

# **Rural livelihoods and climate change adaptation in laggard transitional economies - A case from Bosnia and Herzegovina**

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## **SUPPLEMENTARY INFORMATION**

1. Supplementary note: Study area
2. Supplementary figures
3. Supplementary tables
4. Appendix – Household questionnaire

### **1. Study area (Appendix to section 2 in the paper)**

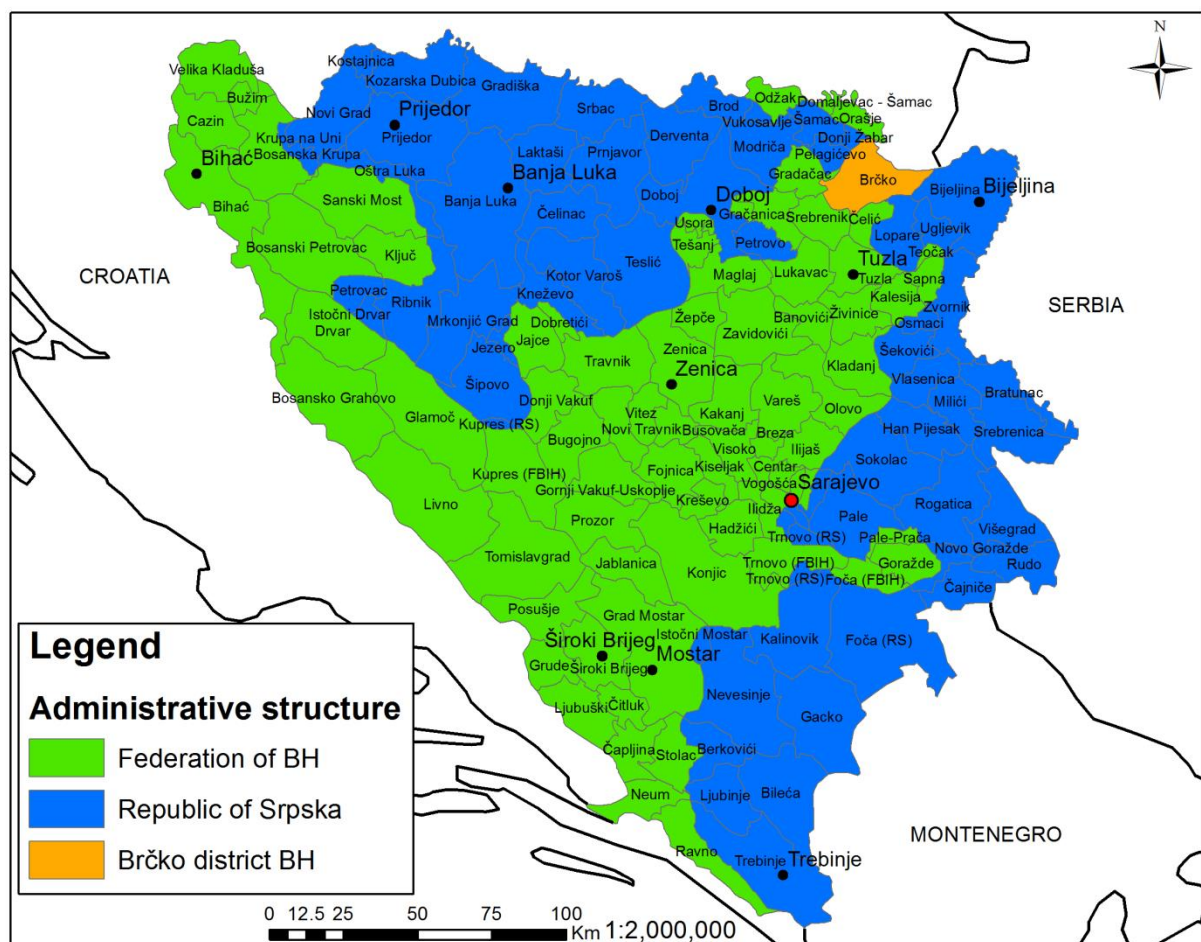
The **lowland region (north)** encompasses the area of so-called Peripannonian Bosnia in the northern part of the country. This area, located in humid continental climate, is dominated by plains, with the appearance of hilly terrains towards the south, where the altitude gradually increases in transition to the central, hilly-mountainous region. More than 60% of the total population in BH lives in this region, making it the most populated region in the country. Agriculture is a significant part of livelihoods for many households, except for a few larger cities and business centers. Geographical and climatic conditions in this area are suitable for various types of agricultural production. The bulk of the country's crop production is located in the fertile plains along the dense network of rivers, most of which is maize, other cereals and legumes (soybean), while the significant part of dairy and meat production, together with the complementary pastures and fodder production are carried out in the more hilly areas. Heavy soils, which require drainage to be productive, the increasing frequency of floods, droughts and other extreme weather events are main physically limiting factors of agricultural production in this region.

The **hilly-mountainous region (central)** covers two thirds of the total territory of BH. It is composed of a mountain chain of the Dinaric Alps, which stretches from the north-west to the east and the southeast of BH. It is geographically made up of the region of central Bosnia, together with the so-called high (tall) karst areas in the northwest and south-east. This region is rich in natural resources, especially water, coal and ores. The high mountain areas are mostly covered by forests or barren and sparsely populated. The terrain is mostly rugged, most of the land is on smaller or higher slopes, and the land is predominantly eroded, shallow and less fertile. This significantly limits agricultural production, the use of mechanization and the choice of crops. Areas above 800 m asl are mostly unsuitable for crop production due to harsh climatic conditions. In this part of BH, larger rivers have formed valleys inhabited by the largest part of the population of this area. In these valleys, the climate conditions are similar to the continental climate of the northern BH. Some of these areas are also the largest economic and industrial centers in BH, including the capital, Sarajevo. Livestock production (dairy and beef, sheep) is dominant in this area, while fruit (apple, pear, raspberry) and vegetable (potato) production are also traditionally represented.

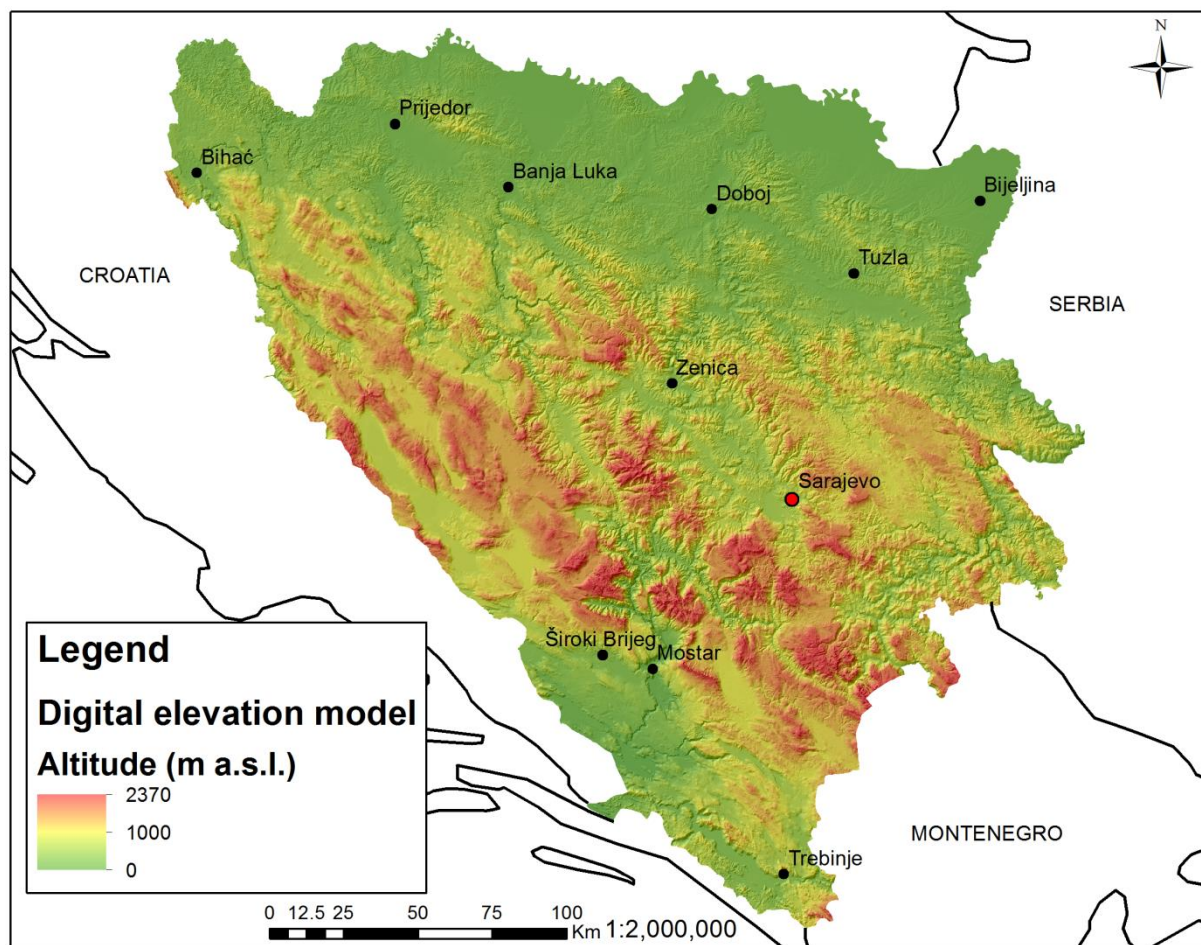
The **Mediterranean region (south)** is located at the southern part of BH and covers most of the geographical area of Herzegovina. This is the smallest of researched regions, but unique in its natural, climatic and geographical characteristics. It is mostly a karst area in the hinterland of the Adriatic Sea,

which gradually increases in altitude towards the Dinaric Alps in the north. By altitude, this region is divided into the area of low Herzegovina (up to 700 m) and high Herzegovina (over 700 m). Long, dry and hot summers, mild autumn and spring with occasional rain and short winters with long rainy periods are the main characteristics of the Mediterranean climate in low Herzegovina. The areas on a higher altitude are more temperate, but still relatively mild compared to the climate in the rest of the country. The most populated and the most fertile areas are found in the south of this region, located in the several fertile karst fields (“polje”). Outside of these areas lies the karst landscape, with its unique surface and subsurface features, like sinkholes, vertical shafts, sinking rivers and streams, complex underground drainage systems and caves. These areas are poorly populated and do not have significant potential for any kind of production, as they are mostly eroded or barren, with sparse vegetation. The natural resources of this region are modest, and the most important is the hydro-energy potential of its rivers and aquifers, on which a significant number of hydroelectric power plants have been built. Traditionally, this is an agricultural region and the climatic conditions are favorable for many different crops, most notably vegetables, such as potato, tomato, pepper and lettuce. Mediterranean fruits, such as citrus, peach, cherry, fig and pomegranate, are also common. The significant areas of the south are under vineyards, while the production of continental fruit (apple, pear, plum) is dominant in the areas with higher altitude and more temperate climate. Livestock production is mainly low-input and in a constant decline. Limited land resources of the karst and access to irrigation water in some areas are the main constraints of agricultural production.

## 2. Supplementary figures



**Figure S1.** Administrative map of Bosnia and Herzegovina



**Figure S2.** Digital elevation model (DEM) of Bosnia and Herzegovina

### 3. Supplementary tables

**Table S1.** Crops and plant-derived products produced on farm, degree of their subsistence and sales via different market outlets (relative, per farm, by location, based on estimations made by survey respondents)

| Crops and plant-derived products | Produced by households within the region (%) | Consumed on farm (%) | Sold on the market (%) | Sold directly (%) |
|----------------------------------|--|----------------------|------------------------|-------------------|
| <b>North</b>                     |  |                      |                        |                   |
| Barley                           | 20.0   | 44.3                 | 55.7                   | 0.0               |
| Maize                            | 77.1   | 29.4                 | 60.6                   | 10.0              |
| Soybean                          | 54.3   | 14.7                 | 80.5                   | 4.7               |
| Tobacco                          | 74.3   | 0.0                  | 100.0                  | 0.0               |
| Watermelon                       | 5.7  | 0.0                  | 100.0                  | 0.0               |
| Wheat                            | 97.1   | 16.2                 | 80.0                   | 3.8               |
| Blackberry                       | 2.9  | 0.0                  | 100.0                  | 0.0               |
| Oat                              | 2.9  | 100.0                | 0.0                    | 0.0               |
| <b>Central</b>                   |  |                      |                        |                   |
| Apple                            | 27.3   | 26.4                 | 10.0                   | 63.6              |
| Barley                           | 6.1  | 100.0                | 0.0                    | 0.0               |
| Beans                            | 9.1  | 3.3                  | 66.7                   | 30.0              |
| Blackberry                       | 3.0  | 5.0                  | 95.0                   | 0.0               |
| Cabbage                          | 6.1  | 1.0                  | 50.0                   | 49.0              |
| Cherry                           | 3.0  | 100.0                | 0.0                    | 0.0               |
| Cucumber                         | 6.1  | 0.0                  | 85.0                   | 15.0              |
| Hazelnut                         | 3.0  | 10.0                 | 0.0                    | 90.0              |
| Maize                            | 21.2   | 78.6                 | 14.3                   | 7.1               |
| Oat                              | 3.0  | 100.0                | 0.0                    | 0.0               |
| Pear                             | 15.2   | 10.0                 | 18.0                   | 72.0              |
| Peppers                          | 6.1  | 12.5                 | 0.0                    | 87.5              |
| Plum                             | 15.2   | 11.4                 | 40.0                   | 48.6              |
| Potato                           | 30.3   | 18.2                 | 10.0                   | 71.8              |
| Raspberry                        | 30.3   | 3.3                  | 95.2                   | 1.5               |
| Rye                              | 3.0  | 100.0                | 0.0                    | 0.0               |
| Lettuce                          | 3.0  | 0.0                  | 100.0                  | 0.0               |
| Seedlings                        | 6.1  | 7.5                  | 45.0                   | 47.5              |
| Sour cherry                      | 3.0  | 30.0                 | 50.0                   | 20.0              |
| Tomato                           | 15.2   | 9.0                  | 32.0                   | 59.0              |
| Walnut                           | 6.1  | 10.0                 | 0.0                    | 90.0              |
| Wheat                            | 18.2   | 68.3                 | 16.7                   | 15.0              |
| Jam                              | 6.1  | 27.5                 | 0.0                    | 72.5              |
| Marigold - dried                 | 3.0  | 0.0                  | 0.0                    | 100.0             |
| Pear juice                       | 3.0  | 15.0                 | 0.0                    | 85.0              |
| Apple juice                      | 6.1  | 12.5                 | 0.0                    | 87.5              |

| South      |      |      |      |      |
|------------|------|------|------|------|
| Apple      | 8.3  | 20.0 | 50.0 | 30.0 |
| Apricot    | 5.6  | 1.0  | 99.0 | 0.0  |
| Beans      | 16.7 | 2.5  | 63.8 | 33.7 |
| Cabbage    | 19.4 | 5.9  | 14.3 | 79.9 |
| Carrot     | 2.8  | 1.0  | 0.0  | 99.0 |
| Cherry     | 11.1 | 8.8  | 47.0 | 44.3 |
| Cucumber   | 2.8  | 2.0  | 0.0  | 98.0 |
| Aubergine  | 2.8  | 1.0  | 99.0 | 0.0  |
| Fig        | 2.8  | 5.0  | 0.0  | 95.0 |
| Grapes     | 13.9 | 1.4  | 49.6 | 49.0 |
| Nectarine  | 5.6  | 1.0  | 99.0 | 0.0  |
| Onion      | 47.2 | 4.9  | 42.1 | 53.1 |
| Peach      | 16.7 | 1.7  | 41.3 | 57.0 |
| Peppers    | 30.6 | 2.6  | 33.4 | 64.0 |
| Plum       | 16.7 | 8.7  | 58.0 | 33.3 |
| Potato     | 44.4 | 7.5  | 46.5 | 46.0 |
| Lettuce    | 5.6  | 1.0  | 0.0  | 99.0 |
| Spinach    | 2.8  | 5.0  | 95.0 | 0.0  |
| Strawberry | 25.0 | 2.3  | 20.8 | 76.9 |
| Tomato     | 38.9 | 1.9  | 58.6 | 39.5 |
| Tomato     | 38.9 | 1.9  | 58.6 | 39.5 |

**Table S2.** Livestock and livestock-derived products produced on farm, degree of their subsistence and sales via different market outlets (relative, per farm, based on estimations made by survey respondents)

| Livestock-derived products | Produced by households within the region (%) | Consumed on farm (%) | Sold on the market (%) | Sold directly (%) |
|----------------------------|--|----------------------|------------------------|-------------------|
| North                      |  |                      |                        |                   |
| Chicken meat               | 5.7  | 0.0                  | 100.0                  | 0.0               |
| Beef                       | 14.3   | 0.0                  | 0.0                    | 100.0             |
| Eggs                       | 68.6   | 40.2                 | 0.0                    | 60.2              |
| Milk                       | 22.9   | 13.8                 | 76.3                   | 10.0              |
| Pork                       | 65.7   | 34.3                 | 2.2                    | 63.5              |
| Lamb                       | 5.7  | 40.0                 | 0.0                    | 60.0              |
| Central                    |  |                      |                        |                   |
| Honey                      | 12.1   | 18.8                 | 0.0                    | 81.3              |
| Eggs                       | 39.4   | 86.2                 | 0.0                    | 13.8              |
| Milk                       | 60.6   | 16.4                 | 47.8                   | 35.9              |
| Cheese                     | 33.3   | 31.8                 | 8.2                    | 60.0              |
| Dairy products             | 6.1  | 2.5                  | 0.0                    | 97.5              |
| Beef                       | 12.1   | 30.0                 | 25.0                   | 45.0              |

|              |      |      |       |       |
|--------------|------|------|-------|-------|
| Calves       | 6.1  | 0.0  | 100.0 | 0.0   |
| Veal         | 3.0  | 5.0  | 0.0   | 95.0  |
| Goat milk    | 3.0  | 0.0  | 0.0   | 100.0 |
| Kids         | 6.1  | 50.0 | 0.0   | 50.0  |
| Pork         | 3.0  | 70.0 | 0.0   | 30.0  |
| Lamb         | 30.3 | 35.5 | 5.0   | 59.5  |
| Mutton       | 6.1  | 10.0 | 20.0  | 70.0  |
| <b>South</b> |      |      |       |       |
| Eggs         | 5.6  | 65.0 | 0.0   | 35.0  |
| Honey        | 13.9 | 5.0  | 21.0  | 74.0  |
| Milk         | 27.8 | 24.0 | 24.0  | 52.0  |
| Quail eggs   | 2.8  | 10.0 | 0.0   | 90.0  |
| Lamb         | 5.6  | 7.5  | 0.0   | 92.5  |
| Kid meat     | 2.8  | 30.0 | 0.0   | 70.0  |

# Appendix S1. Household questionnaire

Interviewer:

Region/Place:

Number:

## VALUES AND NORMS

1. How long do you own this farm? \_\_\_\_\_ years
2. How have you acquired it? Bought Inherited
3. If inherited, how long is the farm owned by your family/kin? \_\_\_\_\_ years
4. Are you happy with the independence and self-reliance which you achieve by working on your farm, or would you rather change it for a stable and equally/better paid work as an employee somewhere else?  
a) Yes, I am happy   b) I would be happier somewhere else   c) Not sure
5. Are you planning one of your children to be the successor of your farm? Would you be happy if one of your children/close relatives continue the farm tradition? Yes No

## ASSETS

### Natural capital

1. Farm size: \_\_\_\_\_, under lease \_\_\_\_\_
2. Area under crops: \_\_\_\_\_
3. Meadows, pastures: \_\_\_\_\_
4. Other (forest, lake, unproductive, etc.): \_\_\_\_\_
5. Is the farm land fragmented a) Yes b) No
6. Soil fertility (in general): a) Low b) Medium c) High
7. Access to irrigation water: a) No b) Yes - River/lake, Well
8. Crop yields (t/ha):

| Crop | This year | Last year | Max yield |
|------|-----------|-----------|-----------|
| 1.   |           |           |           |
| 2.   |           |           |           |
| 3.   |           |           |           |
| 4.   |           |           |           |
| 5.   |           |           |           |

9. Agricultural practice: Monoculture   Crop rotation \_\_\_\_\_
10. Percentage (area) of fallows \_\_\_\_\_
11. How long the fallows haven't been used \_\_\_\_\_ years
12. What is present on fallows \_\_\_\_\_
13. Are they used for grazing? \_\_\_\_\_

14. Reason why under fallow \_\_\_\_\_

### Physical capital

1. Access to drinking water: Yes No
1. Access to electricity: Yes No
2. Road access to other areas: No Yes, road quality (1- lowest – 5 highest) 

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
3. Ownership of the house: Yes No
4. Other available and owned objects (e.g. barn, storage...): \_\_\_\_\_
5. Agricultural \_\_\_\_\_ mechanization \_\_\_\_\_ (and age): \_\_\_\_\_
6. Irrigation \_\_\_\_\_ system: No Yes (which one): \_\_\_\_\_
7. Irrigated area (% of total arable land): \_\_\_\_\_
8. Tools for other on-farm or off-farm activities (if applicable): \_\_\_\_\_

### Human capital

1. Number of household members:
2. Age of the household head:
3. Age (all):
4. Gender (all):
5. Level of education of HH members (0-no education, 8-9-elementary, 11-12-skilled worker, 15-16-university, 16+ higher): 1\_\_\_\_2\_\_\_\_3\_\_\_\_4\_\_\_\_5\_\_\_\_6\_\_\_\_7\_\_\_\_
6. Work capable HH members/incapable (low health, other): \_\_\_\_/\_\_\_\_
7. Where did you/other HH members work before the war?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Financial capital

1. Main source of income: Agriculture Other: \_\_\_\_\_
2. Area utilized for agricultural production (crops, meadows, pastures): \_\_\_\_\_
3. Number of livestock: Cattle \_\_\_\_\_; Sheep \_\_\_\_\_; Pig \_\_\_\_\_; Poultry \_\_\_\_\_; Other \_\_\_\_\_
4. Where does your livestock graze? a) own pastures b) own homestead c) communal pastures d) other: \_\_\_\_\_
5. Do you receive any subsidies for your production? \_\_\_\_\_



- 
6. Does any household member has a job outside agriculture?:  
 If yes, it it:      On farm (and what) \_\_\_\_\_  
                          Off farm \_\_\_\_\_
  7. Any HH member(s) that lives in other area or abroad which contributes to the household?  
 If yes, are they living: a) in other rural area   b) urban area   c) abroad
  8. Average yearly household income (approx.): \_\_\_\_\_
  9. How would you roughly distribute your income per these categories:  
 Agriculture \_\_\_\_\_%  
 Job on farm outside agriculture \_\_\_\_\_%  
 Job outside of farm \_\_\_\_\_%  
 Remittances \_\_\_\_\_%  
 Other (pension, aid, etc.) \_\_\_\_\_%

### **Social capital**

1. Access to information: TV, Internet, Phone, Radio
2. Are you a member of any social organization (political, business, cooperative, trade, religious, cultural):  
 If yes, do you have any benefit from this organization (knowledge, income, friendship, spiritual, other): \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
3. Do you have access to any agricultural extension service (public extension, NGO, cooperative, other)?
4. Are you using agricultural extension services? How often are you using their services?
5. Do you have trust in the national government? (1- lowest – 5 highest)    

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
6. What about the local government? (1- lowest – 5 highest)                    

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
7. How do you get on with your neighbors?    

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
8. If some local problem or issue arises, do you think you and your neighbors would join your forces in order to overcome it?
9. Do you think your community could bring change and improve their lives if they all group together and try to do something?

## CLIMATE CHANGE AND ADAPTATION

1. Do you believe the climate is changing? Yes No
2. Do you think climate change is mainly human induced? Yes No
3. Have you noticed any change in annual air temperatures since you started with agricultural production?  
Yes No  
If yes, is it becoming: Warmer Colder
4. Have you noticed any change in annual precipitation since you started with working in agriculture?  
Yes No  
If yes, is it: Higher Lower
5. Have you noticed the change in the seasonal rainfall patterns (during the vegetation season)  
Yes No  
Describe\_\_\_\_\_
6. Have you experienced a loss of yield, income, or total crop failure caused by any of these events?

| Event              | Very often | often | sometimes | rarely | Never |
|--------------------|------------|-------|-----------|--------|-------|
| Drought            |            |       |           |        |       |
| Waterlogging       |            |       |           |        |       |
| Flood              |            |       |           |        |       |
| Early autumn frost |            |       |           |        |       |
| Late spring frost  |            |       |           |        |       |
| Hail               |            |       |           |        |       |
| Other_____         |            |       |           |        |       |

7. Have you taken any changes on the farm in order to avoid damage caused by these events?  
Yes No (if yes, state them)\_\_\_\_\_

8. Have you considered or implemented any of these measures?

| Measure                                | Have you heard about this measure?<br>1- Yes<br>2- No | Have you implemented this measure?<br>1- Yes<br>2- No | Source of information<br>1- Extension<br>2- Radio/TV<br>3- NGO<br>4- Neighbor<br>5- Relative<br>6- Literature<br>7- other | Has any neighbor or relative invested in this measure?<br>1- Yes<br>2- No | Have you invested in this measure<br>1- Yes<br>2- No | If no, why?<br>1- Lack of knowledge<br>2- Lack of finances<br>3- Lack of labor<br>4- Too risky<br>5- Not convinced<br>6- other | If yes, what are the outcomes?<br>1- Increased income<br>2- No benefit<br>3- Worse than before |
|--|---|---|---|---|--|--|--|
| 1. Change of crop                      |   |   |   |   |  |  |  |
| 2. Change of crop variety              |   |   |   |   |  |  |  |
| 3. Drought resistant crops             |   |   |   |   |  |  |  |
| 4. Reduced tillage                     |   |   |   |   |  |  |  |
| 5. No-till                             |   |   |   |   |  |  |  |
| 6. Change in sowing/planting dates     |   |   |   |   |  |  |  |
| 7. Fertilization (synthetic + manures) |   |   |   |   |  |  |  |
| 8. Incorporation of crop residues      |   |   |   |   |  |  |  |
| 9. Use of cover crops                  |   |   |   |   |  |  |  |
| 10. Irrigation                         |   |   |   |   |  |  |  |
| 11. Drainage                           |   |   |   |   |  |  |  |
| 12. Erosion prevention                 |   |   |   |   |  |  |  |
| 13. Anti-hail nets                     |   |   |   |   |  |  |  |
| 14. Greenhouse                         |   |   |   |   |  |  |  |
| 15. Crop insurance                     |   |   |   |   |  |  |  |

9. Have you considered or implemented any of these measures?

| Measure  | 1- Yes<br>2- No | If no, why<br>1- Lack of knowledge<br>2- Lack of finances<br>3- Lack of labor<br>4- Too risky<br>5- Not convinced in benefits<br>6- other | If yes, what are the outcomes<br>1- Increased income<br>2- No benefit<br>3- Worse than before |
|--|-----------------|---|---|
| 1. Reduce the number of livestock (if engaged in livestock production)               |                 |   |   |
| 2. Change from crop production to livestock (if not engaged in livestock production) |                 |   |   |
| 3. Buy crop insurance  |                 |   |   |
| 4. Rent out your land  |                 |   |   |
| 5. Work on another farm  |                 |   |   |
| 6. Find off-farm job   |                 |   |   |
| 7. Migrate to urban area in search for job   |                 |   |   |
| 8. Migrate to another country  |                 |   |   |
| Others   |                 |   |   |
|  |                 |   |   |
|  |                 |   |   |

## DETERMINANTS OF LIVELIHOOD DIVERSIFICATION AND ADAPTATION

1. Are the household members engaged in their current activities because of:
  - a) the necessity (did not have any other option) or
  - b) by their own choice?
  
2. How many household members are full-time engaged in agricultural production? \_\_\_\_\_
  
3. Are you doing everything by yourself, or sometimes you hire someone for specific activities, like tillage, harvest, mowing, shepherds for livestock, etc.?
 

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4. Are you paying them for their services, or have you established some different way of exchange?
 

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5. Do you have the opportunity/have you considered to work on other farms beside yours?  
Yes No
  
6. Do you have the opportunity/have you considered to find another job somewhere else?  
Yes No
  
7. What factors decide your choice of crops/livestock? (own consumption, market, subsidies, agroecological conditions, other)?

|                           | Very high | High | Medium | Low | Very low |
|---------------------------|-----------|------|--------|-----|----------|
| Own consumption           |           |      |        |     |          |
| Market                    |           |      |        |     |          |
| Subsidies                 |           |      |        |     |          |
| Agroecological conditions |           |      |        |     |          |
| Other_____                |           |      |        |     |          |
|                           |           |      |        |     |          |
|                           |           |      |        |     |          |

8. In the recent time, what did you accomplish with the current choices of your household:
  - a) profit from the current production, increasing your wellbeing
  - b) just covered your expenses
  - c) lost money and become poorer

9. How do you use your eventual incomes? Have you invested in something, like

|   | Significant | Some | None |
|---|-------------|------|------|
| purchasing more land                        |             |      |      |
| investment in the current or new production |             |      |      |
| infrastructure                              |             |      |      |
| education                                   |             |      |      |
| memberships in some organizations           |             |      |      |
| personal comfort                            |             |      |      |
| leisure and hobbies                         |             |      |      |
| other                                       |             |      |      |

10. Have you (considered) to purchase more land to increase your production? Yes No

Explain the reason for

both\_\_\_\_\_

11. In case you would like to purchase more land in your community, do you think it would be easy to find someone to sell it? Yes No, explain why

\_\_\_\_\_

12. If you were faced with some event which lead you to the loss of your capital (drought, flood, loss of job, market failure, etc.), how did you cope with it?

d) Used the savings to recover

e) Sold the assets (land, livestock, house, other material valuables) to recover

f) Received aid from the local/regional government

g) Other\_\_\_\_\_

13. How would you rate the subsidies you are receiving for agricultural production?

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

How would you characterize them in one sentence?

14. Do you have access to loans? Yes No

15. How well informed are you about such possibilities?

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

16. Did you ever take a loan, or have you considered taking a loan in order to invest in your current production or start with the new one? Yes No

In both cases, state

why\_\_\_\_\_

17. Do you have access to local/distant markets? How satisfied are you with them (access and prices)?

Access 

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Prices 

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

18. What are your farm products and how do you use them

| Products | Min price | Avg price | Max price | Consumed on farm (%) | Sold to market (%) | Sold directly(%) |
|----------|-----------|-----------|-----------|----------------------|--------------------|------------------|
|          |           |           |           |                      |                    |                  |
|          |           |           |           |                      |                    |                  |
|          |           |           |           |                      |                    |                  |
|          |           |           |           |                      |                    |                  |
|          |           |           |           |                      |                    |                  |

19. How satisfied are you with the infrastructure in your community

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

20. Where do you buy your seeding materials, fertilizers and pesticides?

|               | In your community | In the nearby town | Not available nearby |
|---------------|-------------------|--------------------|----------------------|
| Seed material |                   |                    |                      |
| Fertilizers   |                   |                    |                      |
| Pesticides    |                   |                    |                      |

21. How satisfied are you with the services provided to you by the state/local government

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

22. What do you think is the biggest obstacle when it comes to your wellbeing and future?

|  | Highest | High | Medium | Low | Lowest |
|--|---------|------|--------|-----|--------|
| 1. Political instability in the country                      |         |      |        |     |        |
| 2. Weak and inadequate agrarian policy                       |         |      |        |     |        |
| 3. Market access and purchase prices                         |         |      |        |     |        |
| 4. Weak infrastructure in your community                     |         |      |        |     |        |
| 5. Climate change and its effect on agriculture              |         |      |        |     |        |
| What is the main challenge (presented 1-5, 6-other, explain) |         |      |        |     |        |

23. What do you think might help you, in addition to what is mentioned here, to achieve your goals and increase your wellbeing?