**Supplementary Material**

**Supp. Mat. 1:** Attendance list for each workshop

**Supp. Mat. 2:** Future agenda

**Supp. Mat. 3:** Structural Analysis conducted in each site

**Supp. Mat. 4 :** Factors of change

**Supp. Mat. 5:** Panorama of the main issues at stake

**Supp. Mat. 6:** Future states of drivers

**Supp. Mat. 1:** Attendance of the futures workshop: this list provides the domain of expertise of participants to the 4 futures workshops (excluding facilitation team). In the 4 sites, experts of the various domains were invited but not always attended.

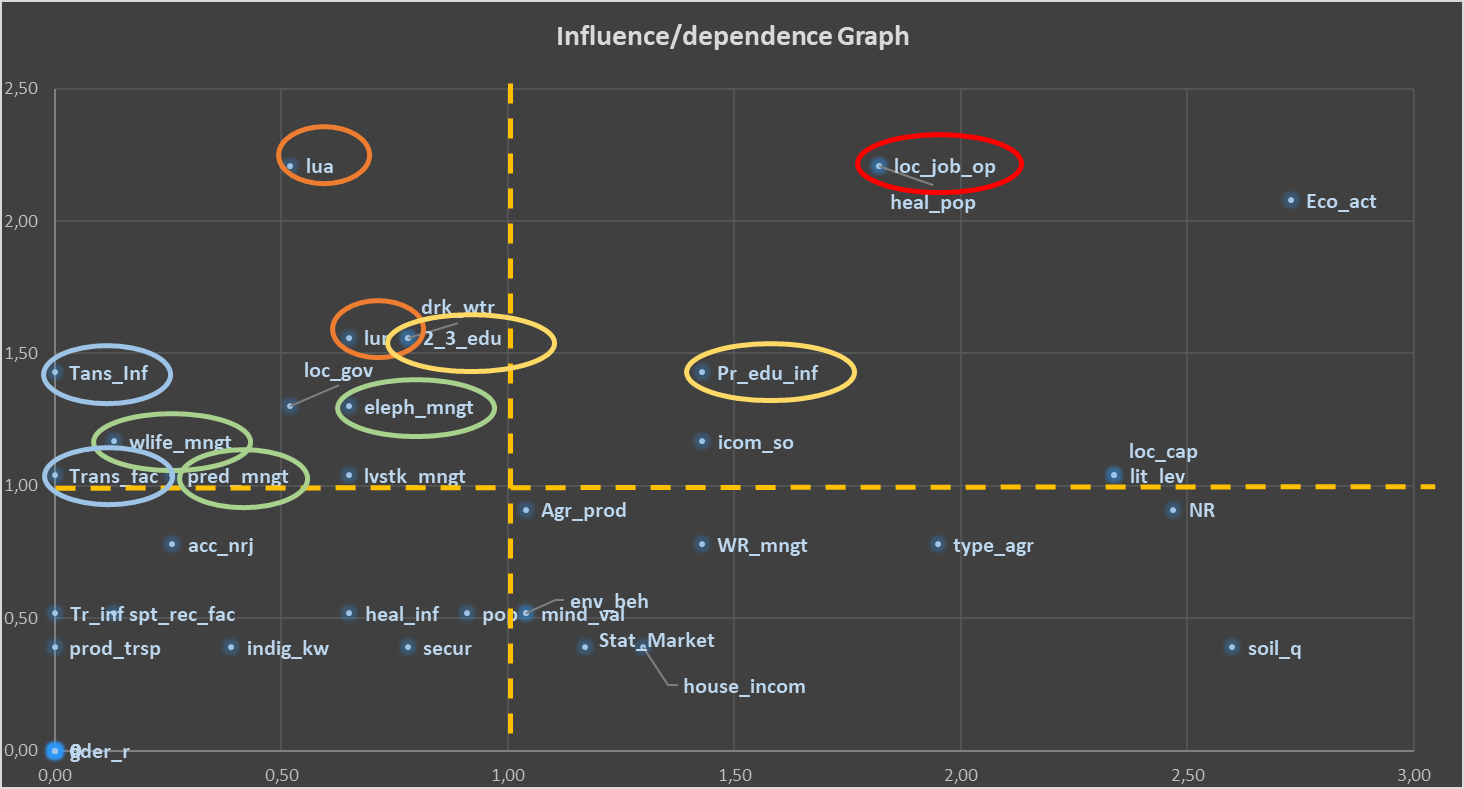
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Expertise** | **Eastern Panhandle** | **Moamba** | **Hwange** | **Chiredzi** |
| Local traditional leadership | 3 | 2 | 3 | 1 |
| Local government | 6 | 1 | 2 | 1 |
| Farmer association | 4 | 4 |  | 3 |
| CBNRM association | 2 |  | 1 | 3 |
| Individual farmer | 6 | 10 | 6 | 3 |
| Local NGO/Trust staff | 5 | 2 | 4 | 3 |
| Governmental technical services | 7 | 3 | 5 | 6 |
| Tourism sector | 9 | 1 |  | 1 |
| District authority |  |  |  | 1 |
| Env. Consultant |  |  | 1 |  |
| Teacher |  |  | 1 |  |
| Protected area staff |  |  | 2 |  |
| **TOTAL** | **39** | **23** | **25** | **22** |

**Supp. Mat. 2**: A Typical 3-day Futures Workshops as conducted in the TFCA sites

|  |
| --- |
| **Day 1**  08:30-09:30 Welcome and introduction  9:30-12:30 Main factors influencing the future of local livelihoods  12:30-13:30 Identification and selection of the drivers  12:30-13:30 Lunch  13:30-17:00 Identifying future states of the drivers  **Day 2**  08:30-12:30 Identifying future states of the drivers  12:30-13:30 Lunch  13:30-17:00 Creating frames and developing synopses  **Day 3**  08:30-10:30 Developing synopses  10:30-12:30 Back to present: tipping points  12:30-13:30 Lunch  13:30-15:30 Back to present: tipping points  15:30-17:00 Linking the present and the future |

**Supp. Mat. 3**: Adjusted structural analyses conducted in each of the four sites in order to explore the relationship between factors of change (influence) and identify the most influential factors of change.

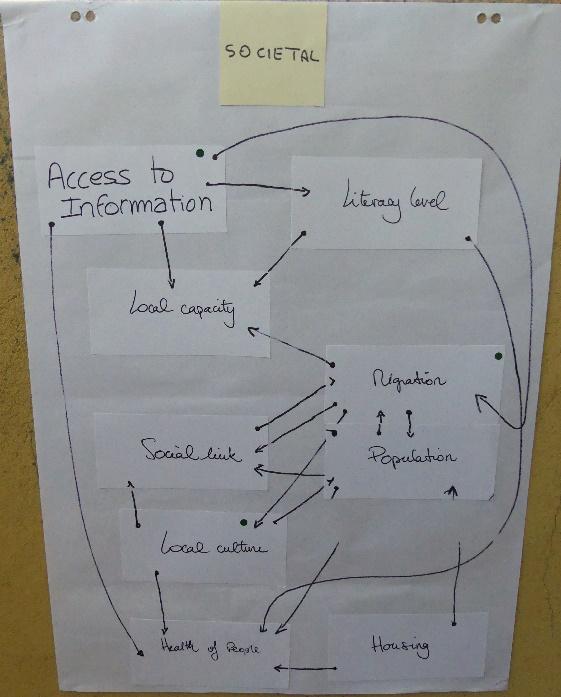
***Eastern Panhandle.*** Participants engaged in an individual voting process, allocating green dots to the factors they considered as the most influential on other factors in this system of 36 factors. Then they allocated red dots to the factors they considered as the most influenced by the other factors. As a result, each factor received two coordinates (Influence + Dependence). The results were recorded in a software and displayed in the form of an influence/dependence graph using these coordinates as shown below. Then, they collectively selected the drivers from the upper part of the graph as it entailed the most influential factors, ensuring that all five dimensions (colored rings) were present. The *state of land use regulation* and the related *land use allocation* were reformulated as one driver by the participants. Similarly, the driver *Human/wildlife interaction management* was defined as the risk management related to the elephant population with regards to human injury and crop damage, combined with the risk management regarding predator/livestock conflicts and other human/wildlife interactions.



**Figure A.1:** Influence/dependence graph for the Greater Seronga site Eastern Panhandle. Acronyms are explained in Supp. Mat. 4.

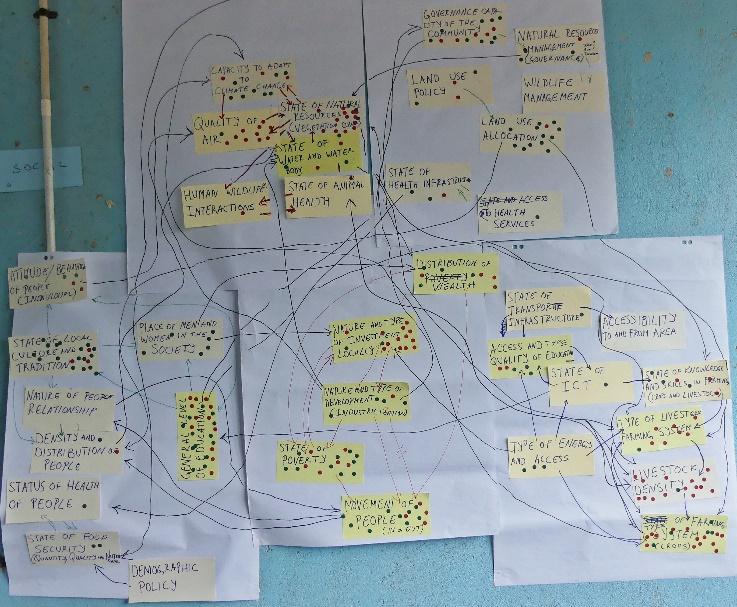
***Hwange.*** Participants engaged first in a brainstorming on the interconnections between the different factors within each of the four dimensions they finally identified. The political dimension was discussed first in a plenary session, and then three groups discussed the interconnections between factors within each dimension. The objective was to identify three factors that participants considered as most influential within each sub-category. This sequence yielded thus 12 factors which were considered as potential drivers. The next sequence was to reflect on the interactions between these 12 factors to select the five main drivers. This took place in four groups each working on the same set of 12 factors. Each group identified five drivers. In a final plenary session, the results of the groups were compared and discussed so as to select the five drivers to use in the next sequences. Participants requested a restructuration of some drivers: *Governance and community* was created by a combination of *Local governance* and *Community organization*; *Land use regulation and allocation* by a combination of *Land use regulation* and *Land use allocation*; and *Farming systems* and *livestock management* as a combination of *Farming systems* and *Livestock management*.

**Figure 4** : *Illustration of the results of the group analysis for the societal dimension in Hwange*



**Figure A.2**: Illustration of the results of the group analysis for the societal dimension in Hwange

***Chiredzi*** Participants first collectively indicated which factors connected with which other factors and displayed the connections with arrows. An individual voting process took place where each participant reflected on the arrows and used eight red dots and eight green dots to identify the factors that were the most influenced by the others (red dots) and the factors that were the most influential (green dots). Finally, they collectively selected one factor per dimension, which they would consider as the entry point for building the frames of the scenarios. *Governance capacity of the local community* was preferred *to land use allocation*, but participants agreed to include a specific land use allocation dimension in the description of the future states of these drivers. For the technical dimension, *types of farming* and *livestock systems* were merged as one driver.

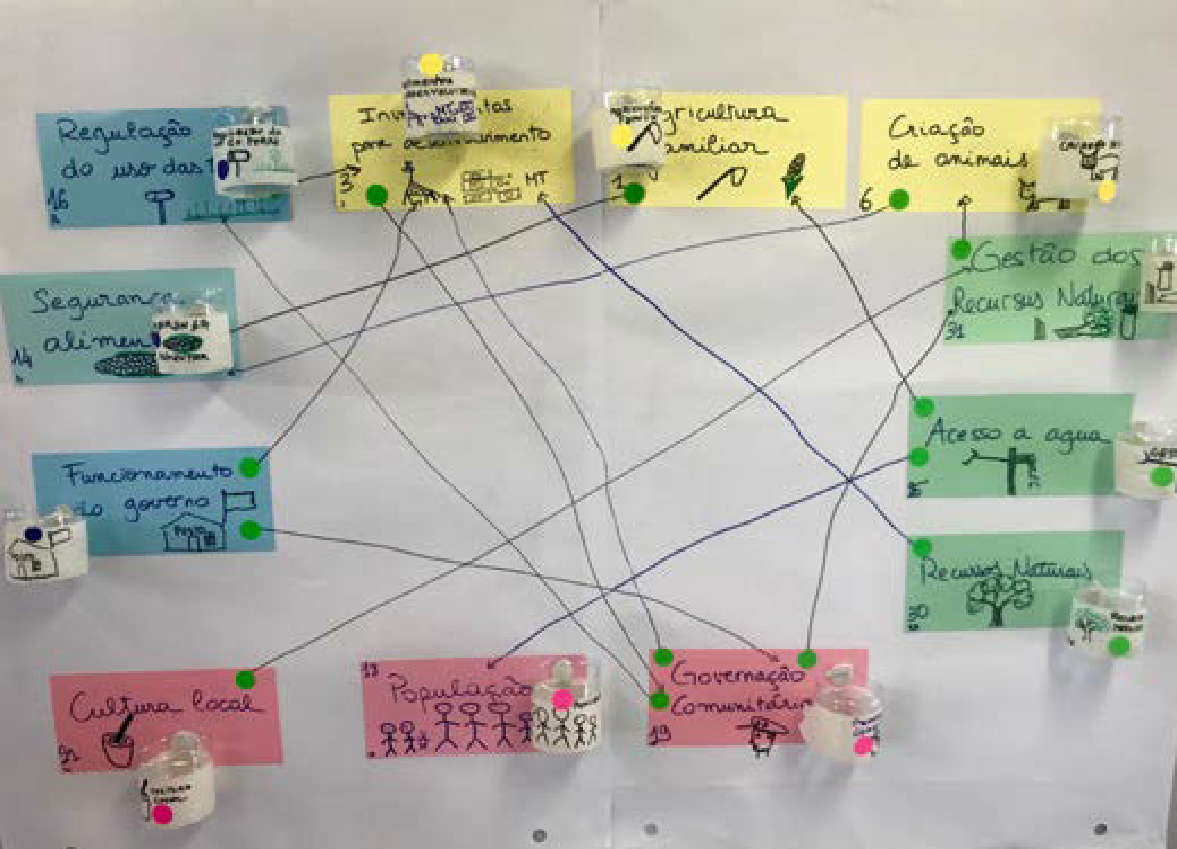


**Figure A3**: Display of all connections and allocation of voting dots in Chiredzi.

***Moamba*** Participants worked first in four groups to identify within each of the four dimensions (the “technical” variables were included in the economic dimension) the three most influential factors. In each group they made suggestions on direct influences and a collective decision was made by sticking a green dot on the influential factors. After three rounds, the three factors with more green dots were designed as the selected most influential factors. The 12 selected factors were displayed on the wall, discussed and a voting process took place with each participant being allocated 5 beans in order to identify the factors that were the most influential on the others. For this step, to help non-literate participants, simple symbolic illustrations (e.g., sketches of people, animal, crops, houses) were drawn on each of the 12 selected factors cardboards. Because votes and opinions pointed to equal strong influence of some factors, participants decided to group *food security* with *family farming* as a single selected driver.



**Figure A4*:***Below, linkages and influences between factors of change and voting system (bottom of plastic bottle with illustration of factors of change);Left display of factors of change with result of the voting as green dots.



**Supp. Mat. 4**: the 136 factors of change classified per cluster and number of times they have been cited across the sites (max 4). For the Eastern Panhandle site, “x” have been replaced by the acronym used in Figure A1.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Dimensions** | **Factor of change** | **Definition** | **Site** | **Hwange** | **Chiredzi** | **Moamba** | **Eastern Panhandle** |
| Economic | Distribution of wealth | Who is wealthy and where are they located | Chiredzi |  | x |  |  |
| Economic | Economic activities | The level of diversification of economic activities in the region | EastPan |  |  |  | Ecoact |
| Economic | Food security | Who and how many are food insecure / secure | Hwange | x |  |  |  |
| Economic | Household income | The level of income of the households (how many households in different income level categories) | EastPan |  |  |  | houseincom |
| Economic | Income sources | The sources of income of the households (where households income come from and seasonality) | EastPan | x |  | x | icomso |
| Economic | Income sources | The sources of income of the households (where households income come from and seasonality) | Moamba | x |  | x | icomso |
| Economic | Income sources | The sources of income of the households (where households income come from and seasonality) | Hwange | x |  | x | icomso |
| Economic | Local job opportunities | The state of job opportunities for local people outside agriculture (type of activities developed in the  area) | EastPan |  |  |  | locjobop |
| Economic | Nature and type of development | Which economic sector is important (is there) how, by whom and for whom | Hwange | x | x |  |  |
| Economic | Nature and type of development | Which economic sector is important (is there) how, by whom and for whom | Chiredzi | x | x |  |  |
| Economic | Nature and type of investment locally | Nature and type of investment locally | Chiredzi |  | x |  |  |
| Economic | Protein consumption | The type and origin of protein local people consume | Hwange | x |  |  |  |
| Economic | State of food security | The local capacity to deal with food insecurity/hunger strategies): type of insecurity, diversity in the way it is affected, who is affected, level of insecurity and type of alternatives / strategies | Chiredzi |  | x |  |  |
| Economic | State of Markets | The state of markets for local products (agriculture, fishin , livestock, handicrafts,…) | EastPan |  |  |  | StatMarket |
| Economic | State of poverty | Who and how many people are considered as poor according to the local definition | Hwange | x | x |  |  |
| Economic | State of poverty | Who and how many people are considered as poor according to the local definition | Chiredzi | x | x |  |  |
| Economic | Investment for development | Type and nature of projects existing in the community: including origin of the project and funds (public, NGOs, private, community-based), size and scale of the projects, level of socio-economic and political integration of local funds (public, NGO, private, community), decision taking | Moamba |  |  | x |  |
| Economic | Economic opportunities | The types of dominant economic sectors in the community and in the district (excluding small agriculture and livestock rearing): including mining, energy, agrobusiness, tourism, services, artcraft; benefits for local people | Moamba |  |  | x |  |
| Economic | Agricultural value chain | How the transformation/processing of trade agricultural products are organized in the community and the district: type of transformation and trading of the products, types of benefits for producers? | Moamba |  |  | x |  |
| Economic | Trade infrastructure | The state of retail and trading infrastructure (quality, localization) | EastPan |  |  |  | Trinf |
| Economic | Role of rural towns | Status and role of rural villages and small towns in the community and the District: size, type of infrastructure and services, type and nature of business opportunities, type of urbanisation, roads etc. | Moamba |  |  | x |  |
| Economic | Product Transformation | The capacity to transform agricultural products locally (the existence and type of transformation units of primary products operating at the local level) | EastPan |  |  |  | prodtrsp |
| Environmental | Energy access | Type and state of energy sources and who has access in the community: its includes energy to cook, domestic and non-domestic uses | Moamba |  |  | x |  |
| Environmental | Domestic water | Access to clean water (quality, distance, type of access/technology, temporal availability/quantity, and who is using it) | Hwange | x |  |  |  |
| Environmental | Drinking water | Access to drinking water (quality and source of drinking water  and who has access to it, meaning who is using it) | EastPan |  |  |  | drkwtr |
| Environmental | Human/Wildlife interactions | The nature of relations and interactions between local people and wildlife | Hwange | x | x |  |  |
| Environmental | Human/Wildlife interactions | The nature of relations and interactions between local people and wildlife | Chiredzi | x | x |  |  |
| Environmental | Natural resources | The state of natural resources as sources of livelihoods excluding soil, drinking water and energy (includes forest, biodiversity, wild life) | Hwange | x |  | x | NR |
| Environmental | Natural resources | The state of natural resources as sources of livelihoods excluding soil, drinking water and energy (includes forest, biodiversity, wild life) | Moamba | x |  | x | NR |
| Environmental | Natural resources | The state of natural resources as sources of livelihoods excluding soil, drinking water and energy (includes forest, biodiversity, wild life) | EastPan | x |  | x | NR |
| Environmental | Non domestic water | The state of water availability, quality, location for non-domestic use | Hwange | x |  |  |  |
| Environmental | Quality of air | The quality of air in the area | Chiredzi |  | x |  |  |
| Environmental | Soil quality | The state of soil fertility (quality and fertility of the soils for agricultural activities and wildlife) | Hwange | x |  |  | soilq |
| Environmental | State of natural resources (vegetation cover) | Excluding water and water bodies | Chiredzi |  | x |  |  |
| Environmental | State of water and water bodies | The quality and availability of water | Chiredzi |  | x |  |  |
| Environmental | Water access | Type and state of water sources and who has access in the community: water quantity and quality and who has access | Moamba |  |  | x |  |
| Environmental | Elephant management | The state of risk management related to the elephant population with regards to human injury and crop damage (how risk is managed, by whom and with what effect) | EastPan |  |  |  | elephmngt |
| Environmental | Human/Wildlife management | The state of risk management regarding conflicts between wildlife and human activities | Hwange | x |  |  |  |
| Environmental | Natural resources management | By whom and how are natural resources (excluding wildlife) managed | Chiredzi |  | x | x |  |
| Environmental | Natural resources management | By whom and how are natural resources (excluding wildlife) managed | Moamba |  | x | x |  |
| Environmental | Predator/ livestock management | The state of risk management regarding predator/livestock conflicts ( how risk is managed, by whom and with what effect) | EastPan |  |  |  | predmngt |
| Environmental | Water resource management | The state of management of local water resources, excluding drinking water (how is the resource managed, by whom and with what effect) | EastPan |  |  |  | WRmngt |
| Environmental | Wildlife management | The state of management of wild life, excluding elephant and predator risk management (how is it managed, by whom and with what effect) | Hwange | x | x | x | wlifemngt |
| Environmental | Wildlife management | The state of management of wild life, excluding elephant and predator risk management (how is it managed, by whom and with what effect) | Chiredzi | x | x | x | wlifemngt |
| Environmental | Wildlife management | The state of management of wild life, excluding elephant and predator risk management (how is it managed, by whom and with what effect) | EastPan | x | x | x | wlifemngt |
| Environmental | Wildlife management | The state of management of wild life, excluding elephant and predator risk management (how is it managed, by whom and with what effect) | Moamba | x | x | x | wlifemngt |
| Environmental | Human/wildlife conflicts | Mechanisms of decision-making for the management of human/wildlife interactions | Moamba |  |  | x |  |
| Environmental | Energy | Access to energy (type and source of energy, effort/cost to access  and who has access to them, meaning who is using them) | Hwange | x |  |  |  |
| Environmental | Type of energy and access | Who has access to energy and what type of energy | Chiredzi |  | x |  |  |
| Political | Education system | Who can get what type of education, including localization and quality (equipment, competitive, empowerment capacity…) | Hwange | x |  |  |  |
| Political | Community organization | The capacity of the local community to organize and influence decisions | Hwange | x |  |  |  |
| Political | Governance capacity of the local community | The capacity of the local community to organize and influence decisions | Chiredzi |  | x |  |  |
| Political | Land use allocation | The state of land use allocation (share of land allocated to different uses, and type of land use) | Hwange | x | x | x | lua |
| Political | Land use allocation | The state of land use allocation (share of land allocated to different uses, and type of land use) | Chiredzi | x | x | x | lua |
| Political | Land use allocation | The state of land use allocation (share of land allocated to different uses, and type of land use) | Moamba | x | x | x | lua |
| Political | Land use allocation | The state of land use allocation (share of land allocated to different uses, and type of land use) | EastPan | x | x | x | lua |
| Political | Land use policy | Who decides and how about land use at the local level | Chiredzi |  | x |  |  |
| Political | Land use regulation | Land use allocation regulation (how, by whom land is allocated) | Hwange | x |  | x | lur |
| Political | Land use regulation | Land use allocation regulation (how, by whom land is allocated) | Moamba | x |  | x | lur |
| Political | Land use regulation | Land use allocation regulation (how, by whom land is allocated) | EastPan | x |  | x | lur |
| Political | Local governance | The state of the local governance systems (who decides and how regarding general matters of public goods, education, health, security, public investment) | Hwange | x |  |  | locgov |
| Political | Local governance | The state of the local governance systems (who decides and how regarding general matters of public goods, education, health, security, public investment) | EastPan | x |  |  | locgov |
| Political | Community governance | The state of the community governance system: who and how decisions are taken on general community matters (e.g. education, security, public investments), decision-making and control mechanisms between actors | Moamba |  |  | x |  |
| Political | Relationship with neighboring countries | Type of decision-making mechanisms to influence or implement aspects of cooperation and entre-aid with neighbouring countries relevant to the community: includes natural resources, migration, trade, security of people and goods | Moamba |  |  | x |  |
| Political | Governement functioning | Type of government system: role of government and local administration (planning, law enforcement, monitoring and accountability), decision-making process (e.g. centralised, decentralised, level of involvement of local actors) | Moamba |  |  | x |  |
| Political | Water management | How water resources are allocated and decision mechanisms within the Moamba region | Moamba |  |  | x |  |
| Political | Demographic policy | The public means used to regulate the number of people living in the area | Chiredzi |  | x |  |  |
| Social | Climate adaptation | The capacity of local people to adapt to climate change through actions | Hwange | x |  |  |  |
| Social | Access to energy | Access to energy (type and source of energy  and who has access to them, meaning who is using them) | EastPan |  |  |  | accnrj |
| Social | Connectivity | The state of communication infrastructure (nature and development of roads and virtual communication to other areas) | Hwange | x |  | x |  |
| Social | Connectivity | The state of communication infrastructure (nature and development of roads and virtual communication to other areas) | Moamba | x |  | x |  |
| Social | Health infrastructure | The state of health infrastructure (access, quality, localization) | EastPan |  |  |  | healinf |
| Social | Health services | The state of health services in the community: type, quality, location/distance and access (who benefits from the services) | Moamba |  |  | x |  |
| Social | State of health infrastructure | Quality and distribution of hospitals, clinics… | Chiredzi |  | x |  |  |
| Social | State of information and communication technologies | Level of development and accessibility to information and communication technologies | Chiredzi |  | x |  |  |
| Social | State of transport infrastructure | Quality and distribution of transportation networks | Chiredzi |  | x |  |  |
| Social | Transport facilities | The type of transportation facilities (concerns transportation means: public, private, type of vehicles) | EastPan |  |  |  | Transfac |
| Social | Transport infrastructure | The state of transportation infrastructure (nature and development of roads and connectivity to other areas) | EastPan |  |  |  | TansInf |
| Social | Accessibility to and from the area | How easy it is to reach and leave which parts of the area | Chiredzi |  | x |  |  |
| Social | Education services | The state of education service in the community: quality (e.g. access to energy/ portfolios), location/distance, access to education systems (who benefits) | Moamba |  |  | x |  |
| Social | Access and type and quality of education | Who has access to what type of education including the quality of it | Chiredzi |  | x |  |  |
| Social | Access to health services | Who has access to health services quality of the services | Chiredzi |  | x |  |  |
| Social | Access to information | Who and how have people access to what kind of information (origin and quality) | Hwange | x |  |  |  |
| Social | General level of education | The level of literacy of the people I n the area (including who and also distribution) | Chiredzi |  | x |  |  |
| Social | Health of people | Who is healthy / unhealthy, where? | Hwange | x |  |  | healpop |
| Social | Health of people | Who is healthy / unhealthy, where? | EastPan | x |  |  | healpop |
| Social | Housing | The type and state of human habitation (who live in what kind of housing conditions) | Hwange | x |  |  |  |
| Social | Primary education infrastructure | The state of primary education infrastructure (access, quality, localization) | EastPan |  |  |  | Preduinf |
| Social | Sports and recreation facilities | The state of sports and recreation facilities (access, quality, localization) | EastPan |  |  |  | sptrecfac |
| Social | State of health of people | Who is healthy, where, who is not healthy, why | Chiredzi |  | x |  |  |
| Social | Secondary and tertiary Education | The state of access to secondary and tertiary education (who has access to it) | EastPan |  |  |  | 23edu |
| Social | Gender role | The role and place of women and men in the society | EastPan |  |  |  | gderr |
| Social | Literacy level | The level of literacy of the local population (the share of population being literate, and which category of the population) | Hwange | x |  |  | litlev |
| Social | Literacy level | The level of literacy of the local population (the share of population being literate, and which category of the population) | EastPan | x |  |  | litlev |
| Social | Local capacity | The capacity of local people to engage in new/alternative activities (individual capacity related to knowledge and know how) | Hwange | x |  |  | loccap |
| Social | Local capacity | The capacity of local people to engage in new/alternative activities (individual capacity related to knowledge and know how) | EastPan | x |  |  | loccap |
| Social | Nature of people relationship | The nature of the local social links between people | Chiredzi |  | x |  |  |
| Social | Place of men and women in the society | Place of men and women in the society | Chiredzi |  | x |  |  |
| Social | Security | The state of security of people in the area (human/human interaction) | Hwange | x |  | x | secur |
| Social | Security | The state of security of people in the area (human/human interaction) | Moamba | x |  | x | secur |
| Social | Security | The state of security of people in the area (human/human interaction) | EastPan | x |  | x | secur |
| Social | Social link | The nature of the local social links between people (how people behave with regards to each other) | Hwange | x |  |  |  |
| Social | Literacy and knowledge | The type and level of literacy and education (formal, traditional, practical, academic...), who benefits and distribution in the local population | Moamba |  |  | x |  |
| Social | Social regulation | Type of relationships between people in the community and with other actors, includes roles of men and women, old and young in managing livelihoods, includes risk management systems (if any) | Moamba |  |  | x |  |
| Social | Density and distribution of the population | Who and how many live where | Chiredzi |  | x |  |  |
| Social | Migration | The state of migration and impacts on local livelihoods (who migrates, how many and how do households in the community use the resources of migration?) | Hwange | x |  | x |  |
| Social | Migration | The state of migration and impacts on local livelihoods (who migrates, how many and how do households in the community use the resources of migration?) | Moamba | x |  | x |  |
| Social | Movement of people | Migration flows out and into the area (number of people, who…) | Chiredzi |  | x |  |  |
| Social | Population | Evolution of population (density and distribution, including migration) | EastPan |  |  |  | pop |
| Social | Population | Who and how many live where | Hwange | x |  | x |  |
| Social | Population | Who and how many live where | Moamba | x |  | x |  |
| Social | Capacity to adapt to climate change | The capacity of local people to adapt to climate change through actions | Chiredzi |  | x |  |  |
| Social | Adaptation to climate change | Capacity of inhabitants and producers to adapt to climate change | Moamba |  |  | x |  |
| Social | Attitude/behaviour of people | Individual attitude and behaviour of people locally | Chiredzi |  | x |  |  |
| Social | Environmental behavior | How people perceive and behave locally with regard to their environment (human-made and natural resources, waste, wildlife...) | Hwange | x |  |  | envbeh |
| Social | Environmental behavior | How people perceive and behave locally with regard to their environment (human-made and natural resources, waste, wildlife...) | EastPan | x |  |  | envbeh |
| Social | Indigenous knowledge | The place of indigenous knowledge in the development of the area | EastPan |  |  |  | indigkw |
| Social | Local culture | To what extent is the local culture including belief systems and indigenous knowledge is embedded in the local society | Hwange | x |  | x |  |
| Social | Local culture | To what extent is the local culture including belief systems and indigenous knowledge is embedded in the local society | Moamba | x |  | x |  |
| Social | Mindsets and values | The state of mindsets and values (including religious beliefs and culture) among people | EastPan |  |  |  | mindval |
| Social | State of local culture and traditions | The place of the local culture and traditions in the local society | Chiredzi |  | x |  |  |
| Technical | Agricultural products | The type of agricultural products harvested in the area (includes also animal husbandry, fishing and other sources of nutrition or tradable) | EastPan |  |  |  | Agrprod |
| Technical | Farming systems | Who is farming, what, how and for what purpose (subsistence, commercial, export…) | Hwange | x |  |  |  |
| Technical | Livestock density | Number and distribution of livestock in the area, localisation and breeds | Hwange | x | x |  |  |
| Technical | Livestock density | Number and distribution of livestock in the area, localisation and breeds | Chiredzi | x | x |  |  |
| Technical | Livestock management | How and by whom livestock is managed in the area (people, organisations, including diseases) | Hwange | x |  | x | lvstkmngt |
| Technical | Livestock management | How and by whom livestock is managed in the area (people, organisations, including diseases) | Moamba | x |  | x | lvstkmngt |
| Technical | Livestock management | How and by whom livestock is managed in the area (people, organisations, including diseases) | EastPan | x |  | x | lvstkmngt |
| Technical | State of animal health | Including domestic and wildlife | Chiredzi |  | x |  |  |
| Technical | State of farming knowledge and skills | Include crops and livestock | Chiredzi |  | x |  |  |
| Technical | Type of agriculture | The type of agriculture practiced (who is farming, with what kind of production technology and what output) | EastPan |  |  |  | typeagr |
| Technical | Type of farming system | Who is farming and how (crops) | Chiredzi |  | x |  |  |
| Technical | Type of livestock farming system | How livestock is managed and by whom | Chiredzi |  | x |  |  |
| Technical | Family agriculture and food security | State of family farming excluding animal husbandry: profile of producers, types of production (rainfed/market); type of technology, production purposes (subsistence/market) | Moamba |  |  | x |  |
| Technical | Fisheries | State and nature of fisheries: what type of fishing, who, where and for which market | Moamba |  |  | x |  |

**Supp. Mat. 5**: Panorama of the main issues at stake, risks and opportunities explored by the participants with links to related clusters (in italics and brackets) and indication of site of origin (in brackets)

* + 1. Governance

The capacity of the local community to organise and influence decisions could be at risk of elite capture of power and top-down decision making, corruption interfering with the real needs of the population. A state of power abuse by leaders in a male dominated society could pervert land allocation and/or chaotic fight for power. A state also describes a general “laissez-faire” with individualistic behaviour (*socio-cultural*) overtaking any form of community governance (Hwange). The local government is also a driver with potential trust, smooth administrative procedures, and proximity to community’s important issues; in opposition corruption, top-down functioning, and lack of respect of local culture (*socio-cultural*) were considered. A democratic community governance was characterized by decentralized decisions, women in decision position, bottom-up approaches, exemplary leaders, well-run elections, local leadership based on the community culture and youth (including minors) involved in decision making processes.

Land use and allocation could become centralized, non-transparent, benefiting a few and creating conflicts in the community (*socio-cultural;* Hwange, Eastern Panhandle). A lack of planning could lead to a boom in unplanned illegal or unauthorized private business (including mines) buying rural lands and renting it to local communities (Hwange). In other states in Hwange and Eastern Panhandle, a well-planned land allocation (including for agriculture – *farming systems*) by leaders for all citizens, supported by clear rights/title deeds, balancing different livelihood aspects (wealth, social, political...) and through a decentralised process involving communities could lead to shared landscape between grazing, residential, industry and wildlife areas (*economic development*) as well as demarcation of different purposes of land through pre-planning for sustainable land use (*natural resources*).

* + 1. Farming systems

Farming systems included principally rainfed agriculture, livestock rearing and irrigated plots for family or local consumption. The principal risks identified were the lack of availability of *natural resources* (i.e., grazing and water) linked to access to land (access to land titles) (*governance;* Chiredzi, Moamba) and its allocation between crop and livestock systems that could link to conflicts within the community (*socio-cultural*). In several states in different sites, those activities would collapse completely due to the degradation of the ecosystem and the plight of pests, diseases and (livestock) robbery, with strong consequences for local food insecurity (*economic development;* Chiredzi, Moamba, Hwange). Technical and organisational innovations could bring transformation to farming systems: introducing new seeds or breeds for agricultural production; mechanisation that could be brought by commercial companies overseeing local production from the outside and providing local employment (*economic development*), possibly in a complete monoculture system (Hwange). The access to better markets, agricultural and financial products associated with improved infrastructures (e.g., slaughter house, *services*) would enhance local production (Moamba). The better management of the rangeland was also seen as an opportunity, including for a better coexistence with conservation (Hwange). Finally, in a context of grazing collapse, greenhouse/rooftop farming of small stocks (e.g., rabbits, chicken) was identified (Chiredzi).

* + 1. Economic development

The state of poverty drove the concerns with only 30% of the population being poor in the best states, and up to 90% when *farming systems* collapse completely due to lack of *natural resources* (Chiredzi). Children, women and elderly people would always be the bulk of the poor, and in one state were mainly concentrated close to the national park (Chiredzi). The non-poor are represented by civil servants and successful local businessmen. The state of poverty was dependent mainly on job employment through the government, tourism (improved by internet connectivity – *services*). Opportunities would come through mining principally with the discovery of rich resources or a new unknown and rare resource in the area (Eastern Panhandle). These new activities would create jobs for skilled workers only (*services*) including foreign workers fleeing their country. The absence of any opportunities linked to the wildlife-economy was noted.

* + 1. Natural resources

Natural resources were encompassing grazing, water, forest products, soil and wildlife and their state was seen as a whole, evolving together towards abundance or depletion and contributing to the success or failure of livelihoods (*farming systems,* energy and food) in all sites but Chiredzi. In the Moamba site, collective (*governance*) or individual water infrastructures, e.g., water tap in each household, were explored to improve water access and quality otherwise creating conflicts (*social*).

The management of human/wildlife interactions involved the management of land use (*governance*) with open systems where wildlife and farming coexist with sustainable use of natural resources (including trophy hunting); or separated systems with parks and agriculture competing for more land and risking wildlife collapse (Eastern Panhandle). Risks were linked to stakeholders, i.e., local, government and conservation actors, behaving independently or working together for a better management of interactions. Innovation through early-warning systems of wildlife presence using telemetry technology to avoid conflicts or genetically modified wildlife species such as forests and plants were imagined.

* + 1. Services

Services as drivers were only explored in Eastern Panhandle. The state of roads, bridges and airstrips in this area could degrade to a point where there are no more transportation systems to enter/exit the area. Alternatively, a circular tarred road, self-driving cars, a regional airport, a high-speed train or boat system on the Okavango Delta were imagined to improve significantly the connectivity with the region. This would include also a safe and reliable public and private transport network.

Secondary and tertiary education was also seen as a driver with the risk of a disappearance of village-level educational infrastructure or the degrading quality of education and distant access to education. A state where quality education was only available to those who can afford it was also imagined. Finally, some states presented well-developed education system from village to small-town level including professional and distant learning.

* + 1. Socio-cultural dimension

In Chiredzi and Hwange, local culture in which people were unified in diversity was seen as a value system that could be central in local society, taught at school and practiced by everyone on the one hand. Its respect and transmission across generation would ensure its continuity. On the other hand, local culture and traditions were also imagined as disappearing, commodified for tourism, and being substituted by a foreign culture. Another state saw a hybridisation of local culture with other cultures with a loss of original values. Finally, cultural individualism with a loss of cultural bonds was also a state of this driver.

* + 1. Local capacity

People could either resist or be incapable to adapt to climate change in Chiredzi. In a state, this incapacity would result in the disappearance of people from the area due to this failure. By the use of irrigation, diversified sources of energy, reforestation, building of water control infrastructures such as dams (*natural resources*) and adapted *farming systems*, this capacity could be strengthened.

**Supp. Mat. 6:** Morphological tables depicting mutual exclusive future states of each driver in each site.

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| --- | --- | --- | --- | --- | --- | --- |
| **HWANGE**  (KAZA, Zimbabwe) | | 1 | 2 | 3 | 4 | 5 |
| A | Community & Governance | Democratic community governance characterized by decentralized decisions, women in decision position, bottom-up approach, exemplary leaders, well-run elections, minimum qualification of legislative, local leadership based on the community culture, minors involved in decision making processes | Computerized governance characterized by machines enforcing the rule of laws, most things are computerized and deprived people of certain freedoms | Corrupted autocracy with eroded governance of the local community | Laisser-faire. Everyone does what they want; disembodied communities | Local corrupted dictatorship |
| B | Natural resources | Increased grazing land of good quality, forest cover. Increased genetic diversity and animal population. Abundant wildlife in parks and conservancies. | Extinct wildlife, forest, and wetlands | Degraded grazing land, loss of biodiversity and forest areas, domination of invasive species and encroachment, and contaminated natural resources | Genetically modified wildlife species (including forest and plants) |  |
| C | Land use regulation & Allocation | Well planned land allocation by leaders for all, supported by clear rights/title deeds, balancing different livelihood aspects (wealth, social, political...) leading to shared landscape between grazing, residential, industry and wildlife areas). Sound and just decision process for sustainable land use using classification based on uses and values. Land allocated in view of professionalism for efficiency. | Boom in unplanned unauthorized private business (including mines), rural land is bought at very expansive prices or even auctioned. | Centralized land allocation benefitting a a few, community fight over land. |  |  |
| D | Local culture | Unified in diversity. Local cultures and values are respected and utilised and transmitted for the benefit of the community | Local cultures have disappeared and only remains in a commodified form (showcasing) | Hybridization of local cultures and reduced understanding of the meaning of the "original" values | Cultural individualism |  |
| E | Farming systems and livestock management | Improved grazing pasture, holistic grazing plans; good integration with tourism; Livestock breeding commercialization, improved breeding, improved market accessibility; environmentally friendly (agroecological) new farming practices for everyone | Monoculture with intensive farming operated by a large company | Small farmers struggling with productivity, lack of inputs and pest and disease | No more crop, no more livestock |  |

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| --- | --- | --- | --- | --- | --- |
| **CHIREDZI** (GL TFCA, Zimbabwe) | | 1 | 2 | 3 | 4 |
| A | Capacity to adapt to climate changes | Use of irrigation, diversified sources of energy, reforestation, adapted cropping and livestock systems, building of water control infrastructures (dams) | Resistance to adapt as climate change is not affecting livestyles anymore | Failure to adapt to climate change related events | No capacity because of no people |
| B | State of local culture and tradition | Central in the society, taught at school and practiced by everyone | Erased and substituted by a foreign culture | Mixed with other cultures | An "Individual culture prevails |
| C | Capacity of governance of community | Ability to good governance, local leaders empowered with authority and power to land use and gender inclusiveness | Power abuse by leaders, no decision taken, male dominated governance, corruption about land allocation | Chaotic fight for power |  |
| D | Farming and Livestock system | Use of adapted breeds and variety with irrigation | No farming/livestock | no grazing, small livestock (rabbits, chicken), greenhouse/rooftop farming |  |
| E | State of poverty | 30% poor, vulnerable groups (women, orphans, elders), mainly near the park otherwise randomly distributed | 90% of the population, 10% not poor: employed, business owners; poverty randomly distributed | 60% of people, mostly women and children, unemployed and elder men, randomly distributed among villages |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **MAESE** (KAZA TFCA, Botswana) | | 1 | 2 | 3 | 4 | 5 |
| A | Transport connectivity | A well maintained circular tarred road links all villages to the greater region with a safe and reliable public and private transport network controlled by a central mechanism (including the bridge at Mohembo). A regional airport in Seronga is fully functional | Bad, not maintained gravel road with dilapidated signs and fences. No transportation system. Bridge in a poor state. One gravel airstrip in Seronga | High speed aerial free train to Maun. Self-driven cars on toll roads with “spaghetti” connections and parking facilities. Water surface high speed transportation on water channel | Collapse of all transportation infrastructure and facilities |  |
| **MAESE** (cont.) (KAZA, Botswana) | | 1 | 2 | 3 | 4 | 5 |
| B | Land use regulation and allocation | Strict laws implemented to deal with land speculation. Decentralised land use allocation involving communities; decision made by Digkosi, VDCs and advisors (using accurate information). Priority to local people who qualify (no red tape), demarcation of different purpose of land through pre-planning and implemented by an efficient land allocation authority ensuring consistency with the national level | No transparent regulation (corruption, nepotism...), no specific land use policy/planning to stipulate demarcation of land | Heavily centralised and non-democratic land allocation system |  |  |
| C | Human/Wildlife interaction management | Open space management system with government supporting installation of collars on wild animals (predators/elephants). People and herders are thus notified of their presence. Regional corridors implemented to manage risks with elephants | Establishment of well-maintained restricted sustainable areas separating wildlife from humans supported by management plans. Government in concertation with communities manages the amount of wildlife per region introducing hunting for trophy | Very limited interaction due to depletion of wildlife related to the development of human settlements. Wildlife survives in parks and local people need to pay to see them | No efficient management of human/wildlife interactions; everyone decides by themselves |  |
| D | Education | A combined primary to senior secondary school in each village. A training and education campus in Shakawe with a university and vocational training institutes (including tourism, fishing, wildlife management, agriculture, etc). A flying school and sport academy in Seronga. All well-equipped and staffed with well-paid competent and motivated teachers | Poorly maintained schools, no secondary schools in the villages, teachers not caring about pupils’ education. Nearest university in Gaborone. Very low school attendance | A “two-speed” system with costly access to a well-developed private education and a lower cost low performance public system; poorly equipped and staffed |  |  |
| E | Local job opportunities | Different many jobs in tourism, government and homebased due to internet connectivity facilitating community joint venture | Increased unemployment in the tourism and government jobs and one activity has developed ( mining...) providing jobs for some qualified people only | The main source of jobs (social workers, police, security, food supply services) is becoming a host region for refugees fleeing conflicts from other countries | A discovery, makes this area the only sourcing in the world providing a lot of a job | System of water tanks for each 10 houses, supplied by cistern truck |

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| **MOAMBA**  (GLTFCA, Botswana) | | 1 | 2 | 3 | 4 | 5 |
| A | Water Access | Water fountain distributed in small villages, managed by the community, and enforcing local traditions; as well as dams for agriculture and livestock water | Drinkable piped water available in dispersed housing, as well as dams for agriculture and livestock water | Water fountains and dams are not functional due to lack of maintenance. Water is of low quality. There are conflicts about the use of fountains and they are found in inappropriate places | Piped drinkable water distributed among grouped housing | System of water tanks for each 10 houses, supplied by cistern truck |
| B | Community governance | Community leadership based on general consent with participatory, inclusive, well-informed governance focused on the resolution of community issues | Proactive community governance regarding the search of mechanisms of management (including maintenance) of infrastructure and local security. | Community leadership imposing decisions, corrupted and disregarding community issues without respect of resident’s voices. | Local leadership which respect the tradition with strong power to evoke rain |  |
| C | Functioning of local government | Local government is trustable, works in coordination with the community using inclusive planning, and is fast in formalities and the monitoring of issues and information | Local government with administrative services close to the community, facilitating formalities and promoting mechanisms of security and protection. | Local government corrupted, with distant relation of imposition and no engagement in the resolution of claims of the community as well as no respect of local tradition. |  |  |
| D | Family farming and food security | Family farming using both family and wage work, with Improved granary for the preservation of production and with planning of production cycle Food security is ensured in access dimension? | Family farming both oriented to self-consumption and markets with: - DUAT - Irrigated plots with superficial pipes on top of rain fed plots - Mechanised plough and inputs - Enclosures for animals Food security in ensured in all dimension | Family farming based on rain fed production, with low productivity and using manual labour related to: - Disease and pest - Lack of water and inputs - Cattle conflicts As consequence families are food insecure and can’t use mutual help | Family farming supported by a commercial farming company (banana / sugar) operating outside of the community and facilitate machines/ tractor and knowledge. |  |
| E | Livestock production | Diversified animal production Sufficient individual areas of pasture and food for bovine cattle. Access to treatments and veterinary assistance Local market and local community slaughterhouse. Insurance mechanisms for livestock production | Livestock production with high mortality related to - Lack of water and pasture - Contamination through wildlife  - Lack of veterinary assistance - Robbery | Tied livestock production related to lack of pasture areas and grouped population settlement | Milk production for market (local breed) | Individual production of Brahman cattle for market, with to water and green pasture |