



# Strengthening climate-resilient agriculture markets, including value chains of aquaculture and irrigation, in the Western Province of Zambia

## Climate Vulnerability and Needs Assessment

People in Need, December 2020



Alliance 2015

towards the eradication of poverty



## Main recommendations are based on the findings from a rapid climate vulnerability and need assessment carried out in November 2020 in the Western Province.

A wide range of stakeholders were involved:

- Government
- Representatives of traditional leaders
- Community based organizations (CBOs)
- Non-governmental organizations (NGOs)
- Micro, small and medium enterprises (MSMEs)
- Research institutes
- Universities

The data was collected through:

Field visits and direct  
observations

Key Informant  
Interviews

Focus Group  
Discussions

The outcomes have been elaborated and combined with literature review, to provide main recommendations in order to improve climate resilience and beyond.

The document is structured in **pillars, sub-pillars and key issues**, under which the **recommendation** for ad-hoc support are given, as well as key cross-cutting issues. The outline is as follows:

- Key Facts
- Overall considerations in the concerned area of study and recommendations
- Pillar 1: Improve climate resilience and livelihoods of smallholder farmers by i. sustaining food production for self-consumption and ii. enhancing alternative value chains
  - Sub-pillar 1.1: crops, vegetables and fruits
  - Sub-pillar 1.2: Agroforestry
  - Sub-pillar 1.3: Fishery and aquaculture
  - Sub-pillar 1.4: Livestock
- Pillar 2: Boost the markets through a Market System Development (MSD) approach
- Pillar 3: Enhance smallholder farmers and agribusinesses to access more affordable financial services
- Pillar 4: Improve weather and hydrological data for the vulnerable population can decrease their risk to climate-related hazards





## Key Facts

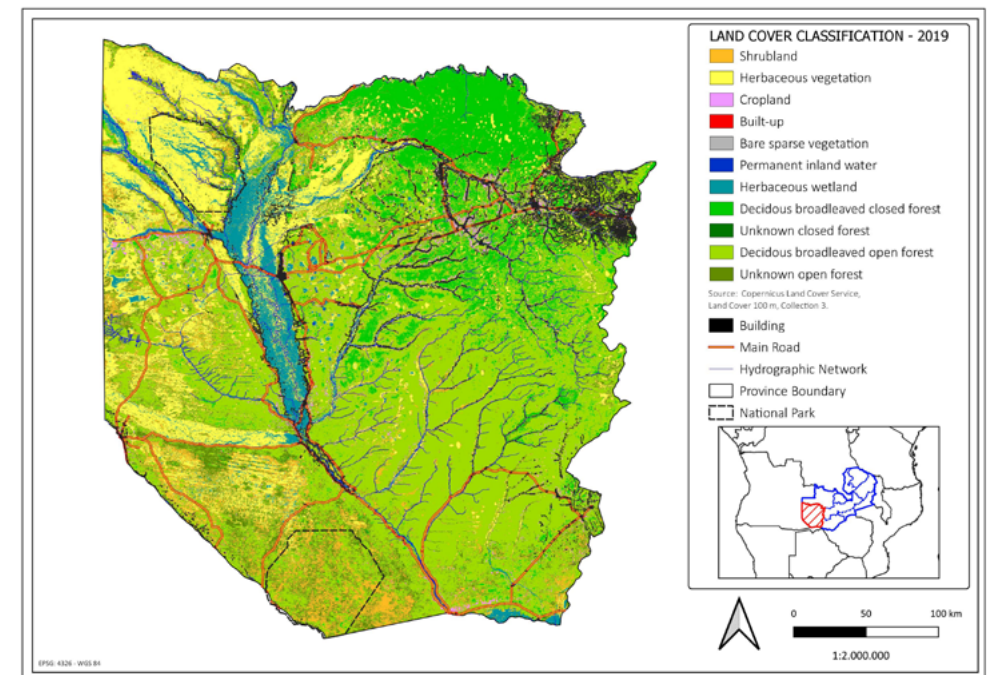
**1** Two main geomorphological areas in the Western province: **floodplains** and **upper land**, with an escarpment separating the two. The cropland represents 2.35% of coverage ([Copernicus, 2019](#)).

**2** Floodplains get flooded after the main rainy season starting around November, with floods peaking in April and receding by July and this has shaped life and livelihoods of Lozi people. Mainly subsistence and rainfed **agriculture is present**, and people live in a combination of agriculture and other **natural resource-based livelihoods** (fishing, forestry and livestock), with transhumant pastoralism in the lowlands ([Biodiversity International, 2014](#)).

**3** **Lack of crop and livelihoods diversification**, with maize (highly supported by governmental policies) dominating as staple crop, can influence the climate resilience. **Climate change effects and impacts** are seen as raising temperatures, more unpredictable rainfalls and changes frequency and intensity of droughts, floods and flash floods, spreading of pests and diseases.

**4** Although **multiple policies and legislative instruments** promoting climate resilience and climate change mitigation exist in the country, actual application is still limited and highly reliant on the Barotse Royal Establishment (BRE).

**5** Local population should **overcome some coping mechanisms** (e.g. quick changes in food consumption, internal movements in search for food and short-term employments, selling livestock even below the market prices, etc.) and can be supported by strategies to **ensure a longer-term resilience**.



**6** **Towns but also more remote communities have been impacted by COVID-19 pandemic**, with an increasing fear and ban to move around to buy and sell, raising prices of the commodities, impeded imports, minor flexibility of credit agencies and reduction of personnel and closure of businesses. As a result, 40% loss on post-harvesting products has happened (Musika).

**7** The Western province has the **lowest figures** or is **one of the least provinces** in Zambia concerning food provision, use of climate smart agriculture and agroforestry practices, use of improved maize seeds, use of fertilisers, value of assets, household commercialisation of commodities, aquaculture development, goats breeding, eggs consumption, farmers receiving advice, retailing/vending actors, farmers' groups and cooperatives, local savings and loans ([IAPRI, 2019](#)).

## OVERALL CONSIDERATIONS IN THE CONCERNED AREA OF STUDY AND RECOMMENDATIONS

### To what extent is climate change to blame in the Western Province?

Some of the conditions can be attributed to non-climate related human activities, wherein climate change acts as an additional stressor that exacerbates the current trends (mismanagement of natural resources, extinction of indigenous species, etc.). Thus, there needs to be a better understanding of **climate vulnerability** at the community level.

- Actions should be taken to **diversify** the sources of food and provide alternative sources of income (e.g. improving value chains), together with actions to improve **Natural Resources Management** and preserve **biodiversity**.
- Climate change **awareness** should be brought into **mainstream** discussions at all levels of society, capitalising already **existing case studies and/or pilots**.

### Does an integrated or sectorial approach work better in the Western Province?

Sectoral-level interventions risk being too narrow in scope, while integrated interventions may become dispersed and diluted.

- In order to figure out which approach to use, there first needs to be a better **understanding of local soil and water characteristics** and flood/ droughts dynamics, in relation to socio-economic behaviours.
- Either way, a long-term strategy of **landscape management** would be adopted, with ad-hoc localised **humanitarian assistance**.
- The idea of **eco-villages**, along with suitable environmentally-friendly activities would be promoted, with compatibility between villages and activities being based on a village meeting predefined criteria and feasibility standards, or vice versa.
- Active participation of the community would be encouraged through a **food-and-cash-for-work** approach.

### Will Lozi society encourage or discourage the development of climate resiliency?

Contemporary Lozi society is affected not only by climate change but also by friction with “modern” society in Zambia.

- Understanding of **key barriers** and **behavioural change** opportunities.
- Promotion of **local varieties and species** and maximisation of **traditional knowledge**.
- **Enhancement of the value chains** wherever food security is not the main concern and cash crops are deemed suitable.
- **Good governance** mechanisms and investment on **local committees, farmers' groups and cooperatives, with involvement of empowered traditional leaders** who can be pivotal to balance in the “traditional way of doing things” and governmental instruments (plans, strategies, legislation, policies).



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## PILLAR 1

**Improve climate resilience and livelihoods of smallholder farmers by 1) Sustaining food production for self-consumption and 2) Enhancing alternative value chains**

In a climate change scenario, crop productivity and fish captures can decrease, while crop and livestock diseases increase and vulnerability of local population grow if food security and nutrition related components are not duly supported, and best practices and diversity promoted. Access to quality inputs and tools/practices and reliance on structured markets frequently limit the potentialities.

### Sub-pillar 1.1 – cereals, vegetables and fruits

#### Key issue 1.1.1

##### Poor and unsustainable soil and water management practices in farms

- There must be an understanding of the key factors in the adoption of conservation and CSA techniques, such as soil types and other environmental characteristics.
- Economic incentives for conservation can come in the form of cash vouchers (short-term) and improved value chains (long-term), both of which are means to support cooperatives and farmers' groups.
- Burning practices should be discouraged through integrated interventions (see 1.2).
- Water and soil conservation techniques should be conducted at the local level.
- Integrated farms on the plateau could utilize solar or hand-dug wells; agriculture plots; and fenced goats for manure. These changes would be implemented under the oversight of local committees.
- Integrated farms in transition areas and floodplains could utilize irrigation channels; and diversification of crop variety (rice, maize, vegetables) for both subsistence and as cash crops. Again these changes would be implemented under the oversight of local committees.

#### Key issue 1.1.2

##### Lack of seed variety and lack of diversified crop production

- Additional seed varieties can be acquired through research and building awareness (the research would be directed towards developing strains that are more deep rooted, mature earlier, more resistant to pests and diseases, more resistant to floods and droughts).



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- Alternative crops to maize that are already available and cultivated should be acquired, such as cassava, sorghum and millet.
- The selection of vegetables and fruits should be done according to the characteristics of the local environmental and nutritional needs of local communities. Possible candidates include mango, cashew-nuts, groundnuts, drought-resistant vegetables like cowpeas, “libowa” (*Amaranthus* spp.) and “sishungwa” (*Cleome*), etc.)
- Kitchen gardens could be included at household level to supplement

#### Key issue 1.1.3

### Underdeveloped irrigation systems

- Site-sensitive environmental and hydro(geo)logical studies should be performed.
- In the floodplains and transition areas between the floodplains and the plateau, the repair/ construction of irrigation systems and large-scale drain-channels for crops that can be commercialised ought to be undertaken. This can be done through the installation of sprinkler irrigation, embankmenting the areas prone to floods, and channelling water flow to dams/pits for irrigation.
- On the plateau, options include groundwater pumping systems and channels to divert the flow of water in the rainy season.
- Localized climate-smart and low-cost solutions at household level include: drip irrigation, micro-jets and bubblers, manual treadle-pumps, shallow wells, furrow irrigation, rainwater harvesting.
- Some irrigation systems could be coupled with fish farming ponds during the dry season.
- Regardless of the method chosen, the management and maintenance requirements must not be too high.

#### Key issue 1.1.4

### Poor agricultural assets and inputs

We suggest adopting the following practices:

- Utilizing organic fertilizers (manure).
- Utilizing organic pesticides (e.g. NEEM and *Euphorbia tirucalli*).
- Training farmers how to effectively use fertilisers and pesticides.
- Helping farmers utilize vouchers for access to materials and MSMEs (kits for groups of farmers containing tools and seeds and support access to fertilisers (FISP), only in food insecure communities).

#### Key issue 1.1.5

### Limited processing and storage facilities and practices

- Vegetable and fruit driers help store products and also help commercialise them. These would be managed by preexisting or newly established farmers' groups and cooperatives.

#### Key issue 1.1.6

### Insufficient commercialisation of the agri-products (see pillar 2)

- There needs to be attentive value chain analysis at the beginning of commercialization.
- Farmers on the irrigated floodplains must be able to produce enough vegetables to sell, not just enough for subsistence.

## Sub-pillar 1.2 – Agroforestry

#### Key issue 1.2.1

### Underutilized agroforestry practices

- Community-based Sustainable Forest Management can help mitigate the effects of climate change, and complements community forests as a local solution.
- Leaving forests to recover can reduce the effects of human activity over time and complement reforestation/afforestation practices.
- There are a variety of options for agroforestry practices:
  - i. crop patches under the tree cover;
  - ii. Home gardens;
  - iii. Silvo-pastoral systems. Seedlings produced in nurseries to facilitate availability (and even commercialisation). These can be combined in various ways.
- Sustainable exploitation of non-timber products (e.g. mushrooms and wild food species, beekeeping--both traditional and apiculture via installation of community/household beehives) should be pursued.
- Phasing out wood-based power (still incredibly widespread) through: Law enforcement (bylaws and patrolling); alternative sources of energy: transitional (improved cooking stoves, eco-briquets) and longer-term (biogas).
- Set-up of committees and organisational bodies.



## Sub-pillar 1.3 – Fishery and aquaculture

### Key issue 1.3.1

#### Unsustainable fishing practices

- The fishing industry needs greater oversight in order for it to become sustainable, starting with stricter surveillance of illegal, unreported and unregulated fisheries and improper catching and managing methods.
- There must be stricter enforcement of conservation laws, as well as training on how to use fishing gear, on how to avoid cutting weeds that can serve as breeding areas, on how to properly manage catches through each season, etc. This can be accomplished with the creation of fishery resource management committees and patrolling units.

### Key issue 1.3.2

#### Aquaculture practices still underdeveloped

The fish farms of the Western province differ according to the socio-economic and ecological characteristics of each area:

- In the floodplains, aquaculture utilizes concrete fish ponds or finger ponds.
- On the plateau, aquaculture utilizes integrated groundwater-fed fish farms (fish feeding with livestock manure as well to stimulate small livestock production). Additionally aquaculture and hydroponics (aquaponics) are both often integrated together, with livestock or a parallel approach with separate fish feeding.
- An alternative to both methods is caged fish farming (the cages are installed and float in water boards).
- Indigenous fish species (e.g. three spotted bream, red breasted bream, barb fish) are under possible candidates, as well as local tilapia species that may be more resistant and have a high potential nutrient content--valuable even in mixed systems with tilapia for sales and income (Worldfish, 2017).

## Sub-pillar 1.4: Livestock

### Key issue 1.4.1

#### Unsustainable rangeland management practices

The overall aim is:

The establishment of Sustainable and integrated Rangeland Management, encompassing livestock, agriculture, fishery, forestry, energy, WASH elements, coupled with climate change mitigation co-benefits.

- The establishment of Rangeland management plans supported by participatory mapping, satellite imagery processing and GIS mapping.
- The establishment of Rangeland committees with traditional leaders, community-based data collectors, monitoring bodies, and patrolling units.
- The adoption of more nutritious and climate-resilient (to drought, heat, flood) fodder species in pastures.
- The establishment of protected areas.

### Key issue 1.4.2

#### Improper management and underexploited potentiality for small livestock

The overall aim is:

Raising enough goats and poultry for both food security/nutrition and alternative income, with the involvement of women and youth. Integrated approaches and pass-on mechanisms would be utilized to stimulate the uptake.

Correct management practices at household level:

- Enclosed production with appropriate technical design.
- Production of crops providing improved fodder/full-grain fodder.
- The establishment of additional veterinary services.
- Easier access to manure for people who do not have access to cattle, for instance through “manure delivery services”.





### Cross-cutting key issues

Generally scarce knowledge and skills as well as inadequate support from officials

- Schools and churches can be utilized as testing centres. Awareness campaigns can be conducted through theatre events, school curricula, and sessions demonstrating practical activities such as tree planting and demo plots).
- Training Provincial and District reformers on sectoral and integrated natural resource management in order for them to qualify as ToTs and spread key messages to community advocates.
- Creating a network of advocates supported by widespread community-based officers at village/ward level (members of the community with the role of being both brokers and leaders) relying on a Main Hub in Mongu that synthesizes university/research, governmental and private sector stakeholders.

### Insufficient WASH facilities and practices

Solutions include:

- Latrine building campaigns supported by local authorities.
- Assessments of water sources to ensure there is a sufficient quantity the year and quality for consumption.
- More integrative solutions to correctly manage water resources at community and household level (e.g. through IWRM or approaches such as “One Health”).

### Insufficient nutritional yields

Solutions include:

- Crop diversification and support to alternative value chains, promotion of legumes, fish farming and agroforestry for positive impacts on nutrition. A quantitative survey (e.g. KAP) may help to create an indicator on diet diversity and nutrition (e.g. FANTA).
- A healthy living awareness program to educate people about nutritional aspects in parallel.

### Key issue 1.1.5: Limited processing and storage facilities and practices

- Vegetable and fruit driers help store products and also help commercialise them. These would be managed by pre-existing or newly established farmers' groups and cooperatives.

## PILLAR 2

### Boost the markets through a Market System Development (MSD) approach

To ensure the sustainability of practices and approaches designed to increase climate resilience in local communities, it is necessary to: 1) stimulate and support the markets; and 2) understand the main social or economic barriers and promote behavioural changes that are socially and economically acceptable. A Market System Development approach can boost the marketability of surplus or cash crop production for smallholder farmers, supporting value chains and increasing access to markets for the poor.

#### Key issue 2.1

#### Value chains for cash crops, fishery and livestock are still underdeveloped

For current cereals, vegetables, and fruits, it will be necessary to:

- Commercialize and assess the value of existing hybrid strains as well as local cereal varieties (maize, sorghum, millet, cassava, sweet potatoes, etc.) known to possess greater tolerance to drought, floods, heat, pests and diseases, as well as possessing co-beneficial nutritional attributes such as richness in pro-vitamin A and zinc.
- Commercialize millet and sorghum in parallel to maize (e.g. for being used in flours but also being used as feed for poultry).
- Promote the following horticultural products in accordance with geography and use: cabbage and tomato (tomato also dried), pumpkin in non-flooded areas, cassava for use in mixed flours with maize/millet/sorghum, hibiscus (dried) as cash crop, and groundnuts, sweet potatoes (also dried and processed).
- For fruits, promote mango (on the West bank of the Zambesi in particular), to be consumed either fresh and dried, and new additions like avocado.
- Promote top-quality value chains for rice, maize and cashew-nuts through specialised agri-businesses, with mechanization of the production process and improved quality control services.
- Facilitate the creation of cooperatives and farmers' groups to aid smallholder farmers in accessing the market.
- For fishery and aquaculture, it will be necessary to:
  - Develop MSMEs for selling aquaculture inputs (e.g. feed, drugs), providing extension services, commercializing fishery resources, and enhancing processing, storage and

transport. This will provide support to emerging middle-scale fish farmers and new farmers (possibly through cooperatives/local organisations).

- Capture fisheries as parallel market, as catch fish coming from the floodplains should be considered an excellence and has an added value.
- Fingering production in Mongu or in the proximity, as fingerings readily available are a limiting factor to the development of business activities.

#### For Livestock:

Develop a more structured market for small livestock that are grown for profit rather than subsistence.

- Promote milk products (including both fresh milk and sour milk), through value chains and commercialization.

#### For agroforestry – non-timber products:

- Promote mushrooms farms (more than a dozen of species are edible and locally marketed).
- Other, more niche natural products should be commercialised in accordance with their unique added value.
- Promote beekeeping in a more structured way as an income-generating activity for the entire population. Aside from honey, wax can also provide additional added value in the market.
- Facilitate the creation of sectorial groups or additional activities of cooperatives/organisations to manage this as additional income source.



## Key issue 2.2

### More innovative value chains are poorly explored

- Mungongo (*Ricinodendron rautanenii*) can be exploited for its good commercial potential (besides being used locally as cooking oil improving nutritional status) in the pharmaceutical industry as a skin/hair care product.
- Moringa could be commercialised informally or more formally and also self-consumed for nutritional properties.
- Other traditional herbs and plants can be explored through a value chain analysis (if already proven to have beneficial properties).
- Promote products made with local plant leaves and reeds (e.g. baskets) that are already present and would benefit from an improvement in quality, variety and marketability.
- Promote natural leather tanning and manufacturing that is already present but would benefit from new product designs, improved production techniques, catalysers, and market development.

## Key issue 2.3

### MSMEs have low capacities to support the development of the value chains

- Encourage further support for local exchanges between buyers and sellers for easier access to the markets of smallholder farmers driven by MSMEs. Agri-digitalisation (as promoted by Lima Links Ltd.) could incentivise the process and be expanded across other industries (e.g. fishery, honey, mushrooms, poultry).
- MSMEs should invest and commercialise alternative crop, vegetables, fruit species and varieties and low-cost and climate-smart agriculture solutions.
- Develop connections to larger companies based in Lusaka (e.g. Agriserve Agro) to improve networking of MSMEs.
- Develop innovative brands for the Western province (e.g. certified as organic and as socio-responsible).

## Key issue 2.4

### Low entrepreneurial literacy and market-related competencies

- Train people in Marketplace and Entrepreneurial Literacy in order to become more attentive customers and build entrepreneurship skills. A gender-based approach is suggested: it will empower customers (1st step), connect people, build the self-confidence and business experience needed for self-entrepreneurship on the market; and improve business development (2nd step), TVET for the concerned commodity (3rd step).





## PILLAR 3

### Enhance smallholder farmers and agribusinesses to access more affordable financial services

#### Key issue 3.1: Difficult access to smallholder farmers and MSMEs to financial services

- Building marketplace and Entrepreneurial Literacy (key issue 2.4) would also stimulate people to open private/company accounts.
- Farm investments by farmers would be encouraged thanks to improving agricultural services (inputs, management and outputs).
- Diversified financial services (Musika):
  - Continuous payments with an up-front payment and then monthly fees(e.g. Vitalite).
  - “Pay as you go” with a down payment that can give more flexibility.
  - “Rent to own” (leasing, AgLeaseCo) that can work for machineries, irrigation equipment and solar kits.
  - Postponed payments where people can pay according to the money liquidity (e.g. during the marketing stage).
  - Governmental/external subventions to reduce the risk of the farmers.
- More formal microcredit and saving groups would limit speculation from money borrowers and facilitate saving.
- Blending climate finance with agriculture finance to attract domestic and international private investors.

#### Cross-cutting Key issue: gender issues are still not sufficiently addressed

- Ensuring a gender analysis and engaging a gender expert along all the project management cycle, with gender-sensitive budget.
- Acquire Gender (and age) disaggregated data with relevant specific indicators.
- There must be a high degree of involvement from traditional leaders in the management of natural resources. They must also stress the positive economic returns that community members will have after overcoming some land tenure issues (the overall ownership lies with the BRE and people are discouraged to invest), besides formalisation of land ownership under the governmental laws.
- Women must be empowered throughout the entire community with specific marketplace and entrepreneurial literacy programmes (key issue 2.4) with more

gender-targeted TVET in sectorial potential businesses (e.g. agro-forestry products such as beekeeping, horticultural products, small livestock, aquaculture commodities, alternative income generating activities such as basket making, leather tanning and manufacturing, etc.).

- Women saving groups and more formal microcredit women-led associations should be formed at community level.



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## PILLAR 4

### Improve weather and hydrological data for the vulnerable population can decrease their risk to climate-related hazards

#### Key Issue 4.1

##### Insufficient number of weather and hydrological stations installed

Possible solutions:

- More weather stations installed for reliable weather forecasts and seasonal predictions.
- Hydrological servers (to measure water levels, velocity, etc.) coupled with EWS to understand the floods and plan water resources.

#### Key issue 4.2

##### Lack of capacities for correct maintenance of the climate/weather tools, data collection and analysis

Possible courses of action:

- Two approaches with ad-hoc training and capacity building:
- Community-based data collection and management as precursor of community-based early warning and disaster risk management systems.
- A more centralised approach can be undertaken to improve sector capacities in data analysis through the use of remote sensing and GIS analysis (e.g. hydrological and agricultural models).
- Improving networking, climate accountability and coordination between the relevant departments (PMMU, ZMD, Ministry of Agriculture) is key.

#### Key issue 4.3

##### Difficulty reaching out to more remote communities

Possible solutions:

- Messages can be spread through the advocates (and community-based actors), radio broadcasts and SMS-based EWS to reach the most remote communities with the available information.
- Digital Agriculture and climate/ weather information tools (e.g. UUSD).
- More reliable hydrological models and FbF systems integrated with EWS protocols.
- Climate risk insurance products insuring the assets. Weather-based or yield-based insurance indexes are a feasible solution in this context.



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agriculture markets, including value  
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Climate vulnerability and needs assessment

Fabrizio Orsini  
Climate Change Advisor

[www.peopleinneed.cz](http://www.peopleinneed.cz)



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