

# TRUST

## Innovative planning tools for water management in water-scarce regions

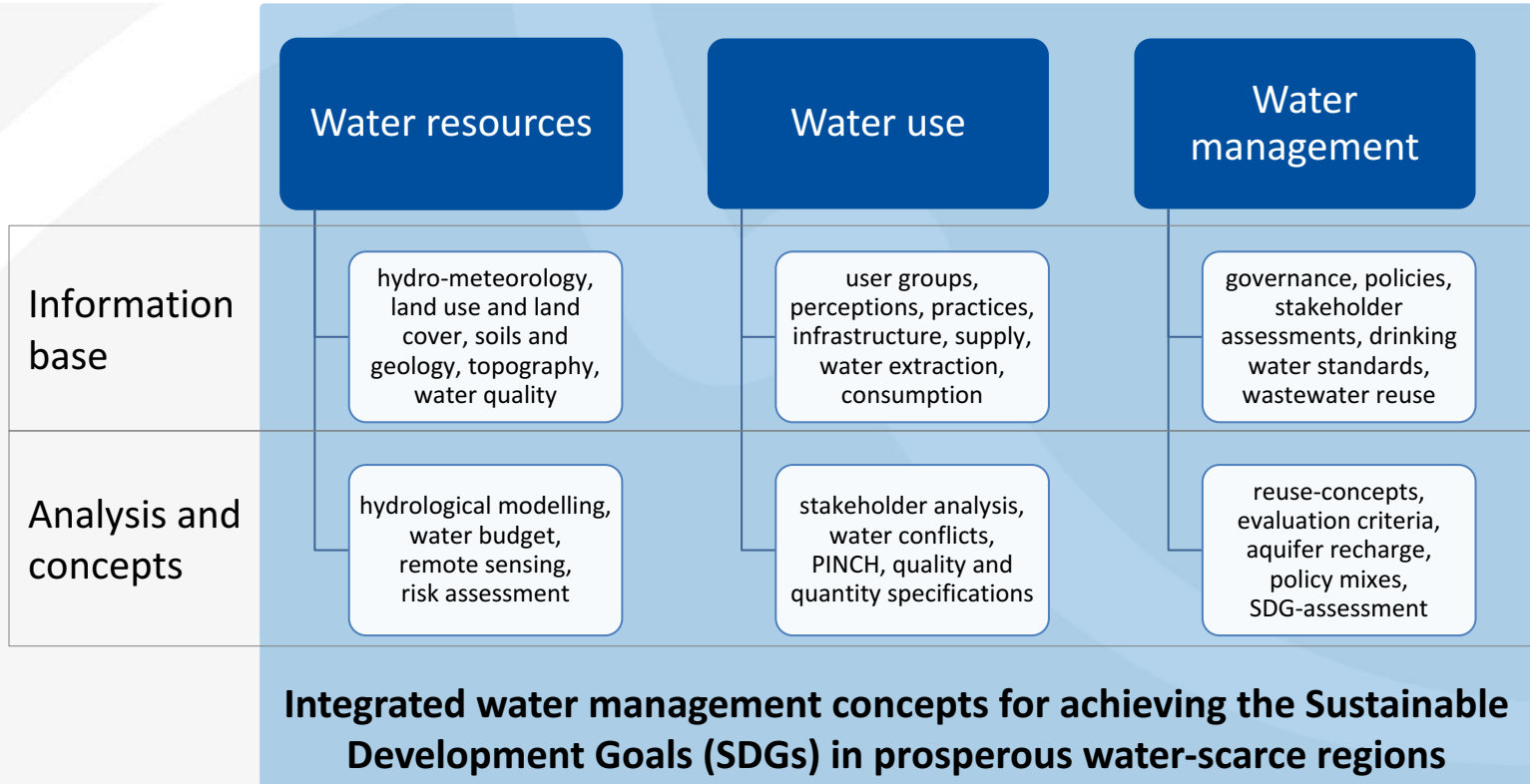
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# How to achieve SDG 6 in water-scare regions of the world?



## Lima/Peru

- economic growth region
- high population growth
- increasing water demand
- water use conflicts
- unequal access to safe drinking water and sanitation services
- complex governance structure

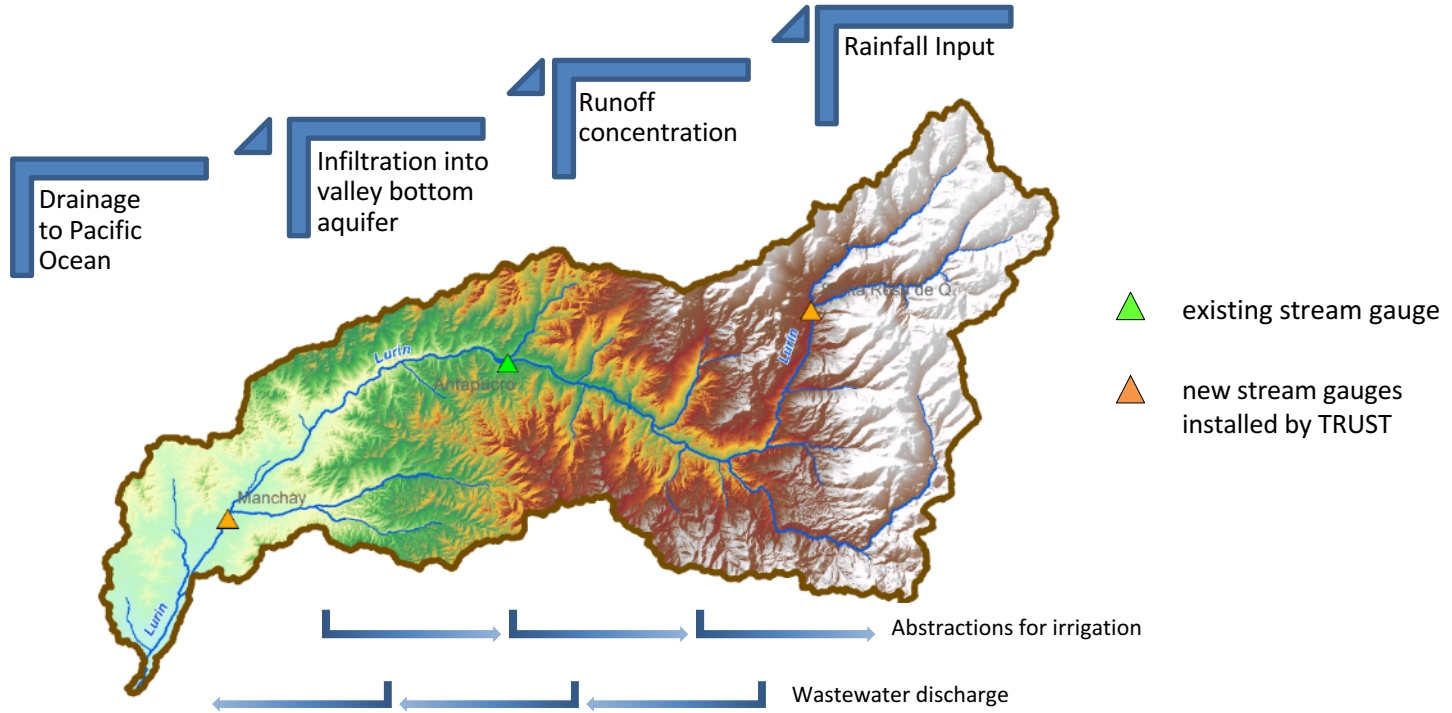


## Water resources

- **Lurin River**: strong seasonality, incomplete monitoring
- new **monitoring stations** for rainfall and discharge
- **hydrological modelling**
- **remote sensing**
- WSP-Tool: innovative tool for **risk assessment** at catchment level

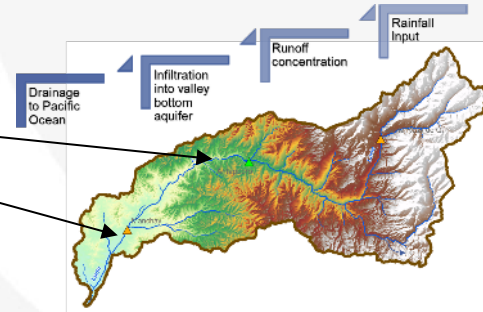
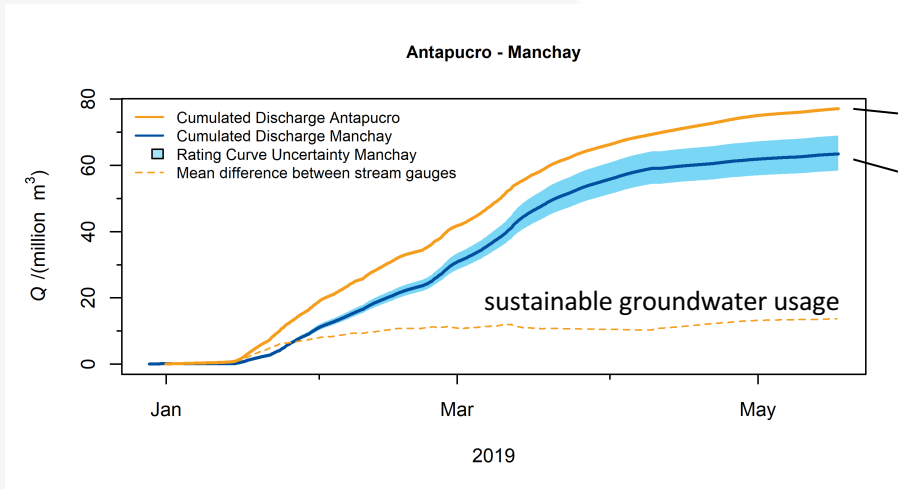


# Hydrology of the Lurin River

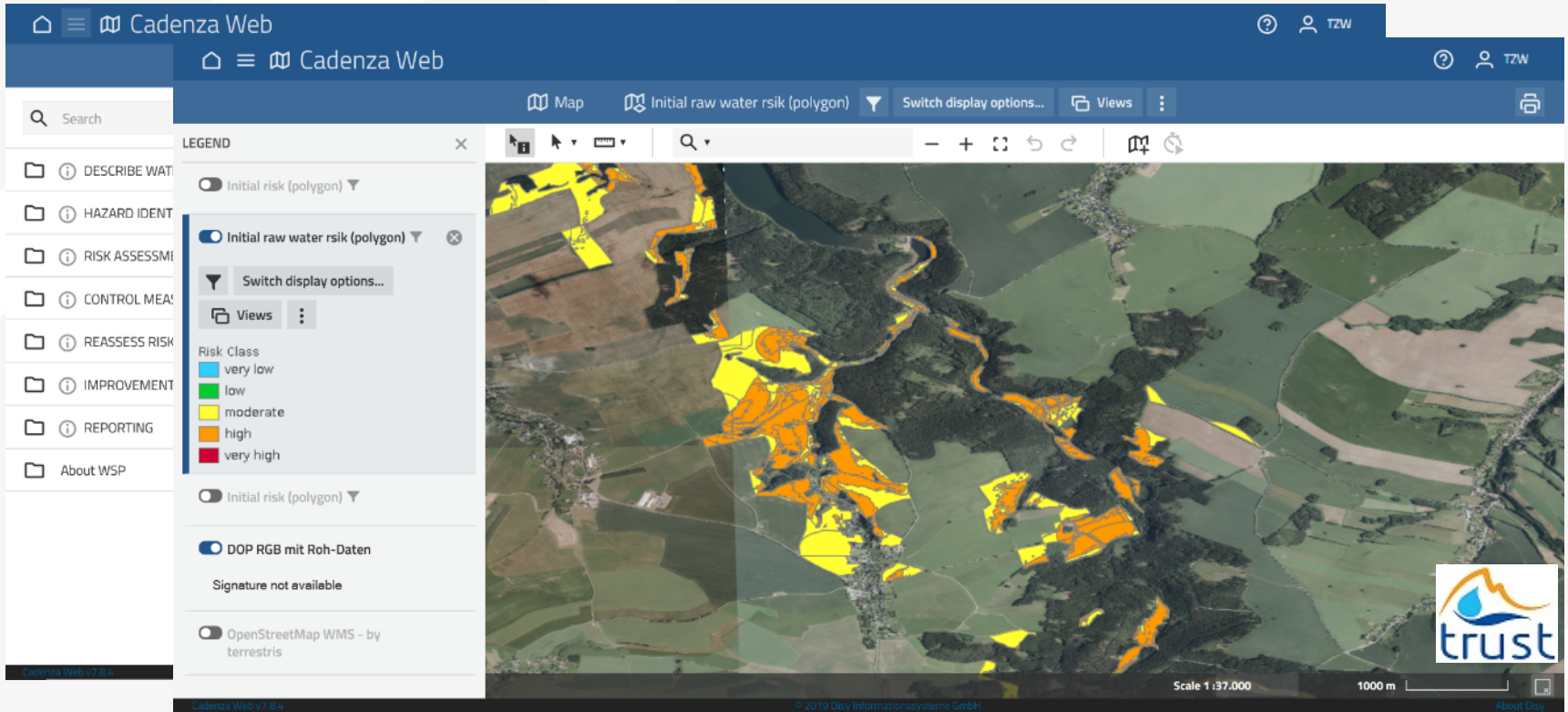


# Quantification of available Water Resources

- two stream gauges (Antapucro and Manchay) allows to estimate
  - amount of infiltrated river / sustainable groundwater usage
  - water drainage to Pacific Ocean / unused water resources



# WSP-Tool: interactive tool for risk assessment on catchment level



The screenshot displays the WSP-Tool interface. The top navigation bar includes a home icon, a menu icon, and the text "Cadenza Web". On the right side of the top bar, there are icons for help, user profile, and the text "TZW". Below the top bar, a search bar is visible on the left. The main interface is divided into a left sidebar, a central map area, and a right legend panel.

The left sidebar contains a list of menu items:

- DESCRIBE WAT
- HAZARD IDENT
- RISK ASSESSM
- CONTROL MEAS
- REASSESS RISK
- IMPROVEMENT
- REPORTING
- About WSP

The central map area shows a satellite view of a catchment area with overlaid risk assessment polygons. The legend panel on the right is titled "LEGEND" and contains the following items:

- Initial risk (polygon) ▼
- Initial raw water rsik (polygon) ▼ ×
- Switch display options...
- Views
- Risk Class
  - very low
  - low
  - moderate
  - high
  - very high
- Initial risk (polygon) ▼
- DOP RGB mit Roh-Daten
- Signature not available
- OpenStreetMap WMS - by terrestris

The bottom of the interface shows a scale bar indicating "Scale 1:37.000" and "1000 m". The "trust" logo is visible in the bottom right corner of the map area. The footer of the page includes "Cadenza Web v7.8.4" and "© 2019 Day Informationssysteme GmbH".



## Water use

- **water users:** stakeholder analysis, objectives and policies
- **policy mix design:** newly developed policy-interaction modelling approach to **analyze synergies and trade-offs between different objectives of different water users** on the level of interactions between instruments and measures
- tested within **participatory processes** involving stakeholders from entire catchment
- for **strategic planning** of sustainable water use





# Policy-interaction matrix for the Lurin catchment

## Upper Lurin

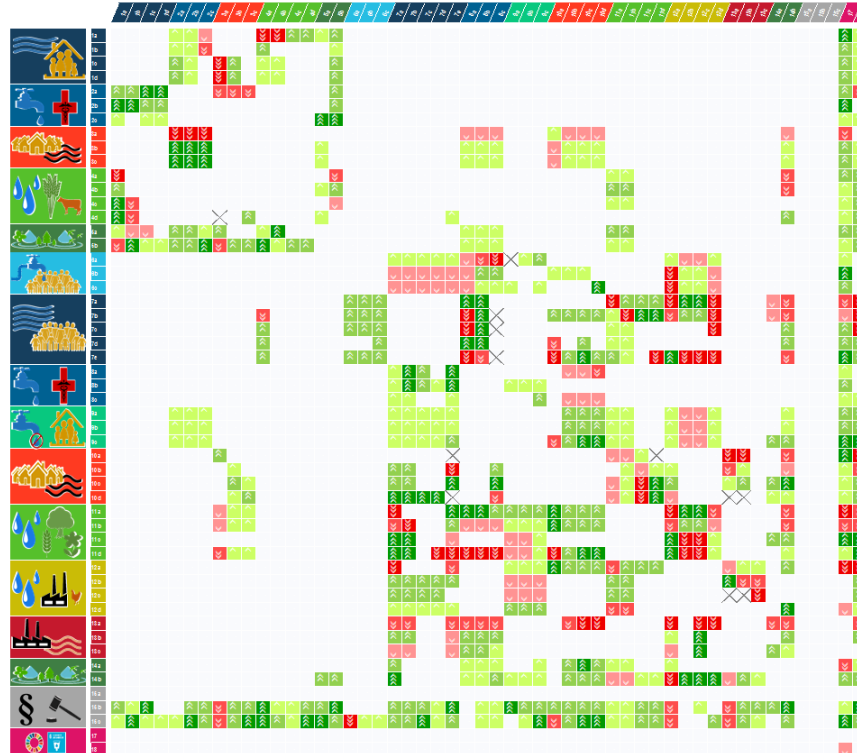
- Households
- Wastewater
- Agriculture
- Ecosystems

## Lower Lurin

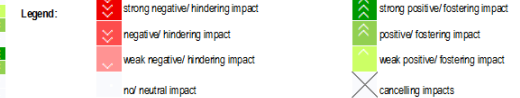
- Households
- Wastewater
- Agriculture
- Ecosystems
- Industry
- Context
- SDGs

14 objectives

47 policies



Assessing impacts on effectiveness of policies



# Analyzing inconsistencies within the status quo policy mix



„inconsistent policy“ = does not follow the networks impact logic (measured by CIB impact balances; more arguments for alternatives)

## Key findings:

- groundwater abstraction by several users  
→ water quantity conflicts
- insufficient wastewater treatment (domestic and industrial)  
→ water quality conflicts

## Water management

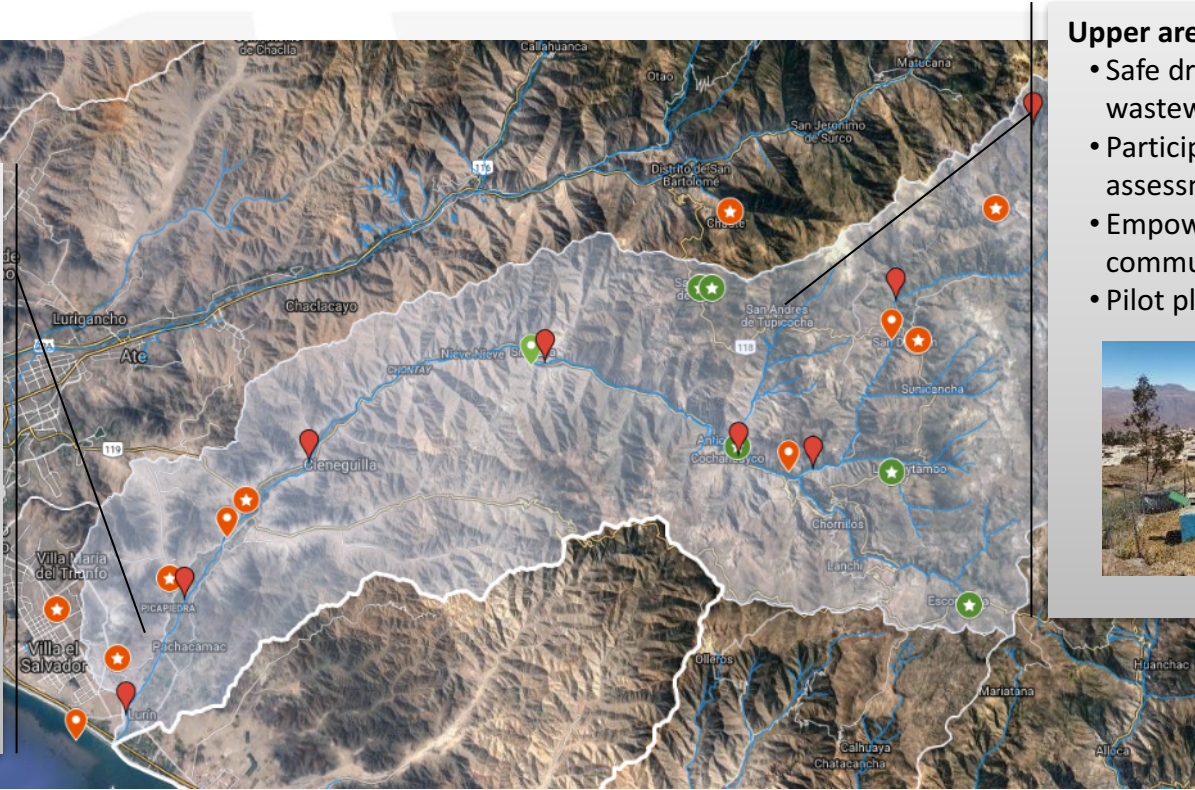
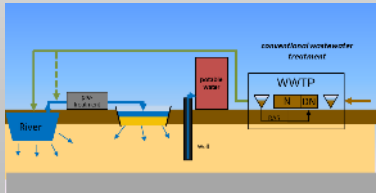
- integrated solutions for **drinking water supply and wastewater treatment**, adapted to local boundary conditions
- **capacity building** (operator) and **awareness-rising** (user)
- concepts for reuse of treated wastewater for **managed aquifer recharge**



# Case study: concepts for the Lurin River catchment

## Reuse potential lower area:

- Agriculture: irrigation
- Industry: process/cooling
- Infiltration to prevent seawater intrusion into the aquifer
- Aquifer recharge: indirect reuse as drinking water, irrigation, industry, ...

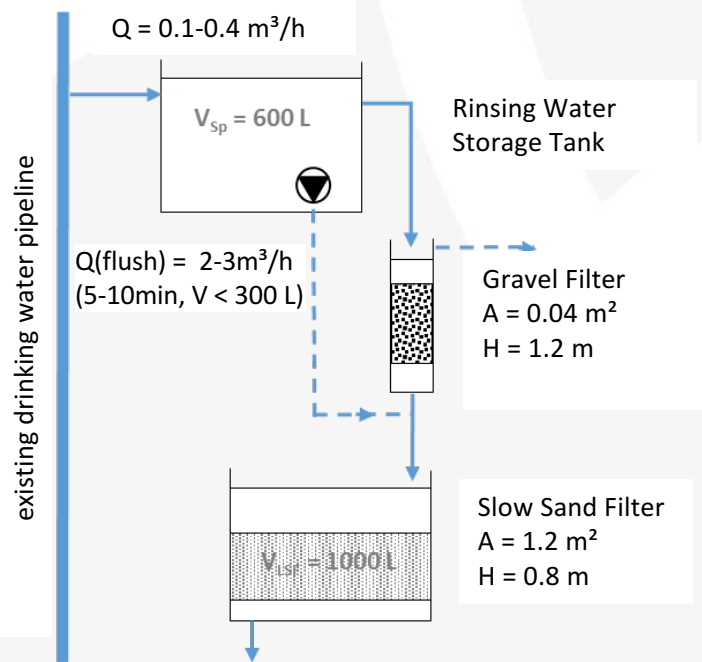


## Upper area:

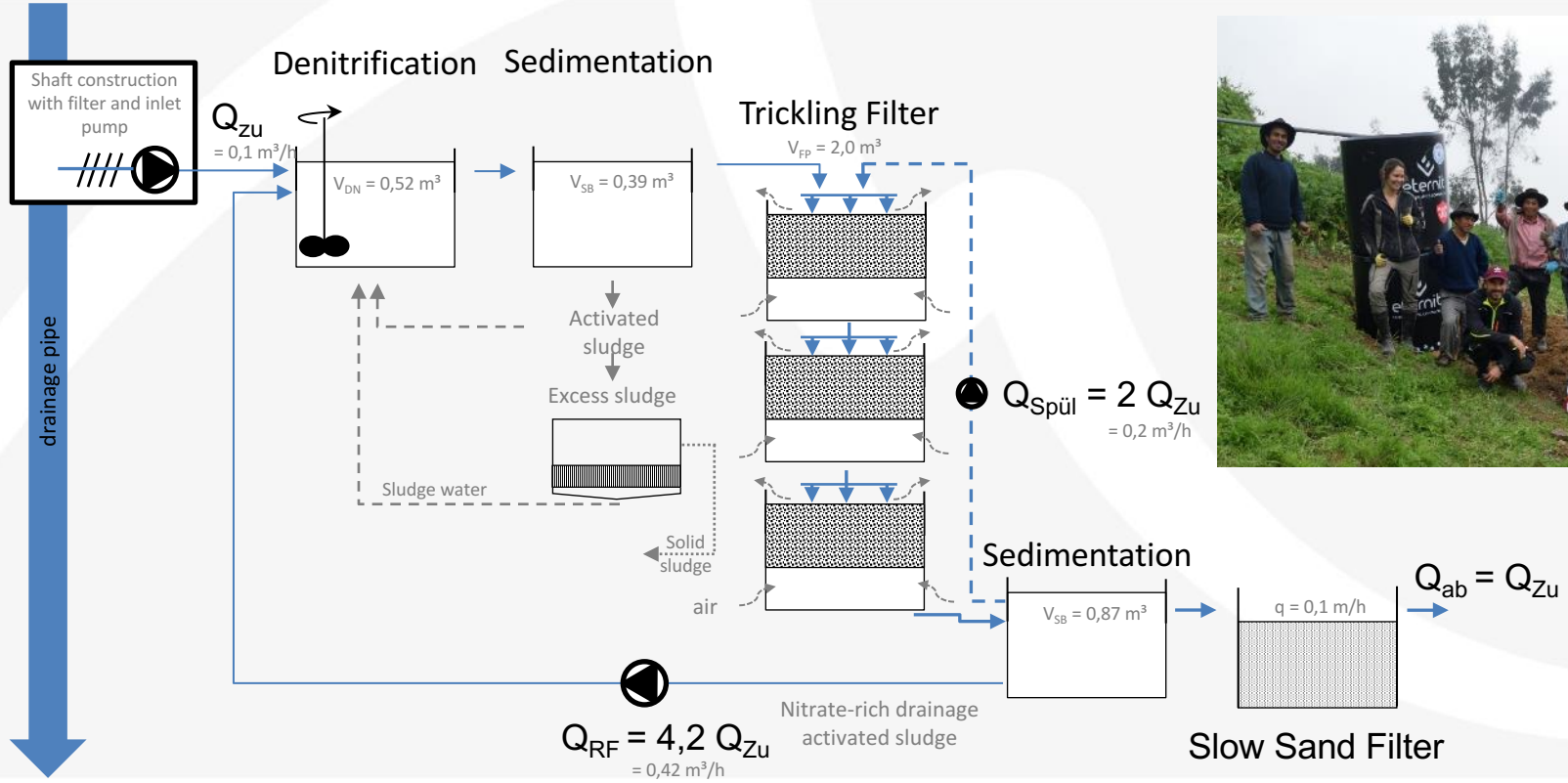
- Safe drinking water and wastewater treatment
- Participatory assessment
- Empowerment of communal organisation
- Pilot plant testing



# Upper catchment: safe drinking water supply



# Upper catchment: safe wastewater disposal



1. **Field work** remains necessary for data on water quantity and water quality. Remote sensing data and derived products using machine learning (ML) to increase data availability still requires further research.
2. **Policy-interaction modelling** is a useful starting point for **integrated water planning processes**, contributing to reduce goal conflicts, to meet the demand of all water users and to attain SDG 6.
3. **Training and capacity building** of local water service providers as well as **awareness raising** of the local water users are key factors for successful implementation and **long-term operation** of drinking water and wastewater treatment plants.
4. **Implementation of participatory formats** during the planning process allows gaining a **socio-technical perspective** regarding innovative drinking and wastewater management concepts.

→ **TRUST recommendations document (Marketplace)**



Universität Stuttgart

Center for Interdisciplinary Risk and Innovation Studies - ZIRIUS  
Institute for Sanitary Engineering, Water Quality and Solid Waste Management - ISWA



Institute for Water and River Basin Management - IWG  
Institute of Photogrammetry and Remote Sensing - IPF



TZW: DVGW-Technologiezentrum Wasser (Karlsruhe)



Disy Informationssysteme GmbH (Karlsruhe)



decon international GmbH (Bad Homburg)



Ingenieurbüro Pabsch & Partner Ingenieurgesellschaft mbH (Hildesheim)



OTT Hydromet GmbH (Kempten)





# Strategic partners in Peru



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**Muchas gracias!**

