
Australian Aid
World Vision
Evidence of impact
Farmer Managed Natural Regeneration (FMNR)
2019

Evidence of impact

This impact brief summarises some key areas of impact in recently completed projects incorporating the FMNR approach.

Summary of findings

Evidence suggests that recently completed World Vision-supported projects incorporating FMNR have:

- ✔ **high reach and uptake,** but less so for female-headed households;
- ✔ **improved tree cover and tree density;**
- ✔ **increased availability of wood and forest products;**
- ✔ **improved land and soil quality;**
- ✔ **increased income and decreased poverty;**
- ✔ **improved food security,** but not necessarily for poorer households;
- ✔ **improved child wellbeing,** and more so for poorer households; and
- ✔ **improved gender equality and social cohesion.**

1. What is FMNR?

FMNR is a rapid, low-cost and sustainable land restoration and natural resource management technique, currently practised across more than 25 countries to restore and improve forest, agricultural and pasture lands. FMNR involves systematic regeneration, management and regrowth of trees and shrubs from felled tree stumps, roots and seedlings.

Regeneration and restoration of trees increases the availability of wood and tree products and improves land and soil quality. This makes agricultural activities more productive and contributes to income, food security and resilience to extreme climate. When the environment thrives, the community can thrive.

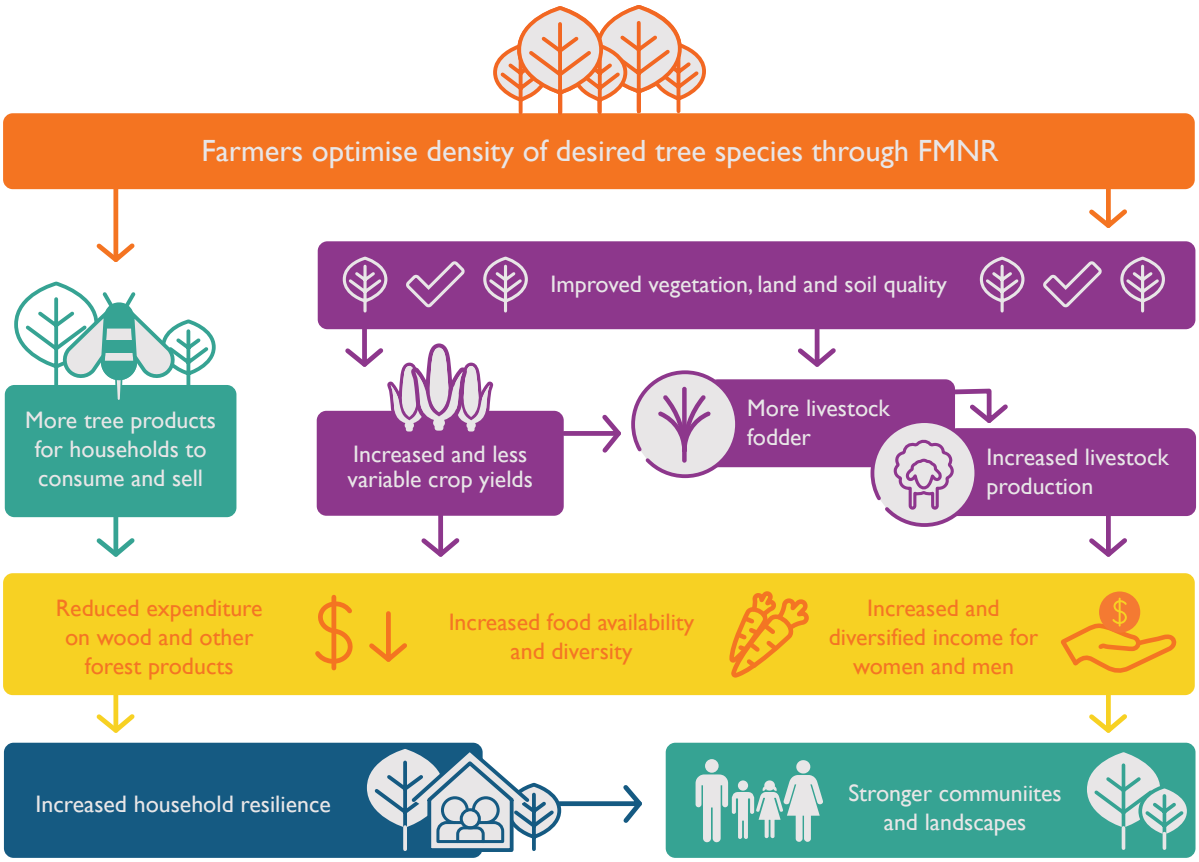


Figure 1: Simplified Theory of Change for FMNR

Sustainable Development Goals

World Vision is committed to achieving the United Nations Sustainable Development Goals (SDGs). In 2015, 193 countries adopted this set of global goals for the world to achieve by 2030. The 17 SDGs and their 169 targets centre around people, the planet and prosperity. They apply to all countries.

Building on the Millennium Development Goals, the SDGs aim to end extreme poverty, fight inequalities and tackle climate change. The fundamental principle of the SDGs is to "leave no one behind" and reach those who are furthest behind.

The simple approach of FMNR contributes towards at least 10 of the 17 SDGs:

Improved land productivity, increased income and household resilience

Increased food availability and diversity

Reduced time to collect firewood, usually done by women

Low-cost approach is pro-poor

Resilient communities and landscapes

Sustainable approach to natural resource management

Strengthens resilience to climate-related hazards and disasters

Restores degraded land

Promotes inclusive and participatory decision-making

Contributes to Australia's overseas development assistance

Kenya is one of more than 25 countries where community members practise FMNR.

2. Overview of projects included in the analysis

In this brief, we highlight the evidence in some key outcome areas for a number of recently completed projects supported by World Vision Australia.

Projects were selected based on the following criteria:

- incorporated an FMNR approach as part of its activities;
- minimum duration of three years[1];
- concluded within the five years from 2014 to 2018;
- endline evaluation reports and raw data were available; and
- presented a sufficiently rigorous evidence base (see Methodology).

Project	Context and scope	Goal	Aspects of project approach
Building Resilience about Climate Change (BRACCE) Timor-Leste, 2011-2016 US$2,492,757	• 12,000 direct beneficiaries • 54 hectares covered in FMNR • High rainfall area	Increased community and environmental resilience to climate change effects	• Climate change awareness, planting of coffee and fruit trees, food security, use of fuel-efficient stoves • Small FMNR groups working on allotments of communal land
FMNR East Africa Kenya, Rwanda, Tanzania and Uganda, 2012-2017 US$3,803,895	• 852,000 direct beneficiaries • Varied landscapes from tropical to arid and semi-arid	To improve food security and climate resilience in smallholder farming systems in East Africa (Kenya, Rwanda, Tanzania and Uganda) by 2017	• Livelihoods approach (improved cropping, livestock management, honey, tree nurseries and chickens), sustainable land management, environmental advocacy, savings groups, use of fuel-efficient stoves • FMNR on a mix of private and communal land
Humbo Community-Managed Natural Regeneration Forest Project Ethiopia, 2006-2014 US$1,157,413	• 20,200 direct beneficiaries • 2,728 hectares covered in FMNR • Moderate rainfall area	The sequestration of carbon in biodiverse native forests through farmer managed, assisted natural regeneration for alleviation of poverty with carbon emissions reduction	• Cooperative-based, certified carbon sequestration initiatives • Regeneration of degraded forest land with attention to watershed protection and biodiversity. • Grain storage and flour mills • FMNR on communal land, but also some private land
Soddo Forestry and Agroforestry Project Ethiopia, 2006-2014 US$395,041	• 53,774 direct beneficiaries • 503 hectares covered in FMNR • High rainfall, mid to high altitudes	The alleviation of poverty with carbon emissions reduction credits through farmer assisted regeneration and planted agro forestry trees	• Cooperative-based, certified carbon sequestration initiatives and ecotourism • Regeneration of degraded forest land with attention to watershed protection and biodiversity. • Bee-keeping, fruit trees and grain storage • FMNR on communal land, but also some private land
Talensi Phase 2 FMNR Project Ghana, 2012-2017 US$1, 368, 124	• 12,000 direct beneficiaries • 567 hectares covered in FMNR • Sudan climatic zone with marked dry season and 4-6 month high-rainfall wet season	To reduce the annual hunger gap for more than 8,400 children and their families in Talensi District of Upper East Region (Ghana) by 2017	• Drought-tolerant and nutrition-sensitive agriculture, poultry, planting of shea butter trees • Harvesting and marketing cooperatives, volunteer fire brigades • FMNR on a mix of private and communal land

[1]To allow for sufficient time for tree growth and other project benefits to begin to become apparent.

Although these projects included an FMNR approach in their programming, in most cases this was just one aspect of the suite of activities and took on different forms depending on the specific location. In the analysis to follow, therefore, it is not possible to disentangle the effect attributable to FMNR from other aspects of project design.

3. Evidence base

While baseline studies were conducted for all eight selected projects, the data was not available for all projects and some baseline questions are not comparable with endline.

Endline evaluations for all projects were of mixed-methods design, with sample sizes for quantitative components chosen considering standard power-based sample size formulas. Respondents for household surveys were randomly selected from project catchment areas and therefore included both participants[2] and non-participants in the sample.

The Humbo Ethiopia endline also included a small sample of 65 households from non-project areas to serve as an indicative comparison group.

While these eight projects will form the basis of the statistical analysis to follow, results from other World Vision studies, synthesis reports and journal articles will be referred to when discussing and triangulating results.

4. Methodology

This brief examines outcomes aligned with the FMNR Theory of Change (Figure 1) and applicable SDG statements, including:

- extent of project reach within project-area communities;
- improvements in tree cover and density;
- increased availability of wood and forest products;
- improved land and soil quality;
- increased income and decreased poverty;
- improved food security;
- improved child wellbeing; and
- improved gender equality and social cohesion.

Project	Endline sample size
BRACCE, Timor-Leste	345
FMNR East Africa, Kenya	774
FMNR East Africa, Rwanda	900
FMNR East Africa, Tanzania	906
FMNR East Africa, Uganda	901
Humbo, Ethiopia	451
Soddo, Ethiopia	355
Talensi, Ghana	463

A farmer in Uganda practicing FMNR from 2015 taken by S McKenzie.

Meta-analysis is employed to examine these outcomes across projects.[3] Meta-analysis is a statistical technique used to systematically combine and reconcile results for outcomes across multiple studies that may involve somewhat different study designs, sample sizes and present conflicting results. It enables estimation of outcomes for individual studies as well as an overall outcome estimate. This overall outcome estimate is obtained by weighting the results from each study to minimise the variance of the overall effect. In doing so, a more precise estimate of the overall effect or outcome can be obtained compared to the individual study effects (Haidich, 2010).

[2] "Participants" are defined at the household level according to available data: in Humbo and Soddo, participant households are those where a household member is a member of a project-supported co-operative, has worked in the project paid or unpaid, or practises FMNR. In BRACCE, households nominate themselves as having participated in the project, which could include attendance at trainings. In East Africa and Talensi, participant households are those who report a household member practises FMNR.

[3] Meta-analysis is conducted across all projects with data available on the particular outcome.

With respect to the vast majority of outcomes of interest in this brief, the endline questionnaires for each project asked respondents to provide a subjective comparison of changes in key outcomes over the life of the project. In the absence of adequate baseline information, the meta-analysis therefore calculates the difference in proportions of participants versus non-participants reporting a positive change in outcomes at endline (or mean difference for numerical outcomes).[4] Part of the analysis includes comparison of differences in outcomes for household poverty status[5], sex of the respondent and sex of the household head.

To the extent that those who choose to participate in the project may be inherently different to those who do not participate (for example, if those who participate tend to be those who are more positive in outlook or more motivated to make change), this only serves to provide indicative evidence of true "impact". To assess the degree to which this may be problematic, comparison and triangulation is made with available baseline figures, differences observed between project and comparison areas in the Humbo sample and evidence presented in other World Vision studies, synthesis reports and journal articles not specifically included in this brief. In fact, the Humbo results will demonstrate that compared to a comparison group, outcomes may be better than what is observed between participants and non-participants in project catchment areas.

5. Project reach

Measures of project reach include whether:

- the respondent had heard of FMNR;
- any household members attended project-supported training; and
- any household members practise FMNR.

Project	Percentage of households adopting FMNR
BRACCE, Timor-Leste	98%
FMNR East Africa, Kenya	85%
FMNR East Africa, Rwanda	76%
FMNR East Africa, Tanzania	73%
FMNR East Africa, Uganda	87%
Humbo, Ethiopia	85%
Soddo, Ethiopia	77%
Talensi, Ghana	84%

Project reach and uptake of FMNR was high in project areas.

Results suggest FMNR information is shared beyond training, and the approach is not cost-restrictive.

FMNR has high rates of take-up among community members.

All eight projects had very high reach in catchment areas, with an overall estimate of 88 percent of respondents having heard of FMNR. FMNR has had excellent take-up, with an overall 87 percent of those who had heard of FMNR practising it. Interestingly, the FMNR take-up rate among households was much higher than the overall estimate of attendance at training (55 percent), indicating high knowledge-sharing of the message among project area communities outside of training.

Overall, poorer households were statistically less likely to have heard of FMNR or have participated in the project, however in practical terms the differences were small (three to six percent less likely than the less-poor households). Among those who had heard of the project, there were no differences in uptake of FMNR by relative wealth status, highlighting that FMNR is not cost-restrictive. An exception was FMNR East Africa Uganda, where poorer households were significantly more likely to have heard of FMNR, participate in the project and practise FMNR.

[4] Meta-analysis was performed utilising the raw individual or household-level data with fixed effects. A random effects model was also estimated but there were no qualitative differences in the results.

[5] In Humbo and Soddo, "poor" households are those who nominate themselves as being a safety net beneficiary – this represents 45 percent of Humbo area households and 17 percent of Soddo area households. In East Africa and Talensi, poor households are defined as those below 50th percentile in a wealth index estimated by principle components. In this sense, 'poor' is a relative concept. There was insufficient data to distinguish poor and non-poor in the BRACCE data.

Female respondents were just as likely as male respondents to have heard of FMNR, but female-headed households were less likely to have participated in the project (eight percent) or practise FMNR (five percent). This result did not differ when households with no land ownership were omitted.[6]

Further enquiring in the Humbo, Soddo and East Africa endlines looked deeper into who in the household practised FMNR: in Humbo and Soddo, this was almost exclusively men, whereas in East Africa women and men tended to be equally involved in practicing FMNR. One reason for this difference between Humbo and Soddo, and East Africa could be due to FMNR in Humbo and Soddo being mostly practised on communal forest land, while East Africa also involved private land, as well as differences in gender norms across countries: in Ethiopia, farming tends to be regarded as men's work while in Kenya women work the fields. Nonetheless, in the East Africa sample men did tend to be nominated as the household member having membership in the FMNR group.

Tree cover and density

Increased tree cover and tree density has been attributed to FMNR interventions in a number of studies both internal and external to World Vision. External studies are largely concentrated in Africa, particularly Niger where five million hectares of regreening is widely reported as a result of FMNR. Among these studies, improvements in tree cover, densities and species diversification as a result of FMNR is well-documented.[7]

Internally, World Vision's Food and Livelihood Enhancement Initiatives (SFLEI) project in Senegal reported an increase in tree density from zero to 33 trees per hectare over three years. The mid-term review of FMNR East Africa found tree density on farms in Kenya rose three-fold from approximately 22 to 74 trees per hectare (Odwori et al. 2016), and from 33 to 198 trees per hectare in Rwanda (Jean and Medard, 2016) over three years.[8]

In the endline questionnaires for the projects included in this meta-analysis, the Talensi project asked respondents their perception regarding changes in tree density, FMNR East Africa about changes in tree cover and BRACCE in Timor-Leste changes in the number of trees.[9] In all cases, participant households were significantly more likely to report improvements than non-participant households.

In qualitative interviews with participants in the Humbo project, environment club members explained:

> ***"Before there were no trees, it was bare degraded land and temperatures were very high. After protection, the trees started growing fast, wildlife started coming back, the temperature has gone down, and rainfall is getting better."***
>
> **– Child members of environment club, Humbo, Ethiopia (Kabore et al. 2010 p.67)**

These results all suggest that FMNR has made significant improvements in tree cover and density for participant households.

In Humbo Ethiopia, FMNR has regenerated land and enabled farmers to increase crop production.

[6] Based on FMNR East Africa data only: this comprised removal of 10 percent of female-headed households and seven percent of male-headed households. It does not reflect land type and degree of access to land.

[7] See, for example, Reij et al. (2009), Tougiani et al. (2009), Larwanou and Saadou (2011), Haglund et al. (2011). Sendzimir et al. (2011), Place et al. (2016), Binam et al. (2017).

[8] Results on tree density are not available for Tanzania or Uganda.

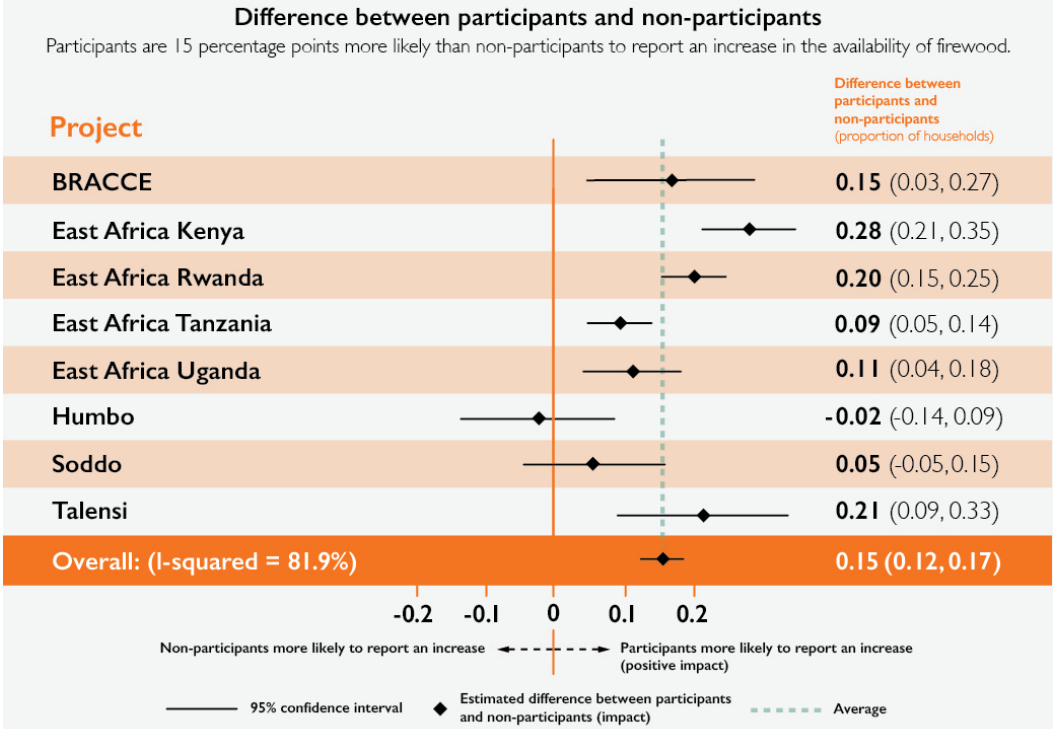
[9] The intention or end translation may not have made distinction between density, cover and number of trees.

Availability of wood and forest products

As part of the carbon methodology requirements in Humbo and Soddo projects, World Vision Ethiopia conducted annual fuel wood utilisation surveys to estimate the amount of fuel wood collected and utilised by communities. The data shows that fuel wood availability has increased year-on-year as the forest has regenerated back from shrubland.[10]

Perceptions of change in the availability of firewood and forest products was asked in all eight projects. The meta-analysis finds a strong positive effect on the availability of firewood: project participants were 15 percent points more likely to report an increase in the availability of firewood than non-participants (Figure 2). This result was observed among poorer households, female-headed households and female respondents alike – that is, participating men, women and poorer households were all just as likely to report an increase in availability of firewood.

Figure 2: Proportion of households reporting an increase in the availability of firewood



For each individual project, the diamond '◆' shows the difference between the proportion of project participants and non-participants reporting an increase in the availability of firewood. That is, values above zero mean that participants are more likely to report an increase in firewood availability, indicating a positive impact. The difference observed varies across projects, and so the Overall figure of 15 percent points reflects the average (positive) impact across all projects included in the meta-analysis.

Project participants were also significantly more likely to report a decrease in the cost of and time required to collect firewood over the life of the respective projects.

With the burden of firewood collection often resting on female household members, by increasing the availability of firewood and reducing the time taken to collect it, FMNR has the potential for positive benefits for women. At endline, 17 percent of female respondents in the East Africa sample mentioned decreased workload as one of the changes to women's lives as a result of the project. The reduction in workload due to increased availability of wood and fodder was also highlighted in qualitative interviews conducted at midterm:

> ***"Women and children now spend less time on collecting firewood and finding grass/fodder for livestock"***
>
> **– FMNR East Africa Kenya mid-term evaluation (Odwori et al, 2016, p.85)**

Time saved enables girls to have more time for school, and women to attend to other household needs and participate in personal development activities such as health and education (Odwori et al., 2016, Weston, 2013). For boys, Odowori et al (2016) and Weston et al (2013) find that FMNR reduced the need for boys to herd cattle, keeping them in school.

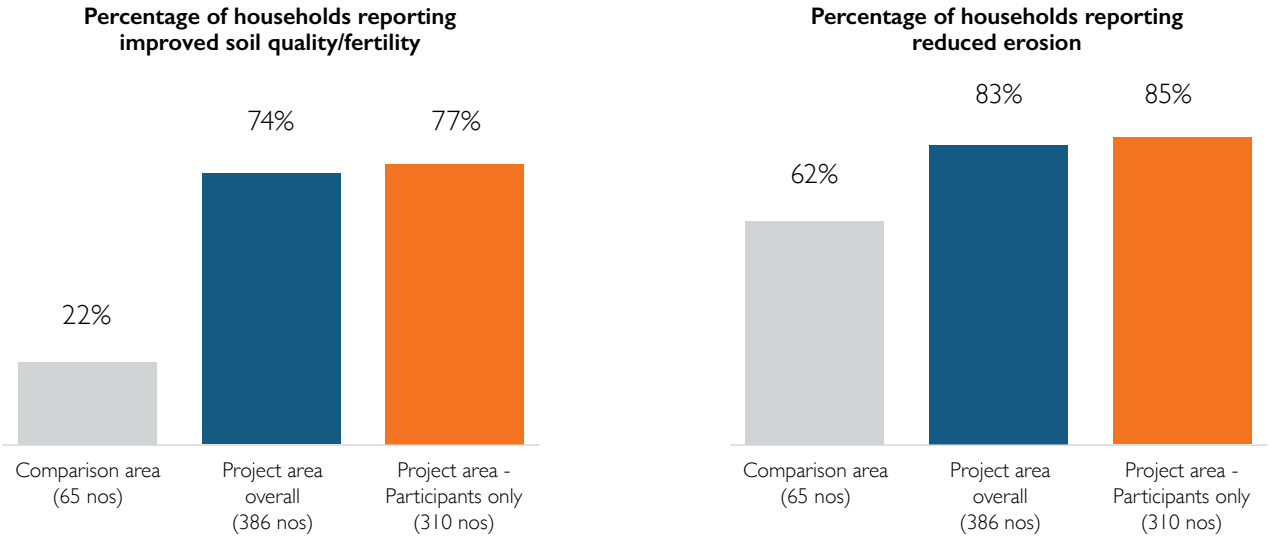
[10] Humbo CDM A/R Project Fuel Wood Utilization /Leakage/ Monitoring Report, World Vision Ethiopia, 2017.

Land and soil quality

Supported by scientific literature that establishes the connection between trees, soil fertility and reduced erosion, improvements in soil fertility as a result of FMNR, particularly in areas where trees border fields, is frequently cited in literature (Bayala et al, 2019, Crawford et al, 2016). Biophysical evidence to support claims, however, is rare in a developing country context due to prohibitive cost and complexity of data collection, and therefore evidence largely relies on subjective views of change.

Based on respondent perceptions, World Vision's FMNR projects appear to have dramatic effects on soil quality and fertility, as well as reducing erosion. Comparing project and comparison areas in Humbo, Ethiopia, participants in project areas were significantly more likely to report improvements in soil quality and a reduction in erosion than households in comparison areas – see Figure 3. Smaller differences were observed between project participants and the general project area population due to the nature of interventions in Humbo being at a community level rather than individual farmland.

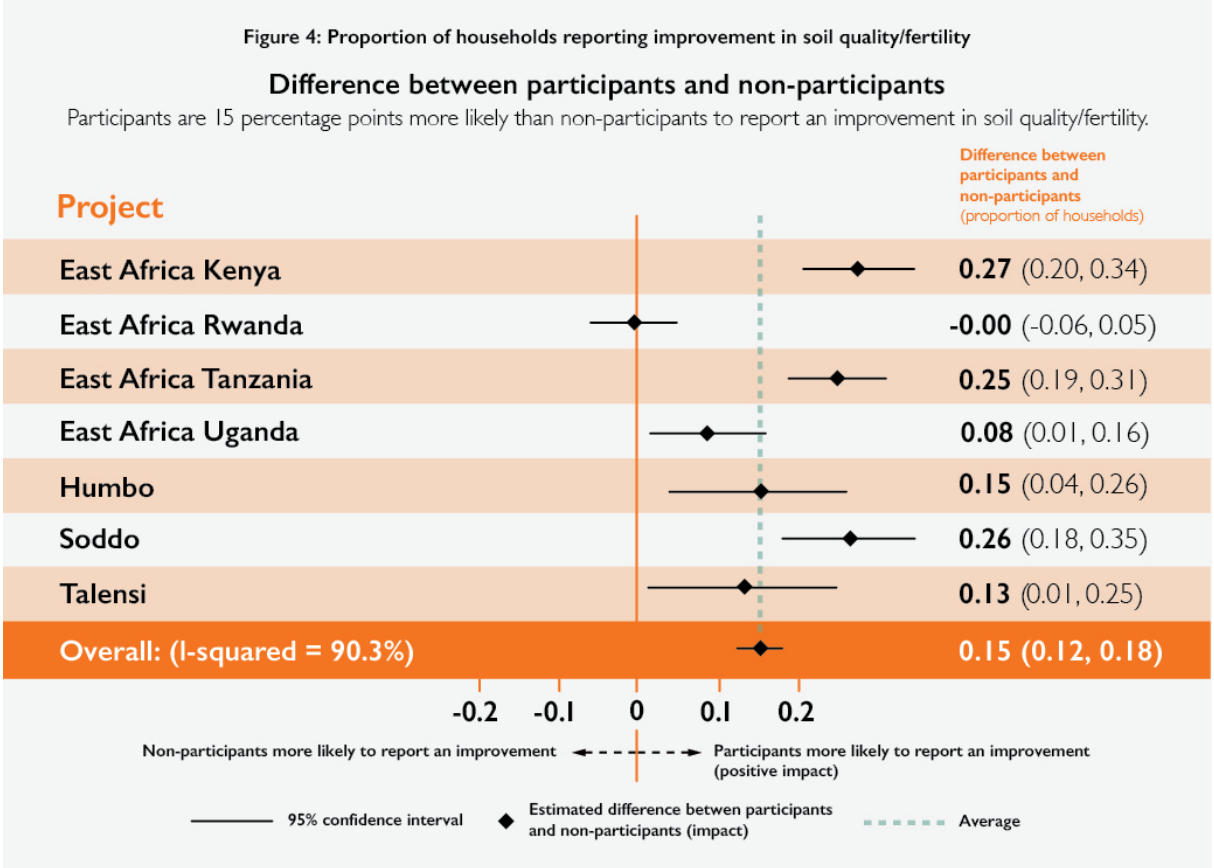
Figure 3: Humbo, Ethiopia

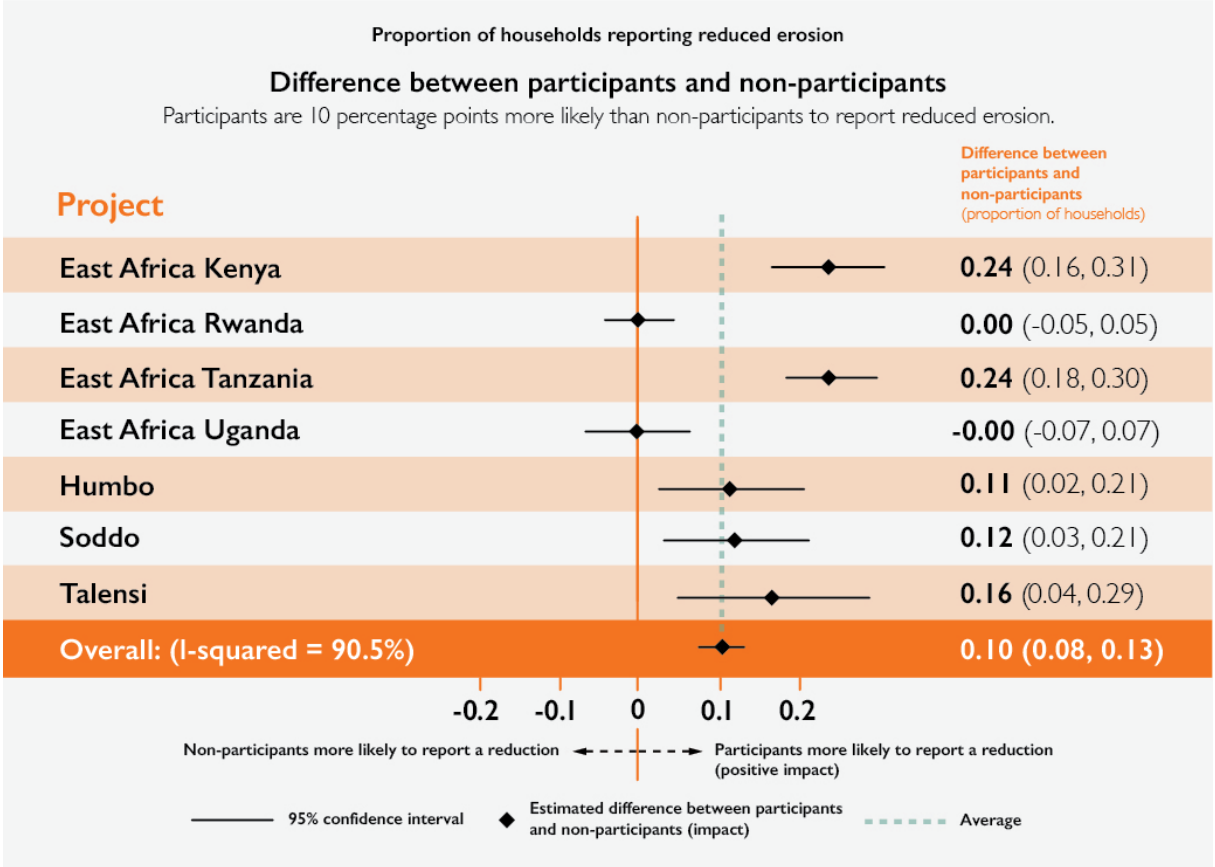


Households in project areas are more likely to report improvements in soil quality/fertility and reduced erosion than households in comparison areas.

Figure 4 shows the meta-analysis results comparing outcomes for project participants and non-participants across projects. Results indicate substantial improvements in land and soil quality as a result of FMNR: project participants were 15 percent points more likely to report an improvement in soil quality and fertility and 10 percent points more likely to report a reduction in erosion compared to non-participants.

Regrown trees and shrubs help restore soil structure and fertility, and reduce erosion.





Positive effects on soil fertility were also reported in other World Vision projects in Senegal: the Beylene Sen Tol (BLST) project and the SFLEI project, where 85 percent of farmers reported an improvement.

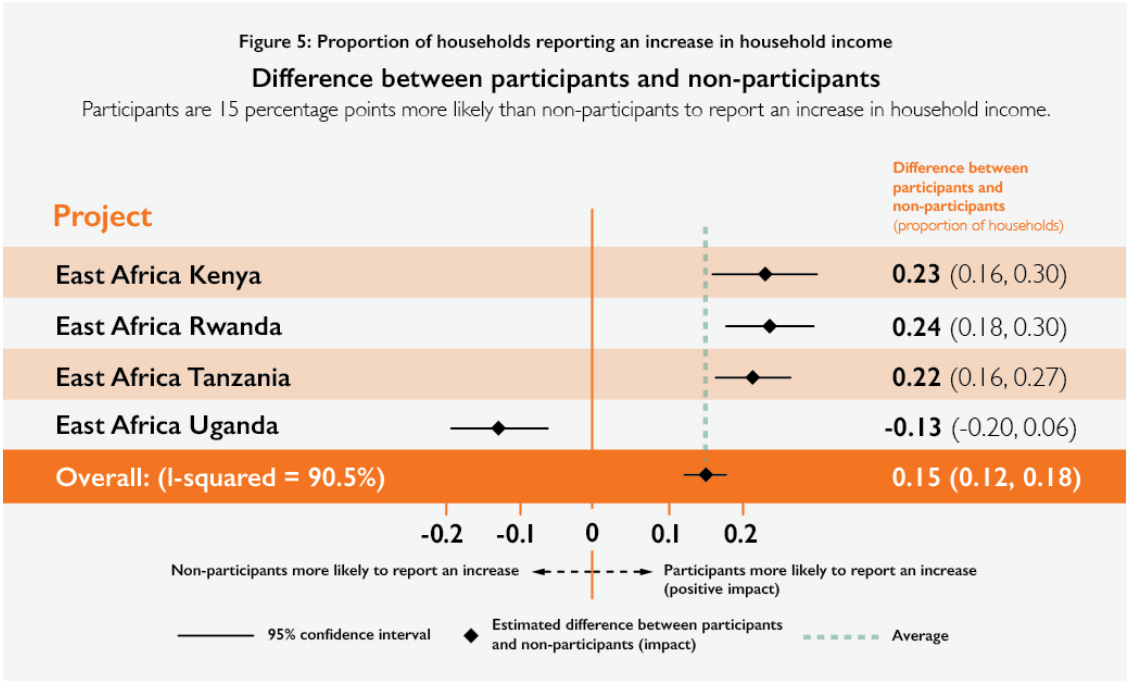
Crop production and yields

In the FMNR East Africa projects, participant households were much more likely to report an increase in crop production than non-participant households. In an external study, Haglund et al (2011) find FMNR increased crop production values by up to 60 percent in Maradi, Niger. Results in other internal and external studies, however, have been mixed and positive effects of FMNR on crop production and yields is perhaps better attributed to particular fertiliser trees having been restored under the FMNR approach.

Income

Endline surveys for the FMNR East Africa projects included a question on whether household income had changed over the life of the project. Figure 5 shows that participant households in Kenya, Rwanda and Tanzania were significantly (22-24 percent points) more likely to report an increase in household income than non-participants. This result was seen for poorer households, female-headed households and female respondents alike.

FMNR East Africa Uganda, however, is a clear outlier in this data, with participant households significantly less likely to report improvements in household income. Recall that participants in the Uganda project were much more likely to be the poorer households in the project area, hence income generation opportunities or perception of income changes may have been different for this group. Even with Uganda included in the analysis, the overall effect on income appears to have been positive: project participants were 15 percent points more likely to report an increase in household income (23 percent points more likely if Uganda is removed from the analysis).



In endline questionnaires for Humbo and Soddo, households were asked whether there had been a change in household income earned specifically through wood and forest products. Participant households in Soddo were more likely to report an improvement in income from this source than non-participant households, but there was insufficient evidence to this effect in Humbo participant households. For BRACCE in Timor-Leste, the proportion of households earning incomes less than US$100 per annum reduced from 47 percent to 18 percent, attributed to FMNR, agroforestry and other project-supported livelihoods activities within the community (Anda, 2016). Improvements in income are also reported in World Vision's SFLEI and BLST projects in Senegal.

In external studies across the Sahel, Binam et al (2015a) finds FMNR to increase household income by US$72 per annum, while Tougiani et al (2009) finds wood sales alone generate US$46-92 per household per annum. Haglund et al (2011) finds FMNR adopters were able to increase their incomes by 18-24 percent above non-adopters. Studies also attempt to quantify the impact of FMNR on income by attaching value to increased harvest quantities of crops and tree products: Larwanou and Adam (2008) calculate the annual value of FMNR through improved soil fertility, firewood, fodder and other products to be US$56 per hectare. Using a different approach, Faye et al (2010) estimates the value of native species of trees in Mali to be up to US$650 per household per annum.

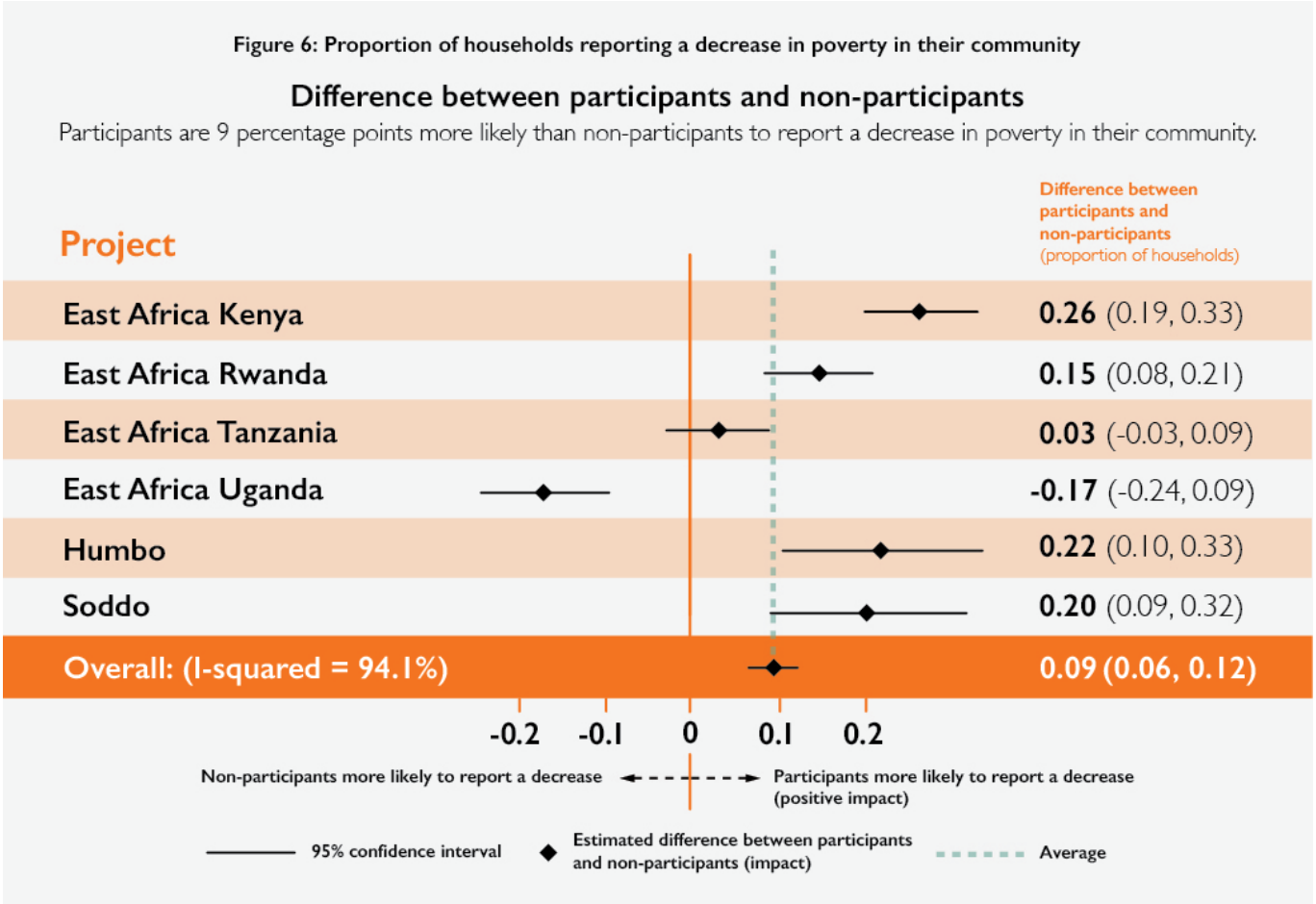
The literature suggests that FMNR may provide particular opportunity for women to generate income from wood and forest products (see, for example, Reij et al, 2009, Sawagado et al, 2001, Binam et al, 2015b). Regarding World Vision's SFLEI project in Senegal, Kabore (2012, p.63) states: "…70 percent of women said income had increased compared with 61 percent of men which possibly reflects the project emphasis on women's income generation activities". This theme also emerged in the midterm evaluation report for FMNR East Africa Rwanda, where Jean and Medard (2016, p. 21) found that during qualitative interviews, women reported that the project enabled them to generate income and provide for the households' needs. At endline, 52 percent of female respondents in the East Africa sample mentioned increased income as one of the changes to women's lives as a result of the project.

Income gains as a result of FMNR are likely to only reflect the smaller immediate gains and not the future income streams resulting from changed practices and improved environment. During the first 10 years of Humbo, for example, sales of carbon credits have generated US$638,000. Benefits also extend beyond tangible monetary figures: Weston et al (2015) estimate the social return on investment in Talensi Ghana to be U$655-887 per household per annum.[11]

Poverty

In terms of effect on poverty, six of the eight projects included in the meta-analysis asked households whether they felt there was more or less poverty in their community since the start of the respective project. Overall, participant households were nine percent points more likely to report a decrease in poverty in their communities (Figure 6). The decrease in poverty was reported similarly by poorer households, female-headed households and female respondents.

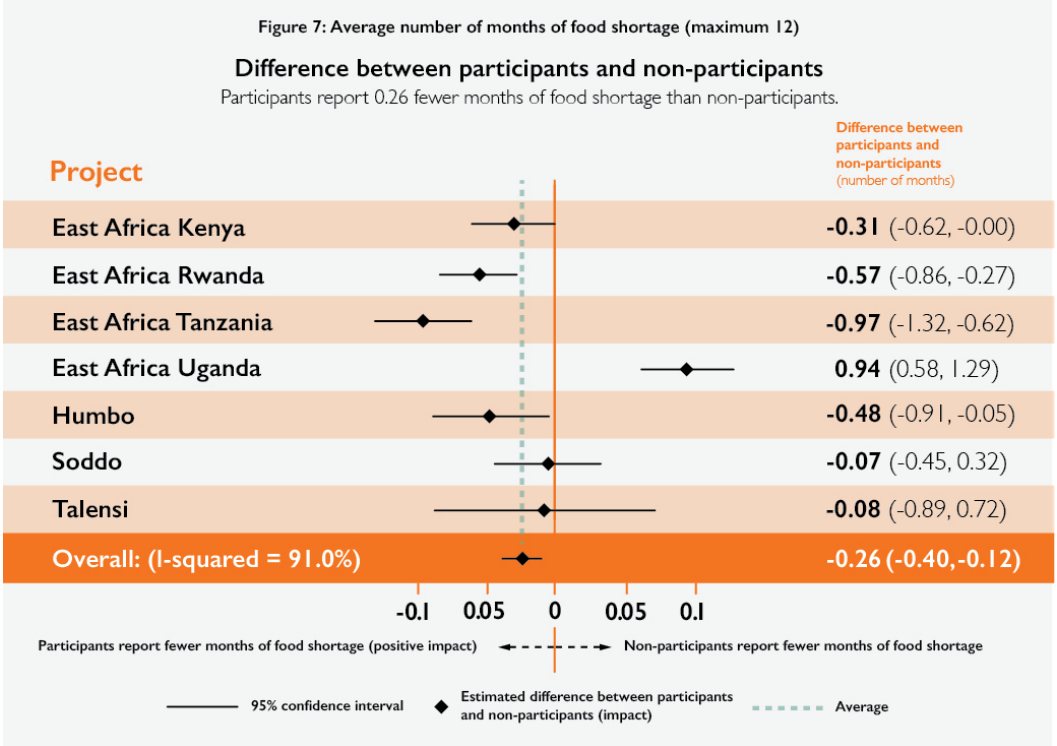
Figure 6: Proportion of households reporting a decrease in poverty in their community



[11] Greatest contributions to social value include that from increased household and communal assets in the form of trees and livestock, increased household consumables sourced from natural resources, increased incomes from agriculture, improved health, psychosocial benefits and climate change mitigation (carbon sequestration) (Weston et al. 2013).

Food security

In seven of the eight project endlines, households reported the number of months of food shortage, if any, in the 12 months prior to the survey. Overall, project participants report being more food secure than non-participants: the average number of months of food shortage among project participants was significantly lower (by 0.26 months) than non-participants (Figure 7).



The positive impact on food security among participants is corroborated with external evidence in the Sahel, where FMNR adopters were found more likely to be food secure than non-adopters. Adopters were also found to have improved dietary diversity and greater capacity to cope with droughts and floods (Binam et al, 2015a, Tougiani et al, 2009).

Further meta-analysis, however, finds that while the projects appear to have had a positive effect on food security for participants generally, this was not necessarily experienced by poorer participant households. This highlights that food insecurity is a complex and chronic condition closely associated with poverty.

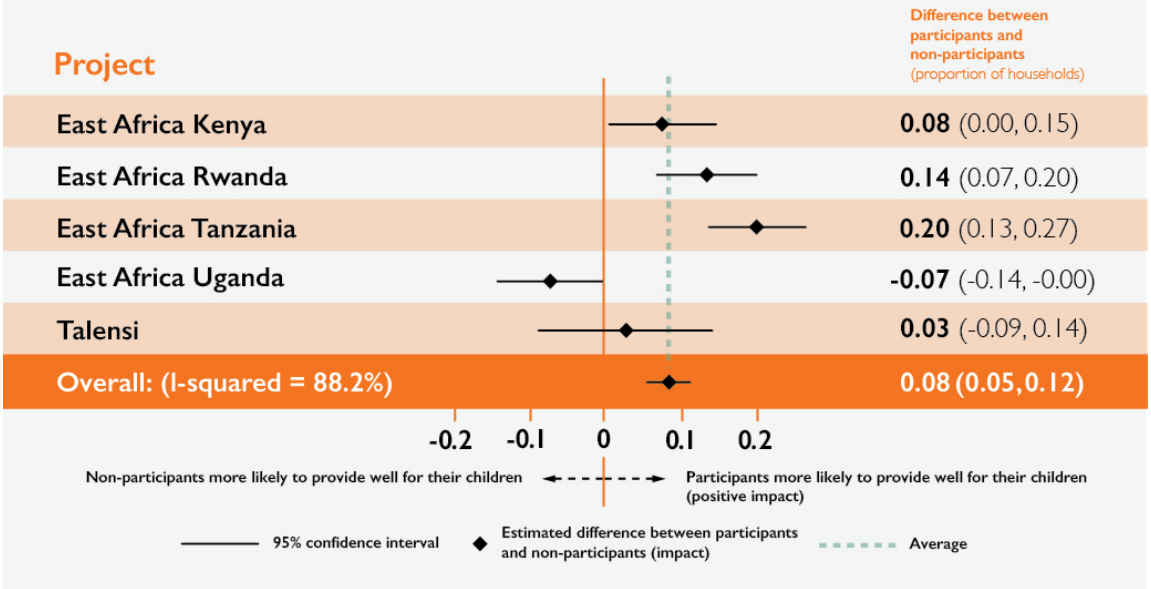
Child wellbeing

The endline questionnaire for FMNR East Africa and Talensi projects includes the question "In the past year, were you able to provide two sets of clothes, a pair of shoes and a blanket for sleeping for all the children (five to 18 years) living in your household, without assistance from family, the government or NGO?". Based on a UNICEF assessment tool, this question is used by World Vision to assess the ability of households to provide well for their children.

The meta-analysis finds participant households to be eight percent points more likely to be able to provide well for their children compared to non-participant households (Figure 8). These results were reported similarly by female-headed households and female respondents. Poorer participant households, however, were an additional seven percent points more likely to report being able to provide well for their children than less poor participant households. In other words, participant households were more likely to be able to provide well for their children, and this effect was even larger for poorer households. Contrasting these results with the weaker results for food security among poorer households, these basic and discrete child wellbeing needs are perhaps more easily addressed than the more complex and chronic condition of food insecurity.

Participant households were more likely to report being able to provide well for their children, **and this effect was even larger for poorer households.**

Figure 8: Proportion of households able to provide well for their children



6. Carbon sequestration outcomes

The Humbo and Soddo Ethiopia projects involved carbon sequestration initiatives. Humbo is certified to the United Nations Clean Development Mechanism[12] and Soddo to the Gold Standard[13]. Using internationally recognised methodologies and with results externally audited by forestry experts, Humbo has sequestered 181,650 tonnes of CO^2 and Soddo 94,817 tonnes CO^2 since 2007. Carbon credits are used in community development projects including construction of grain storage facilities, flour mills and maintenance of warehouse facilities. The cooperatives also provide microfinance to their members, which is then used to purchase animals for fattening, solar lights and seeds, for example. Microfinance supports livelihoods development and home improvements for members.

7. Gender equality and social cohesion

There is some qualitative evidence that FMNR can have a positive effect on gender equality and women's empowerment. As mentioned earlier, by increasing the availability of firewood and reducing the associated time and workload, FMNR can allow women and girls to pursue education – a critical stepping stone towards improved gender equality. Anda (2016, p. 8, 48) describes how the collective structure of FMNR groups were a conduit to increased confidence among women, equal participation and shared decision-making between women and men. These findings are corroborated in data from the East Africa projects and in evaluation findings for other World Vision FMNR projects: Talensi Ghana Phase 1, SFLEI in Senegal, INFOCUS in Indonesia and in the midterm evaluation for FMNR East Africa Kenya.

FMNR groups also appeared to serve as an entry point for women to be more involved in community decision-making, with 24 percent of female respondents in the East Africa participant sample identifying increased involvement in village affairs among the project benefits for women. In the midterm review for FMNR East Africa Rwanda, Jean and Medard (2016, p. 21) linked increased income and ability to provide for household needs for women to increased participation in community decision-making.

FMNR has also been linked to improved household cohesion by enabling men to stay closer to home rather than leave in search of pasture land and economic opportunity (see, for example, Weston, 2013 and Karimi, 2016).

More broadly, World Vision-supported projects with an FMNR component appear to improve trust and social cohesion within communities: males, females and poorer households in Humbo and Soddo overwhelmingly reported an increase in community trust and mutual understanding, and confidence that the community could work together to solve problems. Participants in the East Africa sample were more confident in the ability of the village to work together to make change than non-participants.

[12] https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism
[13] https://www.goldstandard.org/

8. Lessons and recommendations for future programming

This study has revealed that recently completed World Vision-supported projects incorporating FMNR have high reach and uptake alongside improvements in all key outcome areas indicated in the simplified theory of change: from improved tree cover through to improved food security, child wellbeing, gender equality and social cohesion.

Reach and uptake was less pronounced for female-headed households and some results indicated that women were not participating as fully as men in activities. Similarly, while some outcomes highlighted greater benefit for poorer households, in other results the outcomes were mixed. Indeed, gender and poverty has not necessarily been an explicit focus of FMNR programming and are areas that could benefit from greater attention in future FMNR programming. It could also reflect that being a land restoration and natural resource management technique, access to land is a necessary prerequisite to participation and application of FMNR and may be limited for women and poorer households. Existing cultural and gender norms may also play a role.

World Vision employs a holistic approach to its FMNR programming, including advocacy and development for alternative livelihoods. This study is not able to disentangle such effects from FMNR activities, nor does it explore additional outcomes in those areas. Further studies could investigate the synergies and multiplier effects of this holistic approach.

"This is probably one of the largest positive environmental transformations in the Sahel and perhaps all of Africa."

– Chris Reij, World Resources Institute

https://www.scientificamerican.com/article/farmers-in-sahel-beat-back-drought-and-climate-change-with-trees/

Key recommendations:

1. Explore further why women and poorer households may not be participating as fully in FMNR activities. This may involve commissioning a targeted piece of gender and/or poverty analysis for FMNR.

2. Consider piloting an FMNR project using a twin-track approach with an intentional focus on women's participation and improving gender equality. This could look more specifically at the broader outcomes for women and girls such as school attendance and increases in time available for personal development and leisure.

3. Utilise the differences in FMNR program offerings (eg, those with a food security focus, those incorporating an alternative livelihoods approach) to further explore and quantify the synergies and multiplier effects of holistic programming.

Women's participation is an important consideration for future FMNR programming.

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