AICCRA leveraging on networks to communicate climate information and climate smart agriculture to smallholder farmers in Zambia

Report

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Accelerating Impacts of CGIAR Climate Research for Africa project (AICCRA)

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AICCRA
Accelerating the Impact of CGIAR
Climate Research for Africa

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1. Background

Agriculture in Zambia is facing a growing number of climate related vulnerabilities, variability effects and extreme events, compounded with other challenges and risks[1]. Poorly functional markets and support services and volatile prices contribute to farmers producing below potential, against an increasing demand for food, feed and energy. Poorly integrated and outstanding policy frameworks pose institutional barriers to investments. Zambia is ranked among the third of countries most vulnerable to the impacts of climate change[2].

The impacts of climate variability and risks in the context of farming systems are not well communicated and that influences farmers choices, decisions and capacities to cope and adapt to climate change and make best use of climate smart agriculture. Translation into information that can inform adaptation decisions and risk management remains a challenge, as information does not necessarily reach smallholder farmers equally across agro-ecological zones and agricultural production calendars[3]. This in turn affects agribusinesses and enterprises improving farmers' access to agricultural markets and availability of inputs, technologies, finances and services.

The Government of Zambia is supporting climate information and climate smart agriculture solutions through investing in an inclusive green and sustainable economy. Efforts toward a more conducive environment for farmers can be enhanced by leveraging on Zambia's digital innovations, further capacitating national agencies in the provision of climate information services and supporting agribusinesses that are gearing up in supplying climate smart inputs, technologies and markets linkages.

There is need to meet the demand for climate information and advisories that aid short-term decisions and long-term planning so farmers can make tactic and strategic decisions to improve their farm profits while reducing climate risk[4]. Scaling and deepening climate management delivery systems that meet the needs of rural communities[5] can be done through co-production of climate knowledge and building on scientific, expert and local/traditional knowledge, and fully utilizing the interplay of different knowledge platforms (mobile phones, internet, radio, TV), to disseminate localized climate services that meet the needs of rural communities[6]. Specific focus on gender equity and social inclusion requires building capacity to use climate information to manage risks, and better integration of technical service providers, private sector farmer field training and enhanced farmer peer-to peer learning, considering groups with lower educational levels and what currently restricts women from making use of climate information[7].

[1] World Bank. 2019. Zambia Climate-Smart Agriculture Investment Plan : Analyses to Support the Climate-Smart Development of Zambia's Agriculture Sector. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/31383 License: CC BY 3.0 IGO.

[2] German Watch (2021) Global climate risk index 2021. https://www.germanwatch.org/en/19777

[3] Singh, C., P. Urquhart and E. Kituyi. 2016. From pilots to systems: barriers and enablers to scaling up the use of climate information services in smallholder farming communities. CARIAA Working Paper No. 3. International Development Research Centre, Ottawa, Canada and UK Aid, London, United Kingdom. https://www.ccardesa.org/knowledge-products/pilots-systems-barriers-and-enablers-scaling-use-climate-information-services

[4] Clarkson G, Dorward P, Poskitt S, Mambwe D, Mtonga R K, Below T. 2021. User Needs Assessment for Climate Services in Zambia. CCAFS Working Paper no. 399. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). https://ccafs.cgiar.org/resources/publications/user-needs-assessment-climate-services-zambia

[5] Perkins K, Huggins-Rao S, Hansen J, van Mossel J, Weighton L, Lynagh S, 2015. Interactive radio's promising role in climate information services: Farm Radio International concept paper. CCAFS Working Paper no. 156. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. https://cgspace.cgiar.org/handle/10568/70260

[6] Gumucio, T., Hansen, J., Huyer, S., van Huysen, T., Schwager, S. (2018) CCAFS Info Note. Identifying Pathways for More Gender-Sensitive Communication Channels in Climate Services WMO: https://www.wmo.int/pages/themes/climate/climate_services.php

AICCRA Zambia

Deepening linkages across the three pillars of agri-business growth, climate information and climate smart agriculture is important for accelerating local climate action.

AICCRA Zambia supports all three pillars through partnerships with government agencies, universities, civil society, farming business communities and media to deliver innovations, technology packages and knowledge that respond effectively to climate challenges.
- Improved access to climate information services for intermediaries and communicators, to provide short-term and context specific climate projections which inform farmer decisions about the appropriate use of technologies.
  - AICCRA in collaboration with Zambia's digital hub, through SMART Zambia, is supporting creation of the Agdata Hub to digitize and integrate data and services to improve agro-advisory services to farmers.
- Improved access to crop, livestock and fishery inputs, technologies and market systems, including finance for farmers to respond to the climate information with the right management strategies, tactics and practices and marketing, enhancing profitability.
  - AICCRA nurtures the agri-business ecosystems and networks for action, targeting high potential value chains and farmers' particular situations.
- Socially inclusive environment for improved uptake of climate information and climate smart agriculture innovations by women and youth.
  - AICCRA engages with agri-business and media partners in social learning about enhanced delivery, knowledge and use of climate innovations.

Boosting networks

AICCRA aims at targeting climate and agribusiness knowledge partnerships, their dynamic connections, and networks to deliver climate smart products and services to smallholder farmers, stimulate their responses, and learn from their journey. This considers the different functions that networks specialize in and operate at, at micro, meso and macro levels and the connectors and joiners between the levels (Figure 1):
- **Micro level**: Communities operate at the micro level where decisions about climate innovations are made. Outreach through radio programs, being the most accessible channel for most farmers, can support extension officers and farmer organizations in their efforts to contextualize climate information for farmers.
- **Meso level**: Businesses and information and technology service providers operate at meso level and for them communities are their most critical clients. For instance, TV and multi-media interventions at meso level that showcase agri-business solutions to early adopters and farmer structures, extension services and development programs, while radio helps to further expand the contents at micro-level.
- **Macro level**: For stakeholders and networks at micro and meso level to interlink and be successful they need enabling well aligned policies, for agribusiness and investment opportunities, capacity development needs, removing business barriers, which are being programmed at macro level. Holding dialogues across these levels and ensuring that macro level decision makers are well informed is equally critical.

Research engaging with and thereby strengthening agribusiness networks supports more effective and sustainable outreach to smallholder communities with climate information, technologies and services.

The power of media

Engagement through existing linkages and networks across the micro, meso and macro levels generates multiplier effects that can be used more strategically to accelerate sustainable outcomes and impacts. Communications and outreach play a critical role to nurture that. Communication and outreach interventions can help to activate and strengthen networks, and thereby mobilize those who hold important information. Providing space for information and knowledge sharing through networks provides opportunities for stakeholders to become more knowledgeable and internalize knowledge, and act more meaningfully together. Such spaces can also promote effective communication and be used to gather feedback as well as provide a platform for new knowledge to emerge. Ultimately, we are using communications and outreach to support better access by farmers to climate relevant information products and services and to ensure farmers are able to understand and maximize use of those product and service innovations.

Rationale of this report

AICCRA Zambia supports networks and community responses through programs on climate innovation and agribusiness, leveraging on media and communication channels. Interventions are designed to stimulate networks of actors at multiple levels (macro, meso, micro) that catalyse dissemination of climate information and climate smart products and services to smallholder farmers.

At project level, communication and outreach strategies that support networks and linkages within and across the networks can also contribute to achieving impact. Network strengthening and media communications can provide an important bridge for research, development, climate and agri-business to achieve their targets of enhancing uptake of climate information and climate smart agriculture.

Assessment tools are being developed to identify what networks, partnerships and strategic stakeholders the media can leverage on and start working with. Assessing value creation stories with key stakeholders will show how communication and outreach activities of the AICCRA project have resulted in stimulating response by intermediaries and end-users and improved program performance and impact on smallholder farmers.

Providing feedback on how good the media interventions were, how they contributed to local impact pathways, and what new opportunities for partnerships were discovered, supports monitoring and evidencing achievements in accordance with the project results framework.

Macro: Nationwide mandate
- Policy makers, government
- Development agencies
- Donors, investors
- Media, education

Meso: Intermediate level
- Farmer unions, federations
- Extension services
- Development programs
- Business growth centers

Micro: Grass root level
- Farmers, communities
- Agri-dealers, off takers
- Traditional authorities

PRODUCTIVITY
ADAPTATION
MITIGATION
RESILIENCE

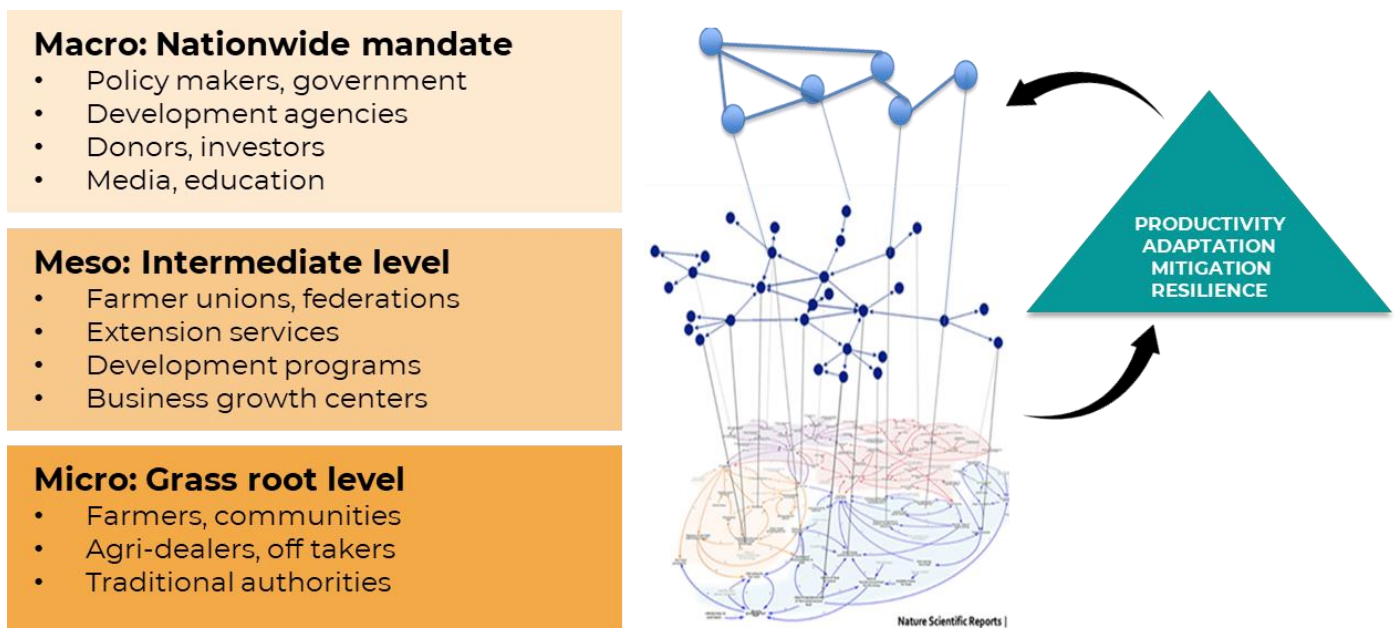Nature Scientific Reports |
(2019) 9:12599 | https://doi.

Figure 1. Concept of strengthening networks to sustainably accelerate impacts of AICCRA research at multiple levels.

2. Approach

AICCRA Zambia engages in four programs that from different angles connect and work towards transforming the agri-business ecosystem in Zambia. They support scaling actionable climate information and climate smart agriculture innovations, each stimulating different and occasionally overlapping networks.

1. **SME accelerator partnerships:** This program supports the private sector to have a more active role and bring specific value chain products closer to farmers. AICCRA Zambia facilitates five accelerator partnerships composed of different SMEs (17 in total), for specific agricultural value chains, in different agroecological zones and provinces (1. Solar irrigation, 2. Aquaculture, 3. Seed systems, 4. Integrated legume livestock, 5. Gender equity and social inclusion). Each accelerator partnership represents a network targeting 75,000 farmers.

2. **Multi-Stakeholder Dialogue (MSD):** Different value chain actors through thematic dialogues have a space to identify common goals, gaps and opportunities in the agri-business ecosystem. It is set up to inform priorities for programming and to advance gender and youth inclusion and empowerment, towards improving the conditions for climate and agribusiness in Zambia.

3. **Internship and Innovation Grant (I2G)**: Opportunities for students, young entrepreneurs at high growth business and start-ups through mentorship programs. This leverages on private sector innovation to build demand driven capacity of future young entrepreneur leadership and competences.

4. **Ag-Data Hub:** Climate information data source that integrates with other meaningful information data sources to provide products and services that can inform climate related decision processes. Capacity development of intermediaries, extension services, businesses and media supports the application of climate information services to help farmer decision-making and enhance uptake of climate smart agriculture.

The **communications and outreach activities** in 2022 employed three communication channels, namely television, radio and multi-media, that provide platforms for the climate and agribusiness networks to engage with rural communities, raise awareness and promote the AICCRA programs. The communication channels were fronted by partners and these include the following

1. **Shamba Shape Up (SSU)**: Munda Makeover (MMO) live TV program, showcasing SME accelerator partners and the products that they offer, broadcasted through Zambia National Broadcasting Corporation (ZNBC), expanding their business outreach, networks and services.
2. **National Agricultural Information Service (NAIS)**: Radio series, translating the MMO contents in vernacular language and expanding the reach to the majority of smallholder farmers.
3. **Agricomm:** Multi-media Company profiling and promoting SME accelerator, MSD, MSD, I2G, Ag-Data hub, targeting macro level stakeholders, experts and decision makers across the agri-business ecosystem and with policy decision processes.

Figure 2 and summarized in Table 1 illustrate AICCRA interventions and communication channels each targeting different entry points through networks at the specific macro, meso and micro levels where they are intended to impact. The networks transfer information and interaction horizontally, amongst partners and influencing others, as well vertically, stimulating information dissemination and feedback across the levels.
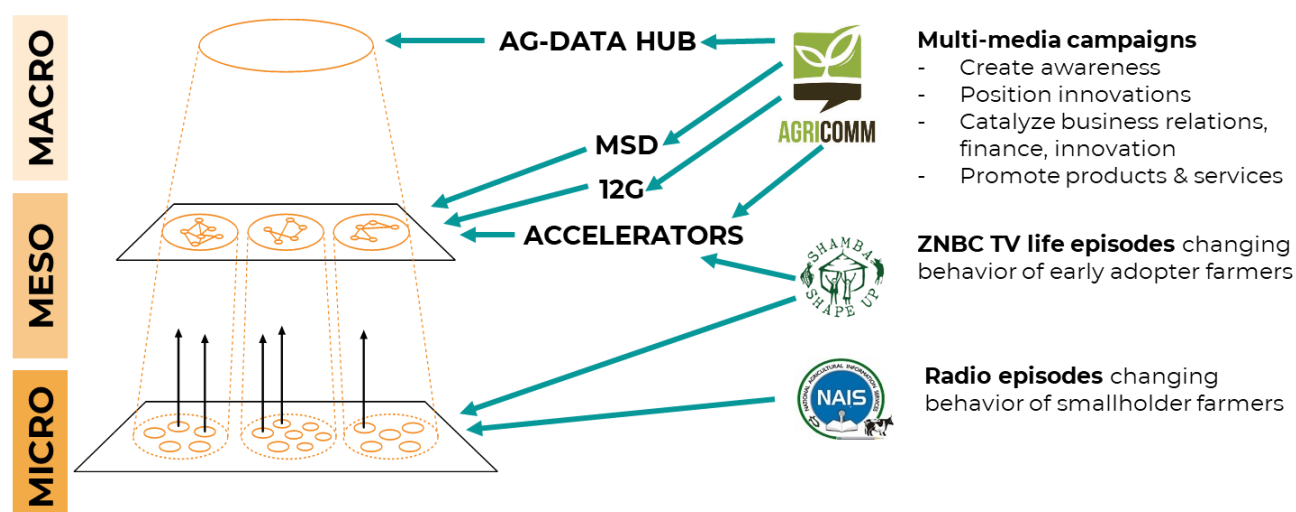
Figure 2. AICCRA expanding outreach, flows of information and interaction through networks across multiple levels and directions.

Table 1. Outreach activities tailored to AICCRA programs

	SME Accelerators	MSD	I2G	Ag-Data Hub
SSU/ Live TV	SSU profile and promote the acceleratory partners, disseminate Life TV stories, ZNBC broadcasted to wide national audience, targeting smallholder farmers			SSU profile and promote the Ag-Data Hub and its products and services, disseminate Life TV stories, ZNBC broadcasted to wide national audience, targeting smallholder farmers
NAIS/ Radio	NAIS convert the Live TV material produced by SSU into radio	NAIS convert the takeaways from MSD meetings into radio		NAIS to broadcast agro advisories following interviews

	series, broadcasted through 7 private radio stations, to extend outreach to smallholder farmers	series, broadcasted through private radio stations, to extend outreach to smallholder farmers		with Principal Agricultural Officers and CIS experts from 4 provinces, through 7 private radio, to extend outreach smallholder farmers
Agricomm/ MMC	Agricomm develop promotional videos to catalyze the partners access to 1. plugging into donor / project / public funding 2. private finance supporting climate smart agribusinesses	Agricomm disseminate takeaways to diverse value chain actors, wide national audience	Agricomm promote awareness amongst students and mentor organizations to onboard internship programs	Agricomm develop educational videos for experts and intermediaries (functions of the hub, using the hub, quality assurance, short-medium, long-term benefits for large-scale applications) to create awareness and promote the Ag-Data hub as source of information and platform for climate information and climate smart agriculture

3. Baseline of partners in the network

3.1 Farm household's use of and demand for climate information

The baseline results inform about farmers' access to and use of climate information, which is important to understand for designing interventions that aim at integrating and strengthening climate information and climate smart agriculture uptake.

The farm household baseline survey was implemented in Central, Southern, Northern and Eastern Provinces in Zambia, in August to September 2022. In total approximately 1500 households were interviewed.

Summary results and implications: Many farm households used climate information and expressed satisfaction with the information received. Access to climate information is mostly around rainfall and to some extend also on early warning and pests, diseases and weeds and temperature. Under rainfed agriculture, season-to-season variability in rainfall and possible changes in rainfall patterns are likely to be of immediate concern to farmers, as crops primarily respond to daily climate patterns. We also acknowledge impacts of increasing temperature[8][9][10]. In comparison, information about market price information, inputs and agro advisories seemed underrepresented. Information delivery in local language

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[8] Stern, R. D., and Cooper, P. J. M. 2011. Assessing climate Risk and Climate Change using Rainfall Data- A case study from Zambia. *Experimental Agriculture, volume 47 (2)*, pp. 241–266. Cambridge University Press.

[9] Stern, R., Dennett, M.D. and Garbutt, D.J. 1981. The start of the rains in West Africa. *Journal of Climatology* 1:59-68.

[10] Cooper, P.J.M., Dimes, J., Rao, K.P.C., Shapiro, B., Shiferaw, B. and Twomlow, S.J. 2006. Coping better with current climatic variability in the rainfed farming systems of sub-Saharan Africa: A dress rehearsal for adapting to future climate change? *Global Theme on Agro-ecosystems Report No. 27*. P.O. Box 29063-00623, Nairobi, Kenya, ICRISAT, 24pp.

was considered utmost important, timely and more frequent delivery as well as accuracy of the information were also rated as critical.

Radio was the most important channel currently in use. As ideal channels to receive climate information farmers rated radio, as well as price information forecasts, SMS and farmer-to farmer knowledge dissemination. Other studies confirm radio as the preferred way of disseminating information to large numbers of farmers in a short space of time. The use of radio in forecast dissemination however limits farmer interaction as farmers are not given the chance to ask questions and provide feedback and this hinders information uptake[11]. Participatory methods of disseminating seasonal climate and price forecast information could help in the dissemination of climate information. According to farmer responses, they received technical advice to support decision-making following receipt of climate information. Furthermore, most farmers stated that they received climate information and advice around crops, and only few farmers received information for livestock. A glaring gap was in the use of traditional knowledge systems in delivery of climate related information.

- ✓ Climate affects farmer decisions through interplay with multiple drivers, including access to adequate information, technologies, markets, yet farmers seem not to access information in a packaged way.
- ✓ There seemed an imbalance whereby climate information focuses on crops. Links to livestock and how climate affects farming systems were underrepresented.
- ✓ Leveraging on radio, SMS and farmer-to-farmer exchange, communication channels that are accessible to and used by smallholder farmers that the project targets, provides opportunities to better integrate climate with other important drivers that affect farmers ability to take up climate smart agriculture.
- ✓ Providing learning opportunities for farmers to interpret and act on climate information disseminated through these channels is important, given that farmer-to farmer exchange and lead farmers ranked high as sources of climate information and most households share information internally.

Results

Access to climate information: Almost all households stated that they had access to climate related forecast information during the 2021/22 season. About 50% of the households accessed forecast information in time, before the last extreme climate event. This was more common in Central province as compared to households in the other provinces. In more than 80% of the cases the information was received short term, about two weeks before climate events, within a season. About two thirds of the households shared the information with others.

Usefulness of current information channels: Almost all households received information on rainfall, a third on early warning and on pests and diseases, and about 20% on temperature. Less than 10% of the households received information on market prices, inputs and advisory services.

By far the most predominant channel whereby farmers accessed climate related information during the 2021/22 season was radio(Figure 3). The second most important source of climate information was

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[11] Ziervogel, G. 2004. Targeting seasonal climate forecasts for integration into household level decisions: the case of small farmers in Lesotho. *Geography Journal 170*:6–21.

through other farmers, and traditional knowledge was also mentioned as source of climate information. Other modern channels such as TV, SMS and market information systems were mentioned less frequently. Most households always used the same source of information (95%).

Respondents rated the information disseminated during the 2021/22 season mostly as good (Figure 4). Best rated were appropriate language and usefulness. Most respondents (>65%) were comfortable with the climate information received, in terms of it being received in local language. Adequacy of contents and timeliness were rated slightly lower. However, many farmers found the frequency and accuracy of seasonal climate forecast information dissemination less adequate, as they only received this information just before the onset of the season and did not receive adequate updates during the season, which restricts agricultural planning and management. The farmers also found the content of the seasonal climate forecasts not adequate as it does not mention when to expect in-season dry spells and end of season, to adjust ex-ante risk management options such as crop variety selection (in terms of either early, medium or late maturing varieties), fertilizer application as well as labour investments.

Farmers were interested in receiving climate information (and other information) that can complement their own knowledge. There is need to disseminate climate information and forecasts in ways that respect and build on farmers' own experiences. As other studies also found, farmers need exposure to climate information more repeatedly and in their own context to increase their interaction with and understanding in the specific context [12].

"Learning is experienced through repeated forecast dissemination, with some feedback mechanisms which integrate the farmers' needs, and there is need to appreciate the role of traditional forecasts that can be used as an analogy to help forecast uptake".
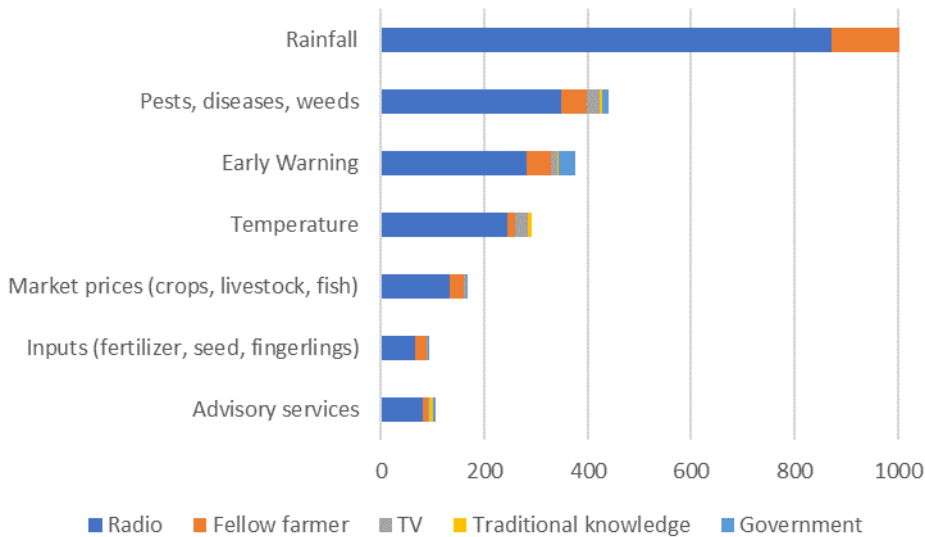
Figure 3. Type of climate information farmers have received 2021/22 by outreach channels.

[12] Patt, A. and Gwata, C. 2002. Effective seasonal climate forecasts applications: examining constraints for subsistence farmers in Zimbabwe. Global Environ. Change12.3: 185-195. https://www.sciencedirect.com/science/article/abs/pii/S0959378002000134
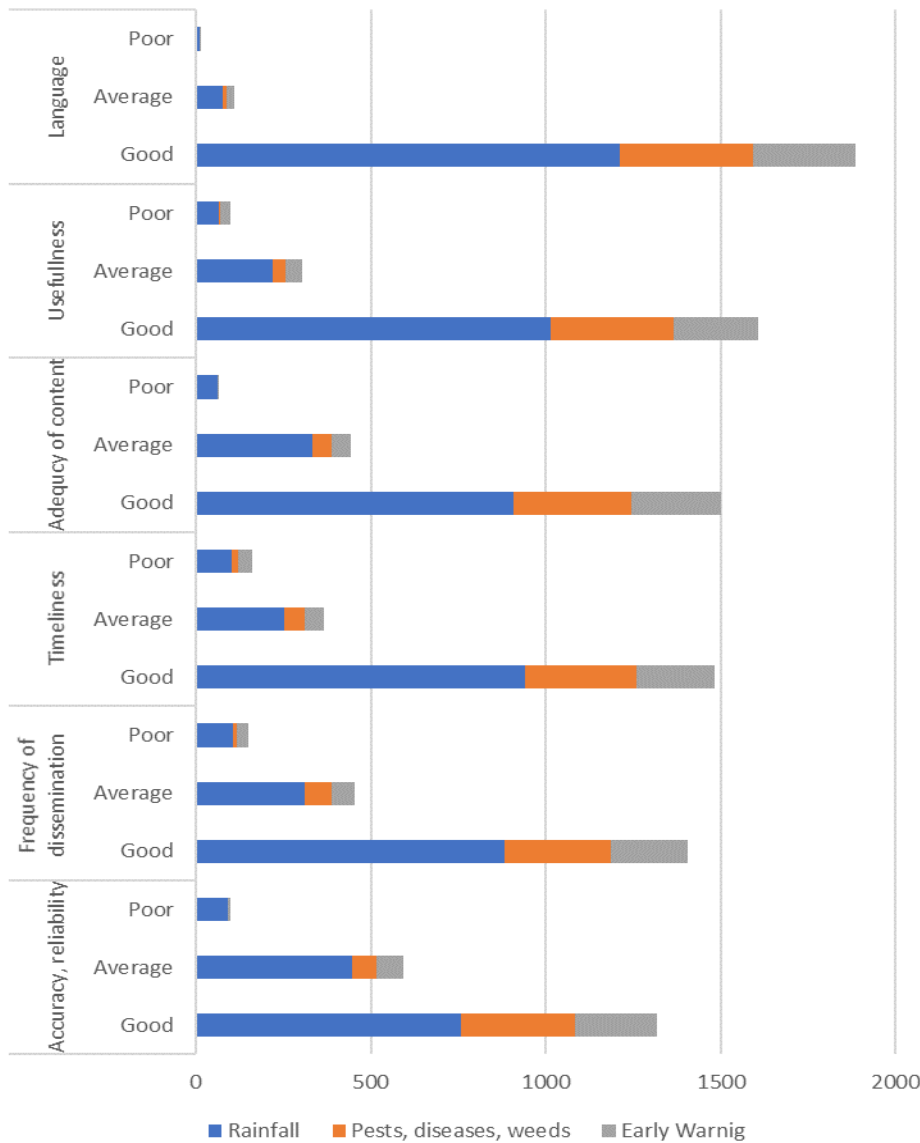
Figure 4. Rating of climate information delivery received during the 2021/22 season for rainfall, pests and diseases and early warning related information.

Preferences for improving climate information channels: Most respondents wanted to see radio as the medium to disseminate weather forecast and early warning information. Price forecasts and SMS were also seen as critical sources of information, highlighting the need to integrate climate with market related information (Figure 5). Farmer cooperatives and fellow farmers also rated high as reliable information sources. Fewer households considered TV as an important channel to use.

Providing the climate information content in the local language rated as the most important attribute for the delivery of climate information (Figure 6). Timeliness was also important, followed by frequency and accuracy.

Impact on decision-making: Access to climate information on extreme weather events influenced decision making for almost all households. Most households (97%) stated that climate information influenced their decisions on crops, few households stated the same in the case of for livestock (8%). Impacts on decisions with regards to fish were not mentioned. Across crops and livestock more than three quarters of households would share the information with their spouses.

Technical advice to support decision-making: About three quarters of households received technical advice along with the climate information to improve decision-making; for 70% of the households the information was related to crops, and for 9% to livestock, no information was provided on fish. Access to this information influenced decisions for 40% of the households for crops and 4% for livestock.

For households who faced weather extremes, 90% received technical advice, 87% for crops and 7% for livestock. Similarly, the most common channels were radio, fellow farmers and price forecasts each used by around 10% of the households.

Although many farmers indicated that they had access to extension services, the interaction around weather related and meteorological information seemed limited and feedback to the meteorological department was not mentioned. The influence of agricultural and metrological extension services seemed thus weak, towards communities' informed decisions on cropping choices and other risk management strategies.

Figure 5. Ranked channels for preferred delivery of climate information.

Figure 6. Importance attributes for climate information delivery.

3.2 Multi-level networks and important stakeholders

Visualizing the networks, stakeholders and connections helps to understand how networks interconnect, and how to prioritize communication and outreach interventions which AICCRA can then employ to deepen and advance climate information and climate smart agriculture 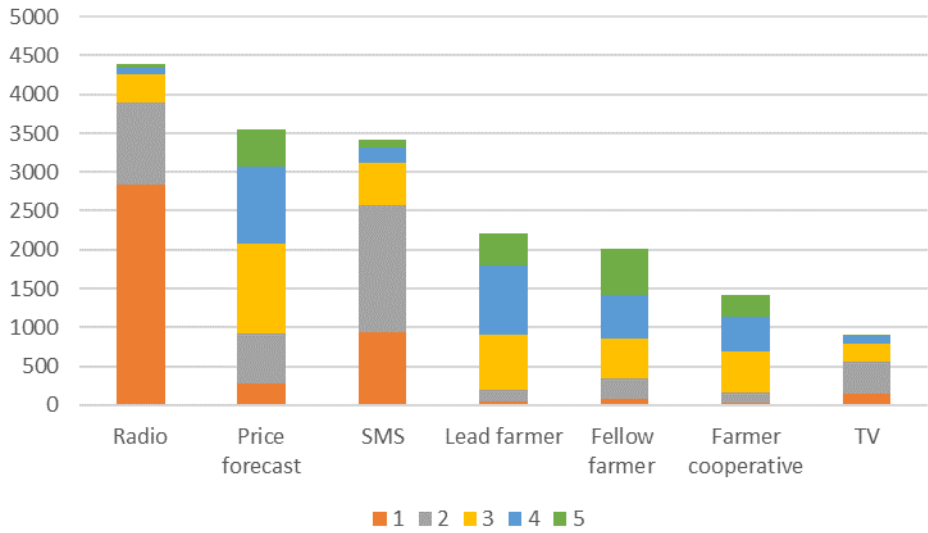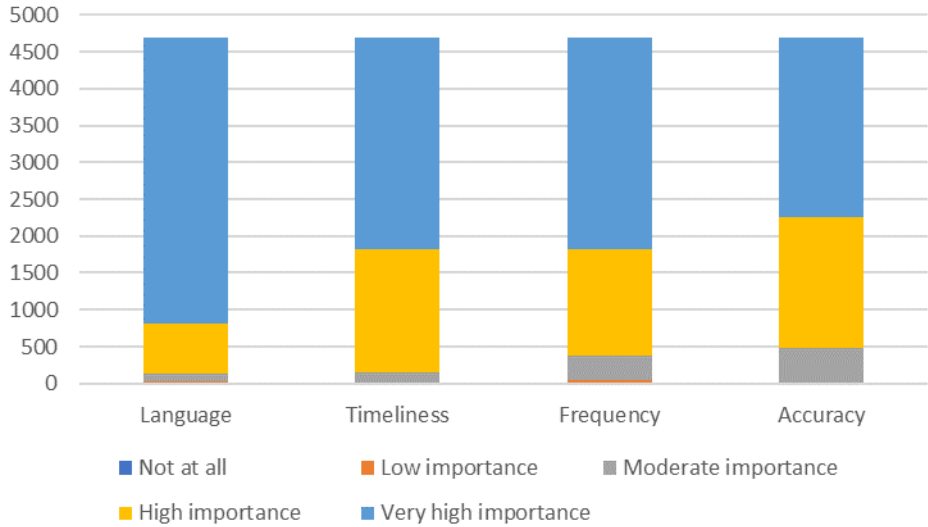innovations. This forms the basis to effectively generate multiplier effects through communication and outreach activities, for partners to promote their products and services, generate feedback and identify new opportunities.

As a first step we map stakeholders focusing on the AICCRA SME accelerator partner program. The stakeholder mapping survey was conducted with 14 SME accelerator partners in July 2022 via an online assessment tool, to identify important stakeholders.

The SME accelerator partners mapped the stakeholders via the short survey:
1. List of important stakeholders that they engage with at macro, meso, and micro levels.
2. Added layer according to how regularly partners work with the stakeholders.
3. Top stakeholder(s) at each level for boosting outreach and communications.

The network results were analyzed and visualized using Polinode[13], a tool that uses a layout algorithm to map partners based on their connections and networks. Centrality is a key concept; i.e. the number of connections a partner has. In this analysis, it indicates how important a given partner is in relation to the SME accelerator partners that nominated it. The more nominations, the larger the partner, or node, appears. The size of the nodes and the closer the nodes appear together, the more connections to the SME accelerator that have nominated it and the other identified stakeholders. An overall network map was produced for all accelerator partners (Figure 7) as well as unique network maps for each accelerator partner (Annex A6 to A10).

Summary results and implications
- ✓ Applying the Polinode network analyses illustrated that each of the SME accelerator partnerships worked through multiple stakeholders and connections at the various levels with overlaps across partnerships and levels.
- ✓ Top stakeholders were identified that the SME accelerators ranked as most important. Monitoring and evaluation targeting these as entry point stakeholders helps us to learn and work with them for boosting outreach and communications.
- ✓ They can be referenced as selected by local stakeholders and presented as protagonists at critical nodes in the SME accelerator partnerships and overall network. Assessing and promoting the value they have added to the network can influence people to pilot or adopt new technologies.
- ✓ A collection of stories of diverse stakeholders at the critical nodes of the network, with numbers to substantiate the individual and overall stories, can show a coherent narrative of how AICCRA has been strengthening the climate action and agribusiness networks, and make this visible through communications.
- ✓ This method can help to enhance visibility and highlight the role of and empower national partners to take ownership and strengthen their interlinkages, ultimately to move desired outcomes further.

Results

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[13] A. Pitts, "Polinode: A web application for the collection and analysis of network data," *2016 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, 2016, pp. 1422-1425, doi: 10.1109/ASONAM.2016.7752435.

Table 2 illustrates the top partners, entry point stakeholders, that the accelerator partners identified for awareness creation, action, promotion, and learning, also reflected as the critical nodes in the network. Interestingly to note that Zambia Meteorological Department (ZMD) was not mentioned amongst the important actors, suggesting that their influence on disseminating climate information is mostly through other organizations like agricultural extension services, and not directly with the private sector.

- **Farmers**, mostly through micro level structures were identified as most central and most important targets for the SME accelerators. It highlights that contextualizing contents, communications and interventions with farmers is important. Accelerators can then more effectively bring information, inputs, technologies, and market access closer to farmers.

- **Ministry of Agriculture and Ministry of Livestock and Fisheries** were just as important at macro level. They provide the institutional context and incentives for agribusiness under which SME accelerators can effectively engage with farmers.

- **International Development Enterprise (IDE)** were rated high at meso and micro level, as interconnecting force for improving access to climate smart technologies, markets and market information. It illustrates other business development actors as critical partners to improve farmers' access to information, technology and service packages.

- **Agricultural extension services** were mostly important at micro-level providing technical advice for farmers to use climate information, make decisions about investments and take up technologies, market participation and services, and thereby reduce climate risk. Outreach can enhance their important functions in delivering technical advice to farmers.

- **National Agricultural Information Services (NAIS)** had strong nodes across and central linkages at all levels, as the most accessible media for broadcasting information for smallholder farmers and as a credible information source for enriching farmer climate smart knowledge and decision-making. It confirms radio as possibly powerful channel to create climate relevant contextualized contents according to their mandate and functions and disseminate those through their country wide networks of radio stations. It can strengthen network linkages among SME accelerators and other businesses with farmers.
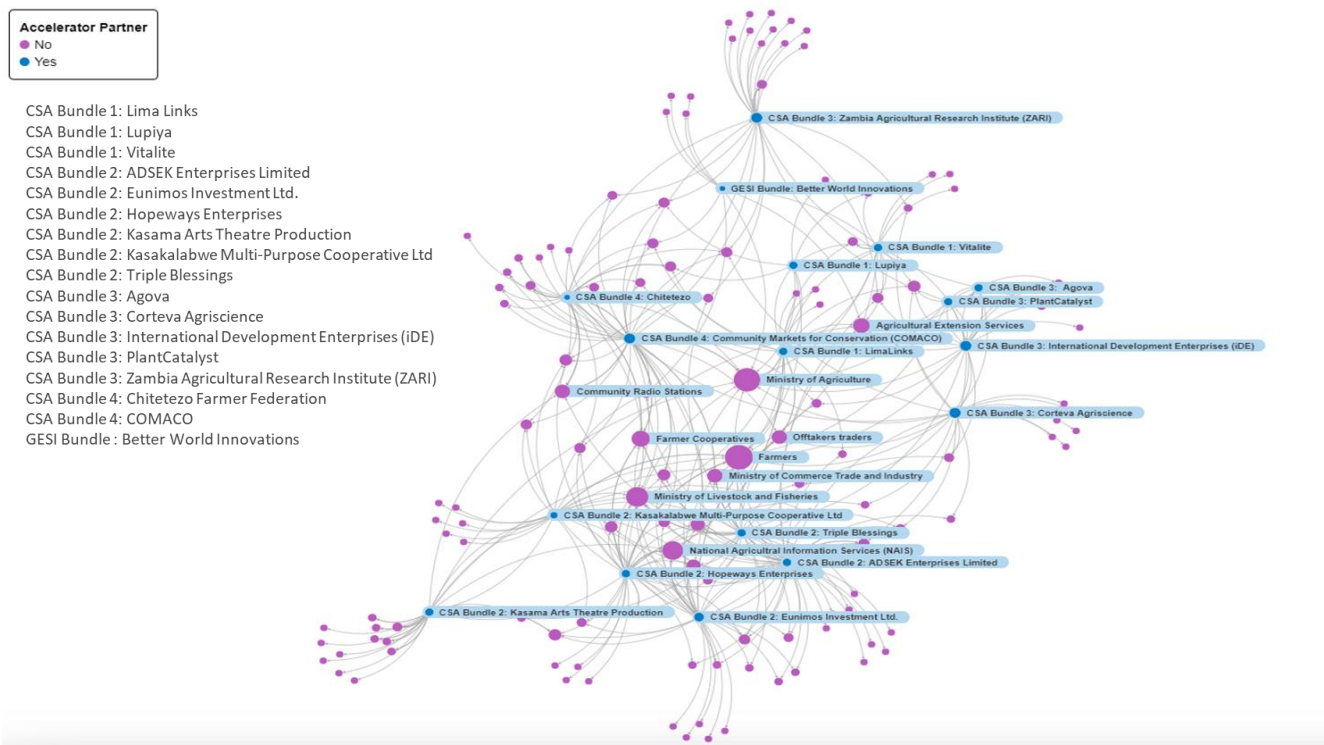
Figure 7. Overall accelerator network map by 14 SME accelerators, illustrated in polinode.
Note: The bundle specific network maps are found at Annex 1.

Table 2. Top actors, entry point stakeholders, rated by accelerator partners, in terms of their importance for catalyzing action, awareness, promotion of products/services and learning.

Partner	Total	Action	Awareness	Promotion	Learning
Farmers	16	2 Meso 6 Micro	2 Micro	4 Micro	2 Micro
Ministry of Agriculture	15	1 Macro	5 Macro	4 Macro 1 Micro	4 Macro
Ministry of Livestock and Fisheries	13	5 Macro	1 Meso	1 Macro 2 Meso	3 Macro 1 Meso 1 Micro
CSA Bundle 3: International Development Enterprises (iDE)	14	2 Meso 1 Micro	2 Meso 1 Micro	3 Meso 1 Micro	3 Meso 1 Micro
Agricultural Extension Services	12	1 Micro	1 Meso 3 Micro	3 Micro	4 Micro
National Agricultural Information Services (NAIS)	10	0	2 Macro 1 Meso	3 Macro 1 Meso 1 Micro	1 Macro 1 Micro

4. SME accelerator impact pathways

An important source of information is feedback on how AICCRA programs helped the partners in Zambia to achieve their goals, contributing to their impact pathways and securing buy-in.

The accelerator partnerships each generated impact pathways for their climate information and outreach strategies, as reference for tracking their progress, identifying new challenges and opportunities (A2– A5).

A virtual feedback workshop was held in May 2022 by AICCRA climate experts together with the SME accelerator partners. The following questions were discussed, to inform the feedback:

What incentive do the bundle partners have to engage in an outreach strategy with AICCRA?
- More robust and multi-dimensional data through targeted communication channels to reach a large number of farmers to make better informed decisions.
- Application of improved decision support tools that integrate climate data to respond to farm decisions for a particular context, creating trust in climate information with farmers.
- Improve farmers access to finance, where they have access to improved decision support tools and ensured markets.

What are the most critical challenges for your outreach strategy?
- Dissemination of crop and area specific short-term seasonal forecast to reach a large number of farmers.
- Information well packaged for farmers to understand. Farmer field groups, cooperatives and other group approaches help farmers to interpret and learn from the information.
- Farmers have limited access to smart phones, use SMS to disseminate phone-based information.
- Reducing the unreliability of rainfall and risks for farmers.

How would you institutionalize climate information for sustainability?
- Work with ZMD and other organizations to develop platforms and tools to disseminate climate, agricultural and market information to farmers, as this will improve the efficiency of using farm inputs that the accelerators sell, beyond the lifetime of AICCRA.
- Collaborate with NAIS on the development and dissemination of radio programs in local language, to amplify the outreach to smallholder farmers.
- Collaborate with all line ministries, including gender and social welfare, to expand the applications and mobilize farmers to access them.
- Work through farmer group approaches, connecting with SME accelerators for the delivery of products and services.

5. Validation of the outreach strategy

The AICCRA outreach strategy was validated at the climate information and climate smart agriculture integration workshop in July 2022. 14 SME accelerator partners interacted with several media companies and AICCRA researchers. The insights would help AICCRA to reach 300,000 farmers by 2023.

The aim of the workshop was to refine outreach strategies with the SME accelerator partners and media for showcasing and promoting the various partners to bring climate, agri-business and climate information and climate smart agriculture knowledge products, services and networks closer to farmers. This would help to expand and deepen outreach, enhancing farmer responses and feedback, whilst ensuring gender equity and social inclusion.

First, the results of the network analyses (Figure 5) were shared with all participants, visualizing the overall network, SME accelerator partners' individual networks and key stakeholders in the networks. Then, SME accelerators, media and researchers, in separate groups for each partnership, worked on stakeholders they wish to work more with, communication channels and products that could help to stimulate their networks, and how that would improve delivery of their products. Implications for AICCRA for designing communications' entry points and interventions were discussed.

5.1 What actors should AICCRA focus on to achieve more?

Action: Engage media and SME accelerators to co-create action for specific target audiences, specifically:
- Farmer-to-farmer engagements, via unions, cooperatives, lead farmers, local authority structures, supporting women and youth empowerment, supported by accessible media, notably radio.
- Input suppliers and agro-dealers to bring adequate crop, livestock and fishery inputs and information closer to farmers, tailored to agro-ecological conditions and market demand.
- Sustainable finance that promotes crop, livestock and fishery production and market opportunities that are not currently available to small-scale farmers.
- Consumers, to stimulate the demand for nutritious and safe food products that farmers can deliver through climate smart crop, livestock and fishery agriculture.
- Vulnerable groups, to mainstream gender and social inclusion in the development of climate information and climate smart crop, livestock and fishery agriculture technologies and services and supportive policies.

Awareness: Combine diverse and engaging media channels with contextualized information, accessible to farmers, specifically
- Understand how farmers experience risk, to then co-create contents with SMEs, media and farmers, packaged to address their multiple and interrelated risks.
- Provide educational contents and training material on the use of climate information to support climate smart crop, livestock and fishery agriculture practices and technologies in vernacular language.
- Disseminate contents in creative ways, integrating technical demonstrations and using drama and road shows, utilizing extension services, cooperatives and other community influencers as communication channels, as well as broadcasting contents that are shareable via local radio, TV and social media.

Promotion and leverage: Blend diverse media channel communications with climate and agribusiness communication networks and deepen collaboration with community-based structures to expand delivery to farmers, specifically:
- Integrate media products with farmer-to-farmer knowledge sharing and local subject matter expertise, to deepen and expand farmer knowledge.
- Deploy multiple channels suited to farmer circumstances to support farmer-to-farmer knowledge sharing and learning (farmer unions, cooperatives, lead farmers).
- Engage existing media product owners and local influencers through common platforms and events (bulk SMEs, agricultural shows, radio programs, community-level and cooperative meetings)
- Engage with macro level policy and decision makers for creating an enabling environment, which is in itself a multiplier for agri-investment, upskilling, and sustained growth.

Feedback and learning: Use diverse media channels to support learning through networks, e.g. how to reach out more effectively, enhance adoption, improve usefulness, inform decision-making, recommend adjustments.
- Provide feedback and learning opportunities through demonstrations and experiments, e.g. through registrars, extension officers, radio and TV call back lines. This helps to grasp changing circumstances, and ensure that women, youth and vulnerable groups can make use of the services.
- Facilitate direct engagement of the meteorological department and extension services with other stakeholders to improve farmer's decision making. Involvement of different experts and stakeholders is required to increase the capacity of communities to respond to climatic pressures.

- Involve media partners and SME accelerators in showing how they each contribute to their own impact pathways as well as achieving their business goals.
- Media partners and SME accelerators to address lessons and shape what they want to communicate and to whom, and they can use the AICCRA platform for extra leverage.

5.2 How should AICCRA design its communication strategy?

What channels and products would stimulate responses at network/ community level?
- Media and SME accelerators together with researchers and experts to be involved in design and roll out of channels to stimulate access to information, products, and services.
- Channels to be community centered, using two-layer off-line and online contents, using local facilities and events to provide SME accelerators a platform to show case products and dialogue with farmers.
- Combination of media channels to be well-integrated with local structures to reach wider audiences, incl radio platforms, community and cooperative meetings, social gatherings, roadshows, field days and agricultural shows, TV, music, social media, apps, print media.
- Feedback platforms to inform impacts, track responses, and capture particular interests.

How will this improve the delivery of SME accelerators' products and/services?
- Media to play a vitally important role in stimulating networks and linkages, across macro, meso and micro levels, through its ability to contextualize messages and tailor content to users and circumstances.
- Strengthening linkages and networks via media makes more knowledge accessible and available on climate information and climate smart agriculture and allows us to check how well interventions are impacting communities, especially women, youth and vulnerable groups.
- This approach is not at the expense of monitoring evaluation and learning tools and frameworks. Its dynamic and complementary in generating the levels of constructive dialogue and feedback needed to stimulate responses and support change. And opens up dialogue for more innovation, more new opportunities.

5.3 Priorities for AICCRA moving forward

Micro level: Deepen outreach to farmers and communities, by co-developing outreach interventions with SME accelerators and media, and leveraging on and strengthening what is already being done.
- Profile farmers for better targeting farmers and local communities, with SME accelerators as critical agents to bring contextualized and time sensitive information, technology and business packages closer to farmers. Quantitative assessments, e.g. farmer registrars, baseline surveys, GIS data, can be used to differentiate farmers with similar needs and requirements and inform about community heterogeneity that planners should take into account for community oriented interventions.
- Enhance awareness creation among farmers through contextualized messages and feedback lines, in vernacular language, presented by farmers in their context and local influencers, as communities identify with their peers.
- Mobilize farmers through existing farmer structures and networks, by engaging with and working through lead farmers, cooperatives, traditional authorities, on how to support advancing their climate resilience agenda.
- Create conditions for learning and feedback, by setting up deliberate demonstrations aimed at influencing farmer decisions and showcasing of what AICCRA can contribute, through the SME

accelerator agents. Integrate key lessons with educational material and trainings to farmers on the use of the products and services.
- Direct the diverse media channels, online and offline, towards widening and deepening outreach, e.g. ISaT, an SMS messaging platform (through data generated from the AgData Hub) and Munda Make Over to leverage on TV programs to stimulate innovation and advertise, inform and motivate extension services and farmer networks, expand messages and feedback with communities through radio and phone platforms, community events and road shows; promote shareable contents via social media.

Meso level: SMEs and media to learn from activities and improve their capacity, and for reaching their impact pathways, which will reflect in AICCRA's impact pathways
- Consolidate feedback from TV and radio call-back lines featuring diverse actors in response to the targets and regional heterogeneity.
- Integrate the multiple functions of diverse media channels, e.g. Munda Makeover through TV shows appetizes and creates interest. That needs to be followed up with ensuring accessibility of the products and technical advice and education for the end user, e.g. through apps and radio, to support behavioral change.
- Widen the audience to include consumers, with media advertising for nutrition and promoting the legacy of SMEs, expanding the demand for locally produced nutrient-dense foods
- Engage in science communication trainings to capacitate local media to become content creators for targeting specific audiences. It involves media companies collaborating and marketing diverse media functions to support the climate/business ecosystem.
- Evaluate and document impact pathways by engaging all partners, to inform most effective ways of disseminating climate information and climate smart agriculture contents to communities, allow adjustments during the process, and ensure that products and service contribute to empowering women and vulnerable groups

Macro level: Institutional mechanisms to strengthen coordination among national partners and channels, to better integrate climate information and climate smart agriculture interventions, and inform longer term footprints
- Leverage on other national and donor funded private sector growth programs to hold high level national dialogues to further strategize the integration of climate information and climate smart agriculture and financing for farmers to access the technologies that they need to tackle climate change on-farm, in parallel with training and technical advice
- The AgData hub to become critical platform to disseminate information that is useful, relevant and forward looking, delivery of climate information to intermediaries to improve farmer decision making. It involves capacity development of key staff in extension, SME accelerators and other private sector partners to link climate information with agricultural advisories.
- Enhance educational content creation around climate information and climate smart agriculture, in accessible formats to support climate information and agricultural advisories to bring about behavioral change at community level.
- Facilitate the integration and mainstreaming of climate information and climate smart agriculture in agricultural structures and programming, involving national agencies, climate experts and business entities.

6. Next step: Develop the scope for value creation stories

To inform outcome and impact stories we draw on and adapt the Wenger's conceptual framework on promoting and assessing value creation in networks and communities (2011)[14] in the AICCRA specific context.

Value creation stories illustrate how at different points in the climate and agri-business network AICCRA has contributed to create value, changing perception and behaviour of important stakeholders, and how that has supported transformation of climate and agribusiness networks in Zambia. Generating value creation stories is a proactive way for AICCRA, as well as media and partners themselves, to get feedback, validate their delivery and improve impact pathways post project support. This is complementary to assessments that media and partners can use to track their own outreach and impact, e.g. Munda Make Over doing its Knowledge Attitude and Practice (KAP) study; whilst NAIS uses call back lines to follow up in subsequent episodes and for evaluation purposes.

6.1 Partners for value creation stories

We link the collection of value creation stories to the network tool <u>Polinode</u> (see figure 7, table 2), applied to AICCRA Zambia SME accelerator partnerships, their networks and communities that they target, so that we can follow-up with key questions to evaluate how partners are progressing in deepening and expanding their networks, to what extend the media has advanced that, and how that affects communities' responses. This can then be illustrated, and changes can be looked at, analysed, interpreted and used for future actions and decisions.

Key stakeholders for value creation story collection are selected partners that were identified as entry points for change and for their high leverage potential through the network. Generating value creation stories with these key stakeholders can point to and highlight multiplier effects across the climate and agribusiness networks in Zambia. The stories will also inform what has been delivered through different interventions of the AICCRA project, how successful it was, what was learned, what needs to change.

For the SME Accelerator program, the SME accelerators had identified stakeholders through the network analyses (Figure 7, Table 2). Value creation stories can be collected for each of the five partnerships.
- Micro level:
  - Lead farmers, cooperative members, local authorities
  - Agricultural extension services
- Meso level:
  - IDE
  - NAIS
- Macro level:
  - Ministry of Agriculture
  - Ministry of Fisheries and livestock

For the other AICRA programs, Multistakeholder Dialogue (MSD), Innovation Internship partnership (I2G), Ag-Data Hub, the value creation assessment can focus on the main levels and relevant stakeholders that the programs targeted, and how they interplay and reinforce transformation that AICCRA supports:
> Multistakeholder Dialogue (MSD): meso level

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[14] Wenger, E., Trayner, B., and de Laat, M. (2011) Promoting and assessing value creation in communities and networks: a conceptual framework. Rapport 18, Ruud de Moor Centrum, Open University of the Netherlands. https://www.asmhub.mn/uploads/files/11-04-wenger-trayner-delaat-value-creation.pdf

Innovation Internship partnership (I2G): Meso level
Ag-Data Hub: Macro level

6.2 Data collection

The assessment follows any of the 5 steps in the Wenger's value creation cycle, to answer selected questions for identifying value creation, according to what is most relevant to the AICCRA program partners and media.

It draws on two sources of data that combined provide an integrated picture of the value created through the networks, with robust evidence, causality and cross-reference.

1. **Value creation stories**: The stories provide meaning, causal relations between activities and outcomes, highlight and explain important features.
2. **Value creation indicators**: A set of indicators substantiate the value creation stories, enhance their robustness through measurable observations.

We draw mostly from the five cycles from the first and second cycle i.e. **Cycle 1.** *Immediate value:* the activities and interactions between members have value in and of themselves and **Cycle 2.** *Potential value:* the activities and interactions of cycle 1 may not be realized immediately, but rather be saved up as knowledge capital whose value is in its potential to be realized later.[15]

Figure 8 illustrates a matrix for mapping the evidence for value creation stories and indicators, and how those interlink for the diverse stakeholders. The squares represent indicators, the arrows interlinkages, which together build an overall story of value creation.

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[15] Other three cycles are: **Cycle 3.** *Applied value:* knowledge capital may or may not be put into use. Leveraging capital requires adapting and applying it to a specific situation. **Cycle 4.** *Realized value:* even applied new practices or tools are not enough. A change in practice does not necessarily lead to improved performance, so it is important to find out what effects the application of knowledge capital is having on the achievement of what matters to stakeholders **Cycle 5.** *Reframing value:* this happens when learning causes a reconsideration of how success is defined. It includes reframing strategies, goals and values
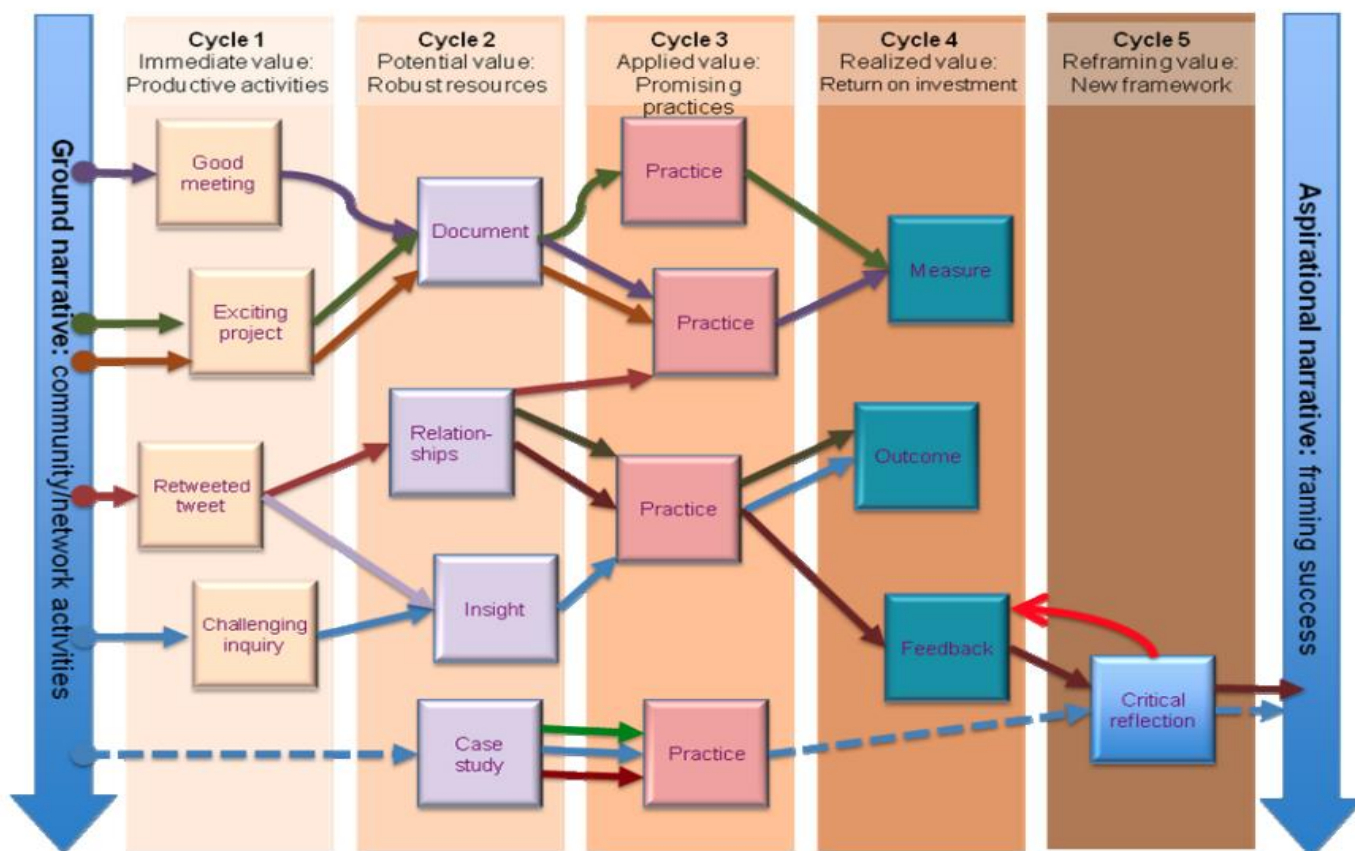
Figure 8. Value creation matrix illustrating the indicators and linkages for an overall value creation story (Wenger et al, 2011).

The guideline of questions for interviews with the stakeholders can be adapted for any of the activities that AICCRA has promoted (Table 3). Here we list prompts that might help the stakeholder framing the story around the AICCRA interventions

1. Activities with focus on media interventions
    a) Live TV
    b) Radio programs
    c) Social media profiling
    d) Agro-advisory SMSs
    e) Road shows, drama
    f) Multi-stakeholder dialogue
    g) Monitoring survey, GESI
    h) Other, specify:
2. Outputs
    a) Insights, ideas, advice
    b) Knowledge, documents
    c) Procedures
    d) Change in perspective
3. Applications
    a) Change in practice
    b) Uptake of climate information and climate smart agriculture practices

c) Use of private sector products and services

d) New / improved partnerships

4. Outcome:

   a) Increased profitability through response to climate

   b) Access to technical and market relevant knowledge and information

   c) Access to sustainable finance programs

   d) Empowerment, capacity development networks

   e) Gender equality and social inclusion in climate information and climate smart agriculture

5. New definition of success:

   a) Changed goals and priorities

Table 3. Overview questions for value creation stories, following the 5 cycle steps (Wenger et al., 2011)

NAME	
TYPICAL CYCLES	**YOUR STORY:**
1. **Activity:** Describe a meaningful activity you participated in and your experience of it (e.g., a conversation, a working session, a project, etc.).	
2. **Output:** Describe a specific resource this activity produced for you (e.g., an idea or a document) and why you thought it might be useful.	
3. **Application:** Tell how you used this resource in your practice and what it enabled that would not have happened otherwise.	
5. **Outcome:** a. Personal: Explain how it affected your success (e.g., being a better professional, job satisfaction). b. Organizational: Has your participation contributed to the success of your organization (e.g., metrics they use).	
6. **New definition of success:** Sometimes such a story changes your understanding of what success is. If it happened this time, then include this here.	

6.3 Indicators for value creation stories

Value creation indicators following the 5 cycle steps can be adapted to respond to the M and E indicators of interest and doable. Tables 4 a to d illustrate the typical indicators.

Table 4.a. Indicators for value creation assessment, cycle 1 (Wenger et al., 2011).

Cycle 1: Activities/Interaction Typical Indicators	Source of Data
Level of participation	Attendance at meetings Number and characteristics of active participants People who subscribe to a site Logs and website statistics Participant lists on teleconference systems
Level of activity	Frequency of meetings Number of queries Quantity and timeliness of responses
Level of engagement	Intensity of discussions Challenges of assumptions Length of threads

Quality of interactions	Bringing experience of practice into the learning space (e.g., "I have a problem with this design," or "we did this in such a case") Debates on important issues Feedback on quality of responses to queries
Value of participation	Feedback form People coming back to community or reengaging with the network Evidence of fun, such as laughter
Networking	Number of people on one's contact list New connections made
Value of connections	Number of people on one's contact list New connections made
Collaboration	Self-reports Frequency of interactions
Reflection	Meta-conversations about community/network

Table 4.b. Indicators for value creation assessment, cycle 2 (Wenger et al., 2011).

Cycle 2: Knowledge Capital Indicators	Source of Data
Skills acquired	Self-report and interviews Tests and surveys Community reflections
Information received	Self-reports Threads read
Change in perspective	Self-reports
Inspiration	Self reports Retention rates of members
Confidence	Self-reports Initiatives started and/or risks taken by members
Types and intensity of social relationships	Social Network analyses
Level of trust	Bringing up difficult problems and failures from practice Number of referrals or recommendations
Production of tools and documents to inform practice	Quantity and types of output Coverage of relevant topics
Quality of output	Evaluation of products Frequency of downloads
Documentation	Summaries of events and discussions FAQ Archives
Reputation of the community	Feedback from stakeholders Links to community site

New view of learning	Self-reports
	Interest in learning and leadership activities

Table 4.c. Indicators for value creation assessment, cycle 3 (Wenger et al., 2011).

Cycle 3: Change Indicators	Source of Data
Implementation of advice/solutions/insights	Follow-up. For instance, it is a good discipline to follow up how a member has adapted or used the advice from a community or network. This way the collective learning continues through application in practice.
Innovation in practice	New ways of doing things New perspectives New concepts and language
Use of tools and documents to inform practice	Self-report such as feedback on documents and tools from people who have used them Indicators of value in application
Reuse of products	Self-report of reuse Estimation of reuse as a proportion of the frequency of downloads
Use of social connections	Collaborative arrangements Leveraging connections in the accomplishments of tasks
Innovation in systems	New processes New Policies
Transferring learning practices	Using communities, networks or other peer-to-peer processes and tools for learning in other contexts

Table 4.d. Indicators for value creation assessment, cycle 4 (Wenger et al., 2011).

Cycle 4: Performance improvement indicators	Source of Data
Personal performance	Speed and accuracy Customer feedback Student achievements
Organizational performance	Client satisfaction Business metrics Scorecard results Project assessments These metrics will differ a lot depending on the nature of the relevant organizations. For commercial enterprises, this might include market share, profitability, productivity, optimized use of assets, etc. For governmental agencies, it might include levels of service (e.g., speed and quality) or citizen satisfaction For educational organizations, it is likely to include student achievements and satisfaction For non-profit organizations, it might include improvement to the quality of life, less poverty, better

Cycle 4: Performance improvement indicators	Source of Data
	health, etc.
Organizational reputation	Ability to attract projects related to domain Client feedback
Knowledge products as performance	Clients interested in knowledge itself Direct delivery of knowledge products to clients

Table 4.e. Indicators for value creation assessment, cycle 5 (Wenger et al., 2011).

Cycle 5: Reframing indicators	Source of Data
Community aspirations	New learning agenda New discourse about value New vision
Assessment	New metrics New assessment processes
Relationships with stakeholders	Different conversations with stakeholders Involvement of new stakeholders New sets of expectations
Institutional changes	New strategic directions that reflect the new understanding
New frameworks	New social, institutional, legal or political systems (emerging or created)

Annex:

A 1. Multiple stakeholders operating in the climate information space, with vested interests delivering climate information to farmers

Actors	Functions for the delivery of climate information	Challenges
Farmers and associations, federations	• Agricultural production • Knowledge sharing • Networks	Access to ITC, educational levels
Extension services	• Nation -wide service, with local representation and networks • Provide technical information services related to agriculture, fish and livestock • Fulfil many other roles that can be relevant, e.g. agro-dealership, market information	Slow in dissemination, underfunded
Off-takers	• Deliver inputs, price information, market information, eg EGT, GNA, COMACO • Dispose of huge data banks, with an interest to disseminate CSA-CIS, for their specific value chains	Vested commercial interest, for specific value chains
Credit providers	• Provide credit eg. FNB, Micro banks • Dispose of huge data bank, with interest to disseminate CSA/CSI to de-risk	Vested commercial interest, for specific value chains and risk factors
Input suppliers, out-growers	• Provide inputs and markets, GNA, LDC • Dispose of huge data bank, with interest to disseminate CSA/CSI to de-risk	Vested commercial interest, for specific value chains and risk factors
Development programs	• Deliver CSA/CSI through ongoing relationships, eg 1 Acre fund, GIZ, Heifer	Geographically and time bound to project cycles
Communications and multi-media	• CSA-CIS innovation stories • National radio: • Community radio • National TV • Small Digital TV • Print	Different audiences, to reach smallholders use community radio and small digital TV Need to integrate contents, partner with experts and multiple sources of data, to reach farmers effectively
Government	• ZMD/ZARI providing provincial level seasonal forecasts (10, 7, 1 day), no extreme events • DMMU flood & draft early warning system (extreme weather events) • FISP, Conservation farming unit, ZNFU, ZDTP • Mandate in providing CSA-CIS to farmers, NAIS • Product endorsement • Supplementary support, eg translation	Important partner, enhancing welfare of rural communities
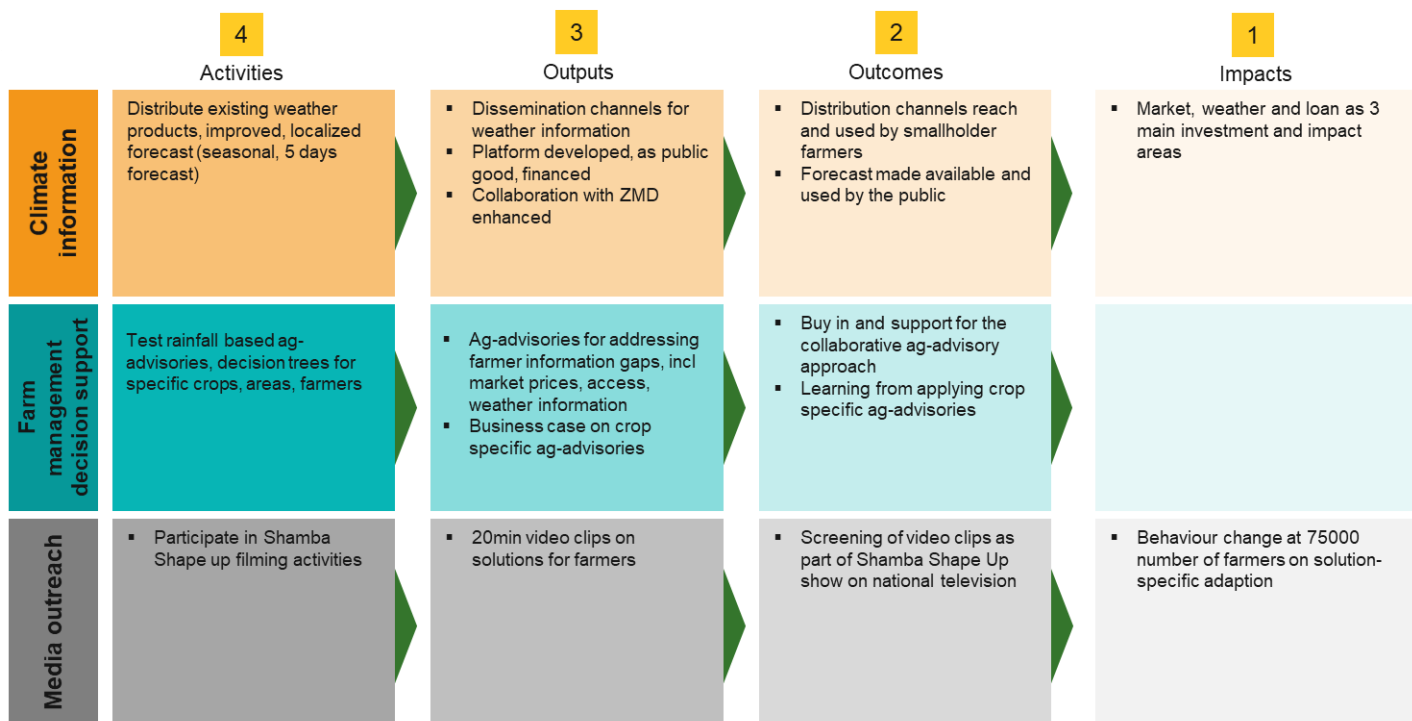
A2. Climate information services and outreach impact pathway for solar irrigation bundle

	4 Activities	3 Outputs	2 Outcomes	1 Impacts
Climate information	Distribute existing weather products, improved, localized forecast (seasonal, 5 days forecast)	• Dissemination channels for weather information • Platform developed, as public good, financed • Collaboration with ZMD enhanced	• Distribution channels reach and used by smallholder farmers • Forecast made available and used by the public	• Market, weather and loan as 3 main investment and impact areas
Farm management decision support	Test rainfall based ag-advisories, decision trees for specific crops, areas, farmers	• Ag-advisories for addressing farmer information gaps, incl market prices, access, weather information • Business case on crop specific ag-advisories	• Buy in and support for the collaborative ag-advisory approach • Learning from applying crop specific ag-advisories	
Media outreach	• Participate in Shamba Shape up filming activities	• 20min video clips on solutions for farmers	• Screening of video clips as part of Shamba Shape Up show on national television	• Behaviour change at 75000 number of farmers on solution-specific adaption

A3. Climate information services and outreach impact pathway for aquaculture bundle

	4 Activities	3 Outputs	2 Outcomes	1 Impacts
Climate information	• Collaborate with WorldFish to collect relevant climate information from reference ponds • Dissemination of aquaculture CIS advisory tools to farmers including women farmers	• Water temperature dataset from land-based aquaculture facilities in the region collected and made available to CGIAR partners (WorldFish) • Reports on dissemination of CIS including sex disaggregated data of farmers reached	• Increased access to and/or use of enhanced CIS among farmers especially women • Improved resilience droughts, floods or extreme temperatures	Improved water and food security in northern Zambia through use of enhanced climate smart aquaculture advisory information services
Farm management decision support	Participate in CSA/CIS Training of Trainers on use of enhanced CIS for aquaculture and IAAs	• Reports on training and dissemination CIS for the aquaculture value chain to farmers developed	• Increased number of farmers accessing and/or using enhanced CIS for aquaculture • Increased fish production among farmers especially women • Increased income generated from farmed fish • Improved water and land use efficiency	Dito
Media outreach	• Develop a communications brief describing the aquaculture bundle for use in communications outreach • Carry out CSA/CIS road shows • Participate in Shamba Shape up filming activities • Programs on local radio	• Aquaculture bundle brief developed & shared with AICCRA partners • Reports on CSA/CIS road shows carried out • Reports on communications outputs carried out (including SSU, NAIS and Kasama Arts?) • Logs of radio programs from local radio stations and recorded	• Enhanced partnerships among private and public local actors for easy access to high quality climate smart aquaculture information	Dito

A4 Impact Pathway for seed systems bundle

	4 Activities	3 Outputs	2 Outcomes	1 Impacts
Climate information	• Farmer Field Schools/group approaches as channels to disseminate CIS • Information dissemination to lead farmers, group leaders, business advisors, helping to enhance dissemination of CIS on the ground	• # of farmers accessing weather information at the right time, to plan properly, buy products in a better coordinated manner	• Cementing partnerships with organizations that gather weather information, and dissemination to farmers, beyond AICCRA	• Cohesion, connection, friendship, better planning, • Improved productivity: better yields, reduced losses • HA of land under CSA practices in target areas increases
Farm management decision support	• Interpretation of CIS, simplified, local language, to the level of farmers, for intermediaries to explain during FFS / group meetings • Encourage women group leaders to disseminate to fellow women	• # of farmers accessing near real time weather information to advise on suitable varieties for that particular season and region • # farmers accessing info on four stages of crop production, sowing, growing, peak, harvesting	• Farmers are encouraged to buy the drought-tolerant and climate-smart inputs, and adapt their agricultural practices • Revised promotion/marketing strategy for agricultural inputs integrating CIS	• Improved efficiency and other benefits for farmers and other value chain actors (seed, fertilizer suppliers) • Credibility and trust in agricultural inputs like seed and fertilizer • HA of land under CSA practices in target areas increases
Media outreach	• Multimedia campaigns (Radio, Lima Links), sending reminders of what should be done at particular time / season • SMS information on weather depending on time of the year	• # of farmers reached by multimedia campaigns • # of farmers reached via SMS dissemination campaigns	• Farmers are changing their behaviour as a result of accessing these media campaigns, demonstrated in their change of behaviour and adoption of CSA technologies	• Improved efficiencies in farmers' agricultural production activities • HA of land under CSA practices in target areas increases • Reduced negative effects on soil quality in target areas: less land affected by surface erosion

A4. Climate information services and outreach impact pathway for seed systems bundle

A5 Impact Pathway for integrated legume livestock bundle

	4 Activities	3 Outputs	2 Outcomes	1 Impacts
Climate information	• Weather monitoring • Weather forecasting to help farmers planning inputs and farm management • Use forecast to project how much produce to come from what farmers	• Probability information, based on ZMD, legal implications • Automated weather information (some information is better than no information)	• Farmers navigate through the season, knowing what harvest to expect, reduced unpredictability	• Risk reduction, confidence in contractual arrangements • Increased adoption of CIS/GESI practices, enhanced legume production, value added and contribution to farm income
Farm management decision support	• Assess needs of cooperatives for CIS/GESI (part of orientation visits) • Training of cooperative leaders and managers to include CIS/GESI • Training of executive committees with smart phones to include CIS/GESI	• Business plan includes CIS/GESI • Extension/monitoring support includes CIS/GESI • Promotion of agroforestry, conservation agriculture, contributions to soil fertility • Remote sensing to determine carbon, soil properties	• Cooperatives board includes CIS/GESI in their agenda • Insurance companies can model based on informed point of view, same data • Risk measure for landing institution for farmer loans, to acquire inputs / COMACO guarantees markets	• Growth in secondary markets through CIS/GESI • Farmers get loans and pay back through COMACO • Federation empowered by using CIS/GESI • Resource mobilization through CIS/GESI data and evidence
Media outreach	• Farm talk radio with weather forecast, provided that information is certified, not to be sued by farmers • Mass SMS messages include GIS/GESI • Media campaign, (TV, radio, video, stories, photos) • Federation whats app group	• COMACO communication channels strengthen the federation/cooperatives to support CSI/GESI and 800,000 people listening • COMACO/Federation in multi-media campaign • COMACO/Federation information in the radio program	• Increased communication between COMACO and the federation on CIS/GESI • CIS/GESI promoted through women in farm talk radio • Increased visibility of COMACO/federation innovations and products	• Strategies, packages, to reach specific audiences beyond AICCRA

A5. Climate information services and outreach impact pathway for integrated legume livestock bundle

A6. Polinode network by bundle 1, solar irrigation

A7. Polinode network by bundle 2, seed systems

Bundle 3

CSA Bundle 3: Zambia Agricultural Research Institute (ZARI)

CSA Bundle 3: Agova
CSA Bundle 3: Corteva Agriscience
CSA Bundle 3: International Development
Enterprises (iDE)
CSA Bundle 3: PlantCatalyst
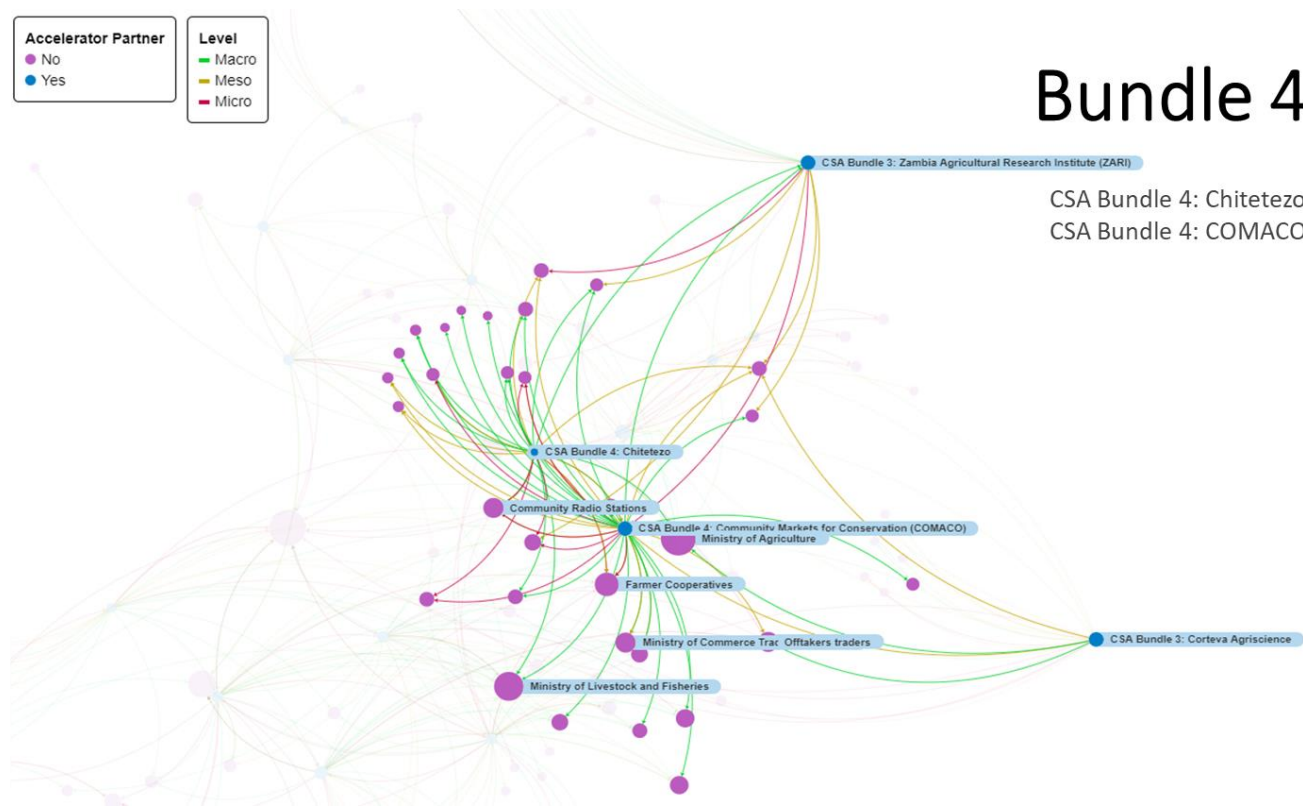CSA Bundle 3: Zambia Agricultural Research
Institute (ZARI)

CSA Bundle 1: Vitalite
CSA Bundle 4: Chitetezo
CSA Bundle 3: Agova
CSA Bundle 3: PlantCatalyst
CSA Bundle 4: Community Markets for Conservation (COMACO)
CSA Bundle 3: International Development Enterprises (iDE)
Agricultural Extension Services
Ministry of Agriculture
CSA Bundle 3: Corteva Agriscience
Farmers
Offtakers traders
CSA Bundle 2: ADSEK Enterprises Limited
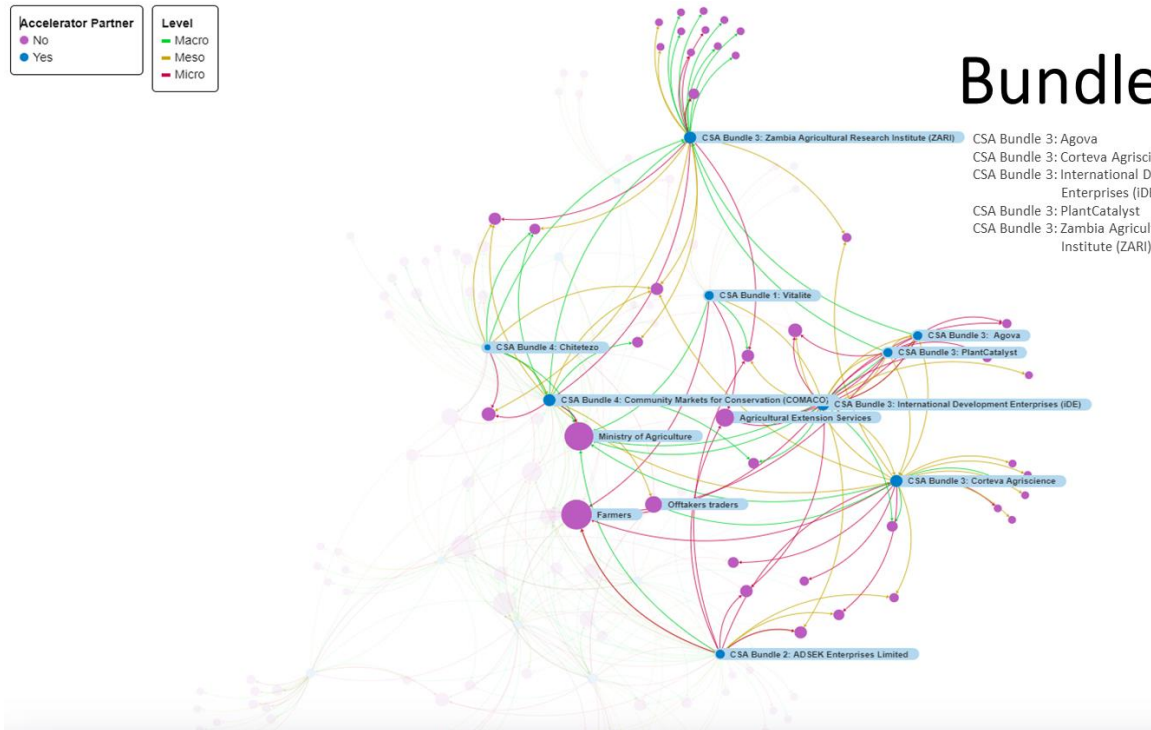
A8. Polinode network by bundle 3, integrated legume livestock

Bundle 4

CSA Bundle 3: Zambia Agricultural Research Institute (ZARI)

CSA Bundle 4: Chitetezo
CSA Bundle 4: COMACO

CSA Bundle 4: Chitetezo
Community Radio Stations
CSA Bundle 4: Community Markets for Conservation (COMACO)
Ministry of Agriculture
Farmer Cooperatives
Ministry of Commerce Trad Offtakers traders
CSA Bundle 3: Corteva Agriscience
Ministry of Livestock and Fisheries

A9. Polinode network by bundle 4, irrigated solar systems
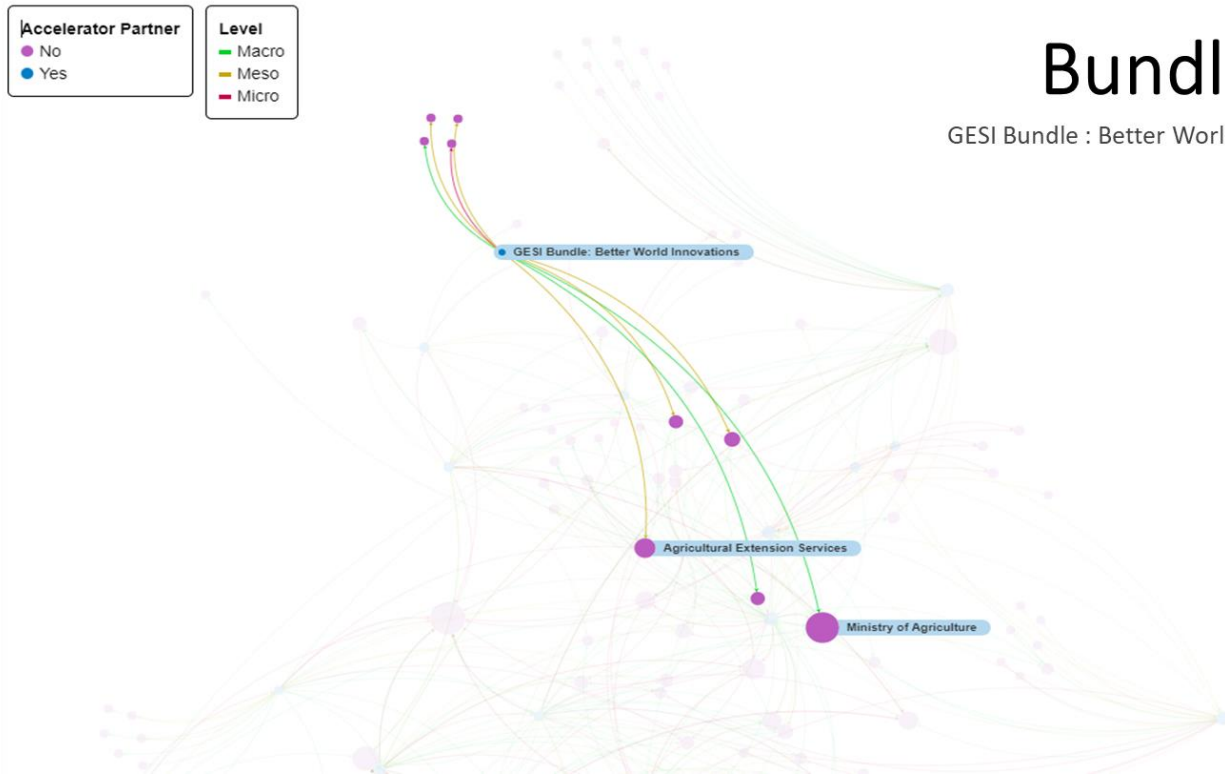
A10. Polinode network by bundle 5, gender equity and social inclusion

Acknowledgement