

FEED THE FUTURE INNOVATION LABORATORY FOR SMALL SCALE IRRIGATION (FTF-ILSSI) PROJECT NOTES

VI. The contributions of Public Works in watershed rehabilitation and irrigation in Bureau for Humanitarian Assistance supported Productive Safety Net Program areas of Ethiopia to resilience and nutrition

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The Ethiopian Productive Safety Net Program (PSNP), launched in 2005 and operating in eight regional states, harmonizes the delivery of donor support to vulnerable populations experiencing chronic food insecurity and shocks. PSNP investments aim to improve food consumption and nutrition, while also protecting and developing assets for sustaining stable access to food. PSNP differentiates two types of beneficiaries:

- (1) Households with no able-bodied members that receive direct support in the form of cash transfers or in-kind support; and
- (2) Public work (PW) beneficiaries, who receive payments in exchange for work on various types of productive investments, such as watershed rehabilitation, irrigation, road and other infrastructure.

This policy note summarizes results from an assessment of the impacts of PSNP investments supported by USAID's Bureau for Humanitarian Assistance (BHA) in watershed rehabilitation and small-scale irrigation (SSI) on food security, nutrition and resilience in Amhara, Oromia, and Tigray regions of Ethiopia and Dire Dawa City administrative area between 2017 and 2021. The interventions assessed include area closures, SSI, other physical soil and water conservation practices, and overall watershed-level activities. Investments in SSI included construction of river-diversion schemes, lined canals, earthen canals, ponds and rainwater harvesting schemes. As watershed rehabilitation interventions take years to decades to show impacts, two time periods were used in the biophysical assessment: long-term changes, covering the period of 1984 to 2020, as well as short-term changes that specifically covered the period prior and during the USAID BHA program.

The assessment combined socioeconomic analysis (quantitative and qualitative), as well as high-resolution remote sensing and biophysical modeling in selected watersheds. Remote sensing and biophysical modeling provided insights on environmental effects and climate resilience of BHA's watershed rehabilitation interventions, whereas quantitative and qualitative analyses helped identify the food security, nutrition and resilience impacts of these interventions.

Of note, the assessment was undertaken during the COVID-19 pandemic and was also substantially affected by civil conflicts in the northern part of the country. This affected both the study design and data access and the implementation of the BHA-supported PSNP PW investments. The results should be seen in this context.

PROGRAMMATIC APPROACH AND MAJOR IMPACTS

The PSNP Program Implementation Manual (PIM) was followed in all study watersheds. Some implementing NGOs have added activities beyond the implementation guidelines to maximize PSNP outcomes (for example, by providing vegetable and fruit seeds).

Biophysical impacts differ by location and type of interventions

Changes in vegetation greenness and other water-balance components—such as soil moisture, actual evapotranspiration, and potential groundwater recharge—were used to assess the impacts of upstream watershed interventions on downstream water availability. Overall, the interventions had positive impacts on restoring vegetation greenness and cover and water availability for various purposes, benefiting PSNP and non-PSNP households. Greenness improved for all types of interventions, but to a varying extent.

- Area closures combined with new vegetation were found to be most effective in enhancing vegetation greenness and reducing soil erosion.
- Watershed rehabilitation and irrigation investment under PSNP created community assets and helped build resilience; however, it is not always clear how these community assets translate into household resilience.
- At the Oromia sites (Goro Gerbi, Rasa Janeta, Homecho Rehana, and Lega Lafto Sororo watersheds), the watershed rehabilitation and irrigation investments directly benefited PSNP beneficiaries. In Muge and Avevet watersheds in the Amhara region, however, non-PSNP households benefitted most as PSNP beneficiaries generally owned no land in the irrigable area.
- Those who benefited from the irrigation interventions (that is, those having land in the irrigable areas) were able to increase their crop productivity by expanding the number of growing seasons.

Impacts on food security, nutrition, and resilience

PSNP interventions enhance resilience capacities by facilitating access to various basic services, including piped water and informal financial institutions, such as village savings and lending associations and rural savings and credit cooperatives. While these activities are not directly linked to biophysical PW watershed rehabilitation and SSI interventions, they can help farmers make use of improved water availability for irrigation and other uses.

- Households in BHA areas reported reduced food gaps, and thus improved food security compared to areas without BHA support.
- Participating in PW activities on watershed rehabilitation, such as communal soil and water investments did not translate into increased food security. This could be linked to the short duration of the program.
- Water harvesting practices and irrigation on own plots benefitted households directly by boosting their agricultural production and crop diversification.



- Positive nutrition outcomes were reported when irrigation development was combined with watershed development (example: Simada, Kurfa Chele, and Gemechis sites). At the Amhara sites, food security, nutrition, and resilience were more pronounced among PSNP nonbeneficiaries who had access to irrigated plots.

TECHNICAL AND INSTITUTIONAL CAPACITY BUILDING

Capacity development is key for achieving the goals envisioned under PSNP as well as for overall agricultural and economic growth of the country. Technical and institutional capacity building platforms were developed to support the PSNP watershed rehabilitation and irrigation investments. Bylaws to protect the rehabilitated watersheds were formulated at all sites; and were enforced by youth groups at the Oromia sites and by guards at the Dire Dawa and Amhara sites. Qualitative data collected show that the program has strengthened the technical and managerial capacities of communities and staff at agricultural offices. Both government agencies and implementers provided training to ensure the quality of the watershed rehabilitation and irrigation development.

However, once implementation was completed, responsibility for the management and maintenance of the sites was handed over to beneficiaries without further support. Moreover, while Training-of-Trainer (ToT) approaches can train a large number of people at low cost, such approaches may not be adequate to address the technical and managerial needs of some of the infrastructure, nor the specific local needs. Water-user associations that have been established in most study sites could play an important role in maintaining irrigation schemes. However, their capacity to maintain and operate the rehabilitated infrastructure has remained limited.

FACTORS INFLUENCING THE ACHIEVEMENT OF POSITIVE OUTCOMES AND SUSTAINABILITY OF IRRIGATION INVESTMENTS

- Although PSNP is an essential social protection program, there is a risk that watershed rehabilitation and irrigation interventions are not sustainable, as interventions are often not sufficiently context-specific and capacity of local entities to maintain systems remains low.
- Sustainability is further compromised due to the lack of technical capacity of PSNP workers as well as the absence of basic physical capital and equipment during construction. Although the use of locally available resources and materials increases the cost-effectiveness of the interventions; if they are not supported by basic technical capacity and equipment, the quality and longevity of the investment is compromised. Resource constraints (lack of capital budget, in particular) limited the quality of construction and increased (unmet) maintenance needs of irrigation infrastructure.
- Additional constraints imposed by PSNP, such as on the size of the infrastructure, for example, limits on the height of small dams, further affected their potential resilience outcomes and cost effectiveness.
- Cost-effectiveness of the program was also reduced by the overall focus on new construction rather than on maintenance of existing structures.

Watershed rehabilitation can support irrigation development, and irrigation development can improve nutrition and resilience outcomes, especially in the face of climate shocks. It is likely that some irrigation development could be achieved without watershed rehabilitation, but limits would be reached faster than



without supportive upstream catchments. If restrictions on capital and materials would be lifted the cost-effectiveness of larger irrigation systems could be improved.

IMPLICATIONS AND RECOMMENDATIONS

The results of the assessment confirm that PSNP interventions rehabilitated degraded lands and increased water availability for multiple uses, thus benefiting local livelihoods, including PSNP beneficiaries and nonbeneficiaries. Pronounced improvement in vegetation greenness was observed in the dry season across the majority of intervention watersheds, indicating the interventions' potential to enhance soil fertility and water-holding capacity. This is particularly critical under growing climate extremes. No consistent improvement in vegetation was observed during the rainy season; this may be because rainfall is sufficient to satisfy plant water requirements during these seasons.

Importantly, by increasing water availability, the interventions helped to improve the watersheds' drought resilience—although it should be noted that the greenness of vegetation is affected by the severity of droughts at the local level. Area closures enriched with vegetation and other soil conservation activities were found to be most effective in enhancing vegetation greenness and reducing soil erosion, but other soil and water conservation structures—such as bunds, check dams, and terraces—also contributed.

The expansion of irrigation practices was key to improving food and feed availability as well as nutrition.

According to qualitative fieldwork, efforts to mitigate the constraining impacts of gender norms by fostering both women's and men's engagement in the interventions brought positive change in terms of gender equality and women's agency. The adoption of integrated approaches encouraged nutrition-sensitive agriculture and likely contributed to improving the nutritional status of households. This could not be confirmed, however, by the econometric analysis.

BHA-supported interventions also strengthened the institutional infrastructure by supporting the development of the technical and managerial capacity of communities and local governments. The interventions also contributed to building a sense of community ownership through implementing the interventions and reaping their benefits, as well as in sustaining their positive outcomes.

A series of limiting factors—such as poor market linkages and lack of complementary rural infrastructure—has limited the overall impacts and benefits of PSNP PW. And while institutional capacity was supported, it was largely insufficient to adequately govern and maintain built infrastructure. The sense of ownership over PW activities could be further strengthened by increasing public participation in site identification and in the planning of watershed development activities.

Women's involvement, and agency, can be further strengthened beyond assigning them roles on watershed committees. The establishment of user associations could help support sustainability, but the institutional structure of such associations needs to be supported and strengthened. A further area for improvement is the development of communities' capacity to maintain investments in watershed development and to manage the business and financial aspects of user associations—an area that has received little attention to date.

The following recommendations are suggested to increase the nutrition and resilience benefits of PSNP's watershed and irrigation investments:



- Discussions with implementers, local governments and PSNP beneficiaries suggest that there is currently no common understanding that PSNP aims to improve nutrition and resilience outcomes. If nutrition and resilience to shocks are goals of PSNP investments, then all actor groups need to be informed of these intentions. Specific nutrition and resilience actions need to be identified for each participating watershed or woreda and any activities that can adversely affect nutrition and resilience needs to be reviewed/re-assessed. Finally, indicators and targets demonstrating their progress need to be designed, ideally with community involvement (see also Project Note VII).
- Monitoring and evaluation approaches should be revisited in order to help realize positive outcomes from the interventions; priority needs to be given specifically to revising indicators on resilience and capacities and nutrition outcomes.
- Modern technologies, such as computers and remote sensing should be used to monitor outcomes from watershed rehabilitation.
- Irrigation has been shown to support both resilience and nutrition, but current support to irrigation does not necessarily reach PSNP beneficiaries directly, particularly not landless beneficiaries and those who own land outside rehabilitated areas or irrigation schemes. Direct support to individual ground-water irrigation could be one solution for beneficiaries with land holdings.
- Some PSNP participants in Amhara sites reported 10–12 months of engagement in PSNP PW. Excessive time spent on PW activities could lead to shortage of time for domestic and economic activities. This may, in turn, negatively affect household nutrition status.
- Increased emphasis needs to be placed on the functionality and maintenance of the constructed irrigation and watershed infrastructure, moving beyond the current focus on new construction only.
- Long-term rehabilitation practices should be coupled with immediate income generating activities as a potential solution to ensuring sustainability.
- Alternative and innovative PW activities should be identified targeting area-specific problems along with contextual solution approaches. Alternative intensification and income-generation approaches are particularly needed in land-scare areas.
- Periodic and targeted capacity-building for user associations (e.g., water and forest user associations, community leaders, community facilitators, and other actor groups should be implemented to strengthen the sustainability of investments.
- Experience-sharing programs among kebeles, woredas, or implementing partners can promote peer learning and capacitate PSNP beneficiaries. Enhanced capacity would help to ensure sustainability and a sense of ownership of rehabilitated watersheds and irrigation infrastructures.

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