

# Talensi FMNR Project

## End-of-Phase Evaluation Report

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**World Vision  
Australia  
Ghana**



**Authors:**

Peter Weston, Research and Evaluation Advisor,  
Food Security & Climate Change team, World Vision Australia  
Reaksmev Hong, Masters Intern, Carnegie Mellon University  
Virginia Morrison, Volunteer Intern, Food Security & Climate Change team,  
World Vision Australia

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## Glossary/Acronyms and Abbreviations

ADP	Area Development programme
FGD(s)	Focus group discussion(s)
FMNR	Farmer-managed natural regeneration
HH(s)	Household(s)
KII(s)	Key informant interview(s)
MoFA	Ministry of Food and Agriculture
NFRI	National Research Forest Institute
NRM	Natural Resource Management

## Definitions

**Lead farmer:** A resident of one of the nine project communities who was selected by their chief and community to undergo intensive training under the project and who became a member of his or her community's farmer-managed natural regeneration group.

**'Neighbour' farmer or HH:** A farmer or household resident in one of the nine project communities who has not received intensive training by the project and is not a member of a farmer-managed natural regeneration group.

**Comparison Group:** The cohort of non-participant households who took part in the household survey.

**Tindana:** A traditional land custodian and spiritual guardian of community lands.

## Photography:

All 2012 photos were taken by Peter Weston, World Vision Australia

All 2010 (baseline) photos were taken by Paul Akaribo

**Cover photo:** Tongo-Beo Lead FMNR Group women in front of 2 year old FMNR copses

## Contents

Definitions.....	ii
1. Introduction .....	1
Context.....	1
Project goals and approach .....	1
Promotion of FMNR and complementary NRM techniques.....	2
Encouraging project sustainability and widespread FMNR adoption.....	3
2. Evaluation Methodology.....	3
Quantitative data collection .....	4
Qualitative data collection.....	5
Data analysis .....	6
Stakeholder review and feedback summit .....	6
Social Return on Investment Study.....	6
3. Results.....	7
Assessment of medium-term objective: Farmers adopt sound NRM practices.....	9
Assessment of long-term objective: Increase in income levels and number of HHs with food all year round.....	14
Unintended negative impacts.....	18
External factors that constrained project impact.....	18
Efficiency/value for money .....	19
Post-project sustainability .....	19
4. Recommendations .....	20
To further promote FMNR.....	20
To stabilise project gains.....	20
Additional recommendations for closing Talensi’s hunger gap.....	21
Additional recommendations for optimising NRM-based economic opportunities .....	21
Recommendations from community stakeholders .....	21

# I. Introduction

## Context



The Talensi Farmer Managed Natural Regeneration (FMNR) project was a pioneering collaboration between World Vision Australia and World Vision Ghana implemented in the Talensi Area Development Programme (ADP) over a three-year period, commencing in July 2009. The Talensi ADP covers the Talensi District, which is located in the environmentally fragile, dryland area of northern Ghana.

Vulnerability to food crises and climate change, exacerbated by population growth, has diminished livelihood security and quality of life in the Talensi District. Over recent decades, annual rainfall volumes have been in decline, forest cover and associated indigenous biodiversity have disappeared and arable soils have lost fertility. The results are region-wide food shortages and a population that increasingly struggles to meet its

**Figure 1: Project location on map of Ghana (Map: University\_of\_Texas)**

The project involved nine of the Talensi District's 69 communities, covering an area of approximately 500 square kilometres and an approximate population of 11,921 individuals or 1,472 households (HHs). Four communities took part in the project from the beginning, including Yameriga, Tongo-Beo, Yinduri and Wakii. An additional five communities joined the project after 2009, including Balungu, Shia, Sepaat, Namolgo and Yagzore.

## Project goals and approach

- **Long-term objective:** to (sustainably) improve livelihoods, by:
  - increasing income levels;
  - increasing the number of HHs with food all year round.
- **Medium-term objective:** farmers adopt sound natural resource management (NRM) practices

In the long-term, the project aimed to improve the livelihoods of people in the Talensi ADP by increasing income levels and the number of HHs with food all year round. In order to achieve this goal, the project encouraged farmers to adopt sound NRM practices. These practices aimed to rebuild HH resilience by reversing losses in forest cover, indigenous biodiversity and soil fertility.

Primarily, the project promoted community mobilisation around FMNR to restore multi-purpose indigenous trees to farmland and community-managed forests. FMNR encourages farmers to identify regrowth from the stumps of cut-down trees and to protect and prune the regrowth into new trees.



**Figure 2: FMNR utilises established root systems of felled trees instead of the tender roots of seedlings**

The project also promoted complementary NRM techniques by:

- using crop residues as fertiliser and fodder;
- providing market information training for farmers;
- developing local laws to support good environmental management;
- promoting bushfire control by establishing and training community fire-fighting volunteers;
- developing supplementary income and resource generation;
- providing training for the adoption of fuel-efficient wood stoves.

This end-of-project evaluation assesses the success of the project against its medium- and long-term objectives, incorporating the experience and observations of the project's community participants, technical partners and World Vision staff.

## Promotion of FMNR and complementary NRM techniques

The project promoted FMNR by negotiating a designated community reforestation plot, an example of which is shown below, within each of the nine communities. In each community, Lead Farmer Groups – comprised of 20 farmers trained in FMNR by World Vision staff – managed the plots. The reforestation plots also acted as a means of providing demonstration training for the wider community, enabling farmers to apply FMNR techniques on their own farmland.

Beyond individual farmer behaviour, the project also encouraged and mediated whole-of-community agreements and regulations in relation to tree-cutting, field burning and bushfires. The suppression of bushfires and field burning was vital to enabling FMNR, as was the renewal and fruiting of mature trees and interest in tree sapling planting. In addition, World Vision distributed 90 fuel-efficient wood stoves within the target communities to reduce demand for wood cutting, thereby further promoting sound environmental management.

The key benefits of FMNR and complementary NRM techniques promoted under the project are that they are easily shared, relatively free of external inputs and conceptually easy to understand and copy. Moreover, they yield results that are visible in the short-term.



Local farmers implementing FMNR techniques in Yameriga, Talensi District

## Encouraging project sustainability and widespread FMNR adoption

In order to support volunteer lead farmers and provide incentives for them to continue with FMNR implementation, the project created mechanisms by which farmers could benefit from their roles. The most important of these was ensuring that volunteers enjoyed priority access to the surplus natural resources generated from the communal forest sites. The project also provided support for the creation of new income sources throughout the three-year period by establishing a group savings bank account for each community's lead farmer group. World Vision trained groups in association management skills and created chairperson, treasurer and secretary roles. To further support community groups and partners, the project manager provided encouragement and follow-up training. In addition, World Vision provided a team of two bullocks to each community for field ploughing.

To encourage widespread FMNR adoption, World Vision involved the most influential and authoritative figures in the community as key planning partners and advocates (notably, community chiefs and the District Assembly). For instance, the figure below shows a Tonga Beo chief demonstrating FMNR techniques to community members during an FMNR pruning session. The project also promoted farmer-to-farmer networking to disseminate FMNR training. In addition, World Vision integrated the project goals and approaches with wider strategy and field operations of Ghana's Ministry of Food and Agriculture (MoFA).



Chief of Tonga Beo demonstrating FMNR pruning technique

## 2. Evaluation Methodology

This evaluation assesses the impact of FMNR through a combination of quantitative and qualitative data collection. World Vision collected data from community members through surveys, focus group discussions (FGDs) and interviews, and from FMNR forest sites through observation and surveillance.

World Vision also held a stakeholder review and feedback summit to gain stakeholders' views on project outcomes and their recommendations for action.

In addition, World Vision Australia conducted a Social Return on Investment (SROI) study to complement the findings of this report.

## Quantitative data collection

### Survey

#### **Longitudinal comparison:**

Before project implementation, World Vision collected baseline survey data from four sub-districts of the Talensi District. After project implementation, 15 enumerators trained and supervised by World Vision Ghana staff surveyed HH representatives and collected survey data to facilitate longitudinal comparison between baseline and end-of-phase data.

As the most intuitive unit of production in the communities, HHs are the chosen sample unit. Enumerators surveyed representatives on HH characteristics, crop and livestock production and FMNR and NRM knowledge and practices.

While there were insufficient financial resources and time to survey all nine communities involved in the project, enumerators surveyed the five earliest-targeted communities to reveal a reasonable representation of the project's influence.

#### **Lateral comparisons:**

Within each targeted community, enumerators surveyed both direct participants (referred to as 'lead farmers') and members of HHs resident in the project area who did not participate in the training provided to lead farmers (referred to as 'project neighbour HHs').

World Vision added a further two communities from inside the ADP but outside the project area – referred to as 'comparison communities' – to the survey. This enabled counterfactual comparison between communities with similar geography and climate, ethnicity, local economy and involvement in ADP activities (other than the FMNR project).

Within lead farmer HHs, enumerators surveyed project-trained HH members. When unavailable, enumerators surveyed the lead farmer's spouse or closest adult relative. Within project neighbour HHs and comparison community HHs, enumerators surveyed randomly selected respondents.

As shown in Table 1, respondents included a total of 104 lead farmers, 154 representatives of neighbour HHs and 142 representatives of comparison HHs. These sample sizes led to statistical results with 95 percent confidence intervals for lead farmer HHs and 90 percent confidence intervals for project neighbour HHs and comparison group HHs.

**Table 1:** Survey sample groups and gender distribution

Group	Freq	%	Female	%
<b>Lead FMNR farmer HHs</b>	104	26	48	46
<b>Neighbouring farm HHs</b>	154	39	59	38
<b>Comparison Group HHs</b>	142	36	72	51
<b>Total</b>	<b>400</b>		<b>179</b>	<b>45</b>

### FMNR forest site surveillance

Throughout the project, World Vision contracted the National Forest Research Institute (NFRI) to monitor annual changes in tree characteristics. Group members in all communities were encouraged to participate in or observe the assessment exercises and to assist with identification of FMNR plot boundaries. Institute and

community members assessed tree density, growth rates and species composition or species diversity in the community FMNR plots to allow for comparison with previous years' records.

## Qualitative data collection

### Focus group discussions

The qualitative evaluation team conducted FGDs in all five surveyed communities, as depicted below. In each community, chiefs nominated community members, based on the criterion of including a mix of lead farmers and neighbour farmers, to participate in a male FGD and a female FGD. The team held a further two FGDs to capture youth perspectives. The total 12 FGDs involved five groups of adult men (59 men), five groups of adult women (55 women) and two groups of young people, each comprising both boys and girls (10 boys and 10 girls).



**Focus group discussions in Tongo-Beo, Yindure and Wakii**

### Key informant interviews

The qualitative evaluation team conducted key informant interviews (KIIs) with ADP and project staff in order to understand which community partners were most important to the project's success. Representatives of each group were selected and invited to participate in an interview with the lead evaluator. They included:

- two managers of the Talensi office of the MoFA;
- a community chief and Tindana (traditional land custodian);
- a secretary of one of the FMNR Lead Farmer Groups (Wakii);
- a member of one of the FMNR Lead Farmer Groups (Yindure);
- the chief researcher for Upper East office of the NFRI;
- the World Vision project coordinator.

### Observation



The qualitative evaluation team also inspected the FMNR plots in each of the five communities. At each location, the lead evaluator visually compared the community reserve sites with photographs taken of those same sites two years earlier in the baseline period.

In addition, the team opportunistically visited two lead farmers' private farm plots to see how FMNR has been introduced into cropland.

## Data analysis

At the end of each day of qualitative data collection, the qualitative evaluation team met to compare notes and observations about the content of the FGDs and KIIs. In particular, they sought to identify emergent themes across groups and new information, especially as they related to explaining project successes, gaps in programming and external constraints to success. The lead evaluator and co-analyst then gathered and analysed the qualitative data and initial interpretations.

After field data collection, hired data entry clerks entered the survey data into CSPro (a Census and Survey Processing system). World Vision Australia staff cleaned and analysed the data in both CSPro and Excel to identify central tendencies such as mean, mode and medians.

The evaluator then brought together the quantitative and qualitative data sets to identify relationships between the data sets. For instance, the evaluator looked for instances in which quantitative data confirmed themes shared in FGDs or qualitative data helped to explain quantitative results. Combining the data sets also helped to identify and explain the magnitude of difference between baseline and end-of-phase data and between project and non-project communities.

## Stakeholder review and feedback summit

Whilst still in Ghana, the lead evaluator synthesised the qualitative data to identify project achievements and anticipate project sustainability, constraints, gaps and discoveries. The lead evaluator then presented these to a workshop attended by chiefs of the nine project communities, the Talensi District Assembly, heads of government ministry offices, World Vision staff and representatives of the Lead Farmer Groups.

After the presentation, participants organised themselves into stakeholder clusters and recorded their reactions and recommendations for action. Their responses are incorporated into the conclusions and recommendations section of this report.

## Social Return on Investment Study

SROI is an evaluative approach founded on social accounting and cost-benefit analysis seeking to express project outcomes as equivalent monetary values. This enables comparison of project outcomes with the cost of inputs (in-cash and in-kind).

SROI is a powerful means of identifying the most valued contributions of a project, learning how community participants value different impacts and comparing the benefits of different types of projects within a community. It also facilitates comparison of different development interventions.

SROI is new to World Vision, and World Vision Australia incorporated it into this evaluation to understand the aggregate value of changes brought about by the project. A separate report summarises the SROI results as part of the overall evaluation methodology.

### 3. Results

The conclusions draw together and summarise key findings and observations. The recommendations that follow are a mix of suggestions from the lead evaluator's analysis and key stakeholders' proposed priorities and solutions put forward over the course of the evaluation data collection period.

For a relatively modest investment of approximately US\$100,000 per year, the project achieved its medium-term objective. There is widespread adoption among target communities of sound NRM practices, facilitated by high levels of knowledge, awareness and farmer-to-farmer training.

The project also made positive and tangible gains in its long-term objective to sustainably improve livelihoods by increasing income levels and access to food. The increases in vegetation and tree density as a result of FMNR and NRM practices have improved soil quality, harvests and access to food, nutrition, livestock assets and HH self-sufficiency.

While some external factors constrained the project's impact, particularly its ability to ensure that HHs had sufficient food all year round, the outlook for post-project sustainability and future benefits is encouraging. Householders in the project area expressed attitudes and expectations that bode well for post-project sustainability of FMNR results.

The recommendations following this section outline ways to further promote FMNR, stabilise project gains, close the hunger gap and optimise NRM-based economic opportunities in Talensi.

#### Key outputs at a glance:

##### FMNR Adoption:

- 180 Lead farmers (90 women and 90 men) trained in and adopted FMNR and related NRM techniques, and trained others in the community
- 574 HHs (37 percent of all HHs) adopted the FMNR approach
- 157 HHs adopted fuel-efficient stoves (90 were distributed to HHs by the project and the remainder were spontaneous adoptions)

##### Re-greening Landscapes:

- 161 hectares under new forest cover with average tree densities of 2334 per hectares (from a baseline of five per hectare)
- 336 hectares of farmland under FMNR management with average tree densities of 57 per hectare (from a baseline of five per hectare)
- 19,024 additional indigenous FMNR trees on farmland by July 2012
- 376,871 additional indigenous FMNR trees in forest areas by July 2012
- 94 percent of FMNR adopters reported an increase in soil fertility (against 26 percent among the comparison group), with 75 percent of adopters reporting high increases (against only six percent of the comparison group)
- 66 percent of FMNR adopters reported improvement in soil erosion (against 17 percent in the comparison group), with 47 percent of adopters reporting "a lot" of improvement (against eight percent of the comparison group)

The coverage of 497 hectares by the end of the project is low compared to the 27,060 hectares of farmland in the district, and compared to the most successful World Vision FMNR projects<sup>1</sup>. However, the tree density in the pilot FMNR reforestation sites means that this project has achieved some of the highest overall trees densities in rural managed landscapes of any FMNR project.

### Key livelihood outcomes at a glance:

- 46 percent of FMNR adopters observed that FMNR practices generate **more wild fruits and food** (fruits, nuts, rabbits and partridges). Without FMNR practices, only 4.5 percent believed wild food availability would increase.
- 95 percent of FMNR HHs harvest all or some of their **firewood** from their own fields compared to 21 percent of non-FMNR HHs.
- FMNR HHs gather, on average, 50 percent of all **firewood** from forests compared to 67 percent for non-FMNR HHs.
- FMNR HHs gather, on average, 17 percent of all **rafters** from their own fields compared to 70 percent for non-FMNR HHs.
- The recovered forest areas provide better access to **herbal medicines**, in terms of availability and proximity.
- The FMNR regrowth trees have some reported effect on **protecting fields from severe wind** storms, and the additional young trees serve as emergency supplies to repair damaged houses.
- **Slowing wind speeds** around human habitations as a result of **fire suppression** allows grass to be retained in fields and leaves on trees.
- The project created avenues for people to work together to achieve a common goal in ways that were not experienced previously. Community **unity** is now extending from collaboration on organised activities to cooperation on one another's farmland.
- Better **shade, beauty and comfort** of the community's surroundings ranked as the fourth most frequent response to an open-ended question asking what respondents thought was the greatest benefit of the project.
- Children and adults now have an increased sense of **optimism** for the future of their farming and their communities' survival.
- Boys are less likely to be removed from school to herd cattle to pastures due to the local availability of fodder.
- Increased access to natural resources has led to the **diversification of income and savings**, as people do not have to purchase as many natural resources as they did previously.
- **Asset creation (trees):** In Ghanaian Cedi (GH¢), a rafter, hewn from a tree trunk of a young tree, is worth around GH¢4 (US\$2.13). Thus, even in the short-term, the additional 393,410 FMNR trees have created assets worth GH¢1,573,640 (US\$838,750), *excluding the value of the trees' products, such as fruit, nuts and seeds.*
- **Asset protection (livestock):** While ownership rates of livestock are similar between groups and have decreased since the baseline, HHs in the project area on average earn GH¢100 (US\$53) per year more from stock sales than HHs in the comparison group.

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<sup>1</sup> Senegal Food and Livelihoods Enhancement Initiative motivated farmers to convert over 9,000 hectares to FMNR cropland between 2008 and 2011. Under a second phase, multi-ADP expansion it had covered 50,000 hectares by mid-2012.

## Assessment of medium-term objective: farmers adopt sound NRM practices

The project succeeded in promoting widespread adoption of NRM practices, improving forest cover, indigenous biodiversity and soil fertility.

### Changes in NRM knowledge, awareness and practices

#### FMNR:

Through the provision of training, there are now high levels of FMNR knowledge and awareness among the target communities. As shown in Table 2, all lead farmers and a vast majority of neighbour HHs and comparison groups are able to correctly describe at least one FMNR technique. There is now almost universal acceptance of FMNR.

**Table 2: Correct descriptions of FMNR techniques**

# correct techniques described	Lead HHs (n=97) <sup>2</sup>	Neighbour HHs (n=100) <sup>3</sup>	Comparison Group (n=27)
Know no correct technique	0%	15%	22%
Know 1 or more correct technique	100%	85%	78%
Know 2 or more correct techniques	69%	46%	30%
Know 3 or more correct techniques	43%	15%	4%
Know 4 or more correct techniques	30%	5%	0%
Know 5 or more correct techniques	19%	1%	0%
Know 6 or more correct techniques	12%	0%	0%
Know 7 or more correct techniques	9%	0%	0%

The benefit of training is self-replicating, with over three-quarters of lead farmers and over half of neighbour HHs passing on their training to other HHs, training an average of five people each. As shown in Table 3, lead farmers recorded high levels of training, neighbour farmers reported moderate levels of training and the comparison group rated very low.

<sup>2</sup> Seven respondents were eliminated from the sample because the enumerators did not fill in the entire section.

<sup>3</sup> 11 respondents were eliminated from the sample because the enumerators did not fill in the entire section.

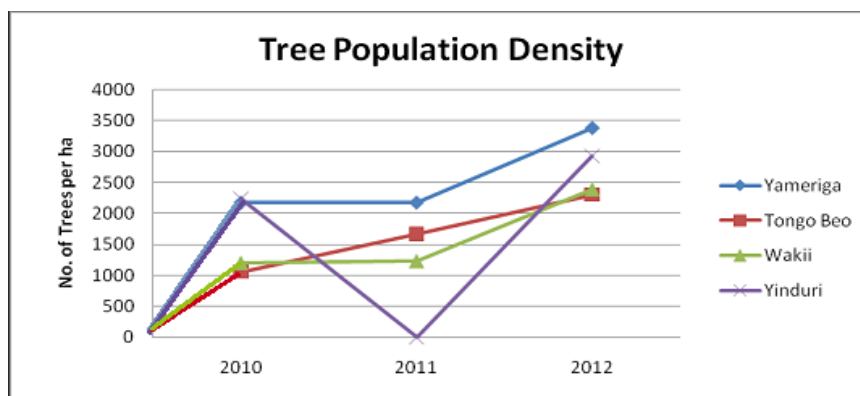
**Table 3: Respondents who received training in the last 3 years**

Training topic	Percentage of HHs trained		
	Lead Farmers (n=104)	Neighbour Farmers (n=154)	Comparison Group (n=142)
<b>FMNR</b>	99%	26%	8%
<b>Tree planting</b>	61%	19%	8%
<b>Tree erosion control</b>	48%	12%	5%
<b>Bushfire control</b>	56%	20%	11%
<b>Composting</b>	46%	10%	0%
<b>Grafting</b>	8%	1%	0%
<b>Animal traction</b>	27%	5%	3%
<b>Zai pits</b>	6%	1%	0%
<b>Livestock</b>	25%	6%	2%

As a result of training, FMNR adoption is widespread in community-managed forest reserves. FMNR now covers approximately 236 hectares of forest reserves, of which at least 161 hectares are new as a result of the project's introduction of FMNR.

There is also widespread acceptance of FMNR in farmers' crop land. During two-and-a-half years of project implementation, 37 percent of all HHs within the target area adopted FMNR into their own crop fields, including 62 percent of lead farmers and 34 percent of neighbours. Based on the HH survey, this has resulted in 336 hectares or more of FMNR-protected farmland.

Through its mixture of intensive community forestry on designated plots and mixed agroforestry on community members' own properties, the project has revegetated 497 hectares, adding 393,410 live trees to the project landscape with high levels of tree density, as shown in Figure 7 below. While 497 hectares of FMNR-protected land across nine communities is a good result after two-and-a-half years, the land coverage remains small in comparison with the 27,000 hectares of arable farmland across all 69 communities in the Talensi District.



**Figure 3: Tree population density from 2010-2012 in Yameriga, Tongo Beo, Wakii and Yinduri**

As shown below, site-specific results vary greatly. While some FMNR sites are very advanced, others are just beginning to advance due to fire or cattle damage or continued harvesting. For instance, as shown in Figures 12 and 13, due to bushfires in 2011, the size of trees in 2012 in Yindure was the same as in 2010 at the baseline.



**Yameriga in 2010 (left). Yameriga after FMNR in 2012 (right)**



**Wakii in 2010 (left). Wakii after FMNR in 2012 (right)**



**Yindure in 2010 (left) . Yindure after FMNR in 2012 (right). The FMNR site was razed by bushfire in 2011**

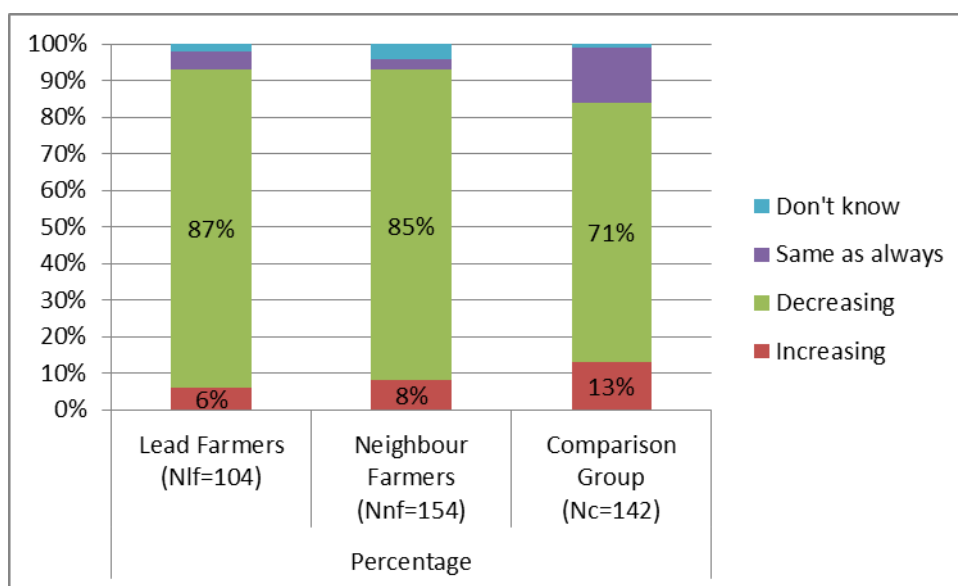
As detailed below, the establishment of well-managed and enforced community regulations have also contributed to improvements in soil management.

**Local laws to support good environmental management:**

All pilot communities have developed local laws to support good environmental management, such as regulations around tree cutting, field burning and bushfires.

In particular, the project achieved almost universal acceptance of the need to control bushfires. Each target community formed bushfire management by-laws, complemented by the provision of training and the establishment of bushfire management volunteer groups, whom the target communities have embraced. According to 87 percent of lead farmers, as shown in Table 4, this has led to a decline in bushfires.

**Table 4: Perceptions of the project’s effect on bushfires**



**Improved composting method:**

Further supporting sound NRM practices, the project achieved almost universal acceptance of composting among lead farmer HHs.

The project’s promotion of community bushfire fighting and suppression of field-burning after harvest facilitated the improved method, which increased the availability and quality of material available for composting. There is now widespread use of improved bulk composting and field mulching methods – using crop residues as the base for making compost fertiliser – to improve crop yields and soil fertility. 42 percent of lead farmers and 10 percent of neighbour HHs learned the improved compost method, 95 percent of whom applied it to their own farmland. This high rate of adoption is testament to the method’s effectiveness in improving soil fertility and coverage.

**Tree planting:**

While the project did not specifically promote tree planting, indirectly it had a profound influence on the acceleration of tree planting, adding an estimated 22,996 live trees to the project area. This was likely because the project demonstrated that trees do not suppress crop growth when pruned effectively and because it allayed traditional fears that growing a tree causes the planter to die. Moreover, bushfire suppression under the project promoted the survival of seedlings.

**Fuel-efficient wood stoves:**

The project had modest results with fuel-efficient wood stoves. For those owning such stoves, reported benefits are important at a HH level. These include faster cooking times, less smoke in the house, the pot staying hot for longer, less danger of burns and improved aesthetic value. Most importantly, the amount of wood purchased from market by HHs with improved stoves is half that of the project area average, and fuel-efficient stove owners spend 21 percent less of their income on wood.

Although recipient HHs appreciate the fuel-efficient stoves, spontaneous adoption is still low in the wider community. World Vision distributed 90 locally-made fuel-efficient wood stoves within the target communities to reduce demand for wood cutting. After three years, a total of 158 improved stoves were in use. Only 13.5 percent of lead farmers and 10.4 percent of neighbour HHs possess such stoves. This is still an accomplishment, given that less than one percent of comparison group HHs possess a fuel-efficient stove.

Several factors may impede uptake. These include the relatively high purchase price and the fact that although males tend to control HH finances, they are not responsible for wood gathering and cooking, and are therefore less sensitive than women to the time-saving benefits of the stoves. Further uptake of fuel-efficient stoves is required to ease demand on wood cutting.

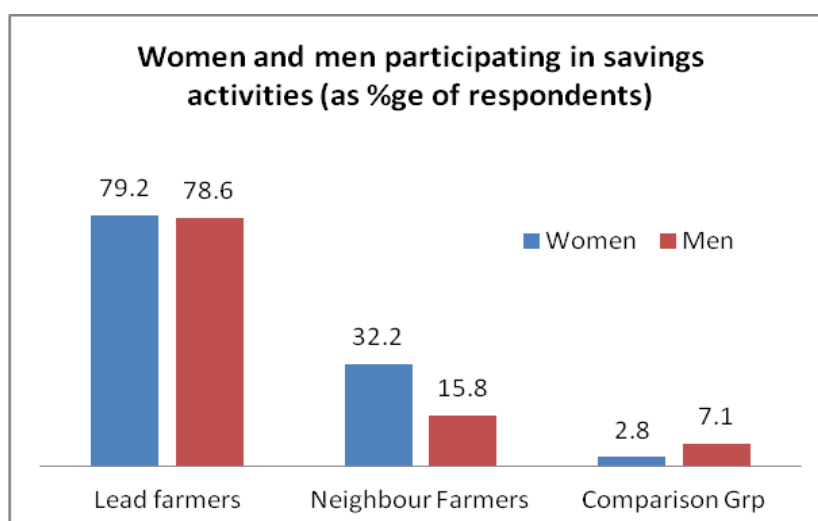
**Supplementary income:**

By the end of the project, lead FMNR farmers were more engaged than neighbours and the control group in new income-generating activities reliant on natural resource harvests, especially selling firewood, charcoal or timber sourced from FMNR fields. The diversification of HH resources and income resulting from these activities has improved resilience to shocks and provided added incentive for FMNR and NRM.

**Savings accounts:**

Despite high levels of participation by lead farmers in group income generation activities and joint savings accounts, as shown in Figure 14, results indicate that groups are not saving enough money to replace the bullocks that World Vision provided them with at the beginning of the project. Moreover, the marginal benefits generated by savings activities appear highly fragile once project support ends.

**Table 5 Participation in savings activities**





## Assessment of long-term objective: increase in income levels and number of HHs with food all year round

As a result of high levels of adoption of sound NRM practices, communities were already beginning to experience livelihood benefits generated by the project during the project's lifetime. FMNR and NRM techniques have increased natural resource access and availability, which in turn has led to improvements in soil quality and yields, harvests, nutrition, animal health and livestock security and children's school attendance. Improved resource accessibility and availability has also enabled greater HH self-sufficiency and savings in time and money. In addition, the project has fostered community unity and psychological and environmental benefits.

As reported in FGDs, communities expect further project benefits to become apparent within the next five years as new trees grow and the first FMNR trees mature.

The project did not show a clear reduction in the annual period of food shortages. Cultural factors such as food wastage are likely contributors, as outlined later in this report. Moreover, the HH survey tool may have impeded results. As the survey posed questions specifically about the number of meals served in HHs, it did not quantify the significant increases in fruit consumption outside the HH dynamic reported in children's FGDs.

### Current livelihood benefits

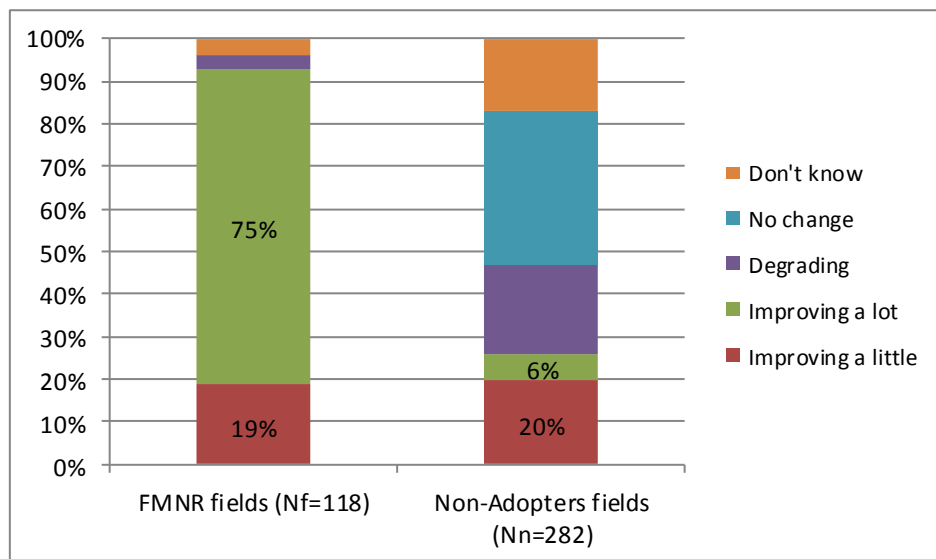
#### *Improved soil quality and yields:*

The widespread adoption of sound NRM techniques has improved soil fertility and reduced erosion. Among farmers who adopted FMNR on their own farmland, 94 percent observed an improvement in **soil fertility** after implementing FMNR techniques, with 75 percent of FMNR farmers identifying high levels of improvement, as shown in Table 5. In FMNR farm plots, 66 percent reported a reduction in erosion compared to just 17 percent in non-FMNR adopting HHs. 47 percent of FMNR adopters reported a high improvement in **soil erosion** compared to just eight percent in the comparison group. Community members attributed these improvements to FMNR, which increases leaf-drop and wind protection and slows run-off.

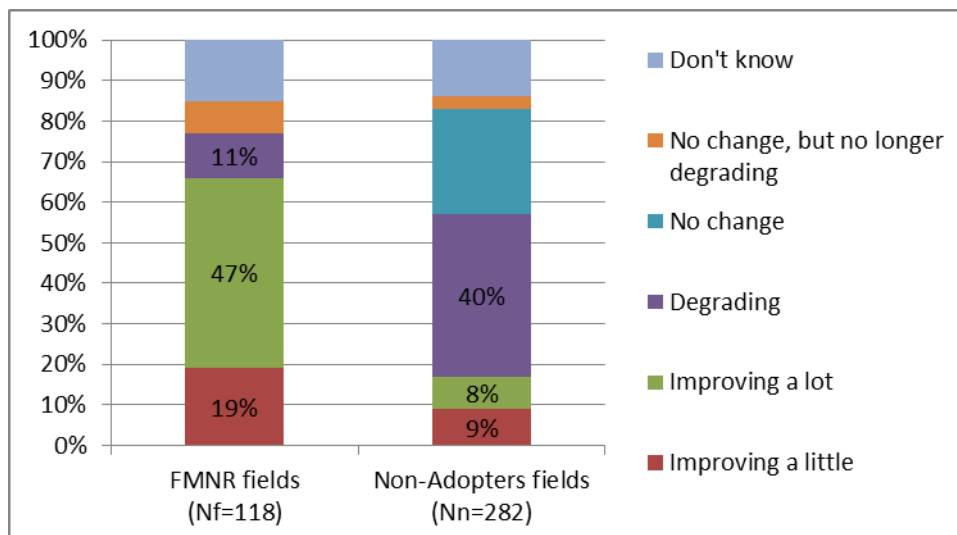
Bushfire suppression has also contributed to soil protection. It protects soils with vegetation cover throughout the dry season and permits the re-growth of stumps and increased leaf-drop from mature trees. The elimination of field burning improves soils by allowing grass and stubble to remain in fields throughout the dry season, thereby controlling erosion, retaining moisture and providing termite food, which becomes a form of manure. During the dry season the stubble and shade also attract livestock to the fields, who deposit urine and manure into the soil while grazing. Moreover, bushfire suppression results in an abundance of fruit because fire no longer singes the fruit-bearing tips of mature trees.

Soil improvements also result from improved composting, which creates organic fertiliser, and from leaving crop residue in fields. Adopters of the improved composting method reported that yields from fields treated with the improved composting method doubled, tripled or even quadrupled in the first year of application.

**Table 6: Observed changes in soil fertility compared to baseline levels**



**Table 7: Observed changes in soil erosion compared to baseline levels**



The use of commercial mineral fertiliser and pesticides, however, may undermine gains in soil restoration. Increased use of these products is greater in the project area than in comparison communities, despite testimonies from some FGDs suggesting that fertiliser is not maintaining higher yields after two or three years of application. While MoFA is promoting access to fertiliser and subsidising the price, farmers do not appear to be informed about how to optimise benefits and avoid associated risks. Resultantly, they may be wasting their money, or worse, jeopardising progress in soil restoration.

**Harvests:**

A quarter of FMNR farmers perceived an increase in crop yields as a result of improved soil health and productivity, though the impact remains inconclusive. As shown in Table 6, 21 percent of target farmers report having access to sufficient food from their harvest for the whole year, which is higher than in the comparison group (16 percent) but still lower than the baseline (31 percent in 2008/9 and 25 percent in 2007/8). Respondents report that 2011/12 was a climatically difficult year, as confirmed by widespread food deficit responses across West Africa. The results suggest that FMNR HHs are slightly more resilient than comparison communities to climate challenges.

**Table 8: HHs stating they grew enough food for 12 months' consumption**

Farmer Group	Freq		Percentage	
	Yes	No	Yes	No
<b>Lead farmers</b>	22	82	21.2%	78.8%
<b>Neighbour farmers</b>	26	128	16.9%	83.1%
<b>Comparison group</b>	23	119	16.2%	83.8%
<b>Total</b>	<b>71</b>	<b>329</b>	<b>17.8%</b>	<b>82.3%</b>
<b>Baseline 2007-2008</b>			25%	75%
<b>Baseline 2008-2009</b>			31.5%	68.5%

**Nutrition:**

Diets have improved along with HH harvests. The protection of trees under FMNR has increased availability and access to wild foods such as fruits, nuts and animals (such as rabbits and partridges, which are high in protein). Improved access to nutritional food sources resulted in reported improvements in children's health, and children reported being able to eat fruit daily.

**Animal health and livestock security:**

The project has progressively increased the availability of grass (due to fire suppression), shade and nesting areas for domestic and wild animals, with surveyed communities reporting that their animals are fatter, healthier and worth up to three times more than they were prior to project implementation. This has generated, on average, an additional US\$51 of livestock sales per HH per year in the project area when compared to the comparison group, without reducing the number of stock per HH over time (ie HHs do not appear to be selling non-surplus animals as a negative coping mechanism).

Moreover, the local availability of fodder, grass and shade means that livestock no longer have to wander or be herded far away. This reduces their susceptibility to theft, increasing food and asset security. Chickens and guinea fowl can also hide in the new vegetative cover, which shields them from predators such as hawks.



**Children enjoying fresh fruit in Talensi**



**Livestock benefit from fodder, grass and shade in FMNR sites at Tongo-Beo (left) and Wakii (right)**

**HH self-sufficiency:**

In addition to livestock assets, HHs expanded tree stocks as another major asset class. Trees are in constant demand for construction timber and firewood. They act as a quasi-bank account, as people can draw upon them to access resources or cut and sell them for cash.

FMNR has also reduced pressure on forests and improved HH internal self-sufficiency. As shown in Table 7, four times more FMNR HHs than non-FMNR HHs are able to harvest rafters for roofs and firewood from their own fields rather than purchasing it from other towns or harvesting it from wild forest. The abundance of shea and other fruit as a result of bushfire suppression has also increased HH incomes.

**Table 9: HHs sourcing firewood from their own fields, the forest or market**

Source of firewood	Own fields		Wild forest		Purchase	
	Freq.	%	Freq.	%	Freq.	%
<b>FMNR HHs (Nf=118)</b>	113	95.76	95	80.51	34	28.81
<b>Non-FMNR HHs (Nnf= 282)</b>	60	21.28	250	88.65	84	29.79

**Savings in time and money:**

In addition to promoting HH self-sufficiency, recovered forest areas and improved availability and proximity to herbal medicines, firewood, thatch and rafters enables HHs to save both time and money.

**Children's school attendance:**

The abundance of locally available fodder also means that young boys no longer have to be kept from school to herd livestock to far-off pastures during the dry season. While not quantified, this is likely to result in improved educational outcomes. As mentioned above, children are also able to access fruit from FMNR fruit-bearing trees to eat on the way to school throughout most of the year. As they had often attended school on empty stomachs during lean times of the year, with detrimental impacts on concentration levels, this is likely to further improve academic results and life opportunities.

**Community unity:**

The project has created avenues for people to work together in the pursuit of common goals in ways not previously experienced. After collaborating on organised FMNR activities, community members are now cooperating on one another's farmland. The creation of social capital is likely to enhance community and HH resilience and increase the feasibility of addressing future challenges and development initiatives, which will further improve livelihoods.

**Psychological benefits:**

Community members have also experienced psychological benefits as a result of the project. These include the aesthetic pleasure of a greener landscape; a more comfortable, cooler micro-climate under the tree canopy, which reduces heat stress and improves mental health; a sense of relief that they no longer have to worry about livestock security as much as they used to; and increased optimism among children and adults for their communities' farming future and survival. Several FGDs reported that, at the previous rate of tree cutting, they feared they would have to abandon their villages in five or six years, whereas now they believe that the environment will sustain them into the future.

**Environmental benefits:**

Another way in which the project has improved quality of life is by enabling communities to feel they are better protected from severe wind storms, with FMNR regrowth trees protecting fields and the additional young trees serving as emergency supplies to repair damaged houses. Fire suppression also slows wind speeds by allowing grass to be retained in fields and leaves to remain on trees.

## **Future benefits**

As FGDs report, communities now anticipate livelihood benefits from the project to increase over the next five years following the project. They anticipate increases in food from trees, shade, soil protection and fertilisation, windbreaks (which in turn mean less damage to crops and homes), rafters, firewood, harvests and income. For instance, the added value to livestock assets during the project is US\$73,491, and in five years' time this may amount to US\$334,793.

## **Unintended negative impacts**

HHs with easy access to FMNR forested areas enjoy improved access to firewood. But while immature FMNR trees remain small, FGDs suggested that other HHs are experiencing an initial increase in effort required to gather firewood, since they are not able to cut more of the local trees and the trees are not killed by local fires. This effect on some households was also observed in FMNR evaluations in Senegal and affirms the need for FMNR projects to factor-in initiatives that reduce wood consumption, such as fuel-efficient wood stoves.

FGDs also raised the fear of venomous snakes taking up residence in FMNR regrowth areas, presenting a danger to volunteers. Although no snake bites were reported, this concern is at the forefront of volunteers' minds when pruning trees.

## **External factors that constrained project impact**

Several factors beyond the agricultural and environmental scope of the project restrained its impact. Addressing these factors (where possible) could increase the positive outcomes of FMNR and lead to better outcomes in child well-being and children's access to good nutrition and housing.

### **Cultural factors**

Food wastage likely underlies the lack of reduction in the annual hunger gap. Post-harvest grain reserve is depleted early for conversion to alcohol, sale to buy alcohol, sale for cash to woo extra wives and for extravagant funeral parties. These cultural factors, which are difficult to address, are responsible for the majority of the food deficit period late in the dry season, when children's health and survival are most at risk.

### **Crop pests**

Crop pests such as army worms, grubs and grain-eating birds are a significant obstacle for producers, further reducing the ability of FMNR to close the hunger gap.

### **Climate shifts**

Although reduced erosion and the diversification of farm production to include indigenous trees and tree products have helped to strengthen climate resilience, erratic climate shifts over the last ten years have destabilised predictability of the start and end of the rainy season, extended dry spells and made for more intensive downpours. Climate shifts make it difficult for farmers to know when to plant, causing significant crop losses.

### **Lack of water reserves**

The lack of water reserves throughout dry season impedes gains made in livestock health and security. While fodder is now locally available, livestock still need to roam or be herded far along the river each day for water. Communities therefore seek external support to establish rainwater dams.

### **Lack of further partnership and involvement**

#### **Government agencies:**

Partnerships with government agencies, which could further promote FMNR, are not as strong as they could be. Although the project formed a healthy partnership with the local branch of MoFA, MoFA does not appear to have incorporated FMNR into its own suite of sustainable land practice promotions.

Furthermore, while the NFRI and Environmental Protection Agency share similar objectives to those guiding this project, the lack of operational partnership with these organisations hampers FMNR expansion.

#### **Children and youth:**

Children and youth were not involved in project outreach activities, such as education on the importance of rich local biodiversity to livelihoods and how to sustainably manage agricultural lands. Their involvement could further extend the project benefits.

#### **Fulani ethnic communities:**

The project involved only the Talni ethnic community. Neighbouring pastoral Fulani communities continue to burn landscapes to promote grass growth and their fires are said to spread wildly across many surrounding areas in the dry season. Their lack of involvement inhibits the reach and effectiveness of FMNR.

### **Population growth**

Population continues to grow, outstripping growth in soil productivity and reducing the size of HH plots. Average HH size among survey respondents is over eight people, and population density remains high. Until population density stabilises, there will be significant strains on productivity per hectare in order to maintain current HH food production levels.

## **Efficiency/value for money**

The project is a sound return on investment. For each live tree added to the landscape by the end of the project, it invested US\$0.29. Six years after project closure, 1,025,000 trees will have been added to the landscape, representing an investment of only US\$0.12 per live tree.

With respect to the funds invested in the project by World Vision, the social, environmental and economic outcomes identified by the stakeholders represent a SROI ratio of 6:1 by the end of the project. The forecasted SROI ratio is 17:1 four years after and 43:1 10 years after project closure.

The categories of outcome that created the most value in the community are, in order:

- the creation of tree stock assets for individual HHs and communal stocks;
- increased access to wild/natural resources;
- carbon sequestration due to net increase in tree growth;
- improved health due to improved diet.

## **Post-project sustainability**

Notwithstanding the typical fragility of voluntarism after the removal of project funding, the outlook for FMNR in Talensi is positive. As a simple and virtually cost-free approach, which other farmers can easily learn and adopt, FMNR can continue with minimal support from World Vision Ghana.

The target communities exhibit high levels of awareness about FMNR techniques and their benefits, with many community members passing on their knowledge to others. There has also been widespread adoption of the FMNR pruning technique throughout the pilot communities. It is reasonable, therefore, to expect the total area of FMNR farmland and forest reserves to steadily increase over the coming years.

High levels of farmer-to-farmer training, and the sense of optimism among community members for the future of farming and their communities, bode well for ongoing expansion of FMNR techniques. The direct and immediate benefits gained by farmers from the reforestation plots, even during the project's lifetime, will be important motivating factors for them to continue FMNR practices in communal sites.

On the other hand, community members are not passing on improved composting knowledge and capacity as quickly and there is little initiative to promote FMNR and fire suppression into neighbouring communities. There is also no initiative in pilot communities to start up new FMNR site management groups beyond the 20 founding members.

## 4. Recommendations

### To further promote FMNR

World Vision Ghana and its partners can take numerous actions to ensure that the project extends beyond the current coverage of 497 hectares across the 27,060 hectares of farmland in the Talensi District, as well as across other districts. Although the project has formed a solid base for FMNR adoption and acceptance, which is likely to continue on land managed by HHs in the nine project communities, further adoption will be slow unless further steps are taken.

World Vision Ghana and its partners can promote FMNR by:

- extending the project into a second phase;
- leveraging the new local expertise to enable promotion and education in new communities;
- promoting self-managed community expansion of FMNR forests;
- establishing routine organisational processes among World Vision, government partners and community partners for Talensi to receive exchange visitors from other districts around Ghana and West Africa;
- exchanging promotion approaches with other successful FMNR projects as part of project management;
- continuing advocacy towards the District Assembly;
- expanding and improving Government Agency Partnerships.

### To stabilise project gains

World Vision Ghana and its partners can sustain momentum by following up government agencies, the District Assembly and chiefs in monitoring and supporting FMNR groups and fire brigades, and encouraging them to:

- reorient the focus on fuel-efficient wood stoves;
- investigate FMNR volunteers' fears of encounters with snakes in FMNR forest sites;
- incorporate peace-building with pastoral Fulani communities into the project to reduce bushfire ignition;
- incorporate youth into future FMNR/NRM projects.

## Additional recommendations for closing Talensi's hunger gap

The following suggestions are complementary to the promotion of NRM farming and can either be incorporated into FMNR projects, other ADP projects or partner agencies' activities to maximise food production and availability in Talensi.

- Support irrigated intensive gardening
- Investigate and promote HH food budgeting or cereal banking
- Challenge the culture of extravagant funerals
- Challenge the culture of alcohol binge-drinking and tolerance of alcoholism
- Promote irrigated dry season gardens and cash crops
- Investigate communication gaps about timing of dam water releases into the White Volta River
- Explore options for community-level animal watering
- Nurture World Vision Ghana's and the project's understanding of integrated pest management
- Educate partners and farming HHs on the role of leguminous trees in agroforestry
- Educate partners and farming HHs on what constitutes healthy living soil
- Educate partners and farmers on the risks of herbicides and commercial fertilisers, and encourage the combination of organic and commercial fertiliser strategies
- Continue the promotion of women's participation in the project and in HH and community decision-making

## Additional recommendations for optimising NRM-based economic opportunities

While the above recommendations focus on food production and availability, the following recommendations focus on converting production into increased HH cash.

- Investigate the weaknesses in the project's savings group approach
- Investigate and connect farming HHs to improved markets
- Investigate and connect farming HHs to new dryland products
- Commit to action learning to identify and adjust income generation initiatives

## Recommendations from community stakeholders

Community key stakeholders also contributed their recommendations to improve food security in Talensi District. Their stated priorities for action are below.

### Community chiefs and Tindanas

- Reduce the perception of non-government organisations such as World Vision as a source of free gifts
- Tackle the culture of alcoholism and selling food reserves to buy alcohol
- Tackle the culture of extravagant funerals and selling food reserves to fund funerals

### District Assembly members

- Tackle the culture of extravagant funerals and selling food reserves to fund funerals
- Advocate against the misuse of agrochemicals, which damage soils
- Plan better to mitigate the effect of increasingly erratic climate conditions



**Heads of government departments**

- Tackle negative social practices that undermine food security, such as using non-surplus HH grain reserves for cash, funerals and alcohol

**FMNR group representatives: women**

- Tackle the culture of extravagant funerals and selling food reserves to fund funerals

**FMNR group representatives: men**

- Address fires originating from neighbouring Fulani herders
- Tackle the culture of extravagant funerals and selling food reserves to fund funerals

**KII: Talensi Office, MoFA**

- Focus on better enforcement of by-laws around bushfires, tree-felling and charcoal burning
- Better align World Vision NRM technique promotion with MoFA NRM technique promotion
- Make better use of multi-media education tools (eg develop local FMNR documentaries)

**KII: Bolgatanga Office, NFRI**

- Encourage FMNR forest site establishment on degraded land, not fertile land, to avoid later temptation to clear it for crop production
- Minimise the amount of material support provided to avoid perverting HH incentives for participating
- Where species diversity is low in a FMNR forest site, complement natural regrowth with selective planting of other multi-purpose indigenous trees
- Provide more intensive training on bushfire prevention, especially fire belt creation and the optimal time for doing this
- Pursue scale-up by greater encouragement of FMNR into individual farms and home compounds, firstly by FMNR group members, then non-group members and neighbouring communities