Combining Volunteered Geographic Information and WPdx standards to Improve Mapping of Rural Water Infrastructure in Uganda

SOTM 2022, Firenze
Florence Italy

STELLAMARIS N.

Uganda Water Infrastructure Mapping Project

A collaboration between:

youthmappers

wpdx water point data exchange

GULU UNIVERSITY FOR COMMUNITY TRANSFORMATION

With funding from:

USAID FROM THE AMERICAN PEOPLE

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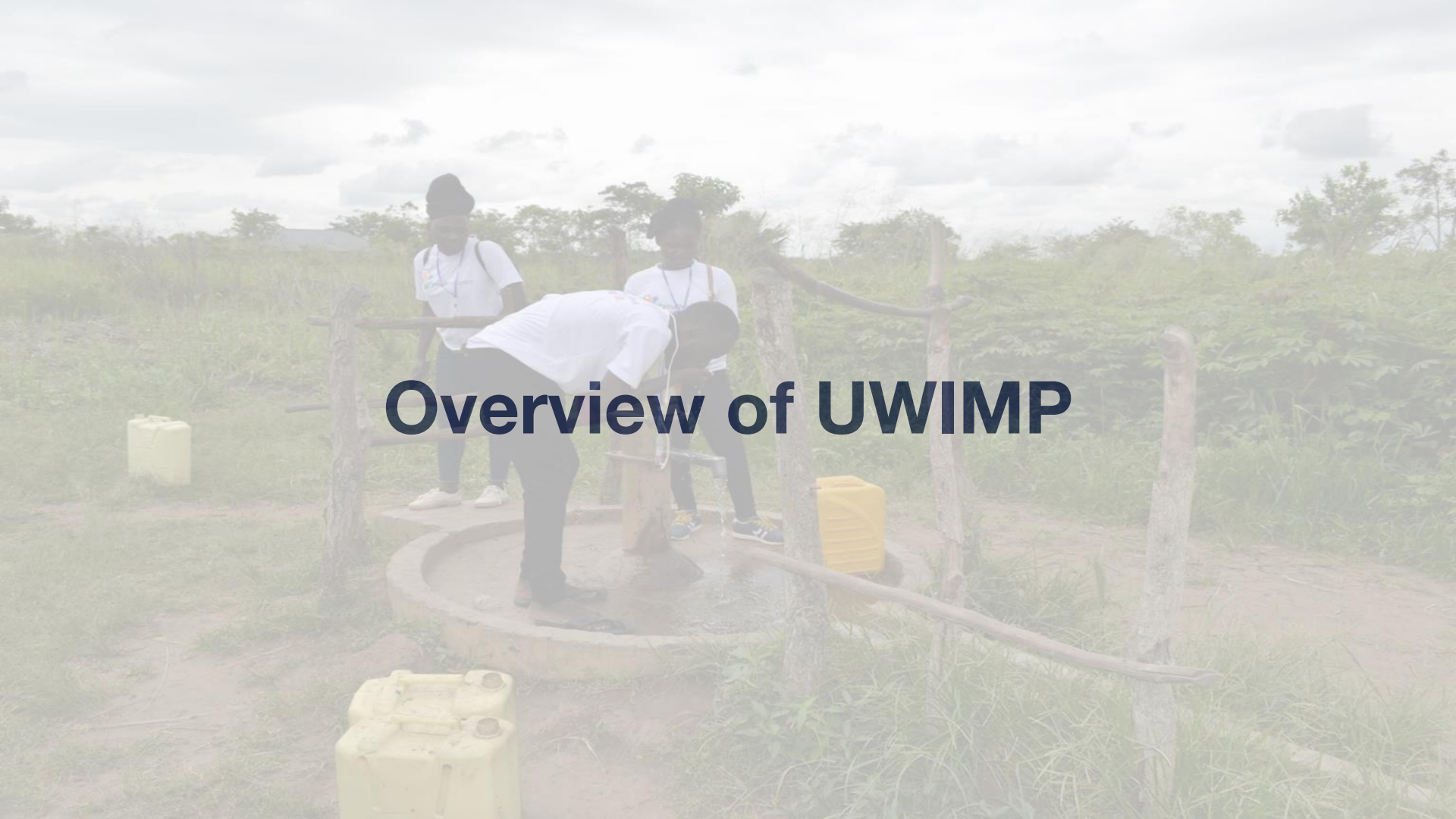

Overview of UWIMP

What is the Water Point Data Exchange?

WPdx is a platform designed to **unlock** the potential of water point data to explore challenges around sustainability and support **evidence-based decision-making** to **improve water services**.

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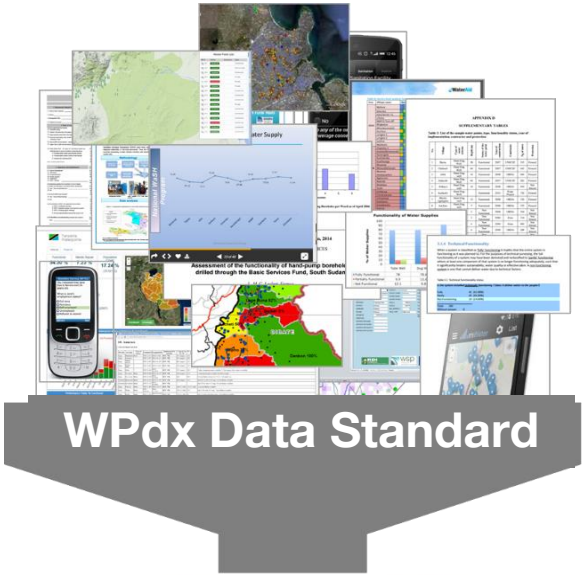


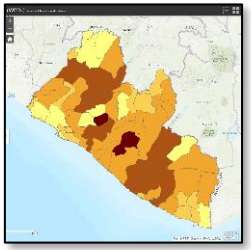
wpdx water point data exchange

Making Decisions with Data

Develop National Water Budget

Identify Allocations to Each District

How much need is in each district?



Develop District Plan

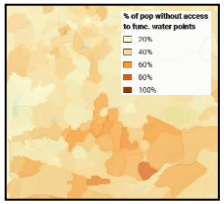
How can we optimize limited resources available to ensure water services for the greatest number of people?

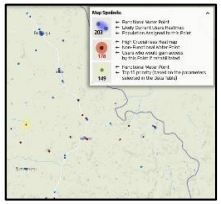
Identify Most Cost-Effective Investments

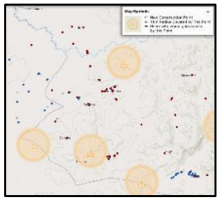
Which rehabilitations and new constructions can reach the greatest number of people? How many of each should be done?

Identify High Risk Water Points

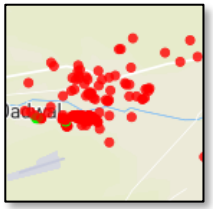
Where can preventative maintenance be most effective?







System	Cost P/P
Rehab 1	4.35
Rehab 2	4.38
New Construction 1	5.12
Rehab 3	5.59
New Construction 2	6.12



UWIMP Outcomes

1

Increased access to water point data and decision support tools, and building of local capacity, for district government officials and NGOs.

2

Development of leadership, teamwork, communications, and technical mapping skills among university students.

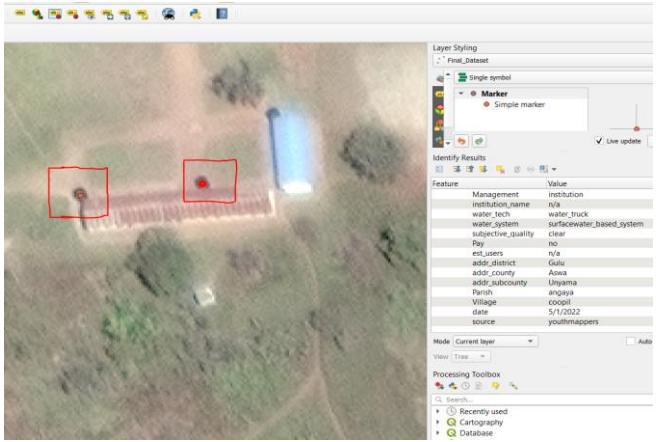
3

A proof of concept to launch discussions and planning for scale to additional districts, regions, and countries.

UWIMP Outcomes

4

A data set to develop an AI solution to detecting water points in satellite imagery.



UWIMP Methods

The Process

A) Data Model Design

WPdx Data Standard Parameters

Required

- Location (Latitude, Longitude)
- At least one:
  - Water Source
  - Water Point Technology
- Presence of Water when Assessed
- Date of Data Inventory
- Data Source

The WPdx Standard is designed for publicly available small water schemes and individual water points (wells, springs, etc.)

OSM meta data Overview

- Location
- Status
- Source
- Amenity_type
- Name of Amenity
- Others


```
node
  [amenity=water_point]
  ({{bbox}});
out;
```

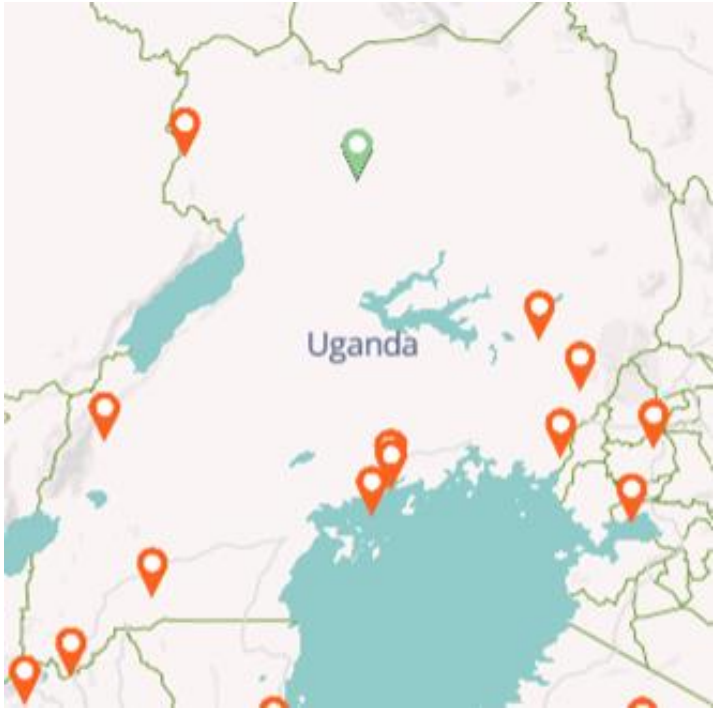
The Process

B) Participant Training (YM)

This activity was conducted within 14 days addressing;

- Understanding of the OpenStreetMap ecosystem including both remote and field mapping tools.
- Understanding of WASH

YouthMappers in Uganda



12 Chapters

- Gulu University
- Busitema University
- Uganda Christian University, Mbale University College
- Makerere University
- Kumi University
- Uganda Pentecostal University
- Mbarara University of Science and Technology
- St. Augustine International University
- Kyambogo University
- Institute of Survey and Land Management
- Kabale University
- Muni University

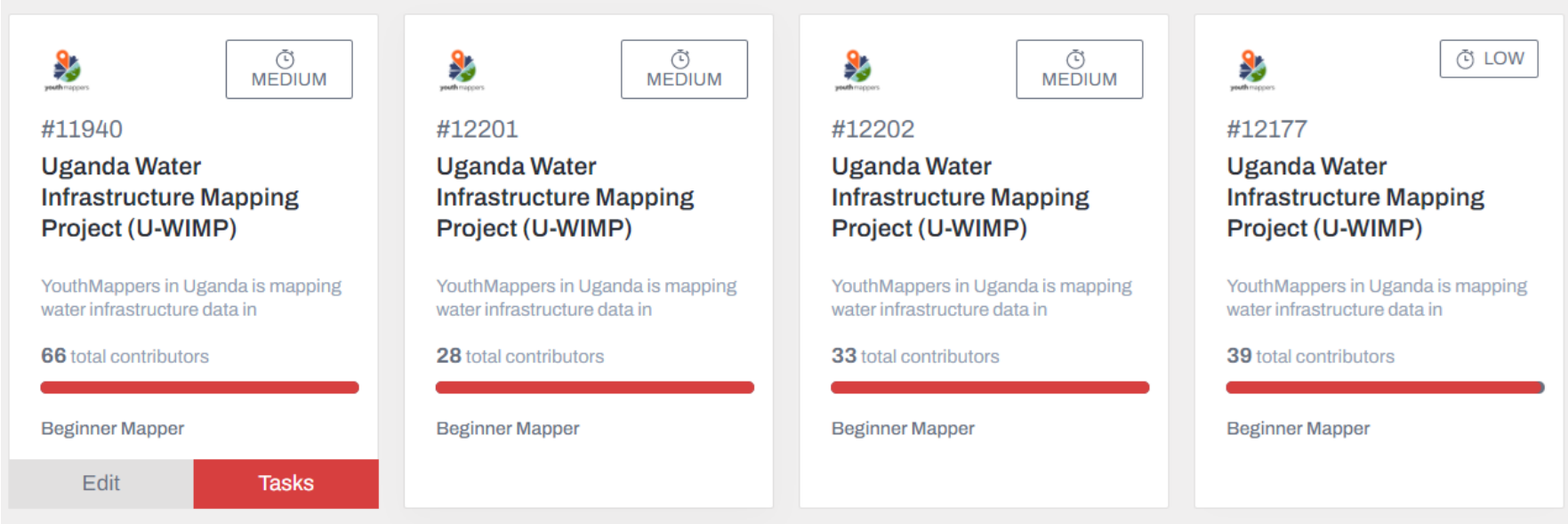
Gulu University YouthMappers Chapter

- Founded in 2017
- Currently has > 90 members
- 30 university student members participated in UWIMP

The Process

C) Remote Data Campaign

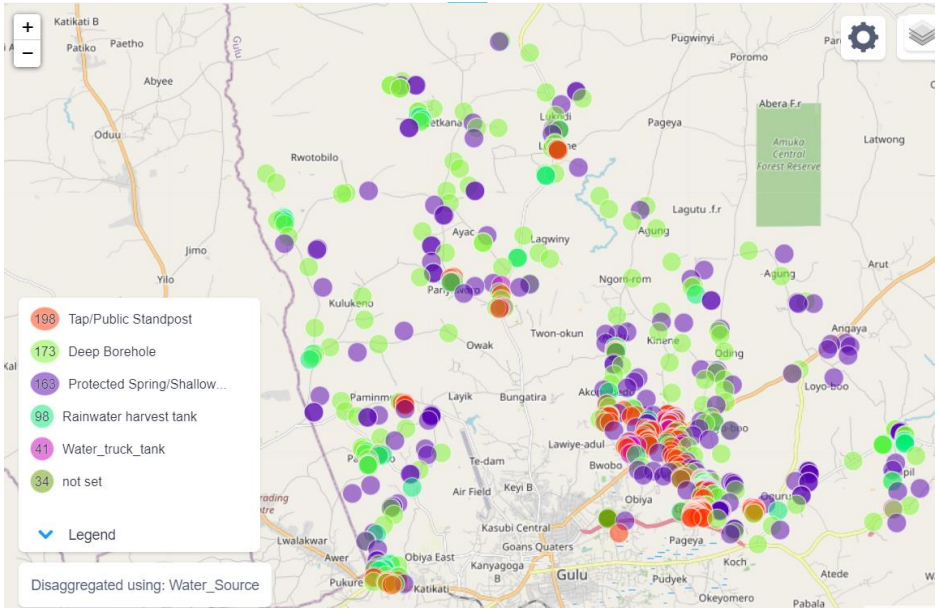
A total of 6 tasks were set up and up to 15000 buildings and 14km^2 of roads were mapped.



The Process

D) Field Data Collection

- The data collection exercise took 10 days and a total of 663 points were collected on different water sources.
- The field exercise covered Bungantira & Unyama sub counties.



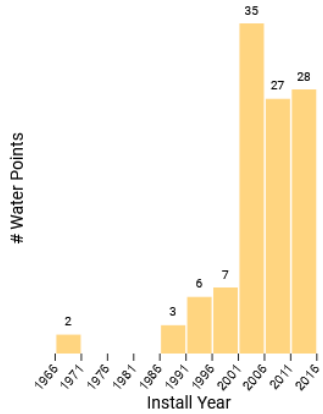
Before UWIMP

Bungatira – WPdx+ Baseline Summary

Bungatira

- **104 water points (94 functional)**
- **Total Population:** 36,456 ppl
- **Rural Population:** 35,055 ppl, of which
  - **Served:** 27,426 ppl (78.24%)
  - **Unserved:** 3,594 ppl (10.25%)
  - **Unknown:** 4,036 ppl (11.51%)

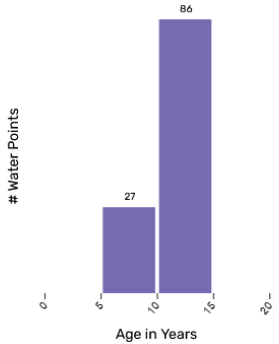
Water Point Install Years



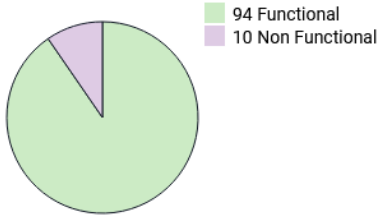
Average Report Age: 11.1 years

Rural Pop. Data Coverage: 88.5%

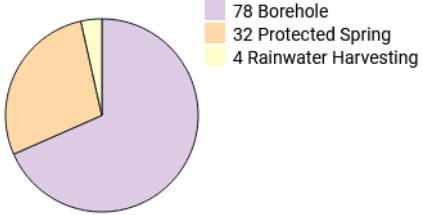
Water Point Report Age Distribution



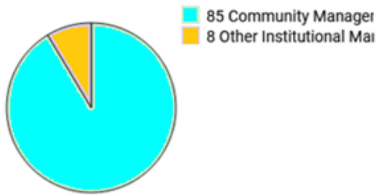
Water Point Status



Water Source Distribution



Water Point Management

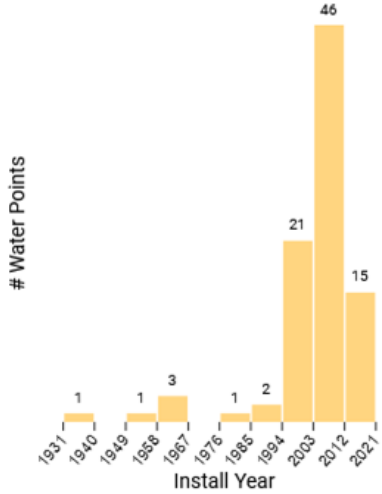


As of May 3rd 2022

Unyama – WPdx+ Baseline

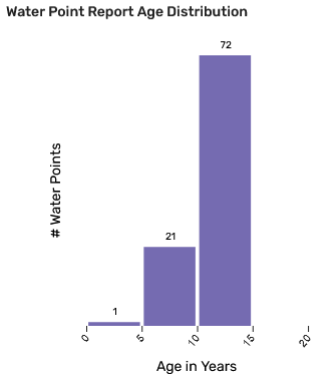
Unyama

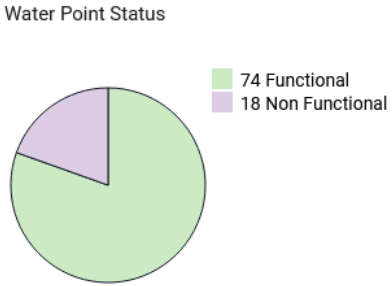
- **92 water points (74 functional)**
- **Total Population:** 18,025 ppl
- **Rural Population:** 18,025 ppl, of which
  - **Served:** 14,919 ppl (82.77%)
  - **Unserved:** 1,023 ppl (5.68%)
  - **Unknown:** 2,083 ppl (11.56%)

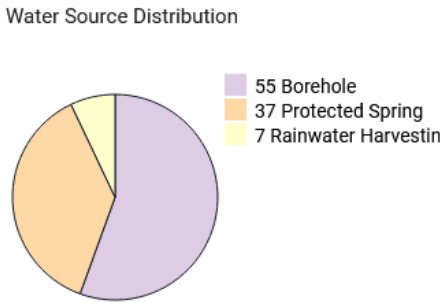


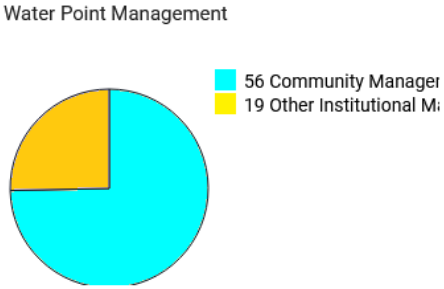
Average Report Age: 11.0 years

Rural Pop. Data Coverage: 88.4%









As of May 3rd 2022

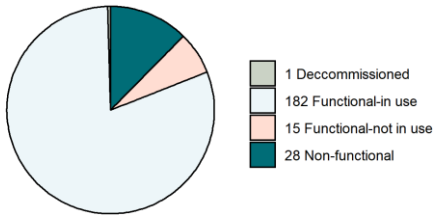
After UWIMP

Bungatira – After YM Data Collection

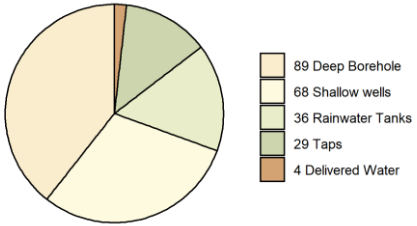
Bungatira

- **320 water points (277 functional)**
- **Total Population:** 36,456 ppl
- **Rural Population:** 35,055 ppl, of which
  - **with Basic Access:** 31,975 ppl (91.21%)
  - **without Basic Access:** 2,213 ppl (6.31%)
  - **Uncharted areas:** 868 ppl (2.47%)

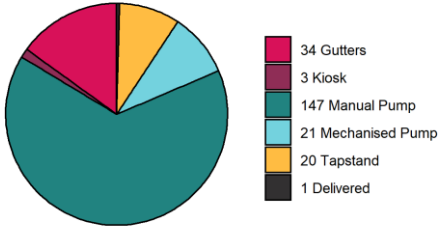
Water Point Status



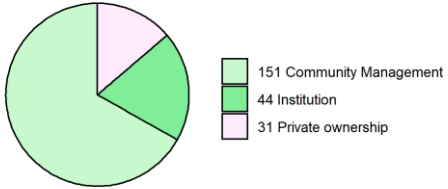
Water Source Distribution



Water Tech Distribution



Water Point Management

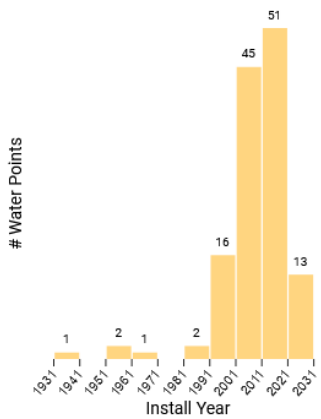


Unyama – After YM Data Collection

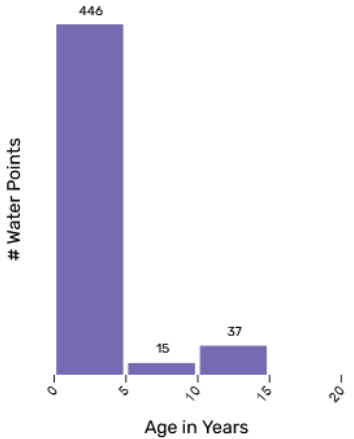
Unyama

- **494 water points (439 functional)**
- **Total Population:** 18,025 ppl
- **Rural Population:** 18,025 ppl, of which
  - **with Basic Access:** 16,885 ppl (93.68%)
  - **without Basic Access:** 78 ppl (0.43%)
  - **Uncharted areas:** 1,062 ppl (5.89%)

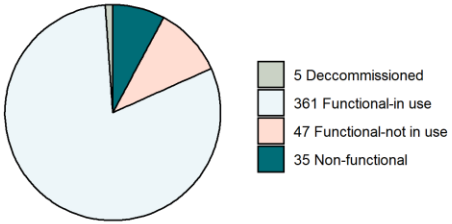
Water Point Install Years



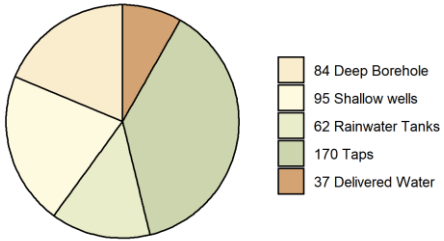
Water Point Report Age Distribution



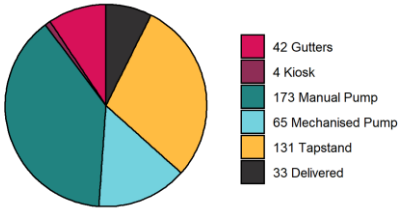
Water Point Status



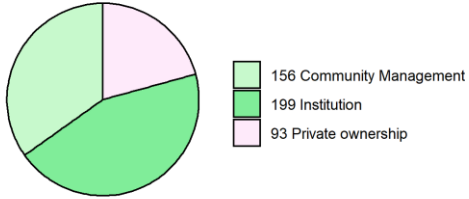
Water Source Distribution



Water Tech Distribution



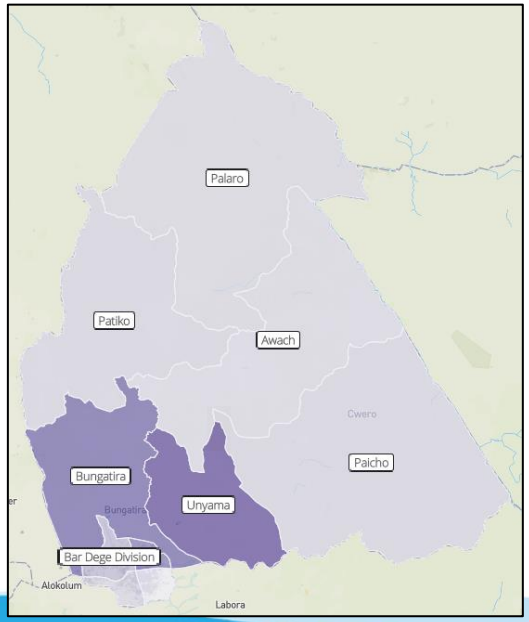
Water Point Management



UWIMP | WPdx Application

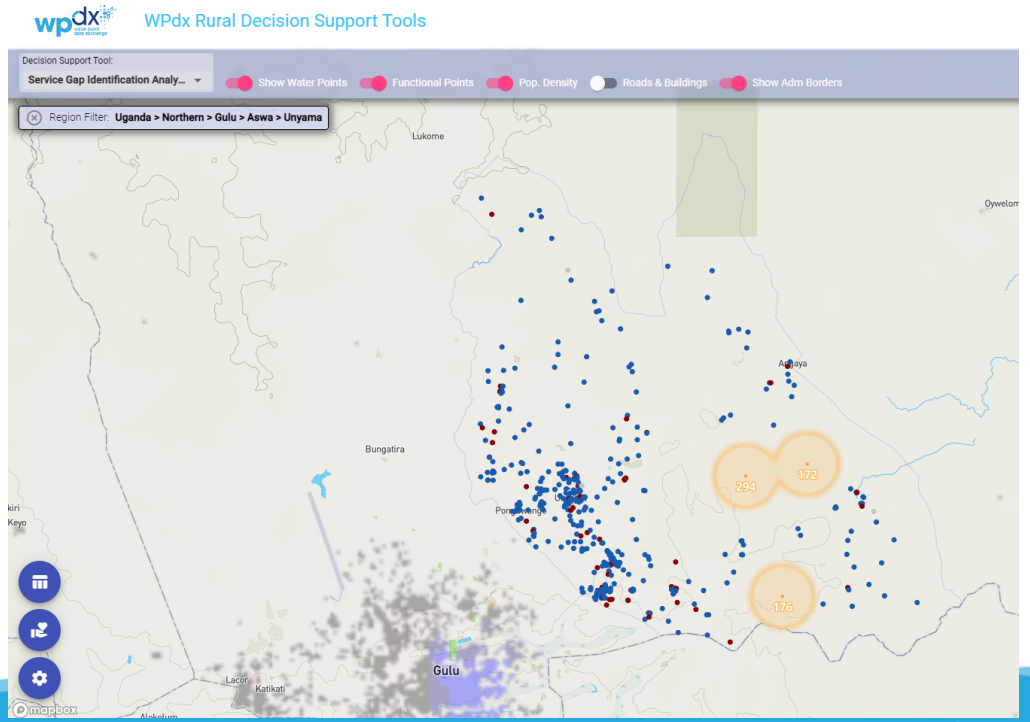
Improved data availability and quality

- U-WIMP project provided representative and up-to-data in two sub-counties in Gulu District



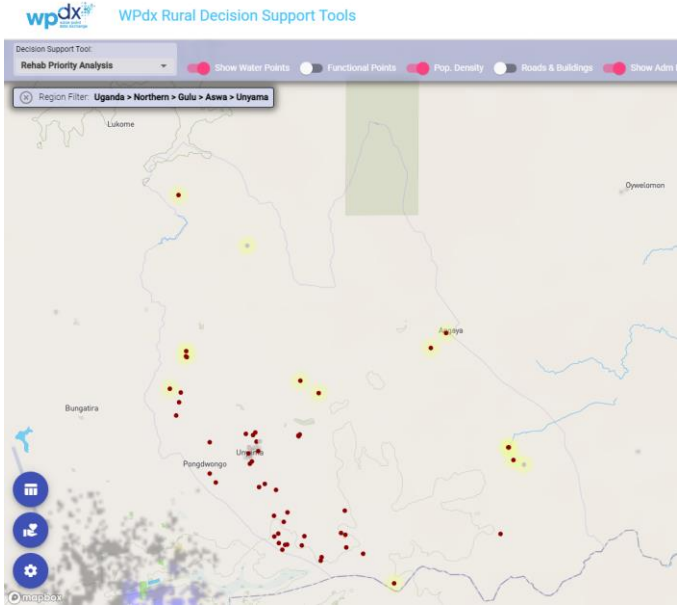
Unyama – Service Gap/New Construction

- Orange circles show recommended locations to consider new services
- Figures inside circles represent number of people who live within 1km of that point who could gain access to a new service



Unyama – Rehab Priority

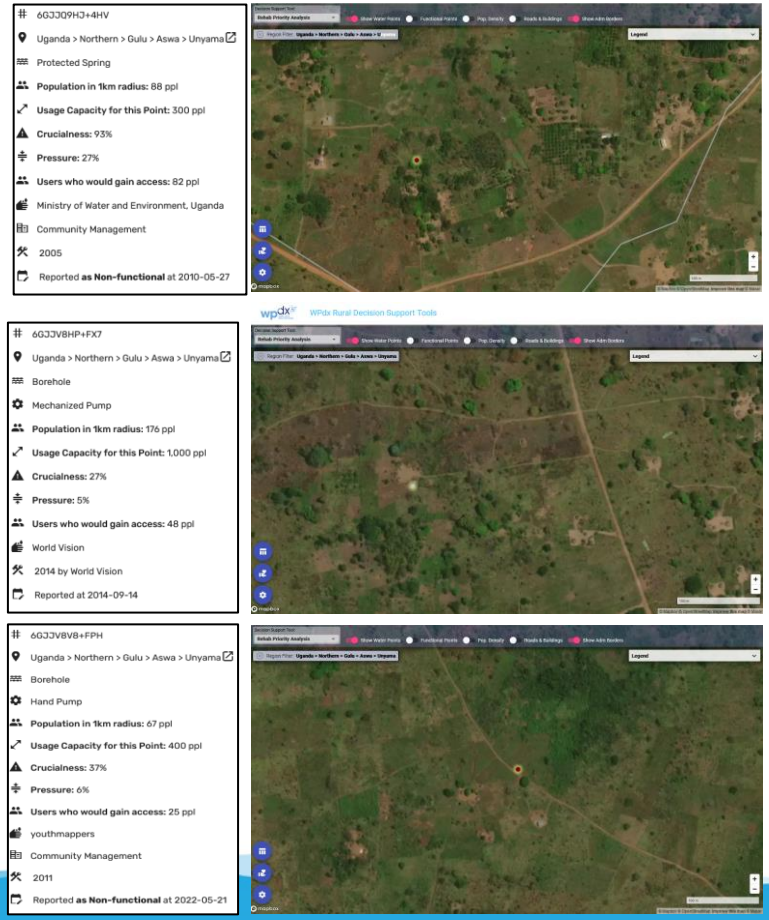
- See map of all non-functional points
- View table of top 15 points recommended for rehab or repair
- Click to see each point (next slide)
- Download full table in Excel for further analysis



#	Functional?	Source	Tech	Local Pop.	Water Point Pop.	Crucialness	Pressure
1	No	Protected Spring	Unknown	88	82	93.2%	27.3%
2	Unknown	Borehole	Mechanized Pump	176	48	27.3%	4.8%
3	No	Borehole	Unknown	172	26	15.1%	5.2%
4	No	Borehole	Hand Pump	67	25	37.3%	6.3%
5	No	Borehole	Unknown	171	22	12.9%	4.4%
6	Unknown	Borehole	Mechanized Pump	180	18	10%	1.8%
7	No	Rainwater Harvesting	Unknown	171	17	9.9%	17%
8	No	Undefined Spring	Hand Pump	167	14	8.4%	3.5%
9	No	Undefined Spring	Hand Pump	167	14	8.4%	3.5%
10	No	Undefined Spring	Hand Pump	167	14	8.4%	3.5%
11	No	Borehole	Hand Pump	103	8	7.8%	2%
12	No	Protected Spring	Unknown	67	6	9%	2%
13	No	Rainwater Harvesting	Unknown	58	3	5.2%	3%
14	No	Protected Spring	Unknown	43	3	7%	1%
15	No	Rainwater Harvesting	Unknown	58	3	5.2%	3%

Unyama – Rehab Priority

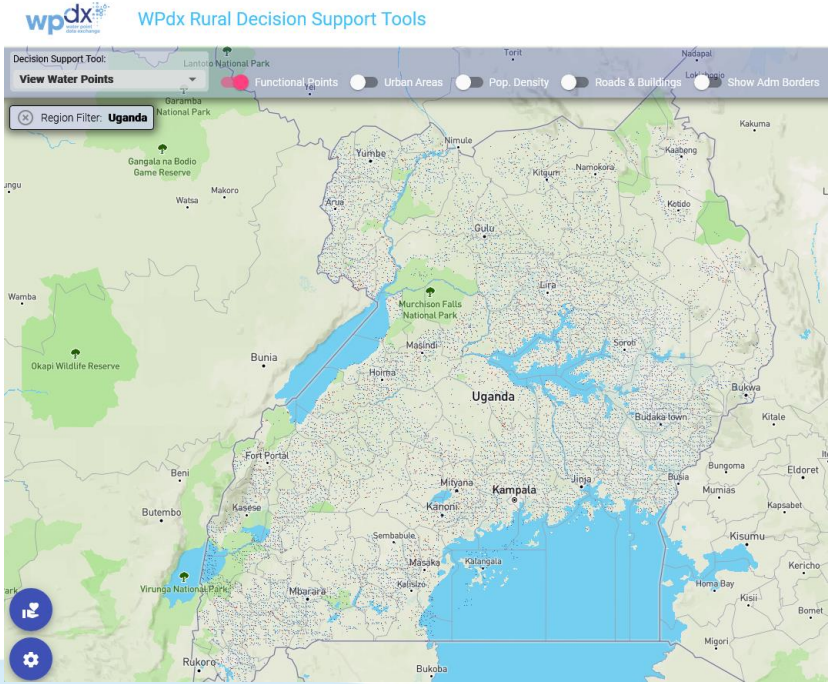
- Zoom to and review information about top points recommended for rehab or repair
- See satellite view of points and surrounding communities



Thank you! ☺

Project Background:

Uganda data in WPdx

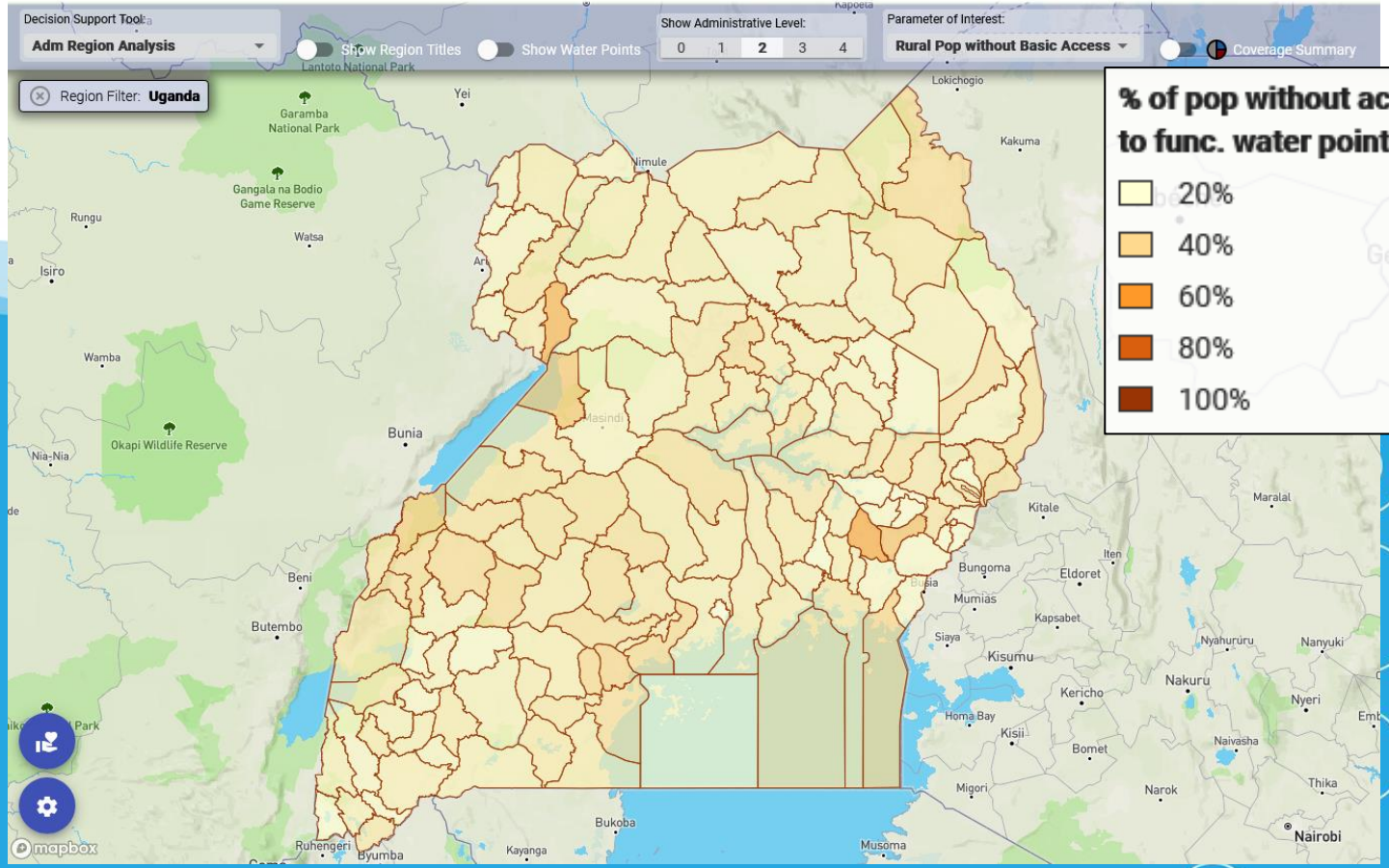


A total of 94,050 water point records
- 77,372 of which are functional
- Estimated 63% of rural population live within 1km of a functional water point*

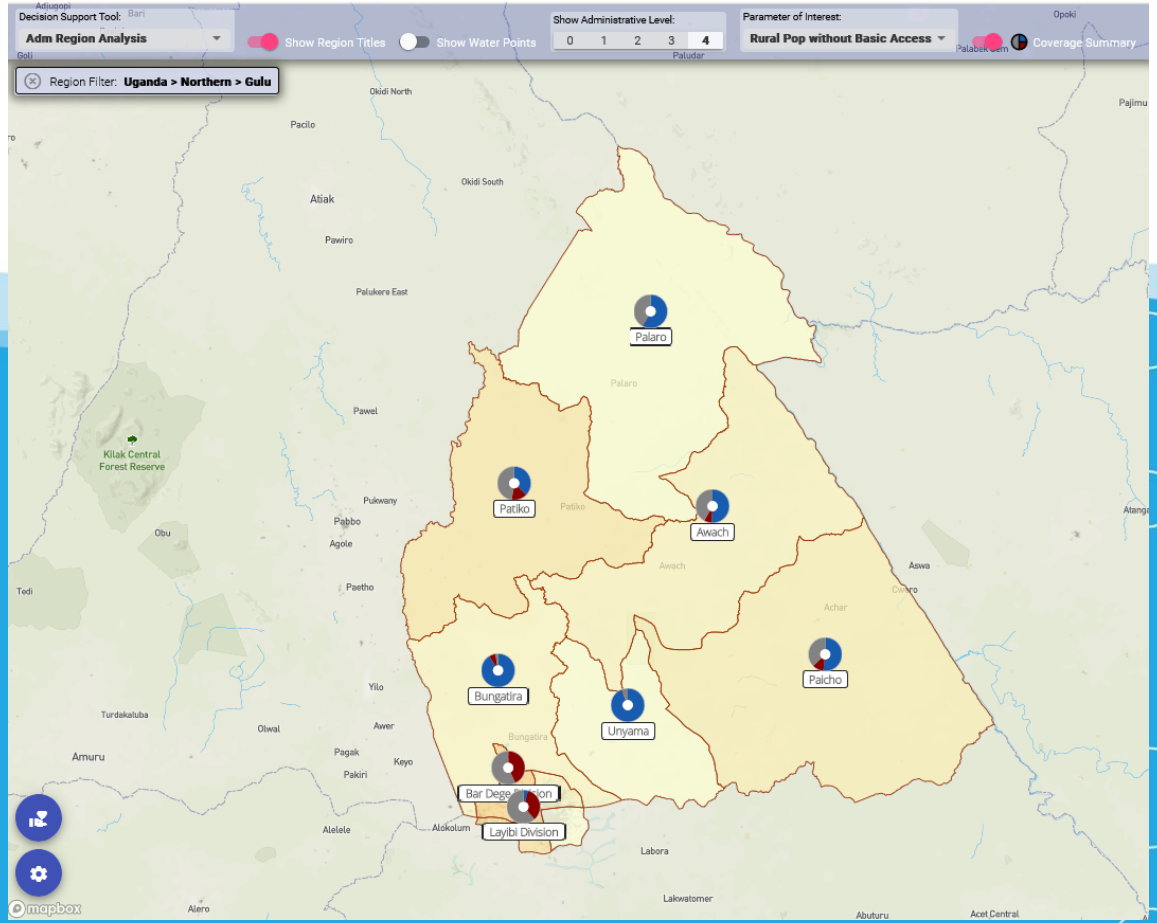
Contributions from 23 organizations from 2005 - 2022

*WPdx is currently making updates to max number of people who can be served per functional infrastructure and how urban areas are masked from analyses

WPdx Rural Decision Support Tools



Evaluating Basic Water Access by District in Uganda



Evaluating Basic Water Access by Sub-County in Gulu, Uganda