Social Outcomes of the CARE-WWF Alliance in Mozambique:

Research Findings from a Decade of Integrated Conservation and Development Programming


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Executive Summary

In 2008, the CARE-WWF Alliance emerged as a major strategic partnership between two international non-governmental organizations seeking to tackle the linked challenge of poverty and natural resource degradation. From the start, the mission of the Alliance was to test the idea that empowering some of the poorest and most vulnerable women and communities on the planet to engage in sustainable livelihoods and natural resource governance could improve their wellbeing and conserve globally important biodiversity. The flagship Alliance project in Primeiras e Segundas (P&S), Mozambique sought to advance three key objectives: *Healthy Livelihoods, Healthy Ecosystems; Empowered Citizens;* and *Supportive Policies and Institutions.* This involved implementation of conservation interventions – especially Community-Based Natural Resource Management of fisheries, mangroves and forests – and development interventions – namely, Farmer Field Schools, Village Savings and Loan Associations, and Water Sanitation and Hygiene with nutrition and gender approaches mainstreamed. Often, conservation and development interventions were implemented together in the same communities, and sometimes, conservation or development interventions were implemented separately in different communities.

Research Design

A decade after its inception, the Alliance used existing monitoring data to support an evaluation that assessed the social impacts of the integrated conservation and development program. The design of the final evaluation was constrained by a baseline intended for project monitoring rather than impact assessment, while depth of analysis was constrained by time. In 2018 and 2019, the Alliance collaborated with expert consultants, academic partners, and the Alliance for Conservation Evidence and Sustainability to implement a mixed-methods evaluation answering two questions:

1. *What are the social impacts of natural resource management in P&S?*
2. *How do impacts vary between those who participated in conservation interventions, development interventions, both, or neither?*

The primary methods were household surveys and focus group discussions. Data included quantitative metrics on human wellbeing (dietary diversity, food provisioning and household assets) and qualitative perceptions on the conservation and development interventions, and their influence on wellbeing. Study sites were a mix of sites where community-based conservation and development interventions were applied together, or separately.

Results

Conservation interventions – no-take zones, community mangrove or community forest management – were associated with a 25% increase in dietary diversity between 2008 and 2014. After that, investment in community-based conservation declined, and by 2018, the correlation was no longer present. When community-managed no-take zones were properly enforced, communities perceived that they contributed to improved food and nutrition security by increasing access to larger and more diverse fish and seafood. Communities also reported that well-managed mangroves and forests improve the food security of single women, who suffer disproportionately from poverty and food insecurity. However, qualitative analysis uncovered many challenges and pitfalls to how community-based conservation was implemented in P&S that, if left unaddressed, could undermine both ecological and social sustainability in the long run.

Community-based conservation interventions were not correlated with significant changes in wealth in the form of assets, like bicycles. But communities valued no-take zones because fish are a critical source

of cash income. Communities also report that well-managed forests improve material wellbeing through provision of timber and other materials for building infrastructure and protection from severe weather that could harm their assets. Because communities understand that mangroves serve as nurseries for fish and shellfish, they also perceive that mangrove protection contributes to their economic wellbeing. When there's a surplus of crabs and snails, women gather and sell them for extra income.

Households in communities with Farmer Field Schools were 13% more likely to experience year-round food security. For other interventions, sub-groups in the community experienced different levels of benefits. Access to credit, advanced through the microcredit interventions like Village Savings and Loan Associations, was correlated with a 31% increase in the reported assets of female-headed households. Communities similarly perceived that well construction and community-based mangrove protection benefit women more than men because women are often responsible for fetching water and more dependent on harvesting shellfish. Finally, communities perceive that no-take zones improve the food security and economic wellbeing of male-headed households more than single women, who are culturally excluded from most fishing activities.

Recommendations

Despite its limitations as a case study, the evaluation offers insights and implications relevant to different stakeholders involved in implementing integrated conservation and development projects.

Recommendations to accelerate conservation and development impacts:

- Donors, governments and practitioners should invest in long-term sustainability through nested natural resource governance systems, including capacity building at multiple levels.
- Practitioners should build incentive structures that sustain community conservation areas from the short to long term and equitably distribute their costs and benefits between resource users.
- Practitioners should communicate and monitor for a shared understanding of roles and responsibilities and costs and benefits between project stakeholders.
- Practitioners should engage the same research partner over the life of a project. If not possible, it is critical to clearly document the research process and rationale for decisions.
- Researchers should invest in co-interpretation of data, including the perspectives of project implementers, communities and other stakeholders.
- Practitioners and researchers should use evidence to infuse community voices into global policymaking and accelerate adoption of integrated approaches for delivery of the 2030 conservation, development and climate agendas, such as the Sustainable Development Goals, the Paris Climate Accord and Convention on Biological Diversity.

Recommendations for ongoing programming and further research in Primeiras e Segundas:

- The new project in P&S has addressed community-based conservation committee governance pitfalls in its social and environmental risk assessment and monitoring system.
- The new project plans to use baseline socioeconomic data for more robust beneficiary targeting to avoid elite capture, redoubling women's empowerment and gender integration efforts to ensure that vulnerable community members, like female-headed households, benefit.
- The new project will provide relevant feedback on the findings, their implications and our recommendations to local stakeholders, including participating communities, national non-governmental organizations, district governments, and local private sector actors.
- Researchers should drive improved understanding and practice in P&S and beyond by further analyzing the quantitative and qualitative data and contextualizing findings within peer-reviewed literature and larger drivers of change, like climate change.

Author contributions

Authorship was determined based upon contributions throughout the research design, collection, analysis and report writing process. The research concept was developed by CAS, LG and SM; SM, LG, AS, LO and BF contributed to research design. 2018 household survey implementation was supervised by RZ while qualitative research was supervised by CAS, with focus group facilitation by CAS, RZ and MX. Research analysis was led by MC and RL (who are equal co-authors of the report), with supervision from CAS, MD and SM. The body of the report and annexes were drafted by CAS, MC and RL with invaluable contributions to both from SM, MD and LG.

Acknowledgements

This research would not have been possible without the dedicated work of the CARE-WWF Alliance leadership and program teams from 2008 and 2018, including John Guernier, Dan Mullions, Henry Khonyongwa, Simon Chitsenga, Maria Cadahia, Cathy Riley, Cremildo Armando, Denise Nicolau, Dalila Sequeira, Jorge Bossman, Jeremais Marques, Milton Xavier and Gladys Nhamgumele. Thanks, also, to those CARE and WWF staff, like Elly Kaganzi, who participated in the data analysis workshop; and to Colleen Farrell and Karen Luz for their editing and content contributions to this research report.

We are indebted to local communities who generously offered their time to help us understand their lives and livelihoods and the extent to which the CARE-WWF Alliance has made a difference in their wellbeing. Our skilled translators, Cassava and Laura, were critical to the success of the 2018 focus group discussions (see right). We are equally grateful to the eight enumerators who carried out the household surveys over 10 long days in the field.

Last but certainly not least, a hearty thanks to Matt and Rafaella's academic supervisors, Dr. Vicken Hillis and Dr. Lisa Campbell.

Photo 1. Translators, Cassava and Laura, relax over lunch between focus group discussions.

List of Acronyms

ACES: Alliance for Conservation Evidence and Sustainability

CARE: Cooperative for Assistance and Relief Everywhere

CBNRM: Community-based natural resource management

FFS: Farmer Field Schools

FGDs: Focus Group Discussions

MEL: Monitoring Evaluation and Learning

NTZ: No Take Zones

P&S: Primeiras e Segundas

VSLAs: Village Savings and Loan Associations

WWF: World Wildlife Fund

Introduction

The CARE-WWF Alliance

While WWF and CARE have worked together opportunistically since the 1980s, the CARE-WWF Alliance emerged in 2008 as a major strategic partnership between two international non-governmental organizations seeking to tackle the linked challenge of poverty and natural resource degradation. From the start, the mission of the Alliance was to test the idea that, by empowering some of the poorest and most vulnerable women and communities on the planet to engage in sustainable livelihoods and natural resource governance, we could both improve their wellbeing and conserve critical biodiversity. Thus, over the last decade, the CARE-WWF Alliance has been focused on testing and implementing integrated conservation and development approaches with the aspiration of building just and sustainable food systems that can support the delivery of the Sustainable Development Goals.

The Alliance project in Mozambique sought to advance three key objectives: *Healthy Livelihoods, Healthy Ecosystems; Empowered Citizens;* and *Supportive Policies and Institutions.* In 2012, the Alliance made meaningful progress toward the third objective when Primeiras e Segundas (P&S) became the first Environmental Protected Area, a unique legal designation that permits local subsistence use and community management. In 2016, an Alliance-supported management plan for P&S was approved, providing regulations for community management of fisheries and mangrove resources in practice. See *Research on the Alliance Program in Primeiras e Segundas, Mozambique* for a summary of research findings to date and *Annex 1* for the detailed project theory of change.

As the P&S Sustainable Livelihoods project was concluding in 2018, the CARE-WWF Alliance teamed up with the Alliance for Conservation Evidence and Sustainability (ACES) to conduct end-line research to understand the social impacts of this integrated conservation and development experiment.

The Alliance for Conservation Evidence

While community-based approaches to conservation have proliferated rapidly across southern Africa, Asia, and South America in the last decades, the evidence base indicating under what conditions community-based interventions are effective and why remains limited. While the pace of evidence generation and synthesis has increased through the efforts of individual scholars and organizations, these efforts have been largely uncoordinated, with limited progress integrating evidence into decisions.

To catalyze the transformation of conservation into an evidence-based practice, ACES was formed in 2016. Together, ACES has developed a holistic theory-based monitoring, evaluation and learning (MEL) framework designed to explore the social and ecological processes influencing community-based natural resource management (CBNRM) establishment, impacts and spread. The framework builds on foundational social and ecological theory, drawing particularly on insights from collective action theory (Ostrom 1990), common pool resource governance theory (Ostrom 1990) and diffusion of innovation theory (Rogers 2003). To anchor the

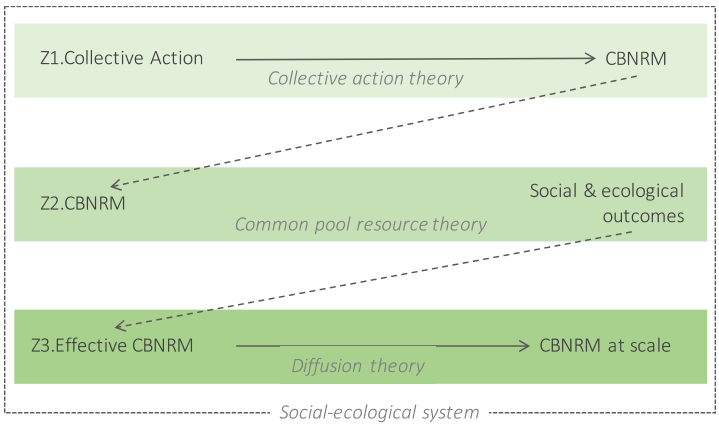

Figure 1. The ACES model draws on theory to understand the establishment, outcomes and spread of CBNRM interventions.

framework, ACES is implementing a portfolio of learning projects designed to provide credible and salient insights for decision-makers on community-based approaches, while also providing a proof of concept on the potential for collaborative MEL to drive evidence-based decision-making in conservation. The portfolio, spans marine, forest and grassland systems in 15 countries and harnesses the expertise of more than 40 academic and practitioner organizations.

The evaluation described in this document on the Alliance in Mozambique is one of the four learning projects currently embedded in the ACES portfolio. In 2018, the ACES team recognized that research on this ten-year project in P&S offers a unique opportunity to explore quantitative and qualitative data about the social outcomes of CBNRM (see Z2 in *Figure 1*, *previous page*).

Research on the Alliance Program in Primeiras e Segundas, Mozambique

Previous research on the Alliance program in P&S suggests that development interventions were successful in advancing development objectives, and community conservation initiatives were delivering both conservation and livelihood benefits.

A 2017 evaluation of CARE's Nampula Adaptation to Climate Change project[1] found:

- Through adoption of more sustainable practices and improved seeds, Farmer Field School (FFS) members doubled production of their staple crop, cassava. They were also twice as likely both to experience food security for 10 months per year and to recover from food shocks than non-member farmers.
- Women participating in Village Savings and Loan Associations (VSLAs) were 7.5 times more likely to report access to credit than non-participants; this halved the gender gap in loan access and increased by five the number of families investing in their children's education.[2]

Mid-term research in 2014 on community-managed No-Take Zones (NTZs) found:

- NTZs – where extraction of marine resources, like fish and mangroves, are prohibited to facilitate stock regeneration – resulted in increased levels of fish abundance. Between 2010 and 2014, fish species diversity in the sanctuaries also tripled, boasting 50% more species than unprotected areas.
- Seventy percent of fishermen reported increased catches from spillover zones where fishing is permitted outside of the NTZs, and 88% of sampled community members supported this community co-management approach.[3]

In anticipation of new investment in P&S, this summative evaluation seeks to take advantage of the rarity of a decade of socio-economic data to understand if conserving ecosystems helps people. To this end, the evaluation addresses two overarching research questions, disaggregated into six sub-questions:

First, *what are the social impacts of natural resource management in P&S?*

RQ1A. *What changes did communities experience in food security and wealth?*

[1] The NACC project served as a major delivery mechanism for many of the Alliance's development interventions in the region between 2015 and 2017.
[2] Peham, Andreas (2017). *NACC Final Evaluation Report.*
[3] Fisher, Brendan (2014). *Fishing for the Future: Social and Biological Aspects of No Fishing Zones in Mozambique.* CARE-WWF Alliance: Washington, DC.

RQ1B. *To what extent are community-managed fisheries, mangroves, and forest interventions correlated with changes in community food security and wealth?*

Second, *how do impacts vary between those who participated in conservation interventions, development interventions, both, or neither?*

RQ2A. *To what extent do changes in food security and wealth differ between communities that participated in both CBNRM and development interventions compared with those that participated in one or none?*

RQ2B. *To what extent do changes in food security and wealth differ between individuals that participated in both CBNRM and development interventions compared with those that participated in one or none?*

RQ2C. *To what extent do changes in food security and wealth differ between women and men?*

The final cross-cutting question is: *To what extent has the Alliance contributed to these changes?*

Methodology

Research Design

The research used a mixed-methods approach, combining quantitative household survey data collected in 2008, 2014, and 2018 with qualitative focus group data collected in 2018. While the project was implemented in four districts across the Nampula and Zambezi Provinces across northern Mozambique, the 2018 was conducted in just Nampula Province's Angoche and Moma Districts. Quantitative and qualitative data were collected in the same eight communities (see tables 1 and 2). Communities were selected for this study to (1) maximize the comparability across quantitative survey years, and (2) to ensure a useful balance of communities that experienced conservation and development interventions, only conservation interventions, only development interventions or no intervention); and (3) minimize costs.

Because surveys in 2008 and 2014 were initially designed for monitoring implementation, they were an imperfect point of departure for an impact evaluation. Key challenges include underpowered sampling in 2008 and surveying only on communities in Moma District that received conservation interventions in 2014. Nonetheless, we determined that the opportunity to analyze a full decade of data that could provide insights on the social outcomes of community conservation was not to be passed up. The 2018 survey was designed to take advantage of and improve upon previously used variables and sampling methods to get us as close as possible to impact evaluation. The resulting 2018 dataset is comprised of a representative sample of communities that either received a conservation intervention (5 communities, 140 households), a development intervention (5 communities, 222 households), both (3 communities, 340 households), or none (1 community, 87 households) in the decade between 2008 and 2018.

The number of surveys collected and used for analysis in the 2014 and 2018 samples were based on Population Proportion to Size of each community. This method ensures that we have enough surveys to constitute an accurate cross-section of each community. In 2018, our target sample size was based on the most recently available census (sometimes 1997, sometimes 2007 and, in rare cases, 2017) for that community and average population growth for that province's rural areas. The selection of households in the field followed a classified random approach. The community was stratified into smaller sections,

following headship or socio-geographical patterns. The team was split into sub-teams and each was allocated to an area. For each area, the team identified the center of that area and randomly selected a direction to follow, which was decided by the way that a pen fall after being spun. Every household was selected in that direction until the desired number of households was reached.

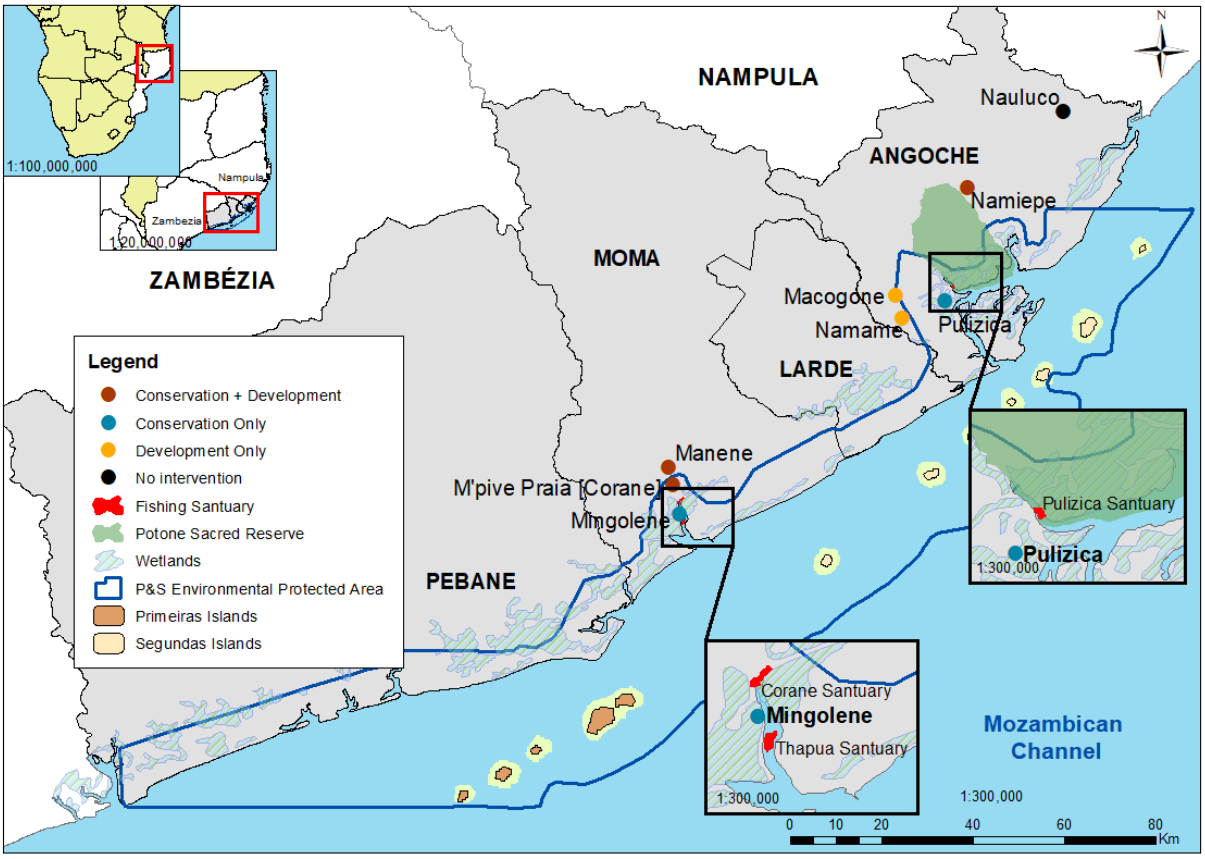

Figure 2. **Map of the Eight Communities Sampled in 2018**

In 2018, 469 households were surveyed across eight communities (see *Figure 2, above*). The minimum sample size to accurately represent the was 425; therefore, we believe this survey and the subsequent analyses are representative of the overall population. *Table 1* (below) also includes the sample obtained for each settlement.[4] Relative to the eight communities in 2018, six of the same communities (Nauluco, Namame, Pulizica, Namiepe, Corane and Macogone) were surveyed in 2008, while only three of the communities were surveyed in 2014 (Manene, Corane and Mingolene). For a summary of the communities sampled, see also *Table 1 (next page)*.

The qualitative research was designed specifically to understand (1) general perceptions of change over time, and (2) perceived changes over time in wellbeing, community participation, and household decision-making. Within both questions, the research explored how the Alliance contributed to change in perceptions, and how perceptions varied between men and women. The qualitative research also

[4] See *Annex 4. Quantitative Instruments and Codebook* for the 2008, 2014 and 2018 household survey instruments in Portuguese.

explored perceptions on how CBNRM evolved over time in sites with conservation interventions, grounded in Elinor Ostrom's eight principles of common pool resource governance (see *Table 2*, p. 14).

Table 1. **Communities, interventions, sample size needed and acquired (2018)**

District	Community	Conservation Interventions (2008-2018)	Development interventions (2008-2018)	Focus Group Protocols Implemented	Required Household Sample	Household Surveys Realized
Angoche	Nauluco	No	No	P1, P2 and P3	51	55
	Namiepe	Coastal forest management via CBNRM	FFS, VSLA, and chicken vaccination	P1, P2, P3 and P4	41	49
	Pulizica	NTZ and mangrove management via CBRNM	No	P1, P2, P3 and P4	30	35
	Namame	No	FFS, VSLA, chicken vaccination, and gender/ nutrition	P1, P2 and P3	63	70
	Macogone	No	FFS, VSLA, chicken vaccination and gender/nutrition	P1, P2 and P3	87	92
Moma	Manene	NTZ and mangrove management via CBNRM	FFS, VSLA, chicken vaccination, gender/ nutrition, Water Sanitation and Hygiene (WASH)	P1, P2, P3 and P4	64	69
	Corane/ M'pive Praia	NTZ and coastal forest and mangrove management via CBNRM	FFS, VLSA, chicken vaccination, gender/nutrition, WASH	P1, P2, P3 and P4	59	64
	Mingolene	NTZ and mangrove management via CBNRM	No	P1, P2, P3 and P4	30	35
Total		5 communities received conservation interventions, 3 of which also received development	5 communities received development interventions, 3 of also which received conservation	29 FGDs (8 of protocols 1, 2 and 3 with protocol 4 implemented in the 5 communities w/ CBNRM interventions)	425	469

Focus group discussions (FGDs, n = 29 representing approximately 300 distinct community members) exploring these questions were carried out in eight communities with Alliance participants and non-participants. Focus groups were facilitated in Portuguese, recorded, and transcribed. Focus groups were carried out by two field teams, each with one lead facilitator and one note-taker, using one of four protocols designed to answer the specific research questions pertaining to the group of stakeholders in

each focus group.[5] In all communities, focus group were organized to ensure all voices were heard and included males and females from the communities who either participated or did not participate in interventions, as well as male and female members of natural resource management committees.

Table 2. **Ostrom's Eight Principles of Common-Pool Resource Management**

1. Boundaries	Support defining group boundaries
2. Rules match local conditions	Ensure rules governing resources match local needs and conditions.
3. Participation in rule-making	Ensure that those affected by the rules can participate in modifying the rules.
4. Monitoring	Support accountable monitoring (led by communities) of natural resources
5. Enforcement	Graduated sanctions are enforced for those not following rules
6. Conflict resolution	Provide accessible, low-cost means for dispute resolution.
7. Local rules are respected	Ensure that resource users have the rights to organize and make autonomous decisions (and rules are respected by outsiders)
8. Nested governance	Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

Analysis

Methods

The quantitative analysis for this report focuses on the eight communities sampled in Moma and Angoche Districts (N= 789 across all years). All data manipulation and quantitative analyses for this report was done using 'R' statistical coding software. All figures were produced using the plotting functionality of base 'R' or using the 'ggplot2' package for 'R.' We harmonized the datasets for the three surveyed years by first compiling all the questions which were identical across the time periods. For questions which were similar across years but not the same, based on logic and question format. For example, many questions allow respondents to choose multiple answers from a list. For these questions, any answers which were listed in only one or two years were classified as "other" where appropriate. Other questions prompted respondents to choose just one answer from a list of many specific choices

[5] See *Annex 5.1. Focus Group Discussion Protocols* in Portuguese.

(e.g. community group membership). Where these types of questions were not identical across years, we created fewer and broader categories which we used to bin the responses.

Survey questions were classified and analyzed as the most appropriate variable type, determined by data availability and best practices in statistical computing. For example, all community conservation or development interventions were analyzed as logical variables (TRUE vs FALSE), while gender was analyzed as character variables, and education was analyzed as a factor (ordered categorical) variables. Effect sizes and significance values were computed using hierarchical linear models. When possible based on effect size, statistical disaggregation by gender was done by assigning gender a random intercept or random intercept and random slope in the equations. All linear models were fit to the appropriate distribution of the question being analyzed (normal, gamma, Poisson, binomial, or negative binomial). The standard significance value of $p < 0.05$ was used to determine the credibility of our analyses. Any results reported as "statistically significant" use this standard threshold.

Table 3. **Key Indicators' Metrics, Sample Size and Analysis**

Key Indicator	Metric	Sample Size (2008)	Sample Size (2014)	Sample Size (2018)	Analysis Notes
Household Dietary Diversity Index	The number food groups households reported eating in the previous 24 hours (out of a 23 possible food groups).	184	136	469	Food groups were weighted based on the nutritional value of the food groups, as per Mozambique Technical Secretariat for Food Security and Nutrition (SETSAN) 2006 guidelines[6]
Months of Adequate Food Provisioning	The number of months in the last year households reported having enough food for the entire family.	0	0	469	n/a
Household Asset Index	The number of assets households reported owning (out of 27 possible household assets).	184	136	469	Asset values were weighted based on the productive or non-productive value and relative frequency of each asset, as per SETSAN 2006 guidelines[7]

For some analyses of household consumption and assets,[8] we use weighting to better understand the financial and nutritional wellbeing of survey respondents (see *Table 3*, above). This weighting system

[6] SETSAN (2006) as cited in Oliveira, Leila (2008). *Situation Assessment for Support to Sustainable Livelihoods in the District of Angoche, Moma and Pebane.* Co-Arq: Maputo, Mozambique. Pp. 16-18.
[7] *Ibid.*
[8] Household assets offers a good proxy for wealth in rural places, like northern Mozambique, because:

- assets are less likely than income to change in response to short-term economic shocks;

ensures that we accurately capture the benefits of individual household goods or food groups. Certain household assets may be classified as "productive" or "non-productive." Productive assets are those with the potential to generate income directly or indirectly, such as a sickle, motorcycle or cell phone. Non-productive assets, like beds or plates, do not have the potential to generate income but are often necessary for day to day life. Similarly, more nutritious food groups were weighted more heavily considering their outsized contribution to nutrition security.

Qualitative analysis of the FGDs was conducted using the NVIVO 12 software, for latent content analysis, which uses lexical cues and indicators to understand the context and meaning of the text. The coding was done both inductively and deductively. A set of nodes, or themes, were first identified based on the research questions and theory (for example, specific Alliance interventions or attributes of human wellbeing). An iterative process of coding was carried out (see *Annex 5.4* for more detailed methods) that both deductively identified insights from the data, while also inductively allowing insights to emerge from the data.[9]

In brief, the qualitative analysis explores food and nutrition security through consideration of FGD passages focused on food access, production and quality. These discussions include community member perceptions of agricultural techniques, yields, food availability, food access and the ability to purchase food, food diversity, nutrition, seasonality and hunger. Meanwhile, qualitative exploration of wealth and economic wellbeing considered FGD discussions focused on income sources, savings practices, access to markets and financial services, inflation and related economic topics.

Limitations

The quantitative analysis of this project is significantly limited by several issues related to data collection. The first and most ubiquitous of these is sample size, i.e., the number of survey respondents. In many cases, when we attempt to disaggregate the sample by multiple variables (e.g., community, gender, intervention participation, etc.), we reduce our sample to less than 50 observations and thereby render impossible statistically significant analyses. Another major limitation of this analysis comes from issues of data availability for communities in 2014. In 2014, no data is available for communities that did not receive conservation interventions, i.e., received only development interventions or no intervention at all. This lack of data limits our ability to compare the impacts of conservation interventions with other interventions over time.

There are also issues with sampling methodology across all three household survey instruments (i.e., 2008, 2014, 2018 surveys).[10] While many questions were consistent across all surveys, there is considerable variation in questions between years, including wording and response options; these differences potentially bias responses and certainly limit comparability across instruments. Additionally, the data collection periods were inconsistent across instruments: while the 2008 and 2018 surveys were both collected in the August or September window, the 2014 survey was collected closer between

- asset measurements are less susceptible to voluntary and involuntary bias than sensitive questions about income; and
- Rural areas in lower-income countries remain less integrated in the market economy.

[9] See *Annexes 5.3. Qualitative Codebook* and *5.4 Extended Qualitative Methods* for more details on the qualitative analysis process, including final nodes, descriptions and examples.

[10] All three household survey instruments and associated codebook(s) can be found in *Annex 4. Quantitative Instruments and Codebook.*

March and April, closer to the hungry season.[11] These inconsistencies may limit the comparability of responses to key questions. For instance, dietary diversity is measured based on what the respondent reported eating in the last 24 hours, which may be highly influenced by season.

A final limitation is the multitude of response bias types associated with self-assessment measures of a phenomenon. These biases are well-documented in the scientific literature. A limitation for both the quantitative and qualitative analysis was the short timeframe (about four months) of the allocated to analysis. This short timeframe similarly limited our ability to contextualize the analysis in the context of peer-reviewed literature, which would strengthen the report's discussion. As with the quantitative analysis, a key qualitative limitation is associated with the more generalized limitations of data on qualitative perceptions. This limit the extent to which we can attribute perceived changes in food security and wealth to Alliance interventions or understand differences between individuals (e.g., men v. women) or groups (e.g., CBNRM committee members and non-members). While data on perceptions offers great value to conservation decision-making (Bennett 2016), it does not on its own, provide information on causation and limits the capacity for generalizing results.[12]

Moreover, answers to several research sub-questions require further analysis. Because the qualitative data was derived from FGDs rather than individual interviews, we do not have individual data on the respondents (e.g., gender, marital status) which limits the ability to make inference on impacts of the Alliance interventions. Thus, the results focus on synthesizing "general perceptions" of "community members", rather than specific statements about perceptions of different groups, attributions to particular actors or more general conclusions about the effectiveness of conservation versus development approaches.

[11] The "hungry season" is the period when some farmers' previous season of crops run out before the next is harvested. In northern Mozambique, some families experience food insecurity in January, most families experience food insecurity in February; depending on the year and the level of household vulnerability, food insecurity may extend into March.

[12] Bennett, N. J. (2016). *Using perceptions as evidence to improve conservation and environmental management*. Conservation Biology, 30(3):582-92. doi.org/10.1111/cobi.12681

Results

What are the social impacts of natural resource management in P&S?

Descriptive Summary of the Communities Surveyed in 2018

Figures 3 through *8 (below)* show the demographic breakdown for sampled households in Moma and Angoche Districts in 2018. Unless otherwise noted, all samples and figures include both participants and non-participants (most of the sample); as such, they give us a sense of the general profile of the region's population.

Only about half of all household heads are reported to have some primary education, with almost 35 percent of respondents reportedly having never attended school (see *Figure 3)*. Fully 60 percent of all household heads are illiterate, with only 40 percent reading and writing in Mozambique's national language, Portuguese *(see Figure 4)*. Macua is the dominant language spoken at home, followed by Koti (*see Figure 5)*. Language offers a good proxy for ethnicity: indeed, the Koti dominate the Koti Islands of Angoche but otherwise remain a minority in this region dominated by people of Macua descent. *Figure 7* demonstrates that just over two-thirds of households identify as Muslim and the majority of the remaining third are Christian. To conclude, the vast majority of those surveyed were men, with only 11 percent of households headed by women *(see Figure 8, next page).*

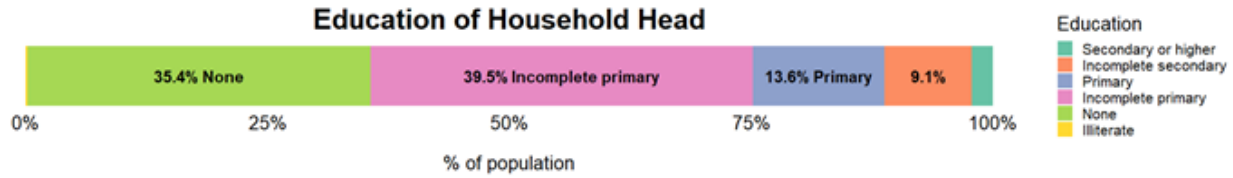

*Figure 3. **Education of Household Head*** shows the educational attainment of household heads as reported in 2018

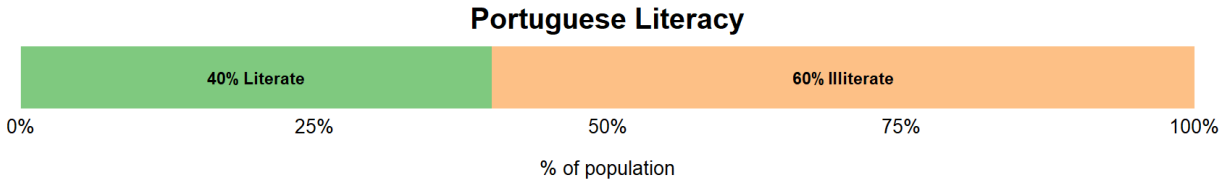

*Figure 4. **Portuguese Literacy*** shows the Portuguese literacy of household heads reported in 2018.

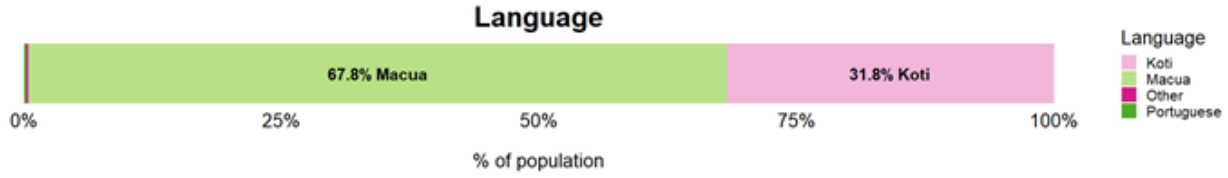

*Figure 5. **Language*** shows the primary language spoken in the home of household heads sampled in 2018.

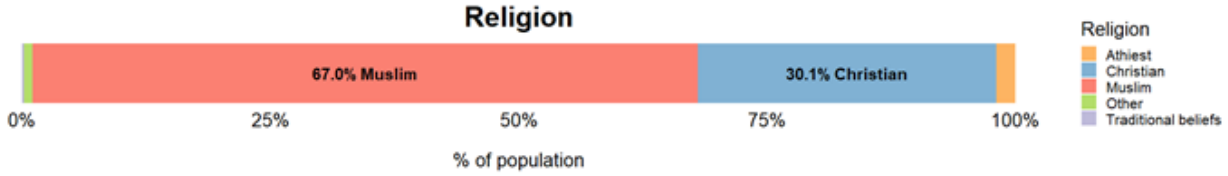

*Figure 7. **Religion*** shows the religion of 2018 survey respondents.

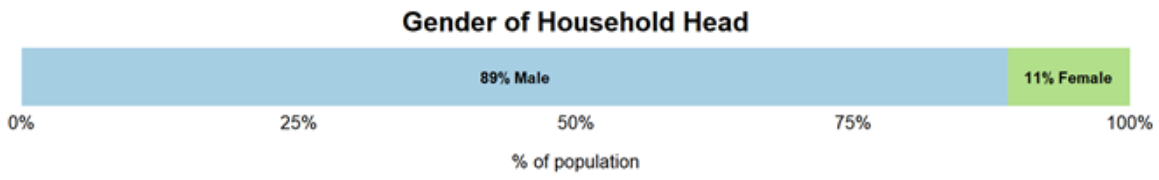

*Figure 8. **Gender of Household Head*** shows the gender breakdown of household heads in 2018, i.e., survey respondents.

What changes did communities experience in food security and wealth? (RQ1A)

Food Security

As *Figure 9 (below)* illustrates, agriculture is the primary source of food for 85% of the survey. 71% of households' food depends primarily on subsistence farming; farming for cash crops is the primary source of income for food purchases for another 14% of the survey. Local fish sales and other, including subsistence fishing, are the primary source of food for just 11 percent of the sampled population. *Figure 10 (below)* shows the stability of reported household dietary diversity in the region over time.

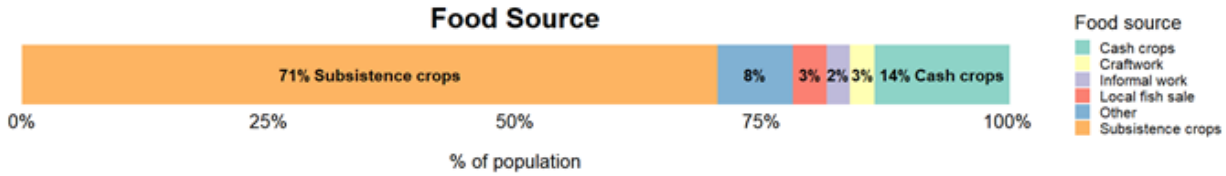

*Figure 9. **Food Source*** demonstrates the primary livelihood activities households use to produce or access food in 2018.

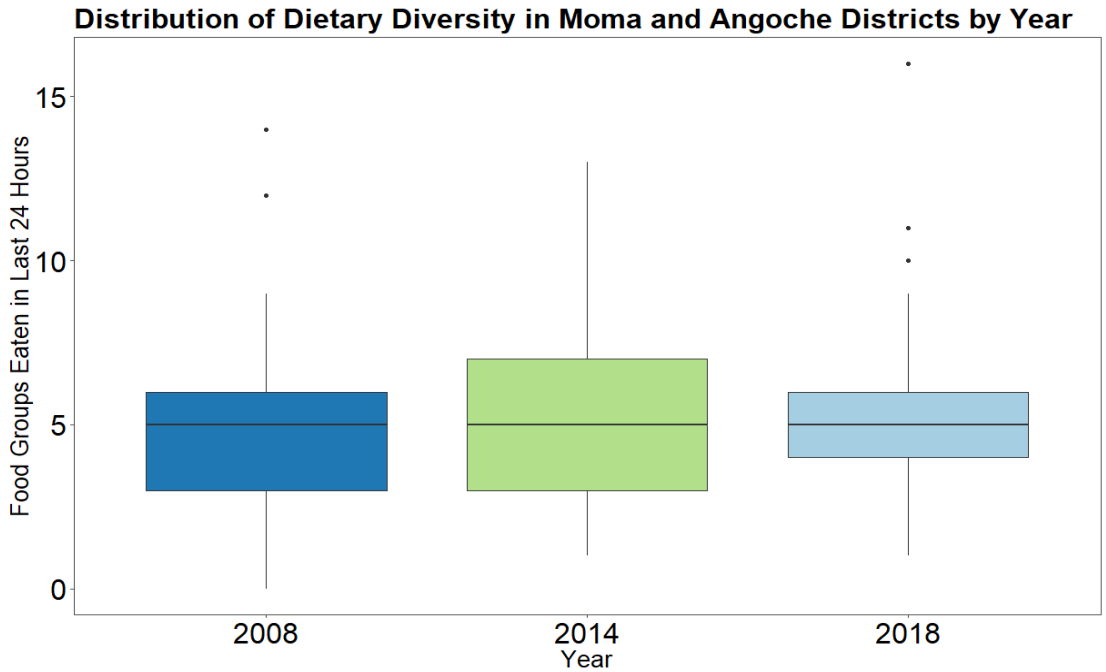

*Figure 10. **Distribution of Dietary Diversity in Moma and Angoche Districts by Year*** illustrates that overall, for both participation and non-participation in Alliance interventions, there is no statistically significant difference in nutrition security between years. The boxes represent the inner 75 of the data, with the black line showing the median.

The qualitative data offers more nuance. Many community members reported increased food and nutrition security due to Alliance interventions through increased crop yields, food access and diversity. Participants expressed no negative perceptions of FFS (described in more detail in RQ2A). NTZs were perceived as increasing food security when governed properly, but many challenges to good governance were identified (discussed in detail in RQ1B). Communities recognized the potential of other Alliance interventions to contribute to their food security, but perceptions of effectiveness were more mixed.

Overall, communities are highly dependent on natural resources for their livelihoods and food security. As such, their ability to secure enough food varies greatly from year to year. A woman in Macogone explains:

> *"Some years we are able to secure food, and others we are not."*

External drivers, primarily climate change and population growth, are perceived to prevent an overall improvement in food security. Particularly aggravating is the increasing unpredictability of rain pattern. Communities reported that they get either too much or too little rain. One man in Namiepe offers an example of the impact this can have on food security:

> *"It rained, and all the fields became flooded and from there all the cassava rotted, our animals - cattle, chickens and goats - started dying."*

A woman from Mingolene illustrates how, combined with global warming, too little precipitation is similarly destructive:

> *"There is a lot of sun and it ends up burning the crops."*

Population growth is also perceived to be detrimental to food security. There is a wide-spread perception that the growing number of people living in the communities is increasing pressure on already scarce food. A woman in Macogone explains:

> *"Before, there was a lot of food because there were not so many people. Her, for example, she has nine children, I have 12. Can food ever be enough under these circumstances?"*

Wealth

Most respondents rely on farming (45 percent subsistence and cash crops) or fishing (24 percent local and external fish sales) for income generation (see *Figure 11, below*).

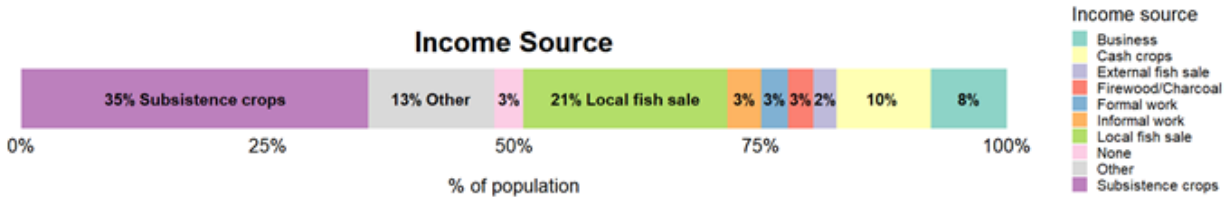

*Figure 11. **Income Source*** shows the primary livelihood activities households undertake for income in 2018.

The qualitative data confirms that the economic wellbeing of these communities is highly dependent on food, both agriculture and fishing. A focus group participant in Namiepe explains:

> "*We [get money by] sell[ing] the products of our agricultural fields, and the other part [of the crops] we reserve to consume*."

A man in Mingolene adds,

> *"There is a shortage of money because there is no fish in the sea… Fish are the basis for our survival."*

However, an increase in food production does not necessarily translate into increased income or improved wellbeing. Communities discussed a lack of good market access to sell excess agricultural production achieved through FFS, and how they were often forced to sell products at a low price.

One man in Macogone explains:

> *"We eat, but there is no money to buy products. We sleep this way because we do not have buyers for our products to buy a mattress."*

Compared to agricultural crops, communities perceive fish as a reliable source of income. For example, when asked how community members paid for the solar panels that were common in the community, they replied simply, "Fishing." While there is a general perception of decreasing fish stocks, there are no complaints about being able to sell fish. As such, when NTZs are functioning as intended, communities perceive that they positively contribute to wealth (for a more detailed analysis, see RQ1B).

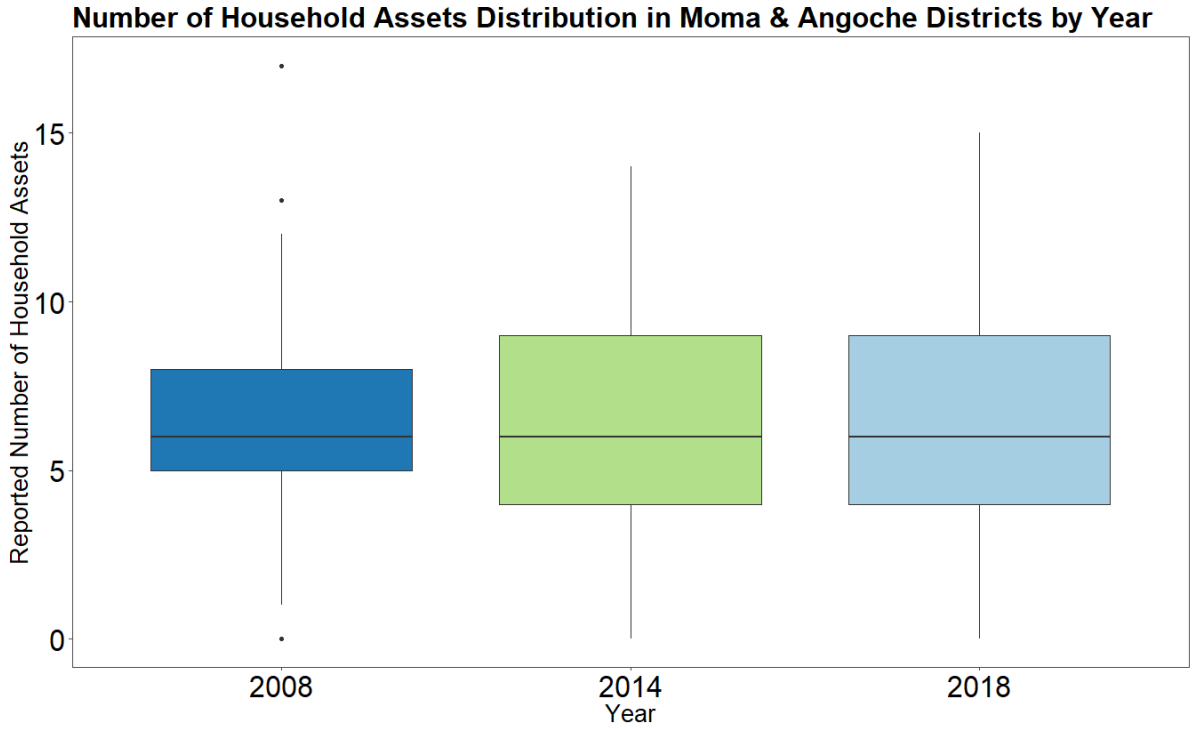

Figure 12. ***Distribution of Household Assets in Moma and Angoche Districts by Year*** illustrates that overall, for both participation and non-participation in Alliance interventions, there is no statistically significant difference in wealth between years. The boxes represent the inner 75 of the data, with the black line showing the median

Figures 12 (previous page) and 13 (below) show the overall stability in number and cumulative value of assets in households across the region over time. *Figure 13* disaggregates productive from non-productive assets, since productive can be used to generate income and, therefore, contribute disproportionately to the financial wellbeing of households. There is no statistically significant difference in the cumulative value of productive or non-productive assets over time. It is noteworthy, however, that households' non-productive assets seem to have greater cumulative value than their productive assets.

Figure 14 (next page) illustrates that, while the total number of assets doesn't change, there is a marked increase in some key productive assets, such as cellphones, between 2008 and 2018.

Community members felt that they have more goods and commodities today compared to the past. Community members reported that the Alliance VSLAs and similar informal savings mechanisms facilitate the acquisition of assets, i.e., accumulation of wealth. A man in Namame says:

> "*It makes a lot of difference to save, because we can buy a lot of things, such as a bed and mattress.*"

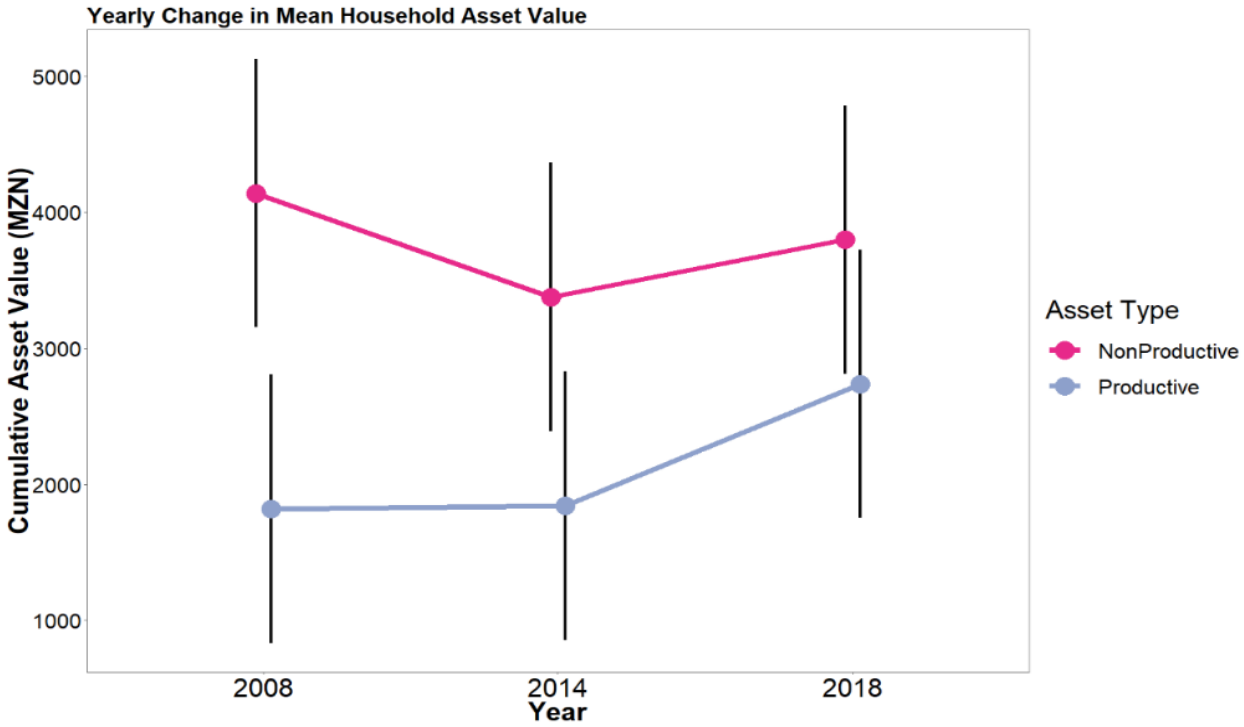

Figure 13. ***Yearly Change in Mean Household Asset Value*** shows the change in mean and standard deviation of the cumulative value of all household assets for the same sampled households across the key communities at three points in time.

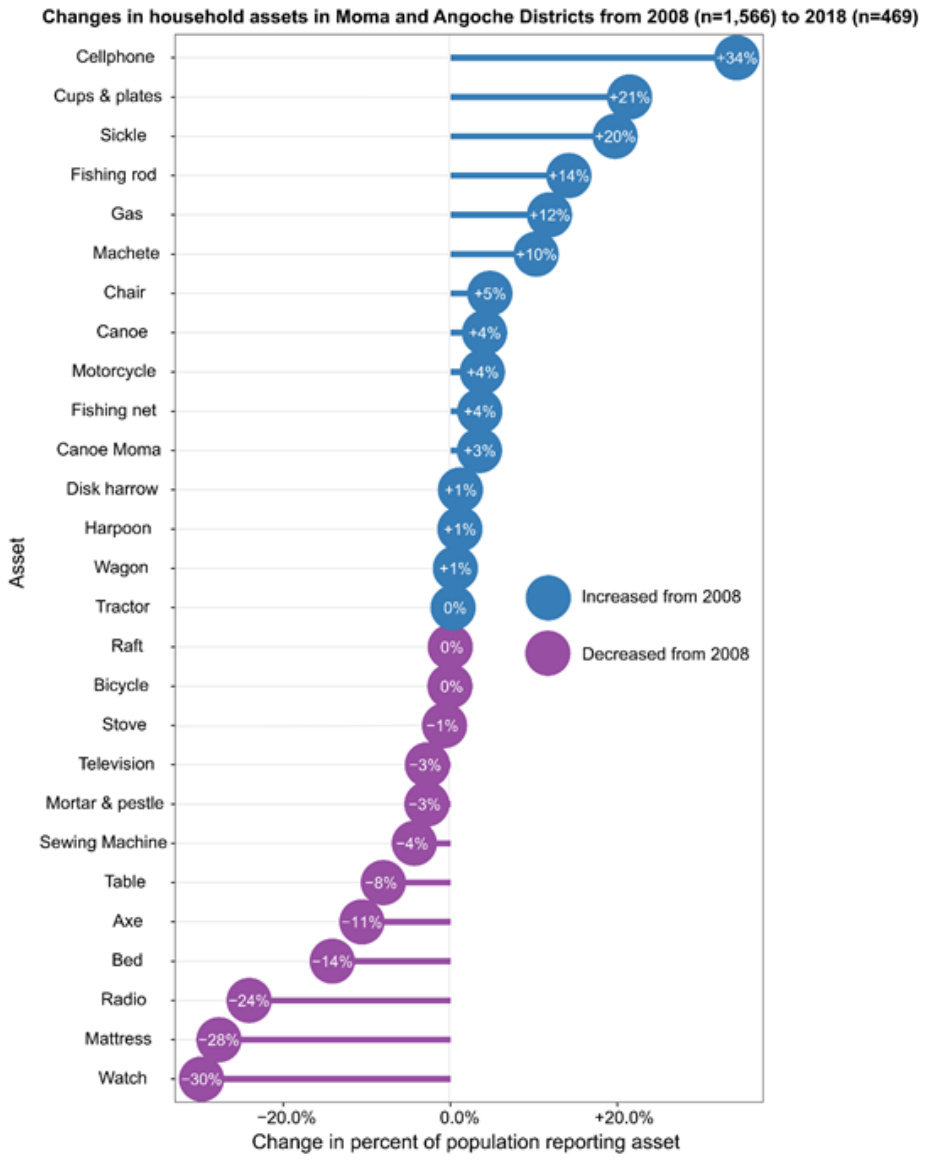

Figure 14. Changes in Household Assets in Moma and Angoche Districts from 2008 to 2018 shows the change in the percentage of households, regardless of participation in Alliance interventions, reporting each asset before and after interventions.

Compared to 10 years before, a woman from Pulizica agrees, that compared with ten years ago:

"*[Today we have] chairs, TVs [and] solar panels; we no longer use oil lamps*."

Focus group participants often cited as new their households cell phones; the quantitative data affirms a 34% increase in ownership over the decade. According to insights from field staff, such new purchases may represent asset substitution. For example, it's likely that two assets, watches and radios, have been replaced over time by cell phones, which offer both services in a single asset.

Communities also discussed how low purchasing power has resulted from the inflation of the Mozambican Metical since 2016. A woman from Manene says,

> "*Before, we had little money, but we were able to buy a lot, but now things are too expensive to buy*."

Communities perceive the lack of alternatives to fishing and farming activities as limiting wealth accumulation and the potential for economic wellbeing. A woman in Corane offers,

> "*When people have money, they do not fish; but when they do not, they turn to the coast for fish to sell.*"

When asked if the number of fishermen has increased over the last decade, she replies,

> *"Yes, because that is the only work available."*

To what extent are community-managed fisheries, mangroves, and forest interventions correlated with changes in community food security and wealth? (RQ1B)

This section examines specific CBNRM interventions – community-based NTZs, mangroves and forest management, in turn – and the extent to which they contributed to changes in food and wealth in the sampled communities. *Table 4 (below)* summarizes what proportion of the sampled households lived in communities that received each CBNRM intervention. We conclude by exploring the correlation between CBNRM interventions and dietary diversity, and the critical role of CBNRM committees in delivering sustainable conservation benefits, including but not limited to food security.

Table 4. ***Households Surveyed in Communities with CBNRM Interventions***

Intervention (Year)	**Surveyed Communities**	**Survey Responses**	**Proportion of annual sample used for this analysis**
Fish NTZ and mangrove interventions (2008)	2	65	35%
Fish NTZ and mangrove interventions (2014)	3	136	100%
Fish NTZ (2018)	4	203	43%
Miombo Forest Management (2008)	2	63	34%
Miombo Forest Management (2014)	1	58	43%
Miombo Forest Management (2018)	2	109	23%
Fish NTZ (all)	4	404	51%
Mangrove Interventions (all)	4	404	51%
Miombo Forest Management (all)	2	230	29%

Community-Managed No Take Zones

Alliance-supported, community-managed NTZs are distinct from government fisheries laws, such as the seasonal shrimp closure, in that they are year-round prohibitions of any extraction from a zone agreed with the surrounding communities. It is noteworthy that the Alliance went through an extensive process of social and ecological validation prior to siting the zones, and they were often areas that were traditionally off-limits because of their productivity as fish nurseries.

Figure 15 (next page) illustrates that the proportion of community members who reported household benefits from NTZs dropped from almost four-fifths to just over half between 2014 and 2018.

The qualitative findings confirm the trend displayed in *Figure 15.* FGDs confirm that community members supported NTZs and felt they benefited from them. When they were functioning, community members reported what the Alliance found in biophysical surveys (2014) – that fish increased in quantity, size and diversity of species. A woman from Mingolene says,

> "*Three years ago, since they set up the sanctuary, we have had fish… There are big fish and there are also many fish, we see them jumping. There is also shrimp [and] little fish.*"

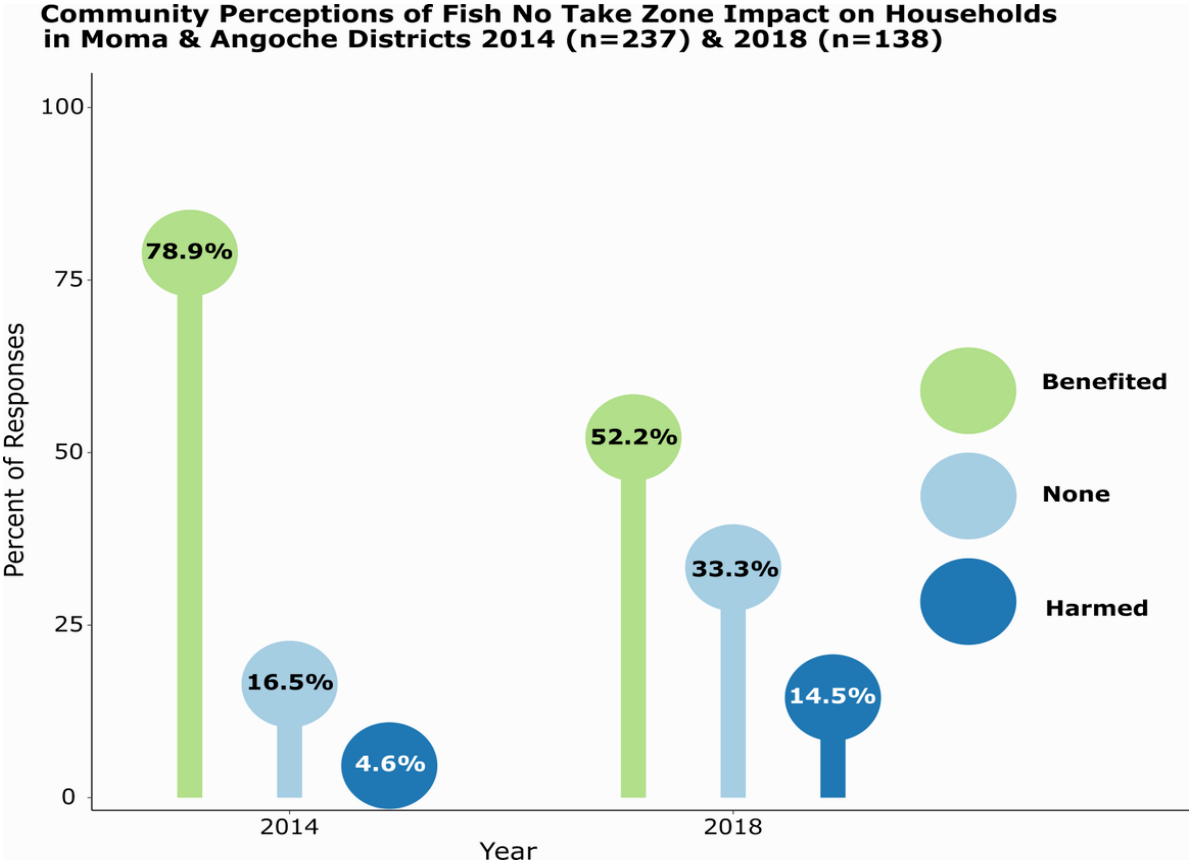

Figure 15. Community Perceptions of Fish No Take Zone Impact on Households in Moma and Angoche Districts in 2014 and 2018 shows the changes over time in perceptions of NTZs across communities.

A man from Corane adds that, due to his community's NTZ, fish capture and income increased:

> *"There are [valuable species of] fish, which had disappeared a long time ago, that have reappeared."*

A CBNRM committee member from Pulizica explains:

> *"There is part of the population that has a positive sentiment [toward the NTZ] and others that don't like it… Those that appreciate the benefits are the majority."*

However, such positive perceptions appear to last only if NTZ governance remains strong. Strong governance entails a good relationship with WWF and/or the government, as the CBNRM committee in Corane explains:

> *"Whenever anything happens in the sanctuary, we call, and the government appears. Because two, three, four, five years have already passed, so everyone knows [the rules]. Now, if someone is found [violating them], they go to jail."*

As WWF reduced its enforcement support in most communities between 2014 and 2018,[13] the direct line to the district government often faded and community enforcement began to decline. A man from Manene says:

> "*Those who go in the mangroves know, back in the day [when] we used to control the sanctuary, there were a lot of fish. If monitoring were still in effect, we would have a lot of fish there.*"

When NTZs stopped working as intended, community perceptions about them started to shift. More detailed analysis of these issues follows, including the strengths and challenges of each conservation intervention and how they potentially contributed to food security and wealth.

Communities report significant challenges to proper implementation of the NTZs at the community level. First, CBNRM committees struggled to monitor and enforce the fish sanctuaries because of the personal costs. The demanding schedule of devoting one to several days a week to monitoring and enforcing the area took time away from productive household activities, such as agriculture and fishing. A male CBNRM committee member in Pulizica says,

> "*We are tired of monitoring the sanctuary, we are not getting paid.*"

Others in the same committee complained that NTZ monitors go hungry and lack clothes. A male CBNRM committee member from Mingolene explains:

> "*Our clothes would [get] torn and we did not have money to buy new ones, so we preferred to look for snails and sell them in the village instead [of monitoring the NTZ*]."

Second, CBNRM committees struggle with legitimacy. CBNRM committee members complain that the lack of uniforms and credentials undermine their ability to enforce rules with violators. This sometimes creates conflicts, a social cost to committee members living in tight-knit communities. CBNRM committees felt they could not sustain the burden of enforcement alone. Historically, when repeat violators were caught, a call to WWF would result in a rapid response visit from WWF or a District government official[14] to jail or fine the violator. After WWF's withdrawal of regular technical and enforcement assistance, the connection to the District government was also severed; within a year or two, community enforcement tended to relax, and compliance dropped. A hypothetical exploration with Mingolene's CBNRM committees regarding the potential of reinstating the NTZ single-handedly received this telling response:

Photo 2. In Pulizica and other communities with no take zones, a sign communicates the boundaries to fishermen and other natural resource users.

> "*No, they will beat us without government [or WWF] help… We understand that it [the NTZ] is a good thing, but we have no alternative.*"

Indeed, the final challenge to NTZ implementation is the basic human need to eat. CBNRM and community members, alike,

[13] Reduction in Alliance technical support and/or WWF exit from these communities tended to occur due to a decline or cessation of funding. The exact timeline of reduced support varied by community.
[14] The responsible government agency at the district level is Serviços Distritais de Actividades Económicas (SDAE).

clearly understand they will have more fish soon if the NTZs are respected. But, as a CBNRM committee member from Manene explains,

> *"[The community] understands [the reason for the rules] but disrespect them, because we can't feed the children and there is no alternative."*

A male CBNRM committee member in Mingolene adds,

> *"[People] are afraid because it is forbidden, but they violate the rules because they are hungry… We [still] sometimes try to prohibit [fishing], but there are times that we ourselves will fish even knowing that it is forbidden, because of hunger."*

Figure 16 (below) shows that NTZs are associated with stability in the number of days households reported eating seafood in the previous week from 2014 to 2018. However, households in communities without NTZs reported eating seafood one day fewer in the previous week relative to communities with NTZs. Men from Manene explain that, generally:

> "*Back in the day [a decade ago], there were many fish, but now there are fewer."*

Women from Corane confirm:

"Understand, our husbands go to look for fish, but because the number of fishermen is great, [they come back with few]. If we didn't the sanctuary, the situation would be worse. There is fish reproduction

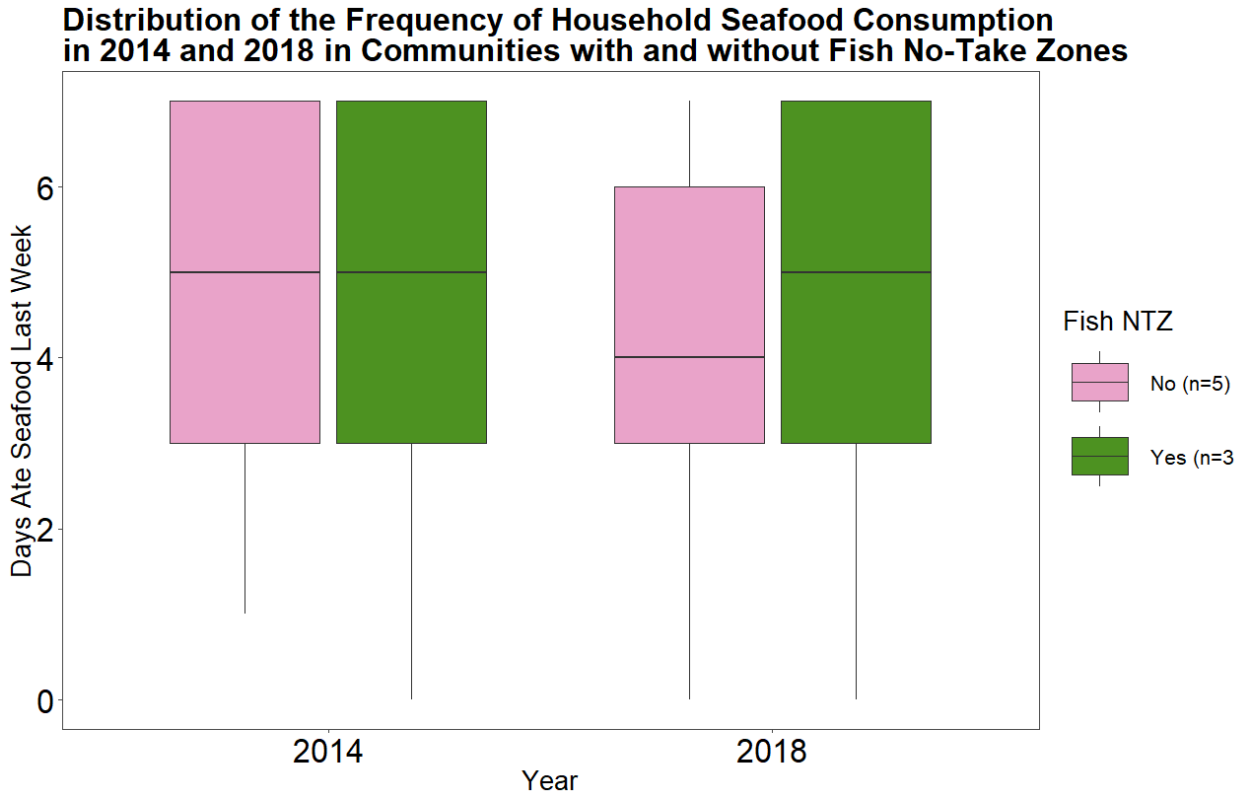

Figure 16. ***Distribution of the Frequency of Household Seafood Consumption in 2014 and 2018 in Communities with and without Fish No-Take Zones*** shows the change in the number of days households reported eating seafood the previous week between 2014 and 2018. The box color differentiates communities who are implementing fish NTZs (Mingolene, Pulizica, and Corane) from those that are not (the other five communities).

[in the NTZ], but there are also too many fishermen… because that's the only work available."

While seafood consumption by communities without NTZs interventions fell due to diminishing stocks, communities benefiting from NTZs continued to eat seafood with the same frequency. NTZs contribute to more fish and – whether captured in the spill over or via NTZ fishing that violates the governance rules —increased food security. Since fish are also economically valuable, a well-enforced fish sanctuary has the potential to contribute positively to wealth (as demonstrated in RQ1A). However, single women may not benefit from NTZ benefits as much as other groups since fishing is a male-dominated activity *(see also RQ2C).* That said, in one instance where community members agreed that, when fish were abundant, even single women benefitted because, at the time, "*fish was cheap."*

Community-Managed Mangroves

Relative to NTZs, community mangrove interventions were less systematic Alliance conservation interventions in the coastal communities sampled. In NTZs, mangrove extraction, like fish extraction, was forbidden. Beyond that, additional Alliance interventions in a smaller set of those communities included the introduction of mangrove management through selective harvesting of a community's mangroves or rotating extraction of smaller zones to allow for regeneration. Where the area had been previously denuded, the Alliance sometimes facilitated mangrove replanting events. Because of the lesser focus on mangrove interventions, FGDs featured relatively little discussion about them, as well.

Photo 3. Fresh mangrove stakes in Mingolene.

When discussed, communities perceived them positively. CBNRM and community members demonstrate a sound understanding that mangroves serve as nurseries for invertebrates that people depend on. That's why the CBNRM committee in Corane took it upon themselves to prohibit activities in the mangroves near the community:

> *"Because if they cut the mangroves and capture the crabs, there will be scarcity of crabs and they will destroy the house of the crabs… The day that we say they could take snails [from the mangroves], the snails would be gone in three days. This is a thing we are leaving for the future of our grandchildren… Our children already understand because they see things."*

Indeed, community members in Manene explain that mangrove replanting and protection is in their interest because, when they grow:

> "*They get full of shrimp and crabs—it's where they lay their eggs and reproduce… it is a breeding site for species.*"

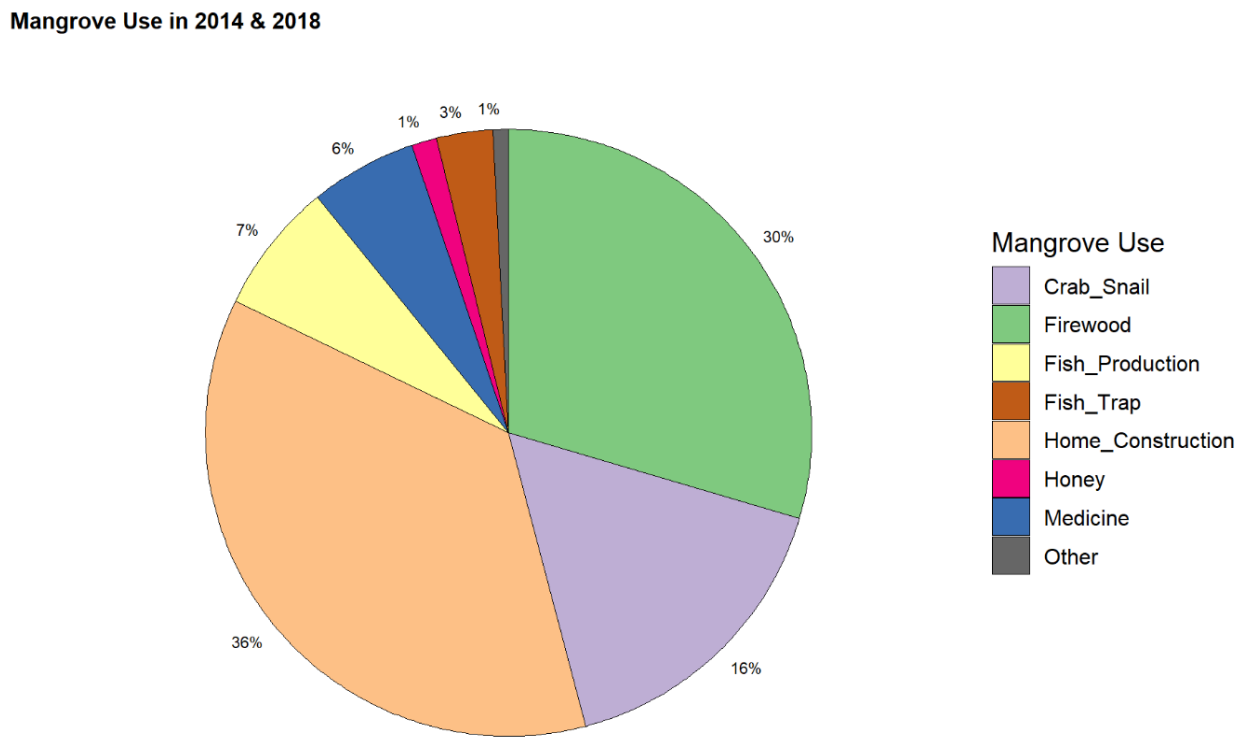

*Figure 17. **Mangrove Use in 2014 and 2018*** is a pie chart that shows the diverse ways in which 47 percent of the sampled households reports use mangroves (281 of 605 households across the two years).

Community members also perceive the importance of mangroves for avoiding erosion and protecting their communities from extreme weather events. In Pulizica, a CBNRM committee member confirms that, for this reason, they still enforce the prohibition on mangrove extraction from NTZs:

> "*You cannot cut here because it will deepen the sea.*"

A community member from Mingolene affirmed that when the community was practicing mangrove management,

> "*We saw benefits. I know that when people cut the mangrove, the sea water comes with more force and invades [our village].*"

That's why, on several occasions, there were calls for more support in replanting. A male CBNRM committee member requests:

> "*We just want you to strengthen mangrove planting… to avoid erosion*."

Figure 18 (previous page) shows the diversity of mangrove uses by households in the region. The most common uses, home construction and firewood collection, constitute 60% of all mangrove use. Another 26% of use is associated with fish production, seafood capture and gleaning of bivalves.

Indeed, community members report that mangroves provide wood for various domestic uses. They also perceive that Alliance mangrove interventions serve as nurseries that can help to restore fish and invertebrates' populations. In FGDs, community members shared that they use the species that live in

mangroves for food; in the increasingly rare case of a surplus, they may sell excess bounty for additional income. A woman in Mingolene explains:

> *"Back in the day when we would catch shrimp and crabs, we would get a lot and so the money was also a lot. But now there is less shrimp and crab, so money is also little."*

Mangroves are important for infrastructure construction and energy, as a man in Mingolene adds:

> *"We use [mangrove] wood for the construction of houses, and for firewood."*

It is notable that bivalves and other invertebrates are particularly important for women, who rely heavily on these as supplemental sources of food, and to a lesser extent, income. When asked who experiences the most food insecurity, Mingolene's women explain that single women suffer the most.[15] They have difficultly, for instance, coming up with the money to buy fish:

> *"Single women can rely only on the farm, but when the sun is like this [so hot], there is no way [to produce enough food… so they fetch snails and clams from the sea] to eat."*

Therefore, mangrove protection has the potential to contribute positively to food security and wealth (in the form of secure housing), including for the most vulnerable community members.

Community-Managed Forests

Like community mangrove management, community coastal forest and miombo management was less of an Alliance focus than NTZs. However, in communities that relied heavily on such forests,[16] the Alliance raised awareness about forest laws, including the prohibition on cutting and hunting of protected tree and animal species. The Alliance also encouraged best forest management practices, such as selective harvesting, controlled burns and abandonment of slash and burn agriculture to open new fields (a best practice also encouraged through FFS).

Community members perceived several benefits from community forest management – that, as with NTZs, disappeared as enforcement and compliance declined. As with declining fish stocks, the overarching perception is that forest cover and access to forest resources is declining. Men in Manene explain:

> *"Here, we had big trees and good agricultural fields… [Today people] are making charcoal and forest fires are increasing. Now to find [timber] for construction is a big problem [and access to firewood] is worse."*

First, FGDs showed that, when implemented well, community forest management increased abundance and accessibility of forest resources. During the period that Namiepe's CBNRM committee was enforcing the community governance rules, they report:

> *"Many [community members] liked it because it was faster to gather grass and stakes to build houses."*

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[15] In FGDs, communities also recognized children and elderly were also recognized as particularly vulnerable groups.

[16] Time was limited to perform a quantitative analysis of community forest use (similar to the pie chart on mangrove use), but that the data exists for further research (see also *Recommendations for Further Research and Analysis*).

When WWF was providing technical support, a Namiepe community member explains that they did "not have to go far." Another community member agrees:

> "*I share these ideas. I liked the rational use of the forest because it benefitted us in the construction of houses.*"

WWF's role in protecting the forest was vital, as this quote illustrates:

> *"Whenever we would find someone violating the rules, we would seize the products and the person. Whenever we could not solve the problem, we reported the case to WWF and they would come [to assist]."*

Another CBNRM committee member explains,

> *"In the past we had manager called WWF and we monitored that forest. We always prohibited the cutting of small trees and sent a report to WWF. But after management left, we didn't have anyone to send our report to, so we stopped [monitoring]."*

A female committee member from the same community adds,

> *"Things have changed since WWF has left. Now we have to walk long distances to get firewood."*

Second, the forest supplements agriculture and fisheries in the provision of wild food stuffs, including fruit and, to a lesser extent, small game. Women gather wild tubers that help to smooth household consumption during the rainy season (usually between April to September). However, women complain that this source of food is decreasing as forest management has faltered.

Third, as with community mangrove conservation, communities report that standing forests can increase protection against weather events and natural disasters, like strong winds and rains. In Corane, where forest management is still being implemented, a community member explains:

> *"The trees are growing more in the forest. It was worth not cutting the trees because [now] when the wind blows, it does not come very strong, it comes normally [and] the rain does not come with a lot of strength."*

Photo 4. Charcoal for sale on the road between the city of Moma in Moma District and the city of Nampula in Angoche District.

Finally, communities shared that forest management reduces the incidence of destructive, uncontrolled forest fires. However, because forest management was always implemented alongside FFS, it is difficult to tease out the impacts of one intervention from the other. What seems clear is that communities understand that avoiding burns on agricultural land – through controlled burns in forests and replacing slash and burn with minimum tillage as a method of preparing new fields – reduces fire-related accidents and improves on-farm soil fertility.

When CBNRM committees enforce natural resource management rules and communities comply, there is a shared perception that forest management is beneficial to both forests and the people who depend on them. Yet the challenges associated with forest management are similar to the NTZs – and, in some cases, more extreme. For instance, while NTZ monitors were usually provided canoes in which to monitor, the Alliance did not equip forest monitors with the necessary materials to do their job. A CBNRM committee member from Namiepe explains:

> *"WWF came here, took some people from here to indicate the boundaries of our forest, and were supposed to bring the signs, but they never came back."*

Another member of the same committee says,

> *"We never did [controlled fires on our own. WWF] taught us, but we did not continue because they had their own tools to make the fires cool, and we do not have them."*

A woman from Namiepe's committee adds,

> *"I cannot go control [the forest] without boots; there have to be boots."*

This quote from Manene illustrates this challenge was not an isolated event:

> *"The thorns puncture our feet… we are working but we do not have working tools to manage a forest."*

Without such material support to CBNRM committees, sustained conservation benefits remain elusive. As with NTZs, the immediate costs of forest management accrued disproportionately to the CBNRM committee. This may be especially true during natural disasters, such as cyclones and floods. A man in Namiepe explains:

> *"Everyone was affected. Nobody had food, hunger was widespread – but those monitoring the forest, they were really suffering."*

A committee member from the same community adds,

> *"[WWF] said that they were going to bring us uniforms and we waited but they never sent it. Then the community found out that the WWF had left and began to disrespect the inspectors… we feared for our lives."*

A CBNRM committee member from Manene explains:

> *"When we go in the forest, people say, 'Those crazy people are coming.' They get a machete and they start to chase us, [saying,] 'We're going to catch one of the committee members here today! Who are you? You have no [official] document, you do not get paid – why are you forbidding us from using this forest?' [They] despise us a lot."*

Another CBNRM committee members from Namiepe adds,

> *For 2 years [after WWF left, we continued to monitor the forest]. But after the population realized that the WWF was gone, they began to invade the forest and to disrespect the monitors… Even the committee ended up giving up, because they didn't even have boots, or hats or gloves ... They*

stopped controlling and they themselves stopped respecting [the rules. Since] even they no longer respected them, if they spoke up [today], nobody would respect them."

To summarize, community members use forests for fruits, tubers, game animals, as well as timber, wood and straw for infrastructure and firewood. Communities also report that forests can protect the villages against strong winds and other extreme weather events. Well-managed forests have the potential to increase food security and safeguard wealth through materials for building sound infrastructure and natural protection from climatic events that might otherwise destroy assets and shock household economic systems. However, better governance systems must be put in place to sustain these benefits.

The Role of CBNRM Committees in Delivering Community Conservation Impacts

These interventions were not associated with any significant change in the reported household economic wellbeing (total household asset value or weighted household asset value).

However, in 2008, communities who would later receive conservation interventions reported eating significantly fewer food groups. By 2018, this difference was no longer present (see *Figure 18, next page)*. Communities receiving conservation interventions — community-based NTZs, mangrove management and/or forest management — reported a statistical increase in food group consumption, whereas communities receiving no intervention or only a development intervention reported no change in dietary diversity.

This suggests that coastal communities where the Alliance implemented conservation interventions were relatively less food secure than other coastal communities in 2008; this makes sense, given that a majority of the communities implementing NTZs (for instance) live on islands with poor, sandy soils and few livelihood alternatives to diminishing fisheries. NTZs, when functioning as intended, are perceived to increase not only fish quantity but also seafood diversity. Similarly, well-protected mangroves serve as

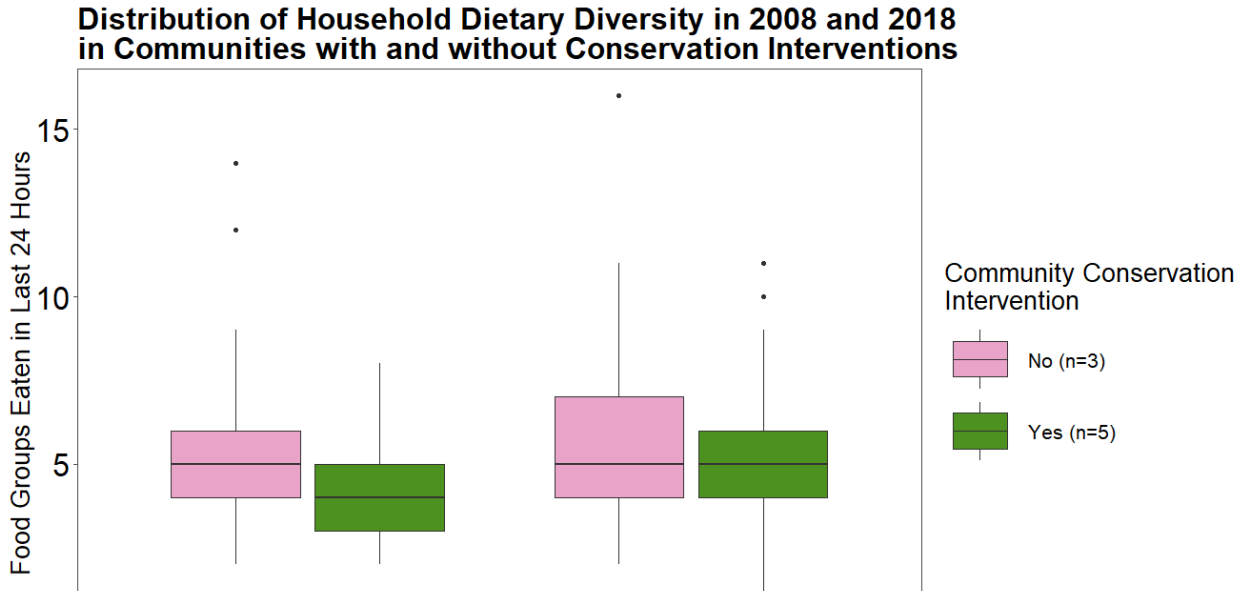


Figure 18. ***Distribution of Household Dietary Diversity in 2008 and 2018 in Communities with and without Conservation Interventions*** shows the differential change over time in reported nutrition security – before conservation interventions and ten years later – between communities that participated in a fish, mangrove or forest management initiative and those that that participated a development intervention or none at all.

nurseries for many species of fish and invertebrates. Finally, well-managed forests can also contribute to increased food diversity.

As the delivery mechanism for community-based conservation interventions, CBNRM committees are a major determinant in intervention success or failure to deliver ecosystem benefits and services, including food provision. In discussions, committees and communities report that these committees functioned effectively in the past. All committees and most community members understood the benefits of CBNRM.

As CBNRM committee members from Pulizica explain, they were open to forming a committee because the community was suffering:

> *"We didn't have [fish for] curry. We were unable to obtain money to buy clothing for our children. [But] today things are different… because we can go to the beach and capture fish. And some sell and others use [them] for curry. There weren't mangroves there [previously]."*

Committee members from Pulizica explain that they shepherded this change through a combination of awareness-raising, warnings and enforcement:

> *"[Our role is to] prohibit… to say, 'Leave that here… you cannot fish [or glean] in the sanctuary… When we capture [someone in violation], we sensitize them, saying how their actions create suffering for everyone – that even those of us who are prohibiting fishing are not taking anything… If the person continues, the second time we find them, we say, "Today we're not going to pardon you because we warned you. You are contributing to hunger for all of us, so we're going to turn you into the government.'"*

However, at the time of data collection, the CBNRM committees across all natural resource bases struggled with the same three challenges explored in depth for NTZs:

1. *Opportunity cost for CBNRM leaders.* Given the lack of appropriate materials and financial compensation or in-kind benefits, CBNRM committees experienced disproportionate and immediate costs associated with doing their jobs.
2. *Lack of legitimacy.* CBNRM committees also felt ill-equipped to do their jobs sans uniforms, committee cards and other symbolic demonstrations of social legitimacy. CBNRM committees also struggled due to lack of clear boundaries around managed resources and insufficient support from nested natural resource governance structures (see also Ostrom's principles in *Table 2, p. 14*).[17]
3. *Trade-offs with basic needs.* Without adequate community enforcement and compliance, more pressing needs (namely, immediate food and accessible construction and energy sources) won out and the medium to long-term benefits from conservation, which would have accrued to the wider community, were undermined.

[17] As noted in *Recommendations for Further Research and Analysis*, time was limited to analyze the CBNRM committees against Ostrom's principles; luckily, this analysis will be completed in the context of a social and environmental risk analysis planned for the inception phase of a new project in P&S. Cursory analysis suggests that nested governance is particularly important. During the period that CBNRM committees received WWF and/or government support, the CBNRM committees functioned relatively well. When Alliance support ceased, this often resulted in severed ties with the District government that had doled out penalties to violators. Without the support of these authority figures, CBCNRM committees not only seem to slowly lose motivation (due to the previously described challenges), but people around them seem to stop respecting their enforcement authority. Then, conflicts arose with more frequency both between local users and with users from other communities.

How do impacts vary between those who participated in conservation interventions, development interventions, both, or neither?

To what extent do changes in food security and wealth differ between communities that participated in both CBNRM and development interventions compared with those that participated in one or none? (RQ2A)

As *Figure 19 (below)* illustrates, community conservation interventions were associated with 25% increase in nutrition security between 2008 and 2014. This effect is no longer present from 2014 to 2018. Similarly, in *Figure 20 (next page),* we do not see a clear trend in the impact of community interventions on wealth (weighted Household Asset Index) compared to communities without interventions. Due to the small sample size, broadly, and lack of 2014 development-only or no-intervention communities, specifically, it's impossible to draw meaningful conclusions.

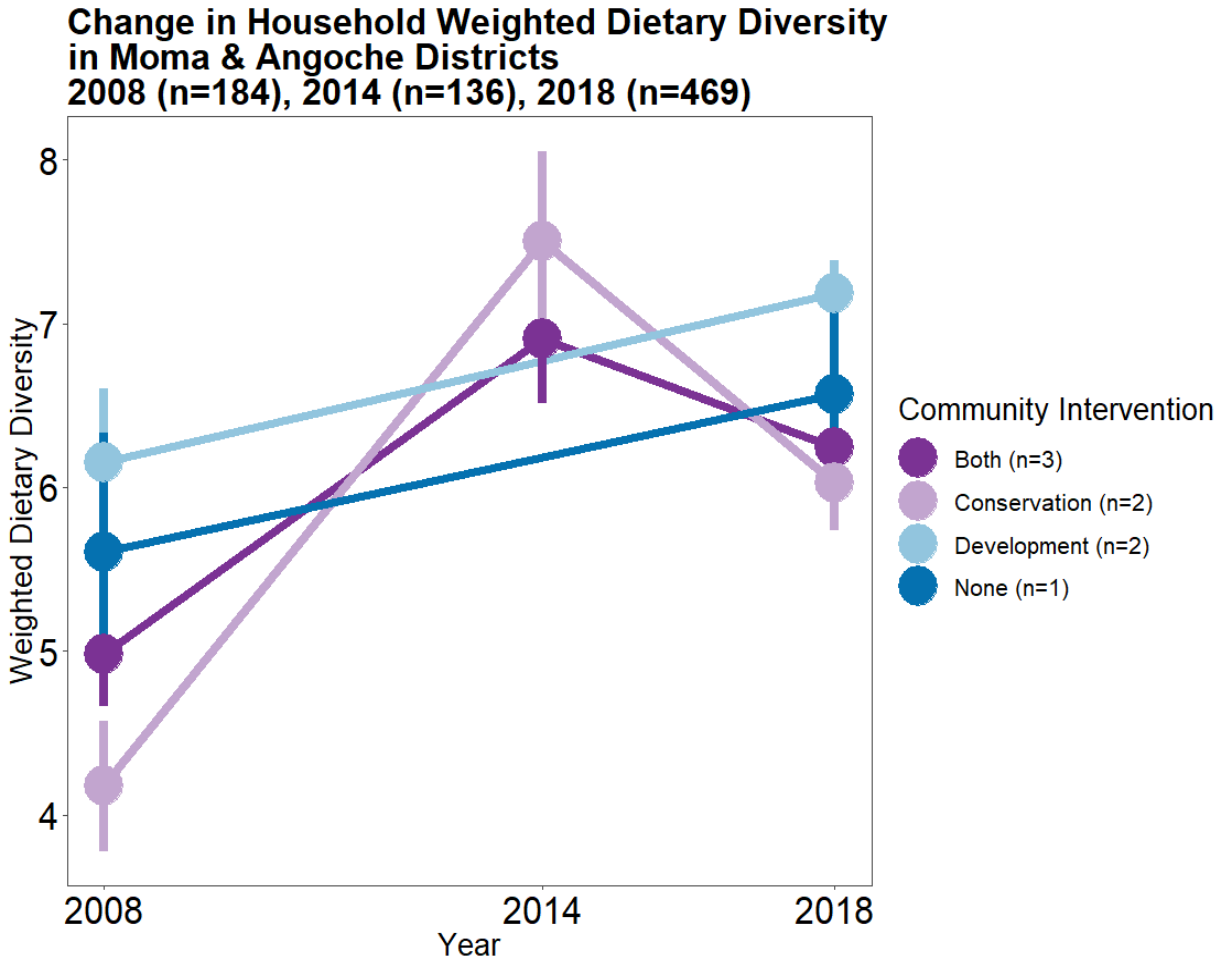


Figure 19. ***Change in Household Weighted Dietary Diversity in Moma and Angoche Districts*** shows the change over time of the mean and standard error of the weighted Dietary Diversity Index for the eight communities. We do not have data from 2014 for communities with no intervention or only development interventions because all communities sampled in 2014 received conservation interventions.

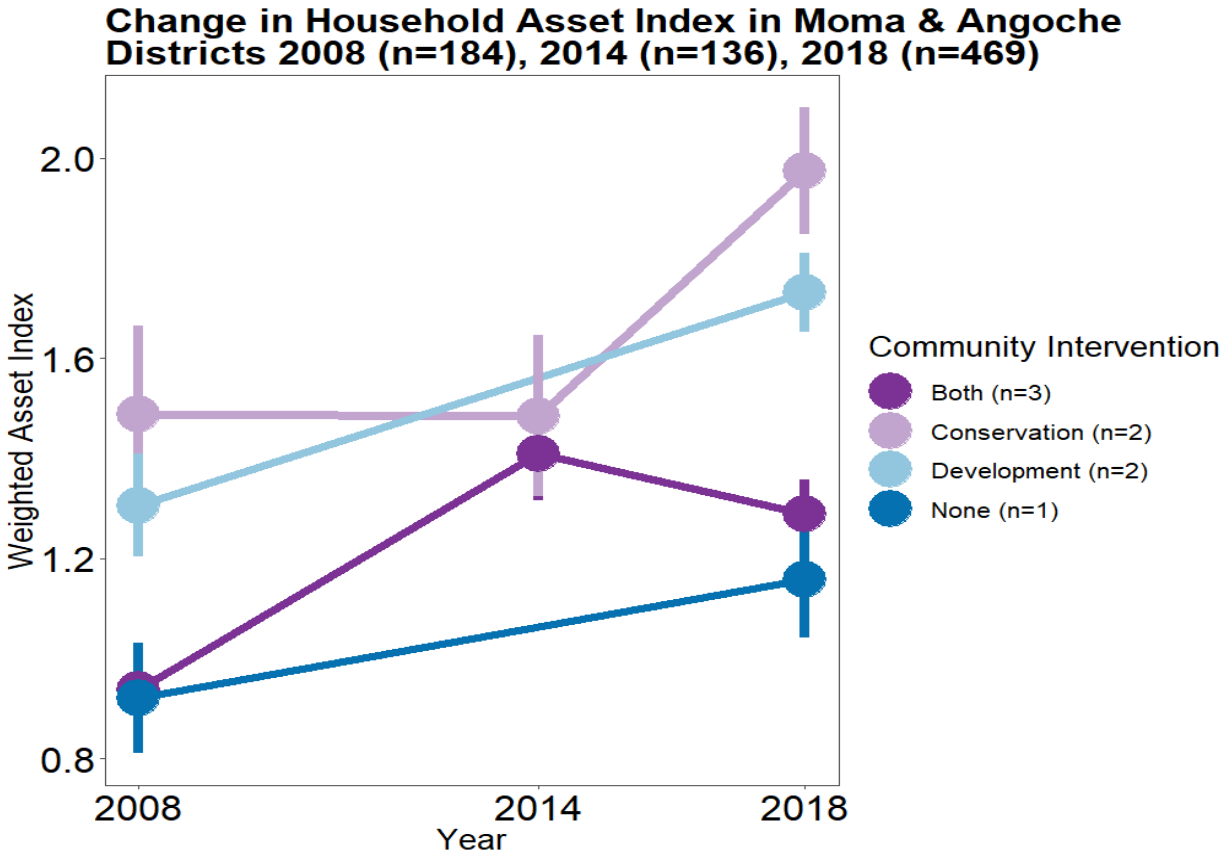


Figure 20. ***Change in Household Asset Index in Moma and Angoche Districts*** shows the change of the mean and standard error of the weighted Household Asset Index for the eight communities between 2008 and 2018. Again, we do not have data from 2014 for communities with no intervention or only development interventions because all communities sampled in 2014 received conservation interventions.

The qualitative data also fails to offer a satisfying answer to this research question. However, the qualitative data does offer insights into the strengths and weaknesses of each of the development interventions. As with the previous section focused on conservation interventions, we will now bring to bear FGD insights in exploring how each development intervention, in turn, may contribute to food security and wealth, respectively.

The qualitative data suggests that development interventions provide more immediate benefits to communities than conservation interventions. While conservation interventions require time and personal investment for a diffuse, communal benefit in the medium to long term, development interventions are implemented by individuals who directly benefit, as well as experience, in the short run, any costs to implementation. Indeed, FGDs reveal that there are more positive perceptions about Alliance development interventions: for instance, communities expressed no negative perceptions with FFS, including improved seed distribution, Water Sanitation and Hygiene (WASH) or nutrition interventions or their perceived impacts on wellbeing.[18] Usually, when communities characterized

[18] Because Water Sanitation and Hygiene (WASH) and nutrition interventions were not a strong focus of Alliance programming, the household survey did not include questions to assess their impacts. Similarly, they were not explored in depth through FGDs. However, scarce qualitative evidence suggests strongly positive community perceptions of these Alliance interventions, including direct and indirect pathways of improved nutrition (respectively). An explanation of what each intervention entailed, and evidence of their effectiveness is presented in *Annex 2. Illustrative Findings from Other Alliance Interventions.*

development interventions as neutral or ambiguous, it was due to larger systems challenges only tangentially related to Alliance implementation of the intervention.

Development Interventions' Contributions to Food Security

Farmer Field Schools, Including Improved Seed Distribution

FFS, an adaptation of CARE's Farmer Field and Business School (FFBS), is a participatory, women-focused extension approach that helps farmers build skills necessary to increase production; collaborate with each other; and engage in beneficial and efficient decision-making. It also transforms the status and recognition of women by providing the support they require to be successful farmers, leaders, and agents of change. Evidence shows that participation in the FFBS builds women's self-confidence and expands their autonomy; reduces gender-based violence; and engenders respect from their families and communities towards them. Three major principles of climate-smart, conservation agriculture (CA) that Alliance FFS promoted include:

A. *Minimum tillage* (which contrasts with "traditional" practice – introduced under Portuguese colonial rule – that emphasized the preparation of clean fields);
B. *Permanent soil cover*, which can be achieved through such practices as not burning (in contrast to traditional slash and burn agriculture), mulching or use of any cover crops, and intercropping; and
C. *Crop diversification and/or rotation* - Use of food legumes, cover crops[19] or intercropping.[20]

Households in communities with FFS were 13 percent more likely to experience year-round food security than households from communities without FFS *(see Figure 21, previous page)*.

The qualitative findings strongly support these quantitative findings. FFS were by far the most popular intervention, perceived by community members to contribute directly to food and nutrition security. Communities expressed no negative

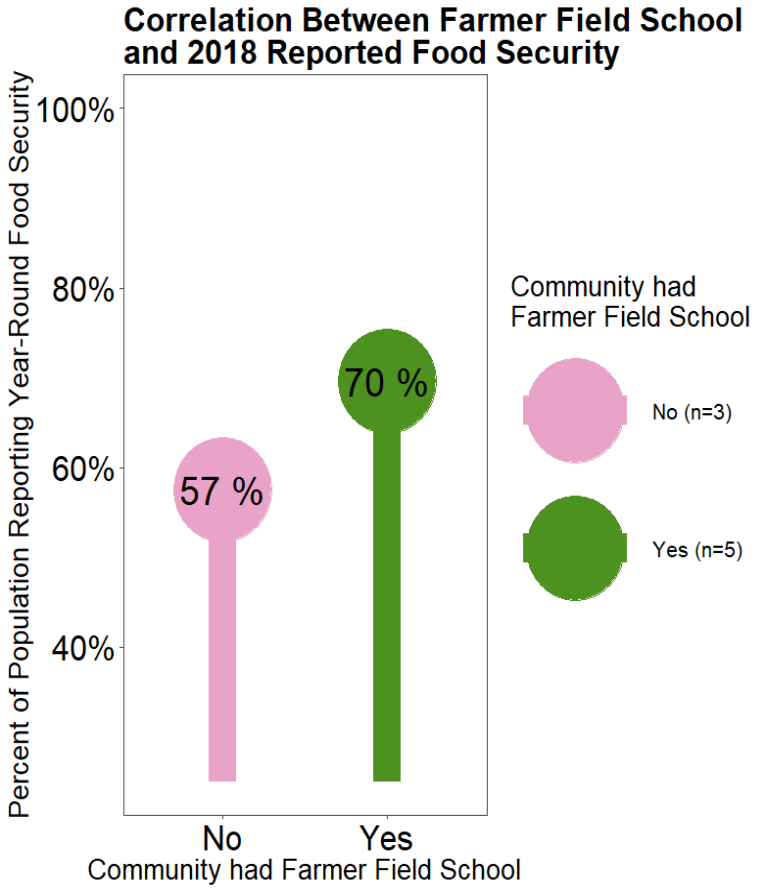


Figure 21. ***Correlation between Farmer Field School and 2018 Reported Food Security*** shows the percentage of households surveyed in 2018 reporting year-round food security in communities with FFS and those that did not. Year-round food security is defined by households reporting adequate food provisioning for all 12 months in the previous year.

[19] Food legumes include velvet bean, lab-lab and/or jack beans, while cover crops include pigeon peas, mung beans and/or cowpeas.
[20] Wahl, Carl (2016). *Comparison of Cassava Yields under Conservation Agriculture vs. Farmer Practice.* CARE.

associations with FFS. Meanwhile, all "neutral or ambiguous" community perceptions associated with FFS reflect issues that the Alliance did not directly seek to address with the FFS intervention, such as market access.

Photo 5. A couple works in a Farmer Field School demonstration plot growing improved cassava that is more resistant to disease and drought.

Communities report that FFS were effective in promoting all three principles of conservation agriculture. Communities reported learning about and implementing minimum tillage (A). A woman from Macogone explains:

"*We learned… not to dig deep when plowing*."

Community members also report contributing to permanent soil cover by not burning and mulching (B), as a woman in Corane notes:

> "*When they [CARE technicians] showed up, they explained that we should not plow and burn the grass, but instead… leave the grass behind.*"

The communities perceived that this produced a co-benefit of fewer uncontrolled forest fires. Finally, farmers reported implementing crop diversification and/or rotation, especially through planting alternating crops in lines (C). A woman in Macogone offers:

> "*We learned to cultivate in line,*" and a man complements, "*They taught us how to make [natural] products fertilize the soil and how we can associate [two] plants [that go together].*"

As with the mangrove ecology, the communities demonstrated a strong understanding of soil ecology. They report that through the application of these conservation agriculture practices – and adherence to seasonal crop calendars – their soil fertility has improved and crop yields, increased. A farmer in Macogone explains how this has contributed to both development and conservation objectives:

> "*The goal is to teach how to plant, to end suffering, because if you use the techniques you produce a lot, and to conserve the land so it does not lose fertility.*"

Farmers in many communities affirm that adoption of these principles and best practices has improved soil fertility. Women in Corane explain that soil has "improved" over the past ten years due to the practices that "they're already accustomed to using." More fertile soil has reduced the frequency with which farmers need to open new agricultural fields. This quote from a male farmer from Manene is illustrative:

> "*Some use [the same field for] 1 year and others use the land [for] two years before they leave… [But through NACC[21]] he has been in the same field for five years and counting*."

[21] NACC refers to CARE's Nampula Adaptation to Climate Change project, through which the Alliance delivered most development interventions explored in this report.

It is noteworthy that non-FFS members also benefited from these practices. The FGDs suggest that the experimental learning-by-doing approach taken by FFS is effective in accelerating adoption of CA techniques, even among non-members. A woman in Macogone explains:

> "*We conducted a planting experiment: we planted in line on one side of the plantation and disorganized on the other. And we found that using line plantations produce a lot more… There are people who did not participate in the [FFS] association but heard about these new practices and saw that it works well.*"

Seeing side by side, with their own eyes, the benefits of CA relative to traditional practices, reportedly convinced many, in a relatively short period, to adopt these practices.

These FFS findings offer the most robust evidence around the correlation between an Alliance intervention and food and nutrition security. FFS directly contributes to increased production of a greater quantity and diversity of nutritious crops.

FFS has also great potential of increasing economic wellbeing, if community members can access markets to sell their excess yields. Women in Corane explain,

> *"Now, we have more assets [than 10 years ago] … since the [farmer] association came and [CARE] taught us to produce well… There are some people that have [more goods], although there are still others that don't."*

To better support the third principle of crop diversification, improved seed distribution was a critical component of FFS.[22] This intervention consisted of the distribution of improved seeds to: address rampant and destructive brown streak disease in cassava (see photo, *next page*); improve drought resistance (helpful in adapting to the variable rain patterns identified as a major stressor for food security); and expand nutrition security through diversification away from the local staple, cassava (i.e., enhanced access to and use of both nutrition-enriched orange-flesh sweet potato and protein-rich beans used for mulching and intercropping, which improves soil fertility through nitrogen-fixing).

When properly implemented, communities reported that it contributed to food access and diversity. A community member in Namiepe explains that, through seed distribution, they now have access to a greater diversity of improved seeds, including "*sesame, cassava, holoko beans, corn, [other] beans, Canavalia, peas, [and] lab lab [an African bean].*"

A man from Namame agreed:

> "*CARE helped us a lot… they have given us seeds of rice, peanuts, beans and many [other] products.*"

A man from Macogone added that the project was successful in addressing disease:

> *"They brought [improved-variety] stalks of cassava [called] N'ziva and Nacala [that] don't have [brown streak]. Today, we no longer have [that disease in the community]."*

[22] However, communities did perceive the relationship between FFS and improved seed distribution.

Another FGD participant from Macogone clarified that non-FFS members also accessed seeds and subsequently benefited from more production:

> "*We waited for them [FFS members] to produce [using improved seeds] and asked for stalks afterwards.*"

However, community members perceived many hurdles in the execution of this intervention. First, Movitel – a type of cassava distributed around 2012 by CARE—was, indeed, more resistant to brown streak disease, but it also made people sick. A community member from Namame explains:

> "*This cassava [Movitel] that does not rot [with brown streak], it is too bitter and [even the] animals do not like it. It causes diseases of legs, hernias, intestines, bladders.*"

CARE stopped distributing Movitel when they learned about these problems, but communities continued to plant it for years after that, since they prefer sickness to hunger.

Second, the agricultural calendar is seasonal, and the Alliance sometimes delivered seeds out of season. A woman from Macogone explained:

> *"[After] they brought Movitel… they brought N'ziva [an improved variety without those challenges]. We did not plant them [immediately] because they brought them out of the planting season, so we kept them in our yards to plant the next season, but they dried up [so we could no longer use them].*"

In other words, the disease-resistant cassava seeds the Alliance sought to promote were not universally accessible, as a woman from Corane confirms:

> *"They are able to cultivate well, to plow well for [cassava to grow] and then the rotting begins to appear."*

Photo 6. Local cassava with brown streak disease.

To conclude, when improved seeds arrive on schedule, they can increase food diversity through more diversified crops and yields through cultures more resistant to drought and disease. In addition to enhancing food and nutrition security, improved seed distribution also has the potential to indirectly contribute to wealth – when households have market access.

Development Interventions' Contributions to Wealth

Village Savings and Loan Associations

Like FFS, VSLAs were perceived positively by communities. VSLAs, which have been promoted by CARE for over 25 years, are a self-managed group of 20-30 individuals that meets on a regular basis to provide its members a safe place to save their money, to access loans, and to obtain emergency insurance. VSLAs enable women living in poverty to increase their financial skills, gain access to and control over resources, and generate economic opportunities and income.

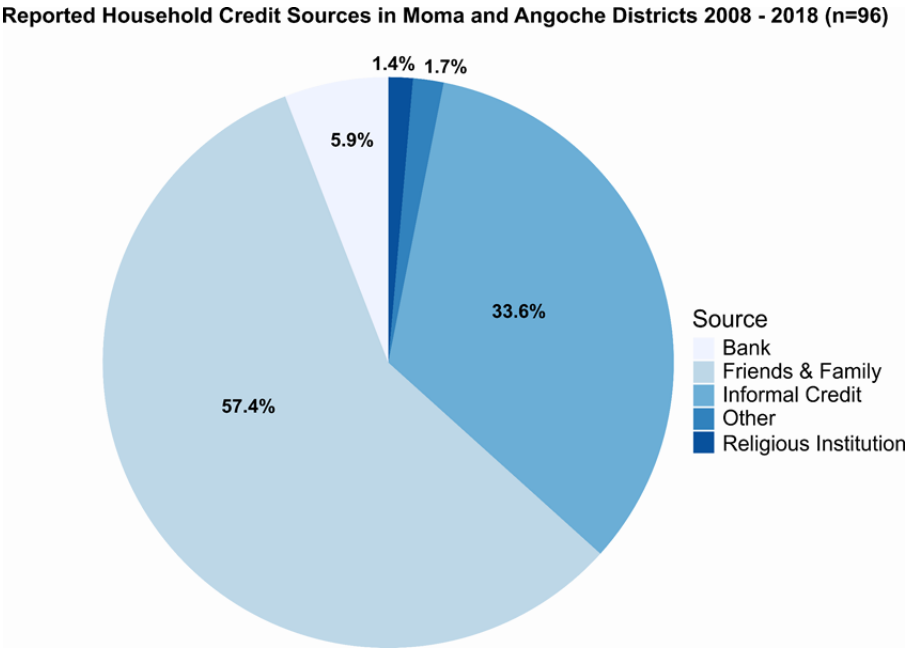


Figure 22. ***Reported Household Credit Sources in Moma and Angoche Districts (2008 to 2018)*** is a pie chart that shows the credit sources for all households who reported borrowing money in the previous year. Because the answer options varied over time, we grouped them to summarize different sources of credit here.

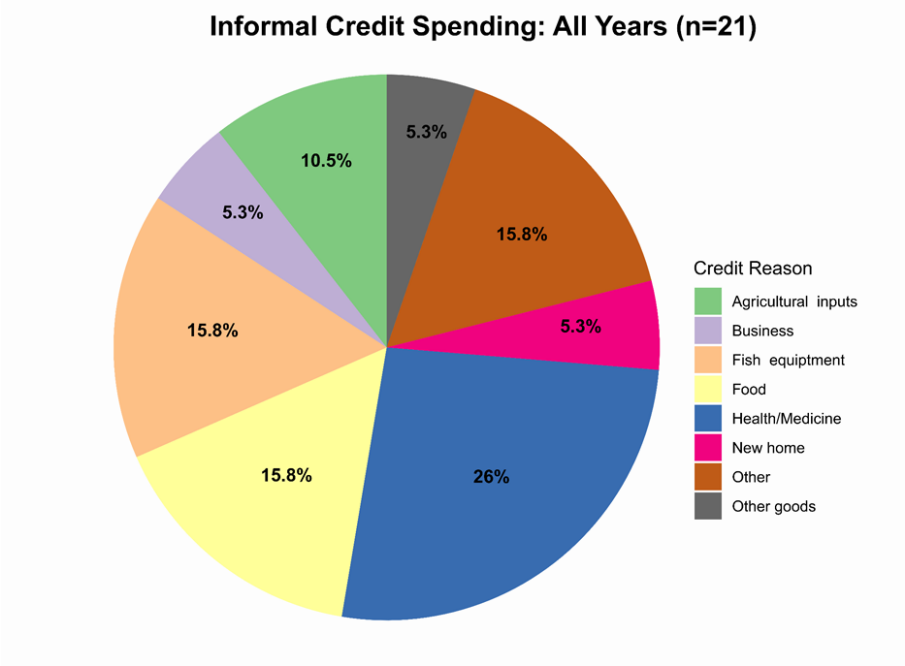


Figure 23. ***Informal Credit Spending: All Years.*** For all households who reported borrowing from informal credit sources (including but not limited to VSLAs), this pie chart shows how survey respondents reported using their loans. Answer options have been grouped to summarize findings.

In *Figure 22 (above)*, VSLAs supported by the Alliance fall within informal credit, constituting almost 34% of respondents' access to credit. *Figure 23 (left)* offers insights into how these households report using the most credit for food, health expenses and medicine (42%) as well as agricultural inputs, fishing gear or other business investments (32%). Although the sample size is very small in both cases, the figures provide some insight into the limited

access to credit and the financial priorities of the surveyed households.

The qualitative findings confirm that, in these rural communities, most savings and credit sources remain informal – either through local associations, family or friends. Unsurprisingly, given that a minority of households surveyed report taking a loan in the previous years, FGDs suggest that more households engage in informal savings than credit schemes. The qualitative data supplements *Figure 22,* providing further insights on how communities report that both savings and loans contribute to their food security and economic wellbeing.

Photo 7. Female participants in a Village Savings and Loan Association, poised to make their savings contributions, during a weekly meeting.

Communities perceive that informal savings interventions, both VSLAs and a similar informal savings group called *xitique,*[23] facilitate the accumulation of more capital at once than was historically common. With a year of savings, community members report: buying household items, like books, chairs and beds; investing in improving their housing infrastructure and children's education, including school fees and uniforms; and buying productive assets, like cell phones, solar panels, batteries and motorcycles.

Mostly, loans seem to community members with an entrepreneurial spirit to produce more food or turn a profit. A woman who recently asked for credit in Namiepe plans to…

> "*pay for [additional] labor to work on the agricultural field*."

A man in Macogone explains,

> "*Loans have an advantage because you can borrow 1000 MTN, then go buy fish and come sell it here for 1300 [a profit]*."

Some community members report using savings and credit to smooth access to food during the hungry months or other "*difficult times*." But others prefer to go hungry, as this woman from Namame explains:

> "*I'm not going to ask for the money because I'm afraid to ask for the money and just use it to eat… and not being able to repay*."

[23] *Xitique* is an informal savings scheme similar to VSLAs in that it depends on local group formation and resources. The primary difference is that *xitiques* do away with the risk of the physical lockbox for savings by lending the group's contributions to a different individual at each meeting. The benefit of the VSLA relative to *xitique* is that members can define the amount and timing of the loan. In contract, *xitique* rotates who receives money every week and the amount is variable (although every individual gets back what they put in by the end of the cycle).

Other ambiguous responses associated with VSLAs similarly relate to community members wanting to save or borrow money but feeling they don't have enough money to save or repay the loan. A man in Macogone says,

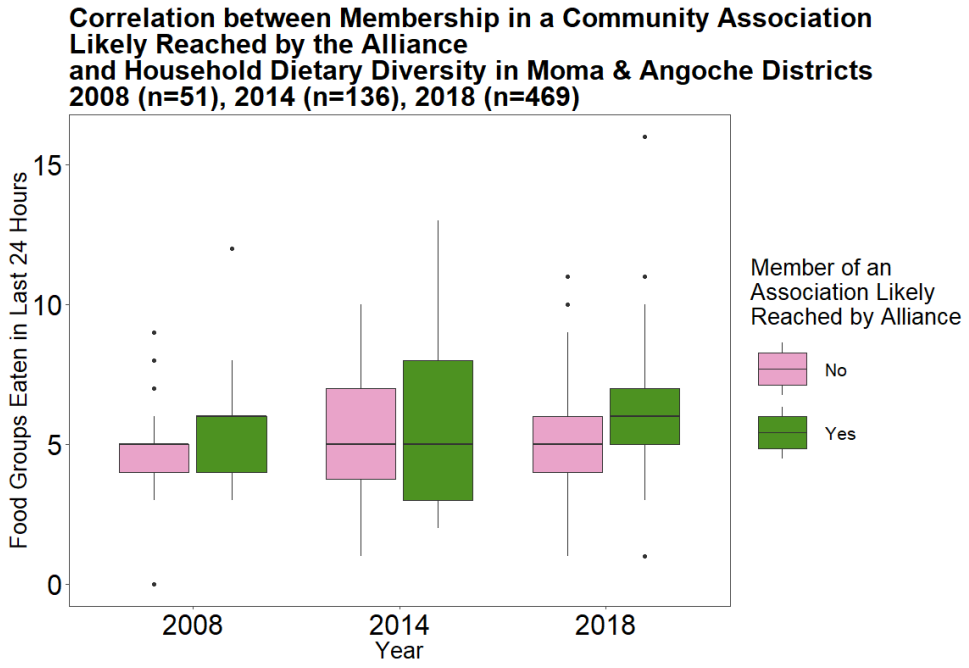
> "*Many do not do savings; they want to, but they cannot [due to] lack of money.*"

A woman from Mingolene agrees:

> *"We are afraid to ask for money and when the time to repay comes, we do not have money and they come to get our belongings inside our house."*

To conclude, there is quantitative and qualitative evidence that informal savings and loan associations help community members acquire both productive and non-productive assets (i.e., income-generating and household assets, respectively) to improve their lives. VSLAs seem to contribute less strongly to food security, although qualitative and quantitative data both point to some households using money saved or borrowed to purchase food during the hunger months; indeed, other FGD participants clearly indicate fear of *"eating the money"* and defaulting on their loan.

To what extent do changes in food security and wealth differ between individuals that participated in both CBNRM and development interventions compared with those that participated in one or none? (RQ2B)



As with RQ2A, the evaluation data are not well-suited to answering this question. This section briefly presents the only survey data[24] that speaks indirectly to the question of participation v. non-participation in Alliance interventions.

Figure 24 (left) shows that in 2018, households who participated in

*Figure 24. **Correlation between Membership in a Community Association Likely Reached by the Alliance and Household Dietary Diversity in Moma and Angoche Districts*** shows the correlation between household participation in an Alliance-supported community group and nutrition security between 2008 and 2018.

[24] Due to limited time, we were unable to analyze the other questions asked about Alliance participation in the 2018 household survey (see the last section of the questionnaire). See the concluding table in *Recommendations for Further Research and Analysis* for more details.

associations likely reached by the CARE-WWF Alliance[25] reported eating 21% more food groups than non-members in the last 24 hours. Indeed, households participating in associations reached by the Alliance were 19% more likely to experience year-round food security (i.e., 12 Months of Adequate Food Provisioning) than non-members.[26]

Figure 25 (below) shows that, across all three surveyed years, households who are members of associations likely reached by the Alliance reported an average of 52% more wealth (as measured by the total value of household assets) than non-members. This finding may indicate that households who

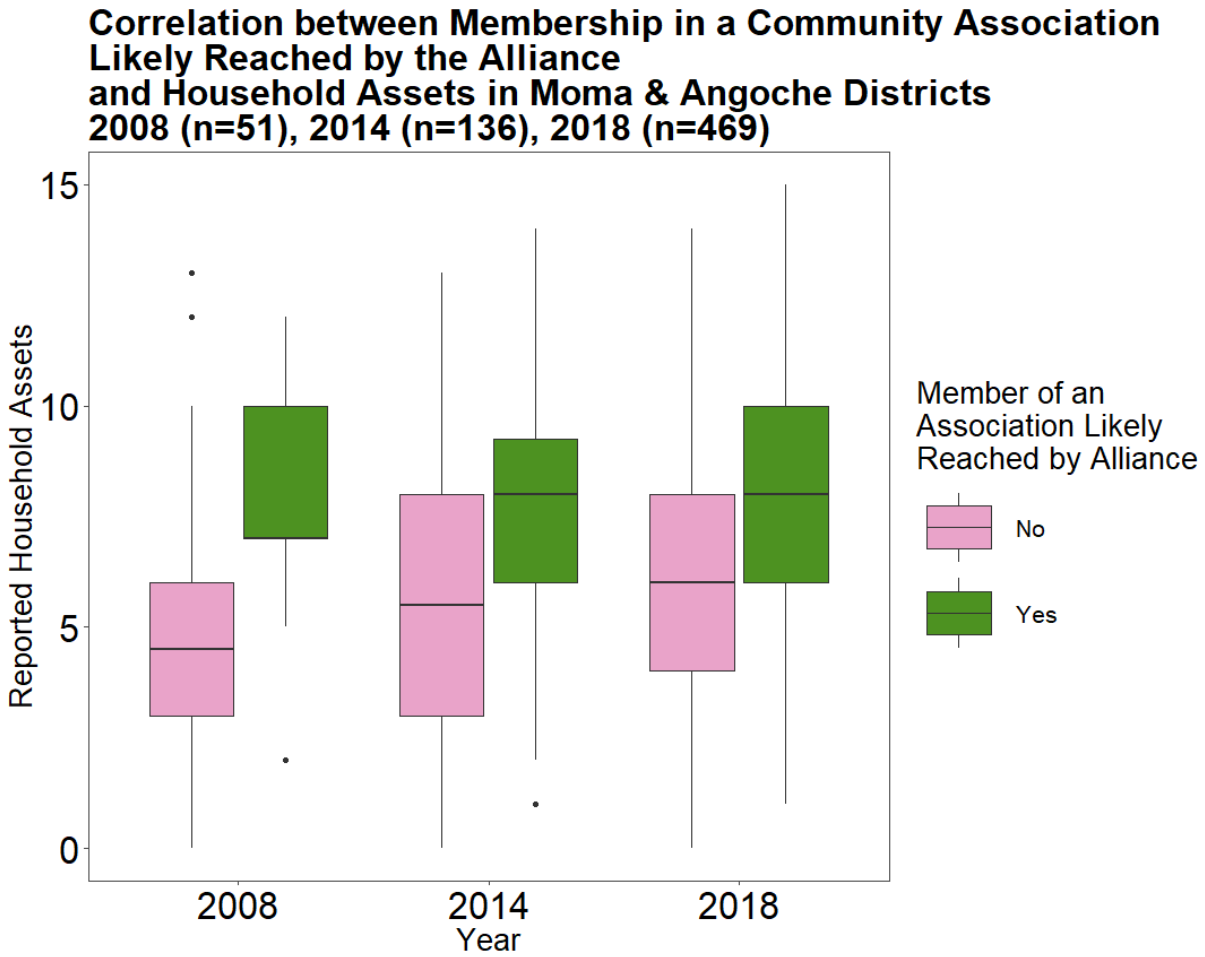


Figure 25. ***Correlation between Membership in a Community Association Likely Reached by the Alliance and Household Assets in Moma and Angoche Districts*** shows the correlation between household participation in an Alliance-supported community group and wealth between 2008 and 2018. We defined associations likely and not likely reached by the Alliance in the same way as in *Figure 24*.

[25] For the purposes of this analysis, we considered associations likely reached by Alliance capacity building or technical assistance to include: Agricultural Association, Fishers Association, Community Fishing Group, VSLAs, Water and Sanitation Committee, Reforestation Group and Natural Resource Management Committees.

[26] Associations defined as not likely reached by the Alliance include: Business Association, Community Development Association, Women's Group, Formal Credit Association, Health Association, Education Committee, Youth Association, Sports Association, Association on Orphans and Vulnerable Children and Religious Associations. Non-members are thus both those participating in association unlikely supported by the Alliance as well as community members that do not participate in any community groups.

were already wealthier were more likely to join community groups that the Alliance established or supported.

Qualitative findings from several communities support the finding that a combination of Alliance interventions "*helped a lot*" through diverse pathways explored in the preceding sections. For further exploration of the qualitative perceptions of Alliance participants, see, *To what extent did the Alliance contribute to these changes?*

To what extent do changes in food security and wealth differ between women and men? (RQ2C)

Through stand-alone gender interventions – as well as gender integration throughout the development, and to a lesser extent the conservation, interventions – the Alliance sought to empower women to both participate in and benefit from their community initiatives.[27] Due to survey design, the quantitative data does not shed light on intrahousehold variation but, rather, differences correlated with the gender of the household head. Meanwhile, gender insights from qualitative research reflect focus group perceptions about differences in the experiences of women and men, broadly, and to a lesser extent, single and married women or men.

While the gender-disaggregated FGDs explicitly explored gender dynamics at the community and household level, participants rarely mentioned the stand-alone interventions, like gender dialogues, as responsible for changes they perceived. As there are relatively few mentions of the Alliance's stand-alone interventions, we focus here on understanding gender disparities and any correlations with the Alliance interventions already discussed.

Gender Differences in Food Security

Figure 26 (next page) shows that, in 2014 and 2018, male-headed households experienced a statistically significant increase (18% and 12%, respectively) in the number of food groups consumed the previous day compared to female-headed households. Across all sampled households in 2008, there was no statistically significant difference in the number of food groups male- and female-headed households reported eating the previous day.

The qualitative data does not offer a clear explanation on this divergence between male- and female-headed households after 2008. However, FGDs confirm that single women have less household labor available for food production than households with two adults. A woman from Corane explains:

> "*Unmarried woman produces little and grows in less space because she is alone.*"

As such, women report more dependence on seasonally available food groups, such as tubers from coastal forests.

Figure 27 (also next page) illustrates that households in communities with an FFS reported year-round food security at a 14 percent higher rate than those communities without FFS in 2018. The effect size was the same for both male- and female- headed households in sampled communities, suggesting that female-headed households benefited from this intervention as much as male-headed households.

[27] For more information about Alliance gender interventions, see *Annex 2. Illustrative Findings about Other Alliance Interventions.*

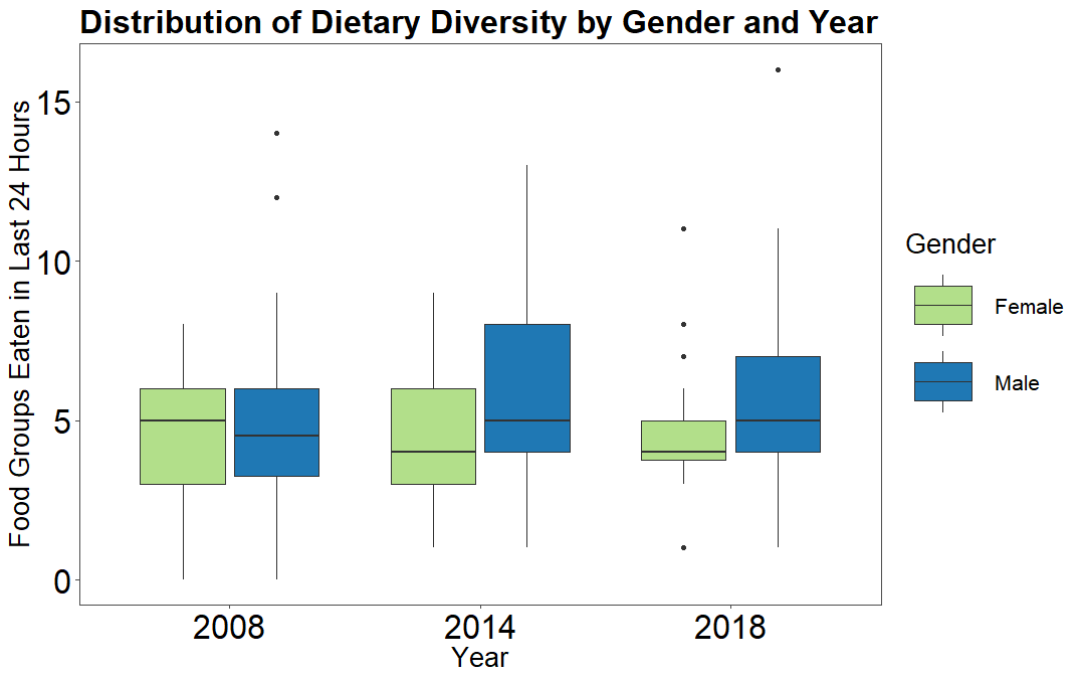


Figure 26. ***Distribution of Dietary Diversity by Gender and Year*** highlights gender differences in nutrition security over time. This figure includes survey respondents who were both in communities which received conservation and development interventions.

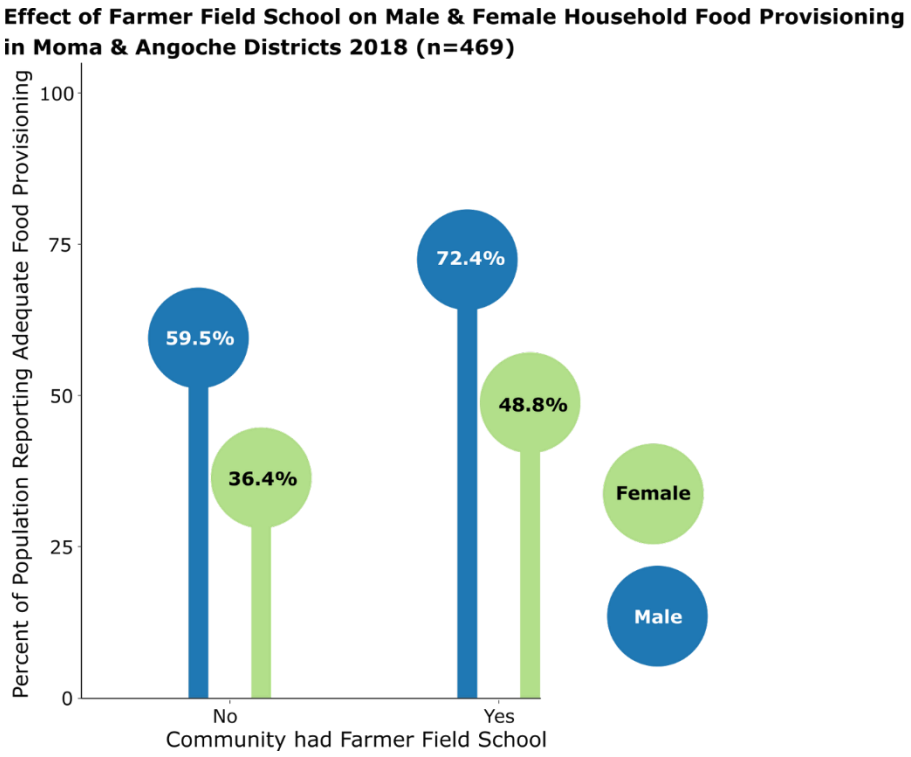


Figure 27. ***Effect of Farmer Field School on Male and Female Household Food Provisioning in Moma and Angoche Districts*** demonstrates the correlation between community FFSes and household food security, by gender of household head, in 2018.

The qualitative data confirms that both male and female community members perceive that FFS increase food and nutrition security. That married couples were able to cultivate larger fields and produce more than single women may, in part, account for the gender gap. Single women also report choosing to remove their cassava before it is mature for lack of other food to eat.

The qualitative data offers another important insight about single women's vulnerability due to rigid gender roles, especially the time burden of fetching water. A man from Corane explains:

> *"The time [dry season] has arrived when women do not sleep, they wake up at 4am to look for water and come back at 7 pm."*

This opportunity cost of women's time spent getting water may contribute to gender inequities in both food security and wealth. Female-headed households, whose primary source of labor is diverted to getting water, understandably have less time to devote to agricultural production activities than their male counterparts.

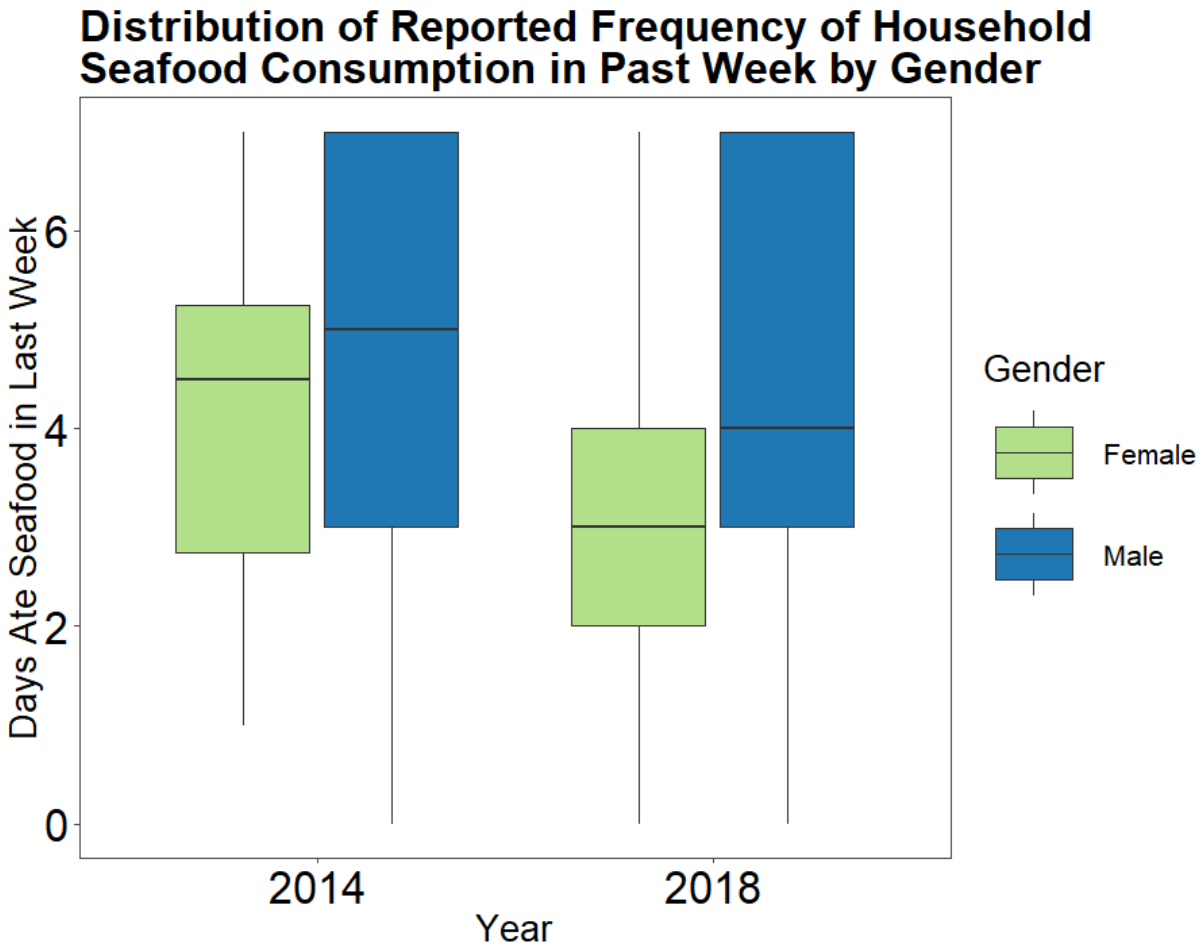


Figure 28. ***Distribution of Reported Frequency of Household Seafood Consumption in the Past Week by Gender*** shows the change in seafood consumption reported in the previous week between 2014 and 2018, disaggregated by gender of household head.

While agriculture is a primary source of food security, fish is also an important source of nutrition in these coastal communities. *Figure 28 (previous page)* illustrates that all sampled households experienced a slight drop in the number of days they reported eating seafood in the previous week between 2014 and 2018. This drop was more pronounced for women than men: female-headed households saw a statistically significant decrease of 25% fewer days households reported eating seafood in the last week compared to a 10.5% drop for male-headed households. These changes represent less weekly seafood consumption of 1.75 and 0.75 days for female- and male-headed households, respectively.

The qualitative data supports that finding in that fishing continues to be culturally construed as a male livelihood activity in Mozambique. While women tend to be farmers, the exclusively male realm of fishing is perceived as more reliably lucrative; the culturally constrained inability to partake in fishing might also negatively affect not only the food security but also the wealth of female-headed households.

Because fishing is an almost exclusively male activity, married women consume more fish than single women since their husbands are more likely to fish. A woman in Corane clarifies:

> "*The difference is that… at least married women can get a fish and eat, but the unmarried woman cannot.*"

This can place single women in a precarious situation: twice, it was implied that men might offer fish to single women in exchange for sex. Another woman in Corane affirms:

> "*Married women are the ones who have easy access to fish, [while] unmarried women only eat snails.*"

That's why mangrove protection, which was perceived as beneficial for bivalves and other invertebrates, is so essential for the food security of women and their families in coastal areas. Even women who don't live directly on the coast benefit, as substantiated by this quote from a woman in Namame:

> "*We leave the house for seven days to look for clams… the husbands stay home babysitting [while] single women leave the children at home alone.*"

Due to the more limited set of food sources for single women, the nutrition security of female-headed households appears to be more dependent on bivalves, snails and other invertebrates gleaned from the mangroves, especially during the hungry season. In the case of excess yield, women also sell bivalves for a small sum that they can redirect for other products, food stuffs or otherwise.

So, returning to *Figure 27*: in 2014, when there was WWF and government support for enforcing the NTZs, community members agreed there was more quantity and diversity of fish. Although single women have more difficulty accessing fish, even female-headed households reportedly benefited when fish was more abundant and cheaper. But, by 2018, when NTZ rules stopped functioning as intended, fish were harder to come by, and single women are the first group to feel the impact of the depleted resource. The FGDs suggest that the same is true for mangrove resources, on which women depend more heavily for their food and nutrition security.

Gender Differences in Wealth and Decision-Making at the Household Level[28]

As with food security, a persistent gender gap can be seen in wealth accumulation between male- and female-headed households. *Figure 29* (next page) shows that female-headed households reported 37% fewer household assets than male-headed households across all sampled households. This discrepancy remains relatively consistent across the three years.

The qualitative data elucidates that single women are financially constrained and experience more suffering than others, at least in part, to rigid gender roles and norms. Like livelihood options, the roles that men and women assume in building homes and infrastructure in Mozambique is constrained by gender. For instance, women gather timber and insulate their house from the elements. A female head of household in Mingolene extrapolates:

> "*Men build the house with bamboos and when they finish building the house, women smooth out the walls with clay... [Meanwhile, single women experience] pure suffering… I would go work on the agricultural fields, and when I would get enough money, I would pay someone to [re]build the [my] house.*"

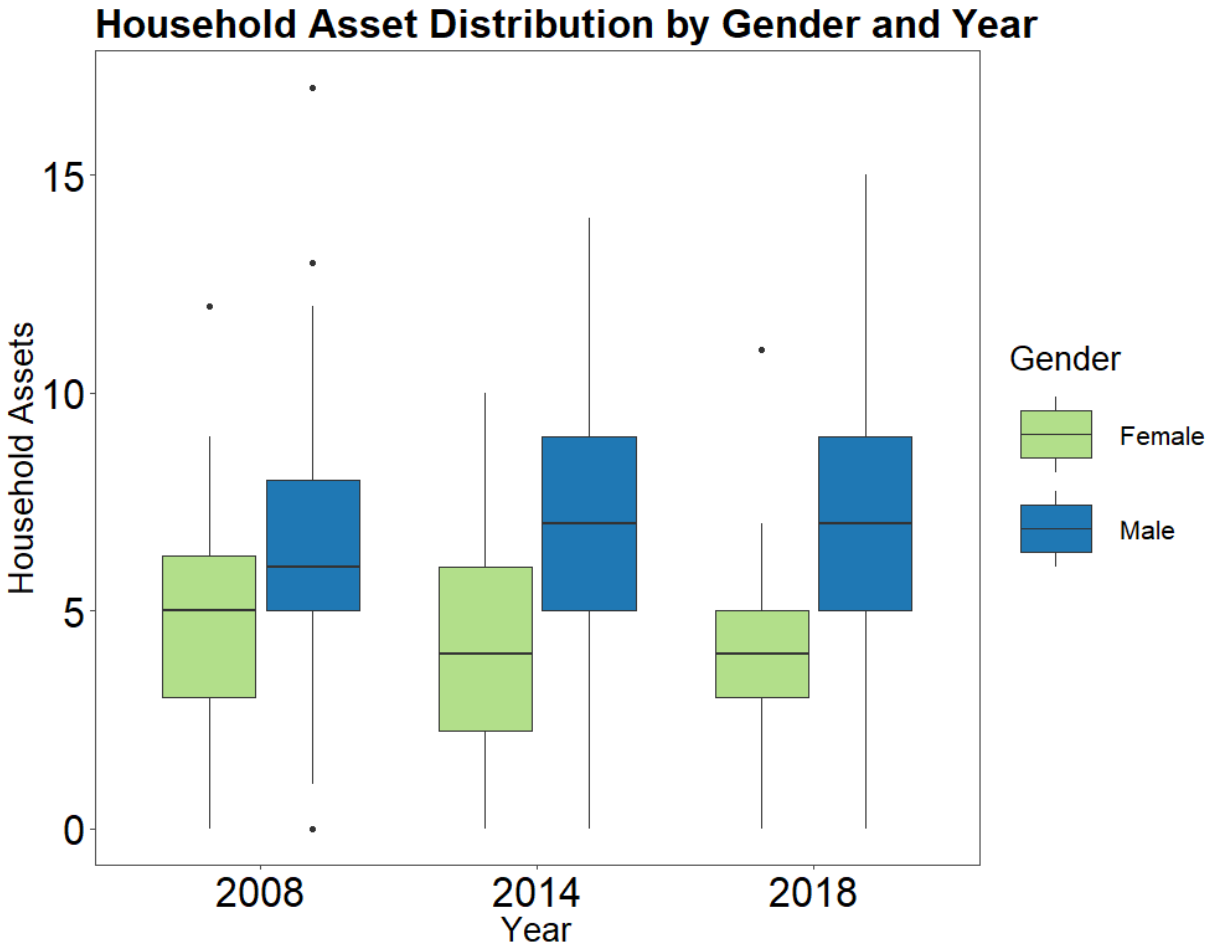


Figure 29. ***Household Asset Distribution by Gender and Year*** compares male- and female-headed households' wealth over time between 2008 and 2018.

[28] Quantitative and qualitative data was collected about women's participation and decision-making at the community level, but the time allotted did not permit analysis. See also, *Recommendations for Further Analysis and Research.*

Single women not only have less labor with which to produce wealth, but also have the extra burden of paying men for construction *(see photo, right)* and other gendered services. Differential access to gendered labor may hold single women back from recovering financially after climatic shocks, like 2008's destructive Cyclone Jokwe, and could help to explain why female-headed households might seek access to credit to buy more household assets.

Photo 8. Traditional homes made from local materials, including timber, mud and palm leaves, in Mingolene.

Unlike the gender-neutral impacts of FFS, access to credit seems to make a greater contribution to asset accumulation of female-headed households than male-headed households. *Figure 30* (next page) demonstrates that access to credit is associated with a 31% increase in reported assets of female-headed households. By comparison, access to credit is not associated with any significant increase in assets for male-headed households.

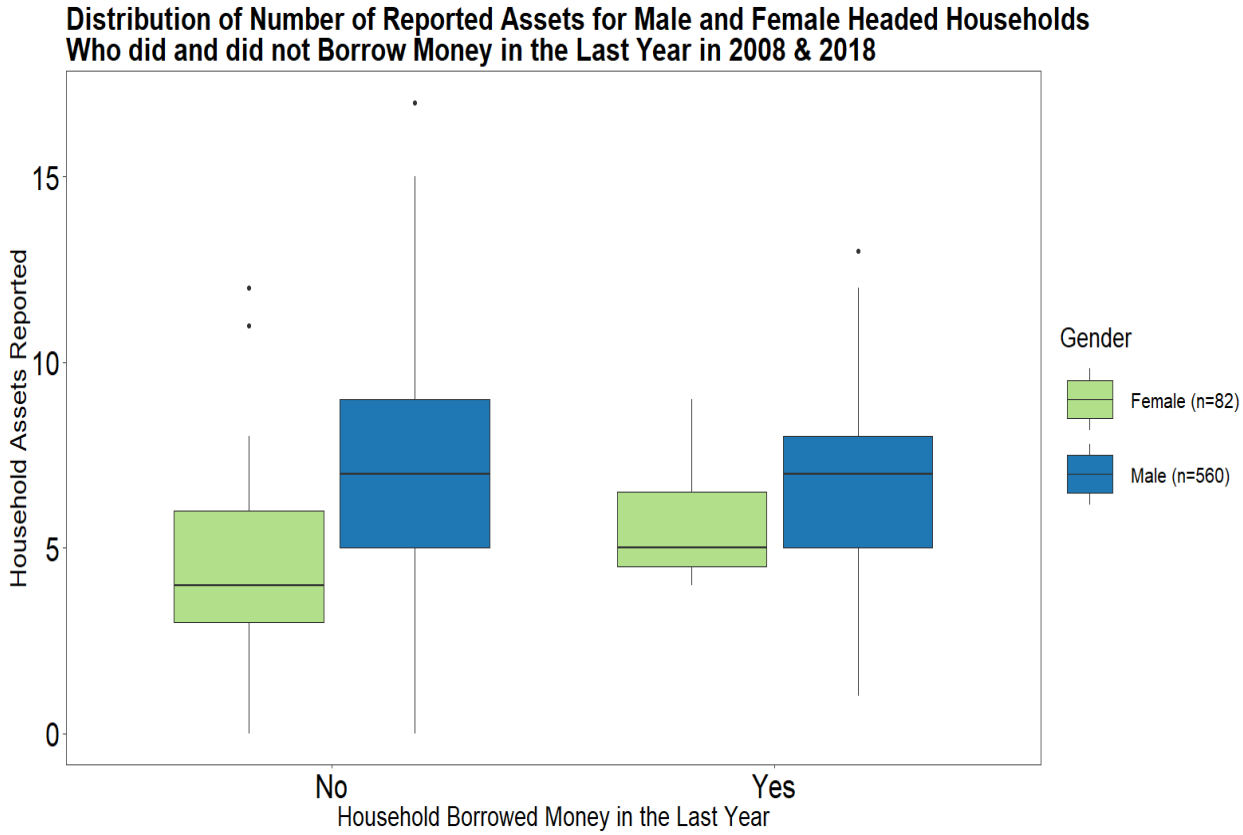


Figure 30. ***Distribution of Number of Reported Assets for Male and Female Headed Households Who Did and Did Not Borrow Money in the Last Year in 2008 and 2018*** shows the wealth gap by gender of household head over time.

While "access to credit" does not refer only to participation in an Alliance-supported VSLA, this finding suggests that VSLAs may have been more successful in addressing gender inequalities than FFS. Although the women's focus groups discussed savings and credit about twice as much about than men's,[29] both men and women viewed VSLAs favorably and believed that they contributed to household asset acquisition.

CARE conducted gender interventions, such as dialogues about the differential workload of men and women in the household, to address gender inequalities prevalent in northern Mozambique. Therefore, the 2018 household survey asked a question about changes in the household head's perception of women's economic decision-making authority in the home compared to five years earlier.[30]

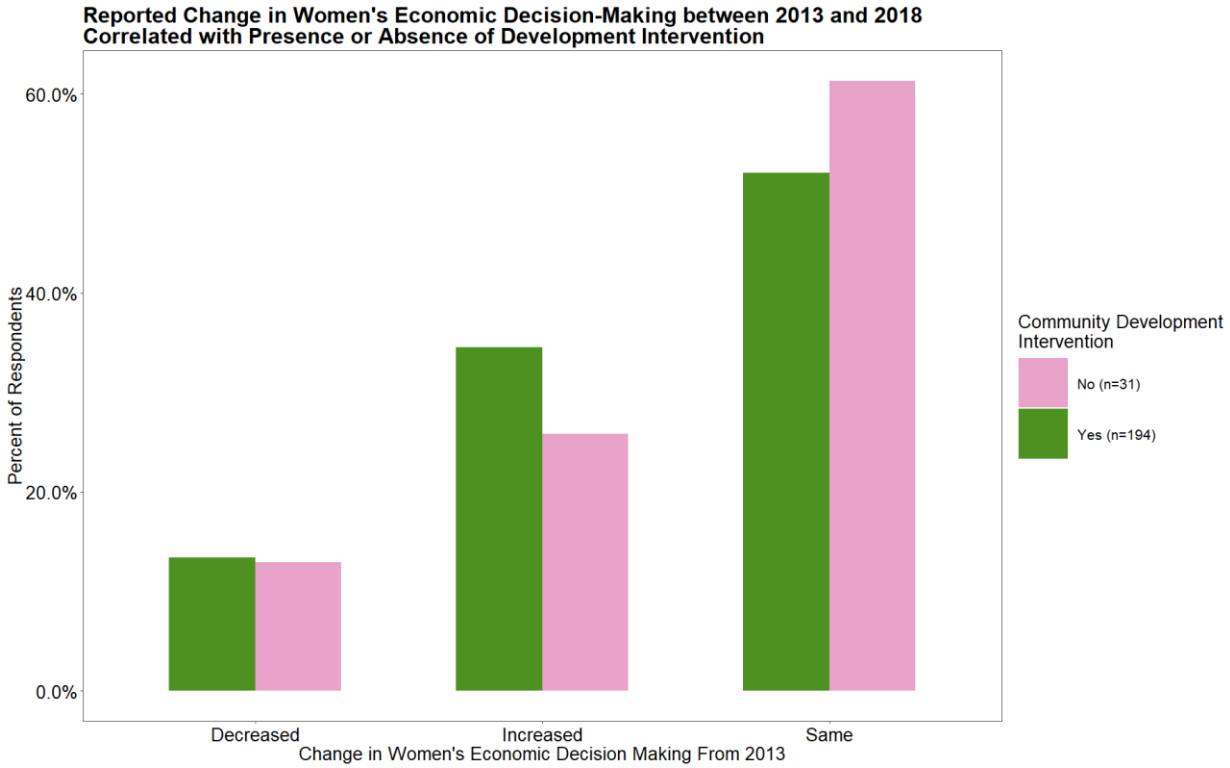


*Figure 31. **Reported Change in Women's Economic Decision-Making between 2013 and 2018 Correlated with Presence or Absence of Development Interventions*** shows the percentage of households in 2018 reporting change or no change in women's economic decision-making power within their household compared to five years earlier.

Figure 31 (above) illustrates that households in communities with development interventions — FFS and seed distribution, VSLAs, chicken vaccinations and/or WASH with gender and nutrition integrated across the board – were 10% more likely to report an increase in women's economic decision-making than communities who did not receive development interventions. Communities who did not receive development interventions were also 10% more likely to report that women's economic decision-making had not changed compared to communities who did receive development interventions. However, the small sample size for households not receiving development interventions (and the

[29] The difference between women and men's discussion was substantial (3187 words vs. 1484) but could be accounted for by focus group facilitator variance.

[30] A related question was asked in 2014 and 2018 inquiring about who makes financial decisions at home—the man / household head, woman / spouse or decisions are made jointly. Change over time in this question was not analyzed due to time limitations, but this analysis could provide further insights on the self-reported changes reported in 2018.

difference in sample sizes – just 31 households from three communities vs. 214 households across five communities – undermines the reliability of this finding.

It's perhaps unsurprising, then, that the qualitative data is more mixed regarding trends in women's decision-making at the household level. The FGDs made clear that a significant variability exists in gender dynamics within households across communities, regardless of the presence of Alliance gender interventions. A woman from Manene reports making decisions in true partnership:

> "*In a home with two people [who] understand each other, the husband is in charge, [and] she [the wife] is also in charge. [For example, in my household,] we make joint decisions.*"

A man in Nauluco, the control community without Alliance interventions, affirms that how decisions are made within households…

> "*varies from household to household. That's why it's best if everyone answers for themselves. In my case, I make decisions in my house. I'm the one to say let's go to the farm so we can buy clothes for our family. That's how I learned from my father. I thank God that my wife obeys me.*"

A woman in Namiepe explains another situation, in which the man controls decision-making power:

> "*Women, when they have money, they show to their husbands so they can decide together what to do with the money. But men, lately, when they have money, they don't tell – they take the money and go drink! We only see that they have money when we see them spending it.*"

Worse yet, domestic violence (while not discussed often) was mentioned in passing as a normalized event. A conversation among three women in Mingolene, a community where the Alliance did not implement gender interventions, is illustrative:

> "*Men are the ones who make decisions because they say that women are many like flies [laughs].*"
>
> *"When the husband has money, he spends it elsewhere and doesn't return home without all the money is gone.*"
>
> "*And if the woman complains, he beats her.*"

In this context, it's hardly surprising that there's significant social stigma around breaking gender norms. This man in Nauluco explains the exception to the norm:

> "*In general, it is men who make household decisions. The households where women make decisions are those in which the woman has her house and the man goes to live in her house [laughter and mocking]. [In these cases,] … then, yes, the woman has a voice and the man does not.*"[31]

A woman from Namame agrees,

> "*Here in the community, if a man goes out to get water, they insult him so much!*"

[31] Alliance staff and Mozambican researchers were surprised to learn that there is a Macua name for a man who lives with and defers to his wife in decision-making, *camomé*.

Interestingly, when women break gender norms by stepping into leadership roles in their communities, a national government campaign in support of women's empowerment was commonly cited as inspiration. A woman from Macogone explains:

> "*When women began to be elected to senior government positions, we also began to have a voice in the community.*"

A man from Namiepe agrees,

> *"We had Josina Machel, now we are seeing Veronica Macamo in parliament. Women are now directors, so that begins to spread even in the community. That is the development of the country."*

Such gems offer insights about how and why power dynamics shifted, or not, over time.

Returning to *Figure 30,* although the small sample size of households receiving development interventions calls into question the validity of conclusions we may draw from this figure, the qualitative data is clear about the importance of WASH interventions (*see photo, next page*) to improving women's lives. Women in Corane cited the well the Alliance built as responsible for a significant improvement in their wellbeing:

> "*We used to suffer a lot because of water… If this was time of lack of water, you would not find anyone here, we would all be there looking for water.*"

Photo 9 and 10. A dry borehole in Pulizica *(left),* and a well constructed by the Alliance for the community of Manene as part of a WASH intervention *(right).*

Omitting from their daily tasks a 20-km round-trip walk to fetch water offers women more time to produce food, care for their children and engage in other productive activities.[32]

While not limited to the Alliance project, men, in particular, cited gender interventions by diverse NGOs[33] – and even government campaigns – over the past decade as having meaningfully shifted power dynamics in their households. A man from Namiepe explains:

> "*We learned [with the projects] that when we go to the farm while our wife is pregnant, we cannot leave her behind carrying firewood on her head, a hoe [and] child on her back – everything on her own – while we carry on only with a machete in our hand. We learned that women have the right to say what is lacking at home, and the man has the duty to give money*

[32] For a deeper analysis of WASH and potential pathways to nutrition, see *Annex 2. Illustrative Findings on Other Alliance Interventions*

[33] An NGO project, called *Tchova Tchova*, that took place around the early 2010s was more commonly cited as the reason for shifting gender norms than Alliance interventions.

for her to go buy these things or go himself to buy these things. We learned that in the family household the two are in charge."

According to some reports, these lessons about equity did not fall on deaf ears. Now, there are accounts of declining rates of domestic violence and men trying to dig new boreholes to alleviate their wives' burden of fetching water. Men in Manene agree:

> "*Back in the day, when women returned from the farm, they would carry babies and had bundles on the head and the men would not take anything; nowadays, you [men] can help her carry wood and she carries [only] the baby… The reason for these changes [is] development… religion… even the government and some projects – CARE, NACC, AENA-- say we cannot treat women badly, we cannot treat them like slaves. People who hear these messages then try to help their wives…. Now domestic violence has already diminished, back in the day it was high.*"[34]

Emergent Findings

Community Misunderstandings about Alliance Interventions

The FGDs and qualitative data analysis reveal misunderstandings about the Alliance that merit mention. First, community members sometimes associated WWF, CARE or local partners AENA or Ophavela with specific conservation or development interventions. It was equally common for community members to identify the interventions with "projects," broadly – without distinguishing if the assistance came from the government or an NGO -- or with specific individuals with whom they interact, like an NGO staff member.

Second, CBNRM members tended to defer to WWF or the government as the ultimate authorities on natural resources rather than feeling that they, themselves, were responsible for sustainable management. This quote from a female CBRNM committee member woman in Namiepe is illustrative:

> *"Since I am part of that committee, I want to know if I can still monitor [the forest] or if I should wait for someone to come to tell me I can monitor."*

Other women from the community responded:

> "*We're not going to achieve that on our own! We won't be able to monitor unless a project comes and calls a meeting. Or the government could achieve [sustainable natural resource management] because people fear the government."*

In hypothetical explorations, most committees confirmed that the leadership of WWF and/or the government is necessary to successfully manage local natural resources. To make the point, CBNRM committee members often referred to WWF as "father" or "management."

Third, some community members reported feeling like they were "deceived", or that "promises" were broken. Community members in Namiepe and misunderstood that community monitoring of natural resources would result directly in development benefits, like a school or well. Similarly, a man in Namame critiqued CARE for not delivering the buyers or market linkages to which improved crop production could theoretically facilitate their access. Such reports suggest that CARE and WWF explanations of how interventions might benefit communities created outsized expectations of the Alliance that went unmet.

[34] AENA is a local NGO that supported the Alliance in implementing both conservation and development interventions.

Unmet Family Planning Need

Another unexpected research finding relates to unmet family planning needs. Communities agree that population growth is a driver of natural resource extraction and degradation.

Figure 32 (below) shows how communities perceived that conservation interventions (*green circles*) and development interventions (*purple circles*) link with and address issues they face or challenges to their wellbeing (*blue circles*). Of the mostly neglected themes (those *blue circles* without lines connecting them to interventions) that emerged, *unemployment* and *schools* are arguably out of the Alliance scope –

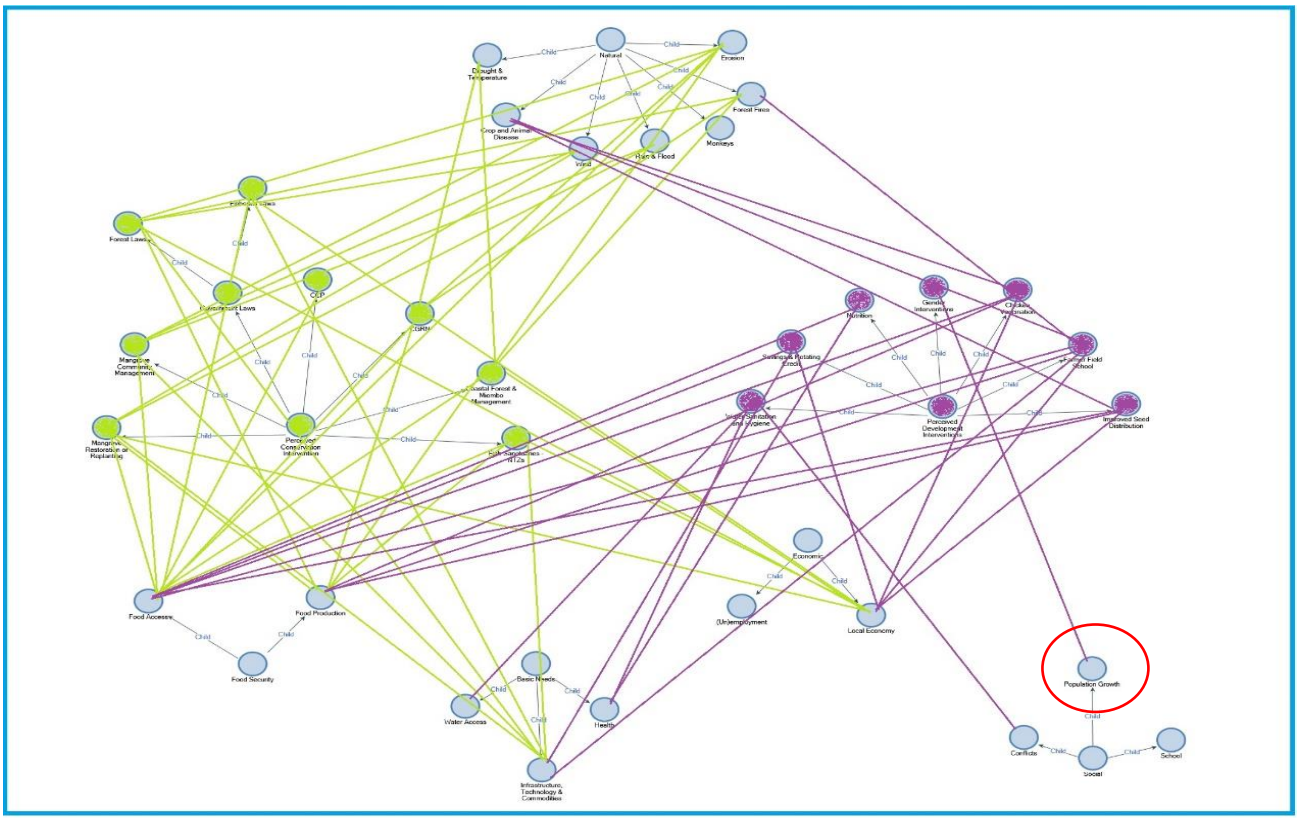


Figure 102. ***CARE-WWF Alliance NVivo Node and Issue Map*** is a map of the themes, or nodes, coded from the FGDs. More specifically, the map shows how communities perceived that conservation interventions (*green circles*) and development interventions (*purple circles*) link with and address issues they face or challenges to their wellbeing (*blue circles*).

probably better addressed by government. Communities near coastal forests complained of *monkeys* eating crops; there may be scope for development NGOs, like CARE and AENA, to address this in the future. *Conflicts* varied widely, from inter-community conflict like marital disagreements to intra-community conflict over water scarcity. The *conflict* node merits further analysis to unpack implications for programming.

In other words, of the themes that emerged organically from the data – i.e., those issues not targeted by interventions – population growth deserves the most attention. Communities reiterated that population growth was a driver of natural resource scarcity or degradation and food insecurity. For instance, when asked how fish resources had changed over the last ten years, community members in Mingolene reported that fish abundance (broadly, outside of NTZ) was decreasing because…

> "*now there are many nets going to sea, and a lot of people need the fish… 20 people can launch [a net] and still not get anything. There are few fish because there are many people.*"

This observation extended to forests. In Namiepe, for instance, the communities confirmed that they perceive a loss in forest cover because…

> "*the amount of people who enter the forest is very large.*"

To be clear, it's not just that dependence on natural resources has increased, but as women in Macogone explain:

> "*In the old days, people did not have many children and now people have too many children.*"

Community members from Manene agree,

> "*Back in the day, there were a lot of crabs, there were lots of clams… [Today] the population is growing more and more.*"

A handful of times, the topic of family planning emerged organically at the end of the women's FGDs when the facilitator opened the discussion for questions the group may have for her.[35] That this happened more than once likely indicates some unmet family planning needs. A few women mentioned implementing family planning for child spacing.

But others that their husbands destroyed condoms to avoid their use, and one reported never having seen a condom. Still other women seemed unaware of how one might avoid having unwanted children, asking:

> "*What is it that you do not to get pregnant during your childbearing years?*"

To what extent has the Alliance contributed to these changes?

Although the qualitative data points to challenges and pitfalls in implementation, community members tend to agree that Alliance interventions contributed to improving their wellbeing over the last decade. In particularly, quantitative and qualitative findings associated with NTZs and FFS confirm that the Alliance – i.e., CARE, WWF and local partners, AENA and Ophavela – contributed meaningfully to household improvements in food and nutrition security.

When asked about the greatest contribution of the Alliance to their wellbeing, FGD participants often cited FFS and NTZs, as well as VSLAs; as explored further in *Annex 2,* WASH and even nutrition interventions also received some praise.

A community member from Manene explains,

> *"[The Alliance] was very important, and here we are: We learned how to weed and produce adequately to the type of climate we have; [today] the type of agriculture we are doing can create a lot of advantages… These two projects [FFS and NTZs] were very important services.*"

Someone else in Manene shares the importance of conservation agriculture to their lives:

> *"Since 2014… we stopped burning our fields because it impoverishes the soil."*

A third agrees,

> *"Today there are [more] vegetables, [such as] tomato, onion, orange potato, and beans… because of the project [with] CARE, AENA and NACC."*

Community members from Corane tell a similar story about the greatest Alliance contribution to their lives:

[35] See the final question of Protocol 2 in *Annex 5.1. Focus Group Discussion Protocols*.

"[Compared to 10 years ago,] we have more cassava than we used to… [and] nowadays, there is more food diversity: there are potatoes, onions… garlic, rice, oil [which we buy]. We grow collards, lettuce, cabbage, carrots, onion, tomatoes from 2015… when an [Ophavela] project helped."

Beyond FFS, a man in Corane praises the contributions of VSLAs and WASH interventions to community wellbeing:

"Lately they [women] get the water nearby – they used to go too far to get water. Now there's already latrines – before, people defecated anywhere. Now [that] they are visited by organizations like WWF… today they wash clothes and bathe – before, they did not use to take baths. Lately, they cook in the normal pots – they used to be clay pots. Nowadays, there are chairs that they didn't have before… and phones [where] before there wasn't (sic) any. Nowadays, they can fry the fish [with oil] – before they would prepare it only with water."

A woman from Corane agrees,

"They [the Alliance] gave us water [and] created the [fish] sanctuary. They installed a water pump [which] brings wellbeing because in times of drought, women used to suffer a lot [and] children would spend two days without bathing."

Discussion

Recommendations for Advancing Conservation and Development Impacts

From the research findings, five major recommendations emerge for integrated project designers and implementers on how to deliver better development and conservation outcomes:

1. *Invest in Long-Term Sustainability through Nested, Natural-Resource Governance Systems, including Building Capacity from Community to Regional Levels*

The research findings indicate some core challenges to the continued flow of benefits from project investments— especially, the sustainability of community-based conservation approaches. The Alliance's attempt to increase the sustainability of the NTZs by avoiding the introduction of financial or in-kind incentives that could not be sustained seems to have backfired, since the opportunity cost to CBNRM committee members appears great. While these governance challenges are social in nature, they subsequently undermine ecological sustainability. After the withdrawal of WWF enforcement and technical support, CBNRM committees struggled to enforce agreed natural resource management rules; in turn, this threatened the natural ability of the ecosystems to restore depleted fish or forest stocks so critical to the livelihoods of current and future generations.

It is notable that the Alliance withdrew support because of reduced funding and, as a result, technical capacity for the project. When WWF left, CBNRM committees also report that they lost their connection to District government representatives, who had also provided enforcement support. Without a nested governance structure and the graduated sanctions that flowed from it (two of the eight critical factors for successful common pool resource management articulated in Ostrom's principles - see the summary *Table 2, p. 14*), community enforcement and compliance declined.

This points to the need for donors to fund, and NGOs to invest in, long-term sustainability of community conservation projects by building capacity and good governance. NGOs should plan for exit by building not only community capacity to monitor and enforce natural resource management rules but also regional government accountability to those communities and the natural resources they manage.

2. *Build incentive structures that sustain Community Conservation Areas from the short to long term and equitably distribute their costs and benefits among defined resource users*

Another contributing factor to declining community enforcement of community conservation areas was that committee members disproportionately bore the costs of fisheries and forest management. Meanwhile, had enforcement and compliance continued, benefits would have accrued to the wider community – without any cost to them individually – over the medium to long term. This inequitable distribution of costs and benefits between resource users over distinct timeframes undermines the incentives for good governance.

To address this shortcoming, conservation and development practitioners must invest adequate time and resources to get CBNRM incentives right. How might CBNRM practitioners build sustainable incentives to offset the inequitable distribution of individual costs of conservation interventions relative to the communal benefits? The differential timeframe of these costs and benefits must be considered to get these incentives right; the short timeframe of development relative to the medium-to-long timeframe of conservation interventions offers both challenges and opportunities. Are there ways in which the economic or social benefits of development interventions can support the costs of conservation

interventions? For instance, could a proportion of FFS yields or VSLA social funds be earmarked for CBNRM committee members in the short-term? Or might medium-term livelihood benefits be effectively taxed, i.e., could a small proportion of fish captured, or timber felled by community members or other stakeholders be redistributed to NTZ or forest monitors to off-set the cost to their productive activities? Socially acceptable solutions are likely to vary from one community to the next, and culture to culture. As such, conservation and development practitioners should pilot and refine incentive models that can contribute to the social and ecological sustainability of CBNRM interventions and their benefits.

3. Communicate and monitor for a shared understanding of roles, responsibilities, costs and benefits

Community misunderstandings that emerged from the FGDs underline the importance of clear communications, qualitative monitoring and, adaptive management based on project learning. It is important that project staff facilitate shared understanding, including managing expectations. This entails communicating, without raising expectations, about the roles and responsibilities, as well as potential benefits and costs, associated with project interventions. Qualitative monitoring and analysis can help to identify issues that need to be addressed before it's too late to course correct.

Project staff must convey to communities that they (not the intervening conservation or development organizations) are the local resource "owners" and their actions, the motor of benefit delivery. Clear definition of roles, and explanation of who will bear which responsibilities and costs, offers an important foundation for shared understanding. Similarly, NGO staff should ensure potential benefits are offered as examples of what's possible if community members fulfill agreed roles and responsibilities and not misunderstood as promises. Qualitative monitoring, such as annual FGDs with CBNRM committee members, is an important tool for surfacing perceptions, such as community misunderstandings or costs disproportionately born on sub-groups or individuals. When community and staff perceptions diverge, project staff should adjust their approach to cultivate a shared understanding with local stakeholders.

4. Collaborate on Applied Research to Improve Conservation and Development Practice

The strengths and weaknesses of this evaluation inform several recommendations around how to improve the effectiveness of applied research collaborations. First, practitioners should engage research institutions or academic partners at baseline to define fit-for-purpose data collection methodologies. In the case of P&S, the original project designers designed for implementation not research. As such, this impact evaluation challenging because the team had to retrofit the baseline and mid-term research instruments – originally designed to monitor implementation – to address the evaluation questions. Ultimately, that's why we were unable to test the core Alliance hypothesis that integrated conservation and development approaches are more effective than siloed approaches. Such shortcomings could be avoided proactively defining the specific questions around which the project seeks to learn to clarify up front what is needed, monitoring or evaluation research. Practitioners should engage research partners early on to agree on clearly defined learning questions. Research institutions can then help design a MEL approach that will deliver the right data at the necessary quality in ways that are meaningful for advancing

conservation and development practice. *Box 1 (right)* indicates key considerations that should be considered to define an appropriate MEL approach, including contexts in which academic partners are particularly important.

Second, such early engagement should kick off continuous academic collaboration over the course of the project cycle. Unfortunately, this decade-long Alliance research project was carried out by different research consultants over time. This is common, given the substantial resources and capacity needed to complete a robust evaluation of this magnitude.[36] Yet, relative to an ad-hoc approach to science, continuity of research partners overtime is advisable.[37] If not feasible, well-documented hand-off is a must. *Box 2 (next page)* offers a check list for conservation and development practitioners who may be constrained by

Box 1. **Key considerations in defining MEL strategies and methodologies**

- *Does the project seek to attribute future change to project interventions?* This is a key question with major implications for methodological design, partner selection and MEL budget.
  - Collecting data that can substantiate causality – a cause-effect relationship between intervention and outcome –requires either a larger baseline sample (defined by power analysis – see below) or the collection of confidential information to enable a time series.
  - A time series increases the ability to go beyond correlation to causality. Best practice entails a survey cover sheet that captures the respondent's name, address, cell phone and GPS coordinates. This identifying information is then matched with a unique numerical code that remains with the survey data, while the cover sheet is stored separately and confidentially. If confidentiality cannot be assured, then this information should not be collected.
- *Random, representative sampling* frames should be defined using *power analysis*.
  - Sampling rules of thumb, like surveying 30 people per community, can lead to underpowered statistics.
  - The sample should also be *randomized* and *representative* of the population, unless specific reasons for a non-random sample are articulated and recorded.
- *Instrument development* should correspond to decision-making needs and rely upon existing, reliable instruments and protocols whenever possible.
  - Standard questions and metrics should be utilized, especially if they have been validated in the target country or region. Development of new instruments should be the last resort.
  - Consider the kinds of decisions that data should inform to prioritize amongst data collection wish-lists. Questions should only be included in instruments if the data they produce contribute to the ability to make better decisions, such as adaptative project management.
- *Data repatriation* – sharing what was learned with the community members who contribute their valuable time to the study – is an important part of the research cycle that is often overlooked.
- *Partner selection* should be strongly informed by the above considerations. Academics are particularly strong partners for:
  - Effectively addressing *strategic response bias,* the human tendency to game the system. Independent researchers are helpful if the intent of the research is to evaluate interventions affecting human wellbeing.
  - Ensuring the design and implementation of *ethical research* due to protocol vetting through Internal Review Boards. IRBs can advise on the most ethical way to reduce bias (e.g., slightly obscuring project evaluation intent by truthfully characterizing the study as focused on natural-resource-based livelihoods changes over time).
  - Sharing findings with communities in a way that is truthful, invites useful feedback and protects the validity of future research.

[36] The Alliance program team is indebted to the science team that advised on final evaluation methods and to the graduate interns, who analyzed the final evaluation data for credit. The in-person workshop underlined the need to more accurately estimate the level of effort required for future collaborations, especially unpaid work. Future science and program staff should seek out graduate students who wish to do their dissertation on the research question or reduce the scope outright to ensure feasibility within the time expected for credit completion.

[37] Depending on funding, such engagements could be structured in several ways. Academic partners could have a contract focused on design and analysis at the beginning and end of the project cycle, assuming enough practitioner capacity to collect data throughout. Alternately, they could be on retainer to weigh in, as necessary, throughout the project cycle.

budget.[38] If not feasible, well-documented hand-off is a must. *Box 2 (next page)* offers a check list for conservation and development practitioners, e.g., who may be constrained by budget from having consistent engagement by a research partner. The check list includes the details that must be recorded for continuity, i.e., to enable future researchers to effectively do their job.

Box 2. ***Practitioner Checklist for Robust MEL***

Especially in cases when a research partner is not involved at all or over the life of the project cycle, it falls to project implementers to ensure adequate documentation of the MEL approach. A clear "bread trail" of information ensures that future research partners or consultants have enough information to repeat the data collection methodology, perform robust analyses and make other informed decisions.

The following information must be robustly documented and stored in an accessible location:

1. A codebook or annotated research instrument that explains the meaning of all numeric codes, permitting future analysis and interpretation.
2. The rationale behind decisions, both original design and sampling choices as well as instrument or methods modifications over time. (Generally, it is unadvisable to change instruments without good reason, such as research question changes or question ineffectiveness.)
3. Contact information and role of anyone involved in research, including fieldwork.

During field research, the following information should be recorded about each household survey or FGD:

- Number of people who declined to participate and refused to answer particular questions
- Date, start and end time
- Enumerator name or code
- Consent of the respondent (even if a tick box indicating verbal consent to a standard consent statement, read aloud)
- Respondent contact information (only for repeating monitoring – see also *confidentiality* in *Box 1*)

Third, invest in collaborative interpretation of findings to better inform conclusions and recommendations. The Alliance experience affirms that co-interpretation of data by practitioners and research institutions is valuable. In April 2019, a data analysis workshop brought together science staff and academic partners (in this case, graduate interns and their advisors) with program, communications and fundraising staff to jointly interpret the data and inform recommendations. This unique approach to co-creation of an evidence-based narrative created shared excitement and understanding that led to these insights and recommendations. The in-person opportunity[39] was critical for the graduate interns to share and validate their findings with project and science staff and accelerate development of an integrated narrative within the short internship window. The presence of program staff familiar with the project, geography and culture provided important context for analysis and understanding. This likely reduced the time qualitative and quantitative researchers needed to arrive at recommendations useful to project decision-makers. Moreover, in the context of mixed findings, increased understanding of the research among program staff could reduce potential push-back around the validity of results. This third point is consistent with the first in that both advocate for thought partnership throughout the applied research and project cycle. Action research best practice entails providing feedback on findings to the target communities, who constitute both research

[38] We are especially indebted to the graduate interns who carried out this analysis over the course of one semester for credit.

[39] Participants in the April 2019 workshop reported that the happy hour that concluded the day represented important, unstructured time for building relationships. It was there that we understood each other's interests and deepened connections that may lead to future collaboration.

participants and project beneficiaries (*see also Box 1* vis-à-vis the role of academic partners*)*. Ideally, the co-interpretation process should also incorporate community perspectives on the findings into analysis and recommendations.

5. Use Evidence to Project Community Voices into Global Policy-Making and Accelerate Adoption of Integrated Approaches for Delivery of the 2030 Conservation, Development and Climate Agendas

Finally, this unique approach to mixed-methods research, and the resulting findings, have implications for the global policy agenda. The year 2020 marks a critical intermediary check-point on the road to 2030, the timeframe that the global community has set for reaching the Sustainable Development Goals (SDGs). Equally important, the global community is renegotiating in 2020 updated targets for the Convention on Biodiversity (CBD) and the United Nation's Framework Convention on Climate Change (UNFCCC). Integrated approaches to delivering conservation and development objectives are critical to make good on what WWF is calling the New Deal for Nature and People. Community-based conservation will play a vital role in reaching the ambitious target of conserving 30 percent of the earth's surface by 2030. This research confirms that CBNRM can also contribute to the food and nutrition security of the world's most remote and vulnerable communities.

The upcoming policy conventions, and contributing to the technical inputs that shape them, offer important opportunities to influence these international policy targets and the approaches used to reach them. While it can be difficult to ensure that community voices are heard in the global corridors of power, quotes from FGD transcripts, similar research and people-centered storytelling techniques can offer qualitative insights to ground policymaker decisions in rural realities. Moreover, evidence that integrated approaches work to support multiple, interrelated development, conservation and climate goals is critical to accelerating their uptake and delivering against SDG, CBD and UNFCCC targets.

Recommendations for the New Integrated Project in Primeiras e Segundas

This research also has specific implications for ongoing conservation and development work in P&S. While no longer implemented by the Alliance, a new project led by WWF Mozambique – and supported by many of the same local development partners that CARE worked through – uses community conservation areas (previously referred to as NTZs), CBNRM committees, FFS and VSLAs to advance similar goals, like marine protection and alternative livelihoods. As this analysis is being finalized, the new project is developing the scope of work for baseline assessments and work plans for project implementation. As such, research insights have and can be incorporated through adaptive management.

Building on the first and second recommendation for advancing conservation and development impacts, the new team has agreed to incorporate into a planned Social and Environmental Risk Assessment, a deeper analysis the five CBNRM focus group discussion transcripts. As part of the risk assessment, a consultant with expertise in natural resource governance will analyze the transcripts to better understand the extent to which Ostrom's principles were applied in each of the communities. These findings will inform the consultant's recommended social and environmental risk mitigation strategies and monitoring. Moreover, it should provide a starting place for adapting the CBNRM approach used historically to address the identified shortcomings associated with governance incentive and benefit sharing mechanisms. No doubt this will involve additional capacity building and a more proactive exit strategy to promote sustainability. Again, potential incentives systems and benefit sharing mechanisms should be piloted to

ensure that NTZs and other community conservation areas deliver the intended benefits for marine ecosystems and people's livelihoods over the short, medium and long-term.

At this critical moment prior to project implementation, the P&S team should also consider the implications of this research regarding beneficiary targeting. As highlighted in RQ2B, findings suggest that association members, likely reached by the Alliance, started off better than non-association members or association members not reached by the Alliance. Luckily, a beneficiary targeting strategy was discussed at the inception workshop of the new project. The new project should follow through on implementation of this strategy to ensure that the most vulnerable community members benefit from conservation and development interventions.

Finally, feedback about these findings to WWF, CARE, government and NGO partners and local communities is a next step, often forgotten by researchers, that is vital to respecting the time stakeholders contributed to the research; and for ensuring it informs more effective practice moving forward. For example, given the perceived link between population growth and natural resource degradation — as well as the Alliance's interest in women's empowerment — provision of reproductive and maternal health services, including the meeting unmet family planning needs, should be considered. While this may be outside of the current project's scope, the government of Mozambique, CARE or another local NGO could markedly improve the lives of women and their families by providing improved access to voluntary family planning to women, enabling them to have the number of children they want, when they want them.

Table 5 (below) summarizes key information to that should be provided as feedback to a variety of local stakeholders:

Table 5. ***Research Findings to Share with Local Stakeholders***

Finding	Audience(s)	Rationale
Contributions of no-take zones and farmer field schools to food security and, to a lesser extent, wealth	• WWF and CARE Mozambique • Local NGO partner, AENA • Local communities • District government representatives • Government of Mozambique ministries responsible for environment, agriculture/ nutrition and rural development	May help accelerate buy-in / uptake of these approaches
CBNRM committees have not had the support, capacity or incentives they needed to do sustain the level of effort required to manage, monitor and enforce community conservation areas.	• WWF and local partner, AENA • Local communities, including CBNRM committees • District government representatives • Government of Mozambique ministries responsible for environment and rural development	The new project intends to address this, and the district government officials have a role to play in enforcement, e.g., delivering graduated sanctions.
Chicken vaccinations and seed distribution interventions were less effective than they could	• CARE and local partner, AENA • District government representatives • Government of Mozambique ministries responsible for agriculture/ nutrition and rural development	CARE/AENA and Government of Mozambique— responsible for seed distribution and delivering chicken vaccinations, respectively – may wish to put in place new systems to

have been,[40] in part because they were not delivered in a timely fashion.		improve timeliness of the service.
Nutrition interventions and culinary demonstrations were mentioned, albeit infrequently, as among the most impactful Alliance interventions.[41]	• CARE and local partner, AENA • Government of Mozambique ministries responsible for agriculture/ nutrition	CARE/AENA may wish to scale up the relatively small investment in these interventions to increase their reach.
There is local demand for improved seeds and solar panels.	• WWF, CARE and local partners, AENA and Ophavela • Local communities, including VSLAs • Local private sector	Seed multiplication and solar panel businesses may represent locally relevant and sustainable opportunities
There is an unmet need for access to clean drinking water that particularly affects women and girls.[42]	• WWF, CARE and local NGO partner, AENA • Government of Mozambique ministries responsible for the environment, rural development, health and women's wellbeing • Large private sector companies, like Kenmar, who may have Corporate Social Responsibility (CSR) programs	These entities may wish to fundraise, engage and/or invest in: integrated water resources management planning; construction of improved water sources; and building the capacity local institutions, including but not limited to Community Based Organizations, to manage water and maintain water sources.
There is an unmet need for family planning and reproductive health services.[43]	• CARE and local NGO partners • Government of Mozambique ministries responsible for health and women's wellbeing • Large private sector companies, like Kenmar, who may have CSR programs	These entities may wish to raise funds to deliver services to meet the unmet family planning need.

Recommendations for Future Research and Analysis

The results presented represent a fraction of potential findings from these rich quantitative and qualitative datasets. As indicated in data limitations and analysis (see *Research Methods*), the scope of analysis was constrained by the semester timeframe and half-time level of effort associated with internships for credit. This section briefly summarizes several additional research questions or frames that merit further exploration and analysis.

As suggested by the previous section, the peer-reviewed literature on the impacts of similar interventions, as well as larger trends driving change, would offer important context for interpreting results. Couching this analysis within the context of literature and secondary data – including geospatial

[40] For further insights on the effectiveness and challenges of implementing chicken vaccinations, see *Annex 2. Illustrative Findings about Alliance WASH, Nutrition, Chicken Vaccination and Gender Interventions.*
[41] For further insights on these approaches, see *Annex 2. Illustrative Findings of Alliance WASH, Nutrition, Chicken Vaccinations and Gender Interventions.*
[42] For further insights on WASH approaches and this finding, see *Annex 2.*
[43] For further insights on this, see *Recommendations for Further Research and Analysis* (next section).

and remote sensing data, climatic, population and market trends – was outside of the scope of this analysis, but such an analysis would undoubtedly offer more nuanced insights.

A major recommendation is to deepen the qualitative analysis around power and gender. Returning to the question of why association members eventually reached by the Alliance would have been better off than non-participating counterparts prior to any intervention, this would include exploration of potential entry barriers for vulnerable community members and benefit capture by elites. Another related finding to explore in more depth relates to the opportunity cost of participation. E.g., are there differential perceptions of the costs associated with participating in development and conservation interventions? Do these perceptions influence the ability of more vulnerable or less powerful people to engage in and benefit from projects? Next, the FGD transcripts offer a rich exploration of gendered power dynamics that there was insufficient time to explore, including changes in women's participation and leadership in community organizations and decision-making. Outstanding questions include: In which kinds of decisions do women participate and influence at the household v. community levels? To what extent has that changed over time? How are the experiences of females in male-headed households and of single men similar and distinct – both broadly and specifically vis-à-vis participation in conservation and development initiatives? When men mentioned shifting household power dynamics, did they provide evidence of behavior change consistent with that conclusion? Is it empirically true, as was perceived by the female FGD facilitator, that women expressed more fear about repayment of loans than men and perceived less change in gender roles than men reported?

A second, related recommendation is to reframe the analysis through a resilience lens. A resilience analysis could provide insights about the Alliance in Mozambique's original ambition that the resource-dependent poor having "better lives and broader options." Indeed, the Alliance recognizes that more than food security and assets are necessary to achieve this; thus, Alliance attention to creating financial safety nets and more diverse, climate adapted livelihood options. While the research instruments were not designed to measure community resilience to diverse shocks and stressors, both the qualitative and quantitative data sets offer insights on this important topic. For instance, the 2008 and 2018 questionnaires included questions about survival strategies to cope with insufficient food. In parallel, the FGD transcripts include rich conversations about how rural men and women deal with multiple shocks and stressors. Overlaying existing findings with a resilience lens and adding these analyses within this analytical frame could help the Alliance to understand the extent to which our cross-sector interventions were effective in enabling poor households, and the ecosystems that support their livelihoods, to quickly bounce back to (if not improve upon) their previous status.

Field staff from the Alliance in Mozambique requested two complementary analyses. The first question is relatively simple: How well do the Alliance interventions map onto the challenges that people report facing to achieving food security? While qualitative challenges to food security have been analyzed in some depth (see *RQ1A*), the household survey included two questions that have yet to be analyzed related to the household's greatest challenges in fishing and agriculture. A quantitative understanding of reported livelihood challenges could help future programs in P&S, such as WWF Mozambique's ongoing project in P&S, to better understand and adapt planned interventions to tackle the greatest drivers of food insecurity according to the people who live that reality every day. The second question is more complex: What are the principal factors that influence conservation interventions' delivery of food security benefits? While the impact pathways of community-based conservation interventions to food security were explored using qualitative analysis (see *RQ1B*), it would be interesting to supplement

those insights with statistical modeling. Additional quantitative analyses that would be relatively light lifts and could provide useful insights, especially for ongoing conservation and development work in Mozambique, are summarized in the *Table 6 (below)*.

Table 6. **Recommended Quantitative Analyses**

Household Survey Variable(s)	Suggested Analysis	Potential Insights
Strategies for coping with insufficient food (2008 & 2018)	- Reported "survival strategies" for coping with insufficient food in the previous year; - Changes in reported coping strategies over time	Potential impacts of food insecurity have on other aspects of wellbeing, like wealth, health and education
Livelihood changes in the past five years and reasons (2014 & 2018); and household's greatest challenges in fishing (2014 & 2018) and agriculture (2014 & 2018)	- Reported livelihood changes in past five years and reported reasons for those changes; - Changes in rate of livelihood change and reported reasons over time; - Reported challenges in fishing and agriculture; - Changes in fishing and agriculture challenges over time; - Regression analysis of livelihood changes v. most reported fishing and agriculture challenges	Nature of livelihood challenges and reasons that drive community livelihood changes; Insight on if livelihood changes tend to be away from fishing and/or agriculture
Forest uses (2014 & 2018)	- Change in forest use over time - Compare uses in communities with v. without community forest governance	Snapshot of changes in community forest use over time; Strength of correlation between forest governance interventions and sustainable forest uses
Knowledge of natural resource laws and prohibitions (2018)	- Simple histogram for comparative analysis with actual legal and Alliance-promoted restrictions	Community awareness on legal and other natural resource restrictions
Adoption of conservation agriculture techniques - multiple variables (2008, 2014 & 2018)	- Change in adoption rates over time - Rates of abandonment of conservation agriculture practices adopted in previous years - Regression analysis between adoption rates and FFS participation (participation v. non-participation) or level of exposure (self v. family member v. community member v. none)	Strength of correlation between FFS intervention and adoption of conservation agriculture techniques; Insights into pace and mechanism of diffusion, including by non-participants (Z3 in ACES language), and the sustainability of innovations once adopted
Degree of participation in Alliance interventions and implementation of related best practices (2018)	- Participation in FFS over time (2014-2018) - Un-adoption of conservation agriculture practices over time (2018)	Correlations between participation in interventions and knowledge of conservation agricultural practices and natural resource prohibitions;

	- Regression analysis between participation in mangrove interventions and adoption of mangrove management practices (participation v. non-participation) or level of exposure (self v. family member v. community member v. none)	Correlations between intervention participation and social outcomes
Domestic animals (2008, 2014, & 2018)	- Incorporate into domestic animals into Household Asset Index	More robust understanding of household assets
Household Dietary Diversity Index (2008, 2014, 2018)	- Change over time in consumption of diverse proteins - Regression analysis with NTZ v. no intervention	If protein substitution is happening as fish stocks change, whether from generalized stock depletion or localized improvements from NTZs

Conclusion

The core hypothesis of the Alliance is that integrated conservation and development approaches are more effective in delivering conservation and development results than either conservation or development interventions, alone. A case study with limited generalizability, this evaluation cannot fully substantiate this hypothesis. Nonetheless, the data supports that Alliance conservation interventions contributed to development objectives, and that some development interventions may contribute to conservation objectives.[44]

A majority of community members agree that Alliance interventions contributed to improving their wellbeing. When properly enforced, household survey data shows that community-managed NTZs significantly increase food and nutrition security. Qualitative findings also suggest that adoption of climate-smart, conservation agriculture techniques reduce uncontrolled burns that may accidentally clear coastal and miombo forest, while reducing the regularity with which small-scale farmers convert such forests and savannas into new agricultural fields.

These cross-sectoral pathways of impact are noteworthy in the context of the challenging picture the data paints about the pressures vulnerable, rural populations face in coastal Mozambique. In Nampula Province, climate change impacts are a tangible reality: rising temperatures and variable precipitation affects smallholders' ability to grow enough food, while flooding or drought increasingly destroy their crops and homes, forcing them to redirect savings or take out a loan to rebuild instead of investing in the future. Meanwhile, rising inflation means the little money they have buys them less than it used to; and population growth is increasing livelihood pressures on an already stretched natural resource base.

In this context, the finding that development interventions successfully contribute to social outcomes, while unsurprising, is also important. FFS that promote conservation agriculture best practices are well-received and associated with increased food and nutrition security for members and non-members. Informal savings and credit associations, like VSLAs, also provide a vital safety net and access to larger

[44] The ecological measurements necessary to substantiate the latter claim were outside of the scope of this evaluation.

lump sums that appear important to smoothing consumption and wealth accumulation, especially for female-headed households, which are worse off than male-headed households.

Finally, this evaluation provides some evidence to suggest the complementary nature of conservation and development interventions in delivering sustainable development objectives, including the SDGs. While community-based conservation interventions may be important to sustain social outcomes in the long run, development interventions are critical to addressing basic human needs in the short term. Ongoing implementation and further research are necessary to understand when to prioritize integrated programming and how to best leverage these complementarities to sustain a virtuous cycle between conservation and development benefits over time.