



Ministry of Foreign Affairs of the Netherlands



World Vision



# Water for irrigation and livestock

Improving productivity and increasing incomes in dryland areas

Impact brief series



Check dam in Tseada Emba

## Background

**Ethiopian smallholder farmers produce 90 to 95 percent of the country's agricultural output.<sup>1</sup> However, virtually all food crops (97 percent) in Ethiopia are produced by rainfed agriculture, much of which is grown in semi-arid areas characterized by highly variable rainfall.**

When combined with land degradation – an increasingly widespread issue due to population pressures – agricultural productivity remains impeded.<sup>2</sup> The irrigation sub-sector produces just three percent of food crops, with the bulk of water supporting industrial crops (cotton, sugarcane, fruit).<sup>3</sup>

While irrigation, in combination with other climate smart production technologies, can increase productivity substantially and double incomes<sup>4</sup>, irrigation projects often require huge financial and capital investment, and the expectation of industrial use of this water means that smallholder farmers are unable to benefit from such schemes. **Small-scale irrigation development remains the most viable solution for smallholders requiring less capital-intensive investment**, but investment depends on water security, which is difficult to guarantee in degraded and semi-arid areas. DryDev, through its integrated land restoration approach, has successfully addressed some of these issues in its targeted sub-watersheds in six woredas of Oromia and Tigray.

1. FAO. 2015 "Ethiopia - Irrigation Market Brief" [online]. Available at: <<http://www.fao.org/3/a-i5196e.pdf>>

2. Tilahun H, Teklu E, Michael M, Hagos F, Awulachew SB. 2011, "Comparative performance of irrigated and rainfed agriculture in Ethiopia". World Applied Sciences Journal, 14(2):235-244.

3. FAO. 2015 "Ethiopia - Irrigation Market Brief" [online]. Available at: <<http://www.fao.org/3/a-i5196e.pdf>>

4. Hagos F, Makombe G, Namara RE, Awulachew SB. 2008, "Importance of irrigated agriculture to the Ethiopian economy: Capturing the direct net benefits of irrigation", International Water Management Institute. In Awulachew SB et al. (eds) Draft Proceedings of 'Impact of Poverty and Environment in Ethiopia' symposium, Addis Ababa, Ethiopia, 27-29 November 2007, pp127-155 [online]. Available at: <https://ageconsearch.umn.edu/bitstream/246409/2/H044133.pdf>

## What has DryDev already achieved?

One of the pillars of DryDev’s approach has been the provision of water security for smallholders through integrated sub-watershed management. DryDev has been promoting and supporting the construction of rainwater harvesting structures, such as check dams, deep trenches and terraces, to improve the infiltration of rain to groundwater reserves. With an increasingly secure supply of water, direct irrigation interventions, such as canals, roof water harvesting, hand-dug wells and water-lifting devices (pumps) have been encouraged. By the end of June 2018, 6,689 hectares of potential irrigable land have been developed and put under irrigation. Over 14,000 farmers have benefited from small-scale irrigation practices and climate-smart agriculture techniques were promoted by the programme to maximize the benefits from the increased availability of water.

The programme has established:

- 500 rainwater harvesting structures to support rainwater infiltration, water storage structures and water access structures (such as hand-dug wells).
- 76 small-scale irrigation schemes that use pumps or channels to send water from water storage or access points, such as reservoirs, check dams, ponds and hand-dug wells, to irrigation areas.
- 37.3 kilometres of water diversion canals or canal extensions developed.
- 116 motor pumps which are being used by the community groups facilitated by DryDev and supported by the woreda government.

Over 5,100 farmers, supported with training and materials, have started and expanded irrigation practices. According to the DryDev uptake survey (2017), 22 percent of farmers in DryDev’s target sub-watersheds are now practicing irrigation. This has increased production and farmers can harvest more than one crop per year, leading to improved food security and increased income.

A small survey of randomly selected households from programme sites in 2018 revealed:

The number of hungry months reduced from

**3.41 in 2014 to 1.6 in 2018,**

indicating increased household food security.

According to the household hunger scale,

**93 percent of households reported no household hunger**

and only six percent and one percent of households reported moderate and severe food insecurity respectively.

**“I am 65 (years old) and this is the first time ever in my life we are having two crops in one year. I never imagined we can grow vegetable/crops in a dry season.”**

– Tesfay Giday, farmer from Tseada Emba Woreda, who is using a DryDev constructed canal to irrigate his fields



Irrigated crop in Tseada Emba

## How has DryDev made this happen?

DryDev adopted a two-pronged strategy to enhance water availability and accessibility both for crops and livestock:

- a) Maximizing capture of rainwater by: i) increasing surface water capture through rainwater harvesting in individual household and communal areas by establishing water ponds and check dams; and ii) increasing groundwater recharge through various physical and biological measures to enhance availability of groundwater through hand-dug wells.
- b) Maximizing use of river water by facilitating water pumping and canals.

The relatively high uptake of small-scale irrigation in DryDev Ethiopia sites can be attributed to deliberate efforts to reduce costs of irrigation interventions by using local resources to establish irrigation schemes. This facilitated farmers' access to appropriate equipment for abstracting water from the rivers and pumping to the farms. The programme worked closely with woreda officials to provide irrigation-related extension services to farmers including technical support in construction and maintenance of irrigation schemes and equipment.

To establish water harvesting structures and construction of irrigation schemes, salient features of DryDev's approach were as follows:

- Planning was bottom-up: through a community action-planning process, communities identified and planned for the water harvesting structures and irrigation schemes.
- No contractors were involved: work was undertaken by trained community members supervised by the government sector office and DryDev technical staff. This reduced costs and enhanced ownership.
- Community contribution was a must: each benefiting community contributed in the form of labor or local materials. Community contributions ranged between 25-30 percent of the total cost of the schemes.
- Local capacity-building for maintenance and monitoring: refresher trainings were provided to already trained community members. In addition, members were trained where capacities did not exist. Communities were trained and engaged in monitoring of implementation and progress.
- Community-based participatory development of by-laws was a must: this helped establish mechanisms for the maintenance and use of the resources.
- Integrated approach: irrigation was introduced in sub-watersheds where land rehabilitation activities were being undertaken and farmers were trained in climate-smart production and linked to the markets.

## Benefits of by-laws development

- **Clear understanding of rights and responsibilities of the members**
- **Better maintenance of the resources, through regular community contribution**
- **Reduce conflict among irrigation users**
- **Agreement on expansion of irrigated land and beneficiaries**
- **Ensures effective and efficient water use**
- **Helps to ensure water is used for its main objectives i.e. irrigation or livestock or for both as agreed by the community**
- **More equitable sharing of resources as by-laws introduce penalties and powerful members cannot exploit vulnerable groups**

- Access to water for livestock was integrated where possible and the design of the water-harvesting and irrigation structures included consideration of accessibility for livestock.

To enhance access to water, costly abstraction devices such as motor pumps had to be considered:

- At the initial stages, farmer groups are usually assisted with water pumps and water-lifting devices at a subsidized price whereby the project covers 70 percent while the farmers contribute the remaining 30 percent.
- These schemes are always group-based.
- Groups are then expected to generate income from the prioritized value-chains to purchase additional devices.
- Benefits from the irrigation schemes motivate groups to work towards a common goal which fosters cohesion among group members. Groups that can prove their plans are bankable are linked to financial institutions for loans, which are given in the form of irrigation equipment.

## Community's perception of benefits

**While no quantification of the benefits has yet been undertaken, members of farmer organizations from one sub-watershed per woreda and the government sector office staff from all six districts identified the following benefits:**

- Increased productivity resulting in increased income: farmers reported their yields have tripled and they can now produce crops like onion, tomato, potato, haricot bean and groundnut for markets. DryDev's uptake survey (2017) substantiates this claim: 84 percent of farmers involved in the production of value-chain commodities reportedly increased their volumes.
- Availability of water for livestock significantly reduced the distance that livestock walked to source their water, improving livestock productivity. This also spared children and other family members from the labour and time required to take animals to water.
- Equitable use of water by all socio-economic groups, including poor farmers, was considered important.
- Participatory development of by-laws has been hugely helpful for water user associations in managing sustainable and equitable use of water for small-scale irrigation.
- Farmers started to use water-lifting technologies to lift water from rivers and pits.
- DryDev introduced the technology by organizing farmers and now farmers can take a loan from micro-finance institutions and access such technologies.



Reservoir in Tseada Emba

**A lack of land and scant rainfall made it difficult for Mr Abadi to produce sufficient and reliable food for his family on his one-eighth of a hectare [1,250 m<sup>2</sup>]. Recovery of a nearby spring, due to upper catchment rainwater harvesting structures, has created opportunities. Access to this water allowed Mr Abadi to convert part of his rainfed land into an orchard. Fruit sales from his newly-planted apple and lemon trees fetched US\$200 in 2016. "I will now plant bananas, oranges and mangoes – and capture my roof water so I can expand further."**



Mr Abadi, apple grower: Kiltse Awulalo

## Can this be scaled up?

While the irrigation interventions are comparatively expensive, the benefits outweigh the costs. However, programmes need to look for strategies to reduce costs, such as by using local resources or leveraging government funding mechanisms. Simultaneously, facilitating farmer groups' access to finance can help increase the uptake.

### Points to consider for scaling up

- Use of local human resources can help reduce the costs to the project and a group-based approach can reduce the costs to individual farmers or households.
- Participatory development and implementation of community-developed by-laws is critical in equitable distribution of benefits and sustainability of water related schemes.
- Access to water for livestock should be included in the design of any scheme, such as water points.
- In the case where a community need might be higher than what a single project might be able to accomplish, collaboration with other stakeholders and programmes can help share costs and collectively meet the need.

**Mr Gebre once struggled to produce enough food for his family on his .25 hectares of land. He became a member of the Tusa Abdi irrigation cooperative in Boset Woreda after seeing the success of many other farmers who were using a motor-pump owned by the cooperative to irrigate their fields.**

**He now produces maize, onion, cabbage and tomato at least twice a year. Last year he earned around 150,000 Ethiopian birr (US\$7,000). Since he joined the programme in 2016, he has improved his house, all his children are attending school and he has savings of 30,000 birr (US\$1,335) in the bank.**



Onion grower, Boset

**DryDev is a six-year initiative implemented by the World Agroforestry Centre (ICRAF) with funding from the Ministry of Foreign Affairs (DGIS) of the Netherlands and a substantial contribution from World Vision Australia. The programme seeks to support smallholder farmers in dryland areas of the Sahel and Horn of Africa to transition from subsistence farming and emergency aid to sustainable rural development.**



[www.drydev.org](http://www.drydev.org)