Pilot Project Proposal

Smart Sprayer: Efficient Terrace Irrigation in Nepal

June 2026

Background

Feasibility study

Over the past year, a consortium of FutureWater (NL), Practica (NL), and the Climate Resilience Research Centre (Nepal) has been conducting a feasibility study on the Smart Sprayer, addressing water scarcity in the mid-hills of Nepal (Syangja district).

By combining highly uniform irrigation with tailored irrigation advice, the system aims to reduce water use, increase yields, and prevent nutrient leaching. It integrates a low-pressure mini-pivot (Sprayer) with a smart advisory service via SMS and WhatsApp (Croptimal). The feasibility study is supported by the Dutch Enterprise Agency (Partners for Water programme).

Farmers face water shortage during the dry winter season but with the Smart Sprayer they are empowered to increase their produce and revenue. Food security is typically a challenge during this dry period, the crops are therefore in high demand.

Unique characteristics of the Smart Sprayer:

- ✓ High uniformity of applied water, therefore efficient with water
- ✓ Water savings through irrigation advice in minutes by SMS/WhatsApp
- ✓ Low pressure operation - can work on gravity or with small pumps
- ✓ Lightweight and easy to relocate

The study is progressing well and is nearing completion. The 10 participating farmers in Putalibazar and Bheerkot municipality are currently finalizing the harvest of their winter crops. Farmers report improved ease of use, water efficiency, and excellent crop yields. Key outcomes:

- ➢ Time savings: a major benefit reported by all farmers.
- ➢ Water savings: farmers report to save water as a result of the uniform application of irrigation water and the irrigation advice received by SMS daily. They highlighted that a larger area can be irrigated with less water compared to conventional practices, which is particularly important under increasing water scarcity.
- ➢ Gender: as women carry out much of the fieldwork, the Smart Sprayer's lightweight design and ease of operation make irrigation less physically demanding and more accessible for them.
- ➢ Production: farmers indicated that the technology could contribute to increased production by ensuring timely and need-based irrigation and noted that visible benefits may encourage wider uptake among other farmers in the community.
- ➢ Soil and nutrients: maintains soil structure by preventing runoff, eliminating splash erosion, and reducing nutrient leaching.

Next steps:

1. Finalise and analyse data on Smart Sprayer performance, crop yields, and user experiences
2. Improve the design of the sprayer based on farmer feedback, with a focus on usability, robustness, and ease of operation
3. Reduce production costs through local sourcing and design optimization
4. Strengthen the irrigation advisory service to ensure it is reliable and accessible

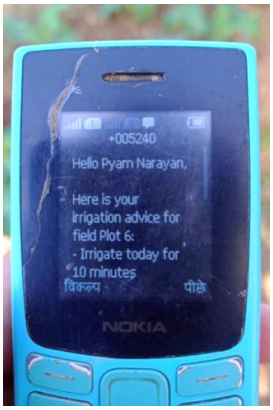
For reference you can find the following documentation in the annexures:
Annex 1: Factsheet and manual: technical details of the Smart Sprayer
Annex 2: List of deliverables, made available upon request

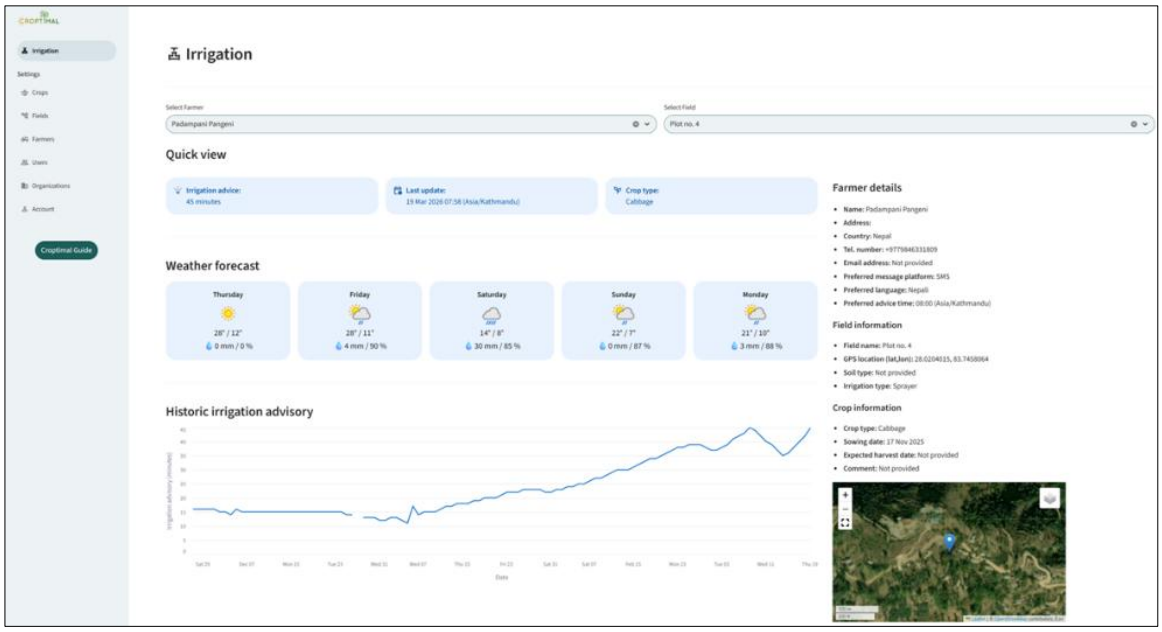
The following videos are readily accessible on YouTube:

- Final results of the Feasibility Study: https://youtu.be/UKfbjbbaBTQ?si=xLzjDjcZDUQdwFJi
- Croptimal | डेटाद्वारा सञ्चालित स्मार्ट सिंचाइ सल्लाह (Nepali) https://www.youtube.com/watch?v=BNeaR0IF5PQ
- Croptimal | Smart Irrigation Advice Powered by Data (English) https://www.youtube.com/watch?v=VznztauUv-w
- Interim Project Video (February 2026) https://www.youtube.com/watch?v=91EU3clzOcQ







Pilot Project

Proposal

The successful feasibility study shows the immense potential of the Smart Sprayer technology in Nepal. Not only for the mid-hills but also for the Terai and other regions. The consortium aims to test the Smart Sprayer technology on a large scale as part of a pilot project. For the pilot project we aim to test the Smart Sprayer with 50-100 farmers. This pilot project is required to make the technology ready for uptake by the Nepalese agricultural sector.

Objectives of the pilot project:

- Validate the Smart Sprayer at scale under real farming conditions, ensuring reliable performance with minimal need for troubleshooting
- Ensure the irrigation advisory software is robust, scalable, and ready to serve a large number of farmers
- Validate and strengthen the supply chain for commercial introduction, building on existing local distribution and service networks

Site and farmer requirements:

- Water source: spring, water tank or pump with a discharge of at least 400 L/hr.
- Elevation difference of >2 meters between field and water intake when using spring water
- Farmer to have access to a cell phone to receive SMS (or WhatsApp)
- Minimum width of terraces of 8 m.

Foreseen activities during the pilot project:

- Local government and stakeholders capacity building and participation
- Procurement of materials and equipment
- Travel by local NGO and by international experts
- Knowledge transfer, support, and monitoring
- Project closure with recommendations for market penetration and subsidy schemes.

Pilot project funding and institutional needs:

- 50-100 participating farmers
- Local government (municipality) supporting the project and engaging in capacity building
- Potential co-financing by local governments
- Cost estimate can be made upon formalising pilot project with number of farmers involved, location, stakeholders.
- Tentative planning of pilot project per below.

Tentative Planning		2026					2027					
#	Activity	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1	Inception: field visit, farmer and site selection											
2	Pilot Phase: sowing, smart sprayer deployment, testing											
3	Harvest: collect crop parameters + farmer experience											
4	Capacity building and monitoring: local gov + farmers											
5	Reporting, closure and recommendations											

For more information, please contact us:

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Annex 1

Smart Sprayer factsheet and manual

SMART SPRAYER

The Smart Sprayer is an irrigation technology that combines a mechanical sprinkler system with the digital irrigation advisory tool Croptimal. It has been developed specifically for smallholder farmers. The sprayer has been developed to deliver uniform irrigation under low-pressure conditions. The fully mechanical rotating system operates solely on water pressure, enabling farmers to irrigate effectively without the need for pumps, motors, or external energy sources. The system is designed to reduce farmers' workload by simplifying irrigation practices. Combined with Croptimal the aim is to use water more effcienlty.

FEATURES

- Suitable for small plots
- No pumps or electricity required
- Uniform water distribution
- Easy to assemble and move

TECHNICAL SPECIFICATIONS

- Sprayer diameter: 10.90 m
- Irrigated area: Approximately 93 m²
- Flow rate (all holes open): 700–1000 L/h
- Flow rate (half of the holes closed): 450–700 L/h

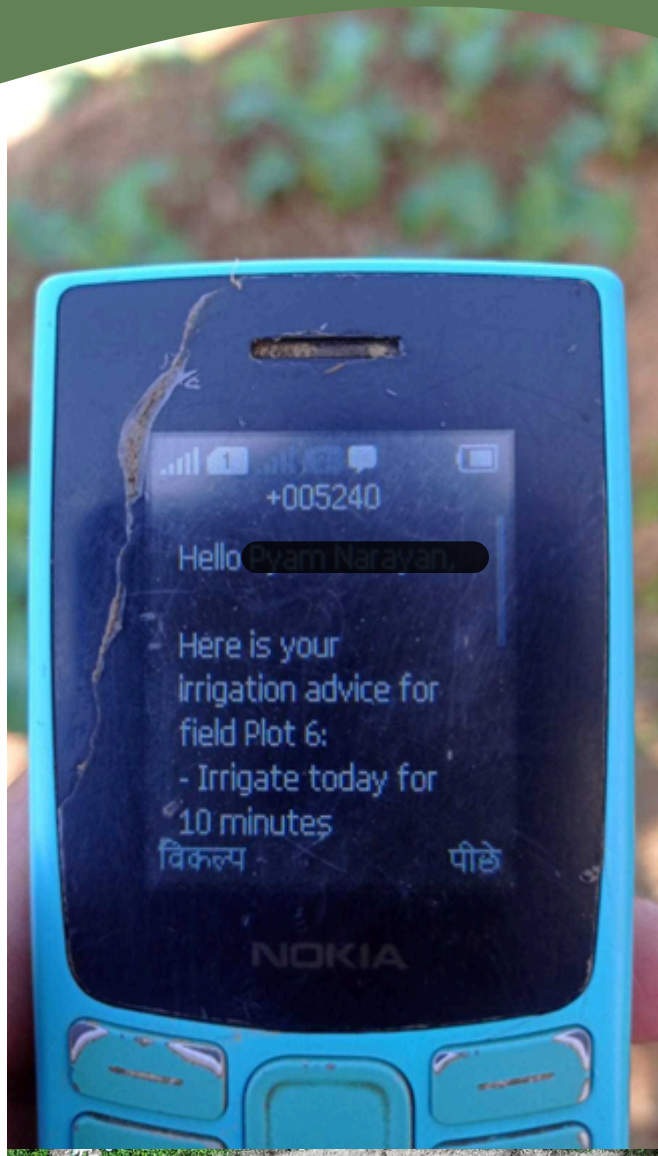
27-02-2026 version 1.0

FutureWater PRACTICA

SMART SPRAYER

GENERAL INFORMATION

The Smart Sprayer operates effectively in areas with low water pressure and functions as a rotating sprinkler irrigation system. The holes in the outer two sections of the arms are oriented horizontally, allowing the sprayer to rotate solely through water pressure. As a result, the system operates fully mechanically and does not require pumps, motors, or external energy sources. Its lightweight and simple design allows the sprayer to be easily moved between fields and operated by a single person. To increase durability and long-term use the structure is designed in such a way that components can be repaired or replaced without specialised tools. Croptimal is a digital advisory tool that calculates crop water requirements based on remote sensing data, crop growth stages, and crop specifications. By integrating this information with the flow rate of the sprayer, it determines the number of minutes that irrigation should be applied. Farmers receive daily text messages with irrigation advice.



CROPTIMAL

https://www.futurewater.eu/tools/croptimal/

ASSEMBLY

STEP 1: SETTING UP THE BASE

- Place the aluminum tripod (1.1) on a stable, level surface.
- Position the cylindrical disc (1.2) on top of the tripod.

STEP 2 – INSTALLING THE CENTRAL VERTICAL TUBE

- Insert the vertical tube (2.1) into the center of the tripod.
- Slide the black plastic sleeve with the built-in spirit (2.2) level over the vertical tube.
- Slide the water inlet (2.3) on the bottom of the vertical tube.
- Insert the additional support pole (2.4) into the ground to stabilize the vertical tube inside the tripod.

STEP 3 – CONNECTING THE WATER SUPPLY

- Insert the water supply tube (3.1) into the lower black plastic component.
- Attach the filter (3.2) to the water supply tube using the hose adapter (3.3) to filter incoming water.

STEP 4 – MOUNTING THE GREEN VERTICAL TUBE

- Push the small plexiglass tube (4.2) into the green vertical tube (4.1), if this is difficult use a rotating and pushing motion.
- Attach the wires (4.3) to the top of the green vertical tube. These wires will later on support the sprayer arms.
- Slide the tube green vertical tube (4.1) over the central vertical tube (2.1).

STEP 5 – ASSEMBLING AND ATTACHING THE SPRAY ARMS

- Attach the sections of the sprayer arms (5.1/2/3) to both sides of the green vertical tube (4.1). First the first sections, then the second and then the third. Place a white foam ring (5.4) between each arm section before connecting them to prevent leakage.
- Attach the wire (4.3) that is connected to the green vertical tube to the third section of the arm.
- Make sure the holes of the first arm face upwards and on the second and third arm horizontally

COMPONENTS LIST- SMART SPRAYER

1 BASE AND SUPPORT

1. Aluminum tripod
2. Cylindrical top disc (mounted on top of the tripod)

1

2

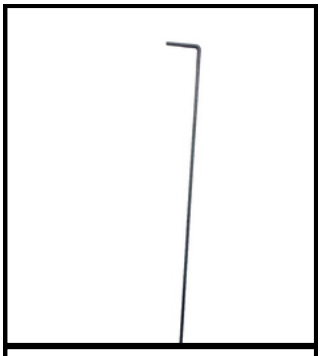
2 CENTRAL STRUCTURE

1. Central vertical tube
2. Black plastic sleeve with built-in spirit level
3. Lower black plastic fixing ring
4. ground support pole

1

2

3



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3 WATER SUPPLY SYSTEM

1. Water supply tube
2. Water filter
3. Threaded hose adapter (20 mm)
4. Water valve

1

2

3

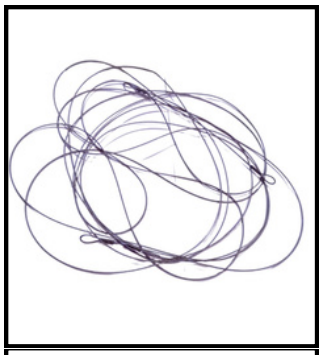
4

4 ROTATING FRAME

1. Green vertical tube
2. Plexiglass tube
3. Support wire for spray arms

1

2



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5 SPRAYER ARMS

1. Spray arm section 1 (largest diameter and with upward-facing holes)
2. Spray arm section 2 (middle diameter with horizontally oriented holes)
3. Spray arm section 3 (smallest diameter with horizontally oriented holes)
4. White foam sealing rings (between spray arm sections)

1/2/3

4

6 OPTIONAL COMPONENTS

1. tube closing rings

1

USERS EXPERIENCES

In October 2025, field testing of the Smart Sprayer was initiated on nine pilot farms in Syangja district (Gandaki province), Nepal. This section presents the experiences and observations of some of those farmers.

Field size: 256 m2

Crop: cauliflower

Water flow: 765 L/h

"With this system I save a lot of time compared to sprinkler irrigation or irrigation with the hose. Also it disturbs the soil and plants less compared to sprinkler irrigation. However, the main adventage is covering more area with less water."

"Before I used to irrigate using open canals, now with the Smart Sprayer I use my water more efficiently. I use less water and the water is distributed better."

Field size: 253 m2

Crop: cabbage

Water flow: 631 L/h

Field size: 500 m2

Crop: cauliflower

Water flow: 498 L/h

"This system saves a lot of time, I do not need to wait anymore or move around with pipes, sticks and sprinkler irrigation. Once it is installed, I can let it run and even turn it off from my house."

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Annex 2

List of deliverables

1. Site Selection Report
2. Farmer Focus Group Discussion Report
3. Mid-Term Report to donor of feasibility study
4. Croptimal Technical Guide
5. Supply chain and market analysis for the Smart Sprayer & Croptimal in Nepal
6. Feasibility Study Final Report