



MILLENNIUM WATER
ALLIANCE



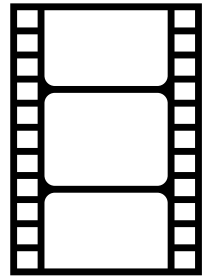
TOOLS, TRADE-OFFS, & TAKEAWAYS:

*EXPLORING PRACTICAL APPLICATIONS OF AI
FOR WATER SECURITY*

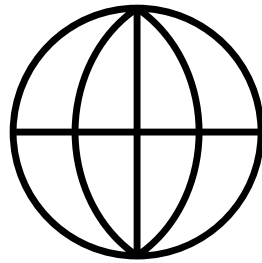




HOUSEKEEPING RULES



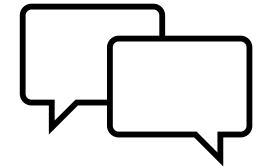
This session will be recorded and shared



Live translation is available



Please be kind and respectful during discussions



Be present and ask questions



-> *"language and speech"* -> *"show live captions"*

Change default translation via language settings



AGENDA

- Welcome & Setting the Stage
- AI Overview for Water Security
- Case Studies - The Water Project, The Aquaya Institute, World Resources Institute
- Panel & Q&A
- Final Messages & Webinar Closure



AUDIENCE POLL: WHAT IS YOUR BIGGEST BARRIER TO USING ARTIFICIAL INTELLIGENCE (AI)?

Vote in Menti using the QR Code or link below:

<https://www.menti.com/alo95fpygd3d>

Access Code: 8390 6503



Framing AI for the Water Security Practitioner



Dr. Samuel T. Segun

Senior Program Manager, Global Center on AI Governance (GCG)
Senior Researcher, The African Hub on AI Safety, Peace and Security

What Is AI — and What Are We Actually Talking About?

Machine Learning (ML)

Systems that learn patterns from data to make predictions or decisions without being explicitly programmed. The dominant form of applied AI today.

Predictive Analytics

A subset of ML focused on forecasting outcomes from historical data — pump failure prediction, flood risk modelling, demand forecasting.

Generative AI (Gen AI)

Models (like GPT, Claude) that generate new text, code, or images. Powerful for knowledge tasks — but only one type of AI, and often misrepresented as the whole field.

Key Concepts to Know

Training data

The dataset a model learns from. Quality and diversity of data determine quality of output.

Model

The algorithm that has been trained. A model is not "thinking" — it identifies statistical patterns.

Inference

When a trained model is applied to new data to generate a prediction or output.

Human-in-the-loop

Design approach where humans review, approve, or override AI outputs at key decision points.

Bias

Systematic errors baked into model outputs when training data is unrepresentative or skewed.

What AI Is Not – and What the Water Sector Has Actually Been Doing

3 Misconceptions to Leave at the Door

✗ "AI means chatbots and Gen AI"

Gen AI is a recent and narrow slice. Most AI in the water sector is ML-based — predictive models, anomaly detection, satellite image analysis. Not a chatbot in sight.

✗ "AI makes decisions automatically"

Well-designed AI systems flag, suggest, and surface patterns — humans retain decision authority. Automation without oversight is a design failure, not an AI feature.

✗ "AI is neutral and objective"

AI reflects the data it was trained on. In LMIC water contexts, data gaps and Global North biases can produce outputs that are wrong precisely where accuracy matters most.

AI in Water Security: A Longer Story Than You Think

1990s

Flood forecasting models

ML-based hydrological models used for flood prediction in river basins across Asia and Europe.

2000s

Remote sensing + classification

Satellite imagery + supervised ML to map water bodies, detect land cover change, monitor groundwater.

2010s

Predictive maintenance

ML applied to sensor data for pipe failure prediction and anomaly detection in water distribution networks.

2020s

Gen AI + foundation models

Generative tools, natural-language interfaces (e.g. Aqueduct AI, Project W search), and real-time Earth observation systems.

→ Next

Integrated decision systems

Combining real-time sensing, predictive models, and human-in-the-loop governance for water risk management at scale.

Four Questions to Carry Into Every Case Study

01 What is the AI actually doing?

Is it predicting, classifying, generating, or detecting? Knowing the task type tells you where the system is reliable — and where it is not. A chlorine dosing calculator that runs deterministic formulas is not the same risk profile as an LLM answering policy questions.

02 Where does human judgment stay in the loop?

Every well-designed system in this sector keeps humans at critical decision points. Ask: what does a human review before action is taken? What can the system not override? Human-in-the-loop is not a nice-to-have — it is an accountability requirement.

03 What data was used — and whose data is it?

AI is only as good as its training data. In low- and middle-income country contexts, ask whether the underlying data reflects local realities. Missing or misrepresentative data doesn't produce neutral outputs — it produces confidently wrong ones.

04 Who benefits, and who could be harmed?

AI tools optimised for efficiency can inadvertently deprioritise under-served or hard-to-reach communities. Ask who the intended beneficiary is, how equity was designed in, and what the failure mode looks like for the most vulnerable users.

AI is a tool — its quality depends on design choices, data choices, and governance choices. The case studies you're about to hear are all navigating exactly these questions.



ShockCalc:

From Idea to App in 4 Days

AI-Assisted Tool Building for Water Security Fieldwork

Peter Chasse

The Water Project

AI for WASH Webinar | April 14, 2026



MATURITY MAPPING

Stage: **Deployed & In-Use**

Problem: **Operational**

AI Role: **Field Tool Rapid Development**



THE WATER PROJECT

Why Shock Chlorination?

Since 2006 | Kenya, Sierra Leone, Uganda | 100% Coverage Models | Wells, springs, rainwater systems



Build and maintain wells

We don't just implement, we maintain 2,800+ water points



Maintenance means contamination risk

Every repair means opening the well to bacteria



Shock chlorinate

Required after every service or E. coli detection

THE CALCULATION

Inputs

Well diameter

Depth to water

Static water level

Math

Volume formulas, unit conversions, concentration

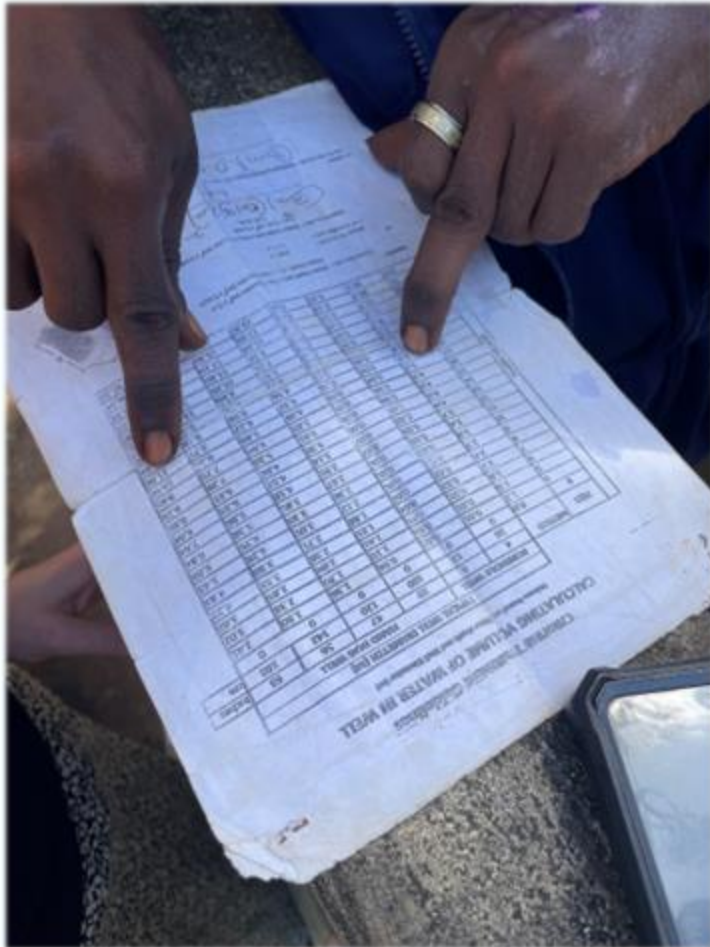
Output

Exact grams of HTH powder

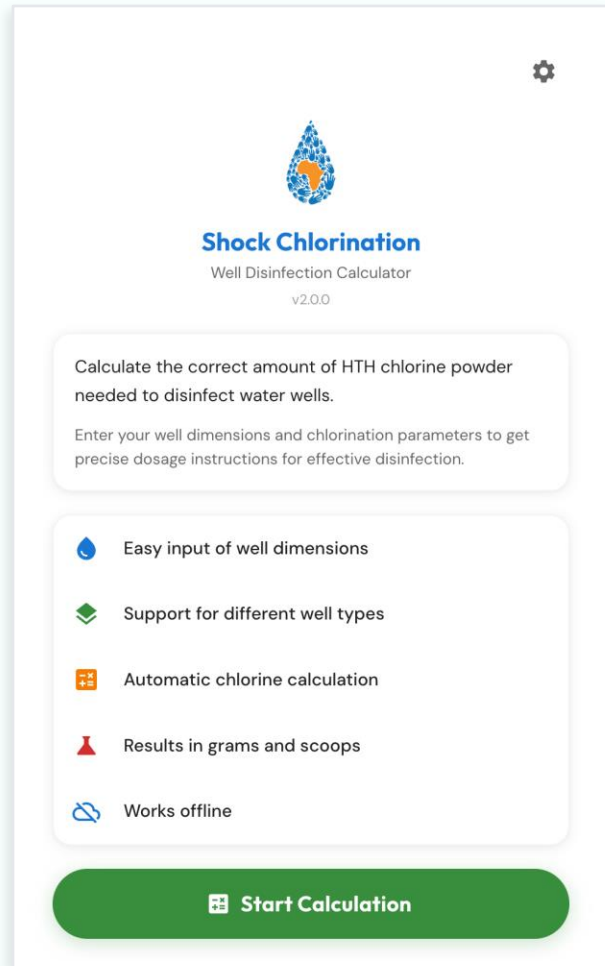
ROUTINE After every well service **REMEDIAL** When E. coli is detected **CRITICAL** Get the dose wrong and it doesn't work

THE CHALLENGE

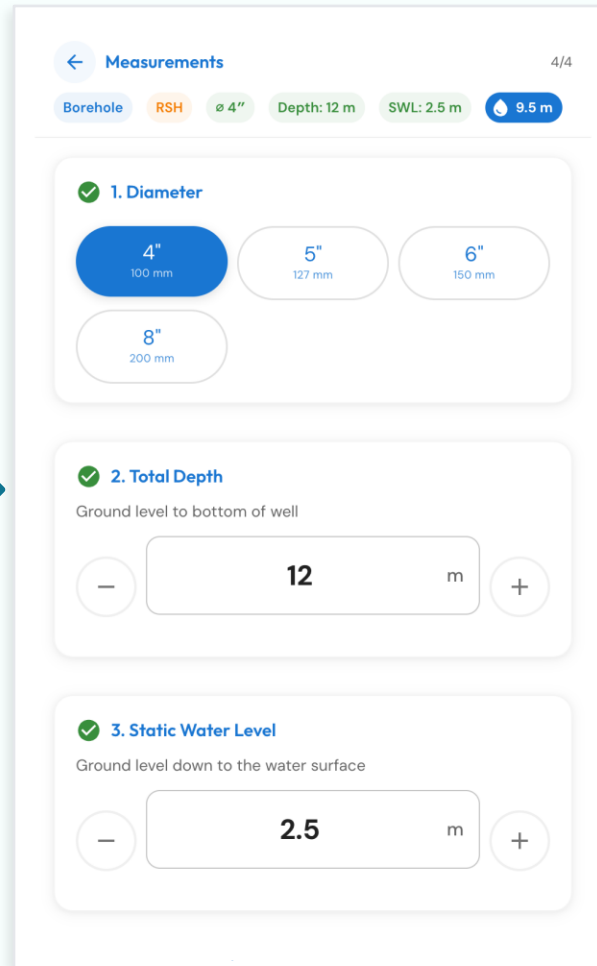
Chlorine Dosing in the Field



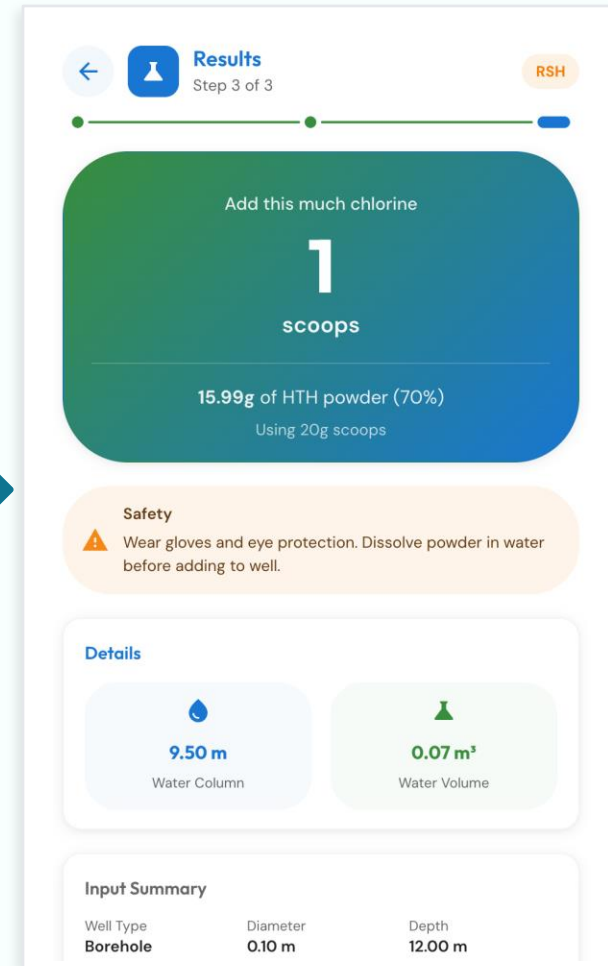
ShockCalc in the Field



Welcome



Measurements



Results

AI Application at a Glance



THE CHALLENGE

Chlorine Dosing in the Field

The Work

Field technicians calculate chlorine doses manually using complex formulas, paper charts, and mental math — in challenging outdoor conditions.

The Economics (Until Now)

Custom software development for a small WASH NGO? Quotes start at \$10,000+. Ongoing maintenance adds more. For a single-purpose field calculator, the math never worked.

What we needed:

A mobile-first calculator that works offline in the field

Configurable per partner org with different defaults and units

Installable as a PWA
no app store, no deployment pipeline

Built and shipped fast
because the need was immediate

APPROACH

What Is Vibe Coding?

Coined by Andrej Karpathy (OpenAI co-founder), Feb 2025. Collins Dictionary Word of the Year.



You (Human)

- Define the problem and constraints
- Own the domain knowledge
- Decide what 'done' looks like
- Verify every output by hand



AI Does

- Writes the code (syntax, not strategy)
- Manages dependencies and structure
- Builds UI, tests, deployment config
- Acts as PM: surfaces questions you missed

WHY IT WORKS: CODE OVER LANGUAGE

We didn't ask AI to decide how to chlorinate a well. We asked it to build a calculator that does the same math a technician does by hand. **Code is deterministic: same inputs, same outputs, every run.** That's verifiable. An LLM giving you a text answer is not. The tool does the work the same way, every time. That's the difference.

APPROACH

The 5-Step Prompt Process



ONE PROMPT, FIVE STEPS

These aren't five separate prompts. They're five steps within a single conversation. The AI guides you through each phase, building context as it goes. **The plan predicted 12 weeks of human effort. We were live in 4 days.** Iteration costs next to nothing, so version 2 often looks more like what used to take four releases to reach.

LESSONS

How Limited Scope Kept Us Safe



Scope choices that limited exposure

- Deterministic code, not LLM opinions — same inputs, same outputs, every time
- No databases, no APIs, no auth — all data on-device
- Small enough to read and review end-to-end
- Every formula verified against hand calculations



These tools are improving exponentially

We built this with Claude 3.7 — five prompts, four days.

Today's 4.6 does deep code review, catches its own errors, and reasons about architecture. **This app would ship from a single prompt.**

What required careful prompt engineering a year ago now works conversationally.



Keep it small

Single-purpose tools are the sweet spot. You can always add complexity later.



Validate the outputs

AI can review its own code now, but you still own the domain logic. Check the math.



The ceiling is rising fast

Reassess what's buildable every quarter. The landscape shifts that quickly.

Where We Are Now

v1.0 — Initial Build (4 days)

- Step-by-step dosing workflow
- Borehole and dug well support
- Offline-capable PWA
- Input validation and safety warnings
- Hardcoded for TWP partners only
- Basic mobile layout



v2.0 — Profile System (2026)

- Org profile configuration – Make it shareable.
 - Any org can customize branding, partners, defaults
 - Dynamic theming from profile colors
 - Profile Builder web tool (no code)
- UI re-designed (again) for big hands, small phones, outdoor contrast.

4 days

v1 build

1 session

v2 profile system

\$0

development cost

3 partners

using the tool

Recommendations by Stage

If you're exploring AI...

- Start with a real problem, not the technology
- Write your spec first — the clearer the spec, the better the output
- Pick something small and self-contained
- Validate outputs independently

If you're actively building...

- Keep scope tight — one tool, one job
- Deterministic outputs only — math, not judgment
- Verify every result against manual calculations
- Build it so someone else can maintain it

If you're deploying...

- PWA beats native for field tools
- Offline-first is not optional
- Build configuration in from the start
- Document what AI built and why

What we'd do differently: Build the profile/configuration system from day one. We hardcoded partner data in v1 and had to refactor everything for v2. Design for reuse from the start, even if you're building for yourself.



Think Small.

*Build the tool you need,
not the platform you're trying to imagine.*



**The Water
Project**

Peter Chasse

peter@thewaterproject.org

thewaterproject.org

ShockCalc is open source and available for any WASH organization to customize.



PROJECT W

Using AI to Unlock WASH Data at Scale

Dayna Hansberger

14 April, 2026

AI Application

Stage: **Deployed & Building**

Problem: **Analytical**

AI Role: **Analytical Systems & Data Infrastructure**

THE AQUAYA INSTITUTE

Aquaya is a non-profit research and consulting organization dedicated to advancing global health through universal access to safe water and sanitation.



**SAN FRANCISCO,
CALIFORNIA, USA**



**NAIROBI,
KENYA**



**ACCRA,
GHANA**



**6 COUNTRIES
WITH FULL-TIME
STAFF**



A CURATED WASH DATA LIBRARY

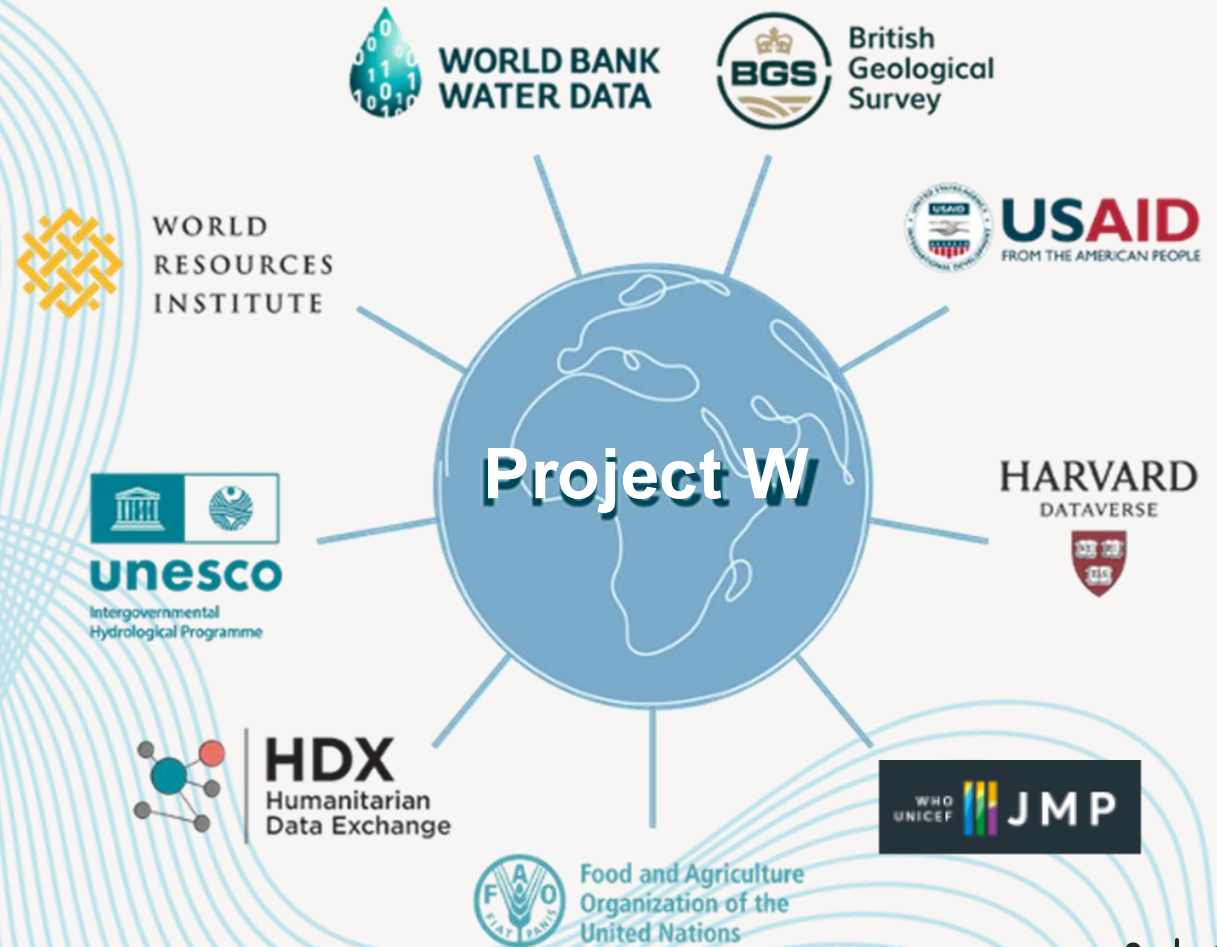
**Global directory of
all WASH data**

4,700+
datasets

950+
organizations

280+
geographies

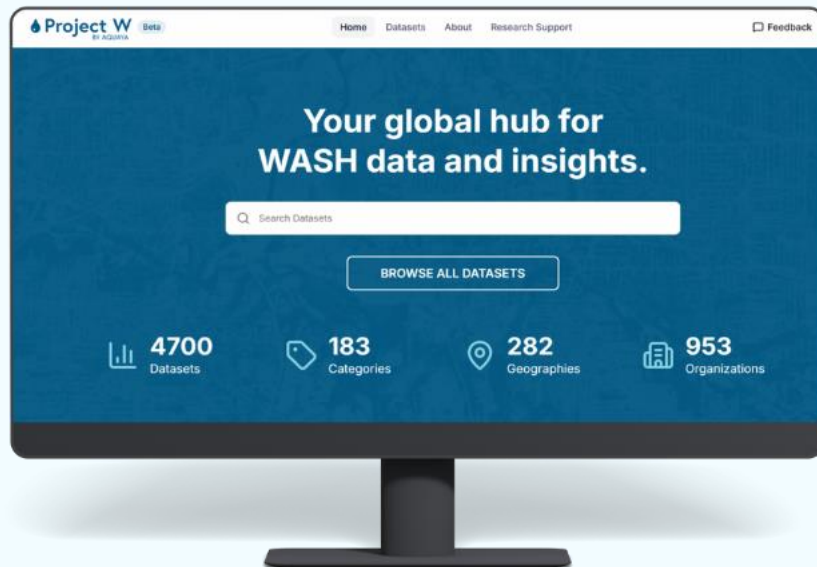
Millions
of data points



PROJECT W

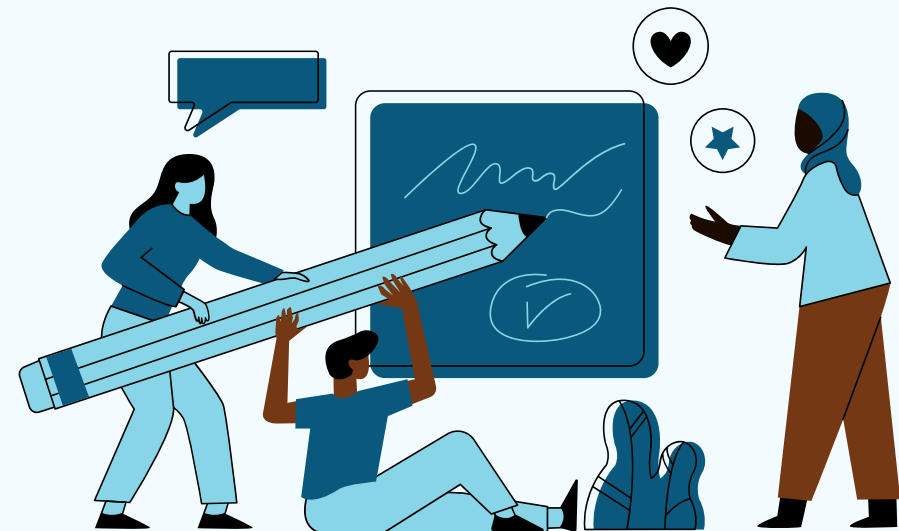
PUBLIC DATA LIBRARY

AI-ENHANCED SEARCH FOR
USERS TO FIND AND USE
AVAILABLE DATASETS

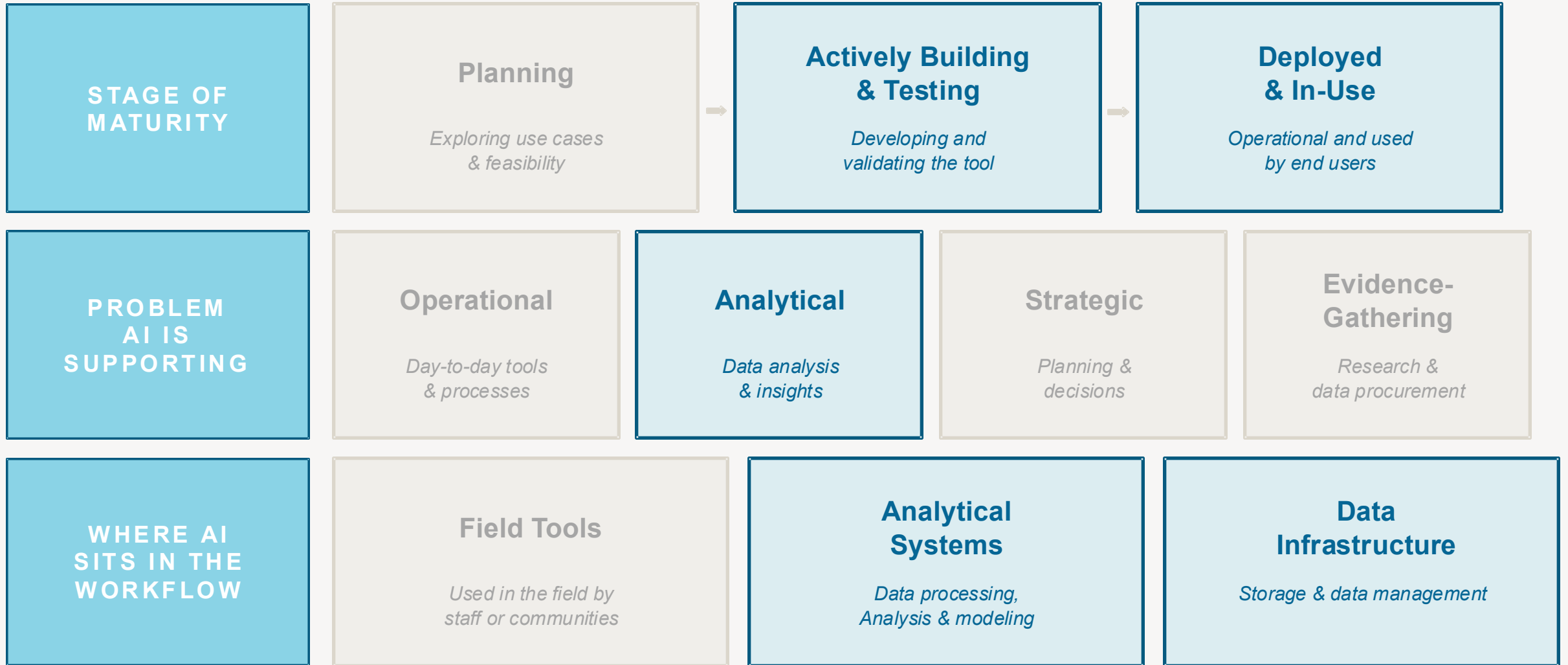


BESPOKE DATA SERVICES

AQUAYA ANALYSIS SERVICES
LEVERAGING PROJECT W
FEATURES



AI Application at a Glance



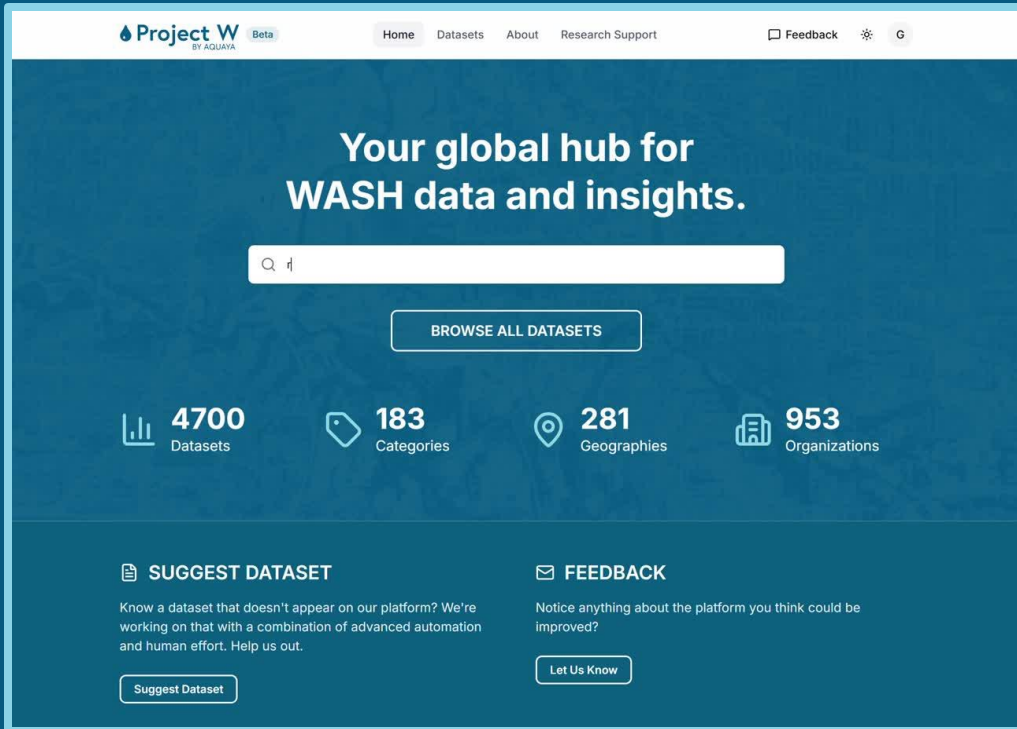
AI SUPPORT FOR DATA DISCOVERY AND ANALYSIS

- Intuitively **search and find** data
- **Identify and summarize** new datasets
- **Update existing** datasets
- User-led basic **data analysis**

Partnered with
BAOBAB TECH to
integrate WASH
AI into Project W

DEPLOYED

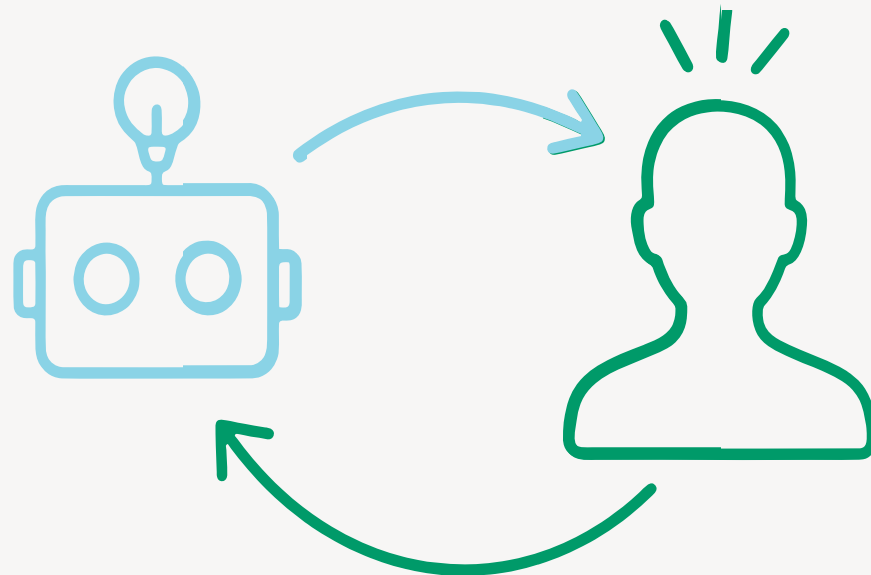
- Platform infrastructure upgrades
- Natural language search



IN DEVELOPMENT

- **Finding** new datasets
- **Classifying and extracting** metadata for new datasets
- Flagging **broken links or updates**
- Guided exploration with a **chat-style interface**
- Basic **data visualization and analysis**

ADVANCED AUTOMATION & HUMAN EFFORT



AI TASKS

- Dataset identification & metadata
- Search relevance & recommendations
- Data organization & cleaning
- Summarization and basic analysis

HUMAN REVIEW

- Expert curation & dataset approval
- Quality assurance
- Platform support to users
- Advanced analysis

KEY TAKEAWAYS

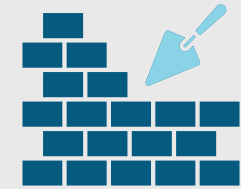
Start with a clear problem rather than with AI



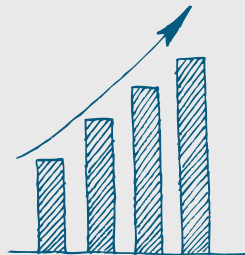
AI most useful “unblocking” problems, not decision-making



Ensure AI works with existing infrastructure



Scaling AI still includes trade-offs



Don't try to automate everything



“Human in loop” is essential





RESOURCES



Leveraging AI for Water Risk Analysis and Environmental Monitoring



WORLD
RESOURCES
INSTITUTE

April 2026

Liz Saccoccia, Water Security Associate

About WRI

WRI is a global research and development organization working at the nexus of environment, economic opportunity, and human wellbeing. Using research-based approaches, we work globally and in focus countries to meet people's essential needs, protect and restore nature, and stabilize the climate while building resilience.

North America

WRI
Mexico

United
States

WRI
Colombia

Latin America

WRI
Brasil

WRI
Europe

Europe

Africa

WRI
Africa

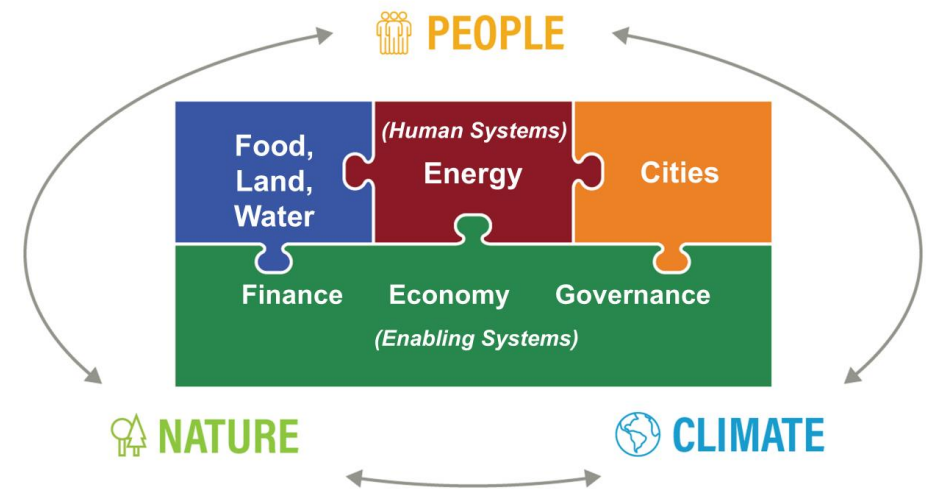
Asia

WRI
India

WRI
China

WRI
Indonesia

INTEGRATED ACTION AND SYSTEMS TRANSITIONS



BASELINE FUTURE PRIORITIZE BASINS

Temporal resolution ?

Annual Monthly

Indicators

Change Indicators and Weightings

OVERALL WATER RISK ?

PHYSICAL RISKS QUANTITY ?

Water Stress ?

Water Depletion ?

Interannual Variability ?

Seasonal Variability ?

Groundwater Table Decline ?

Riverine flood risk ?

Coastal flood risk ?

Drought Risk ?

PHYSICAL RISKS QUALITY ?

Untreated Connected Wastewater ?

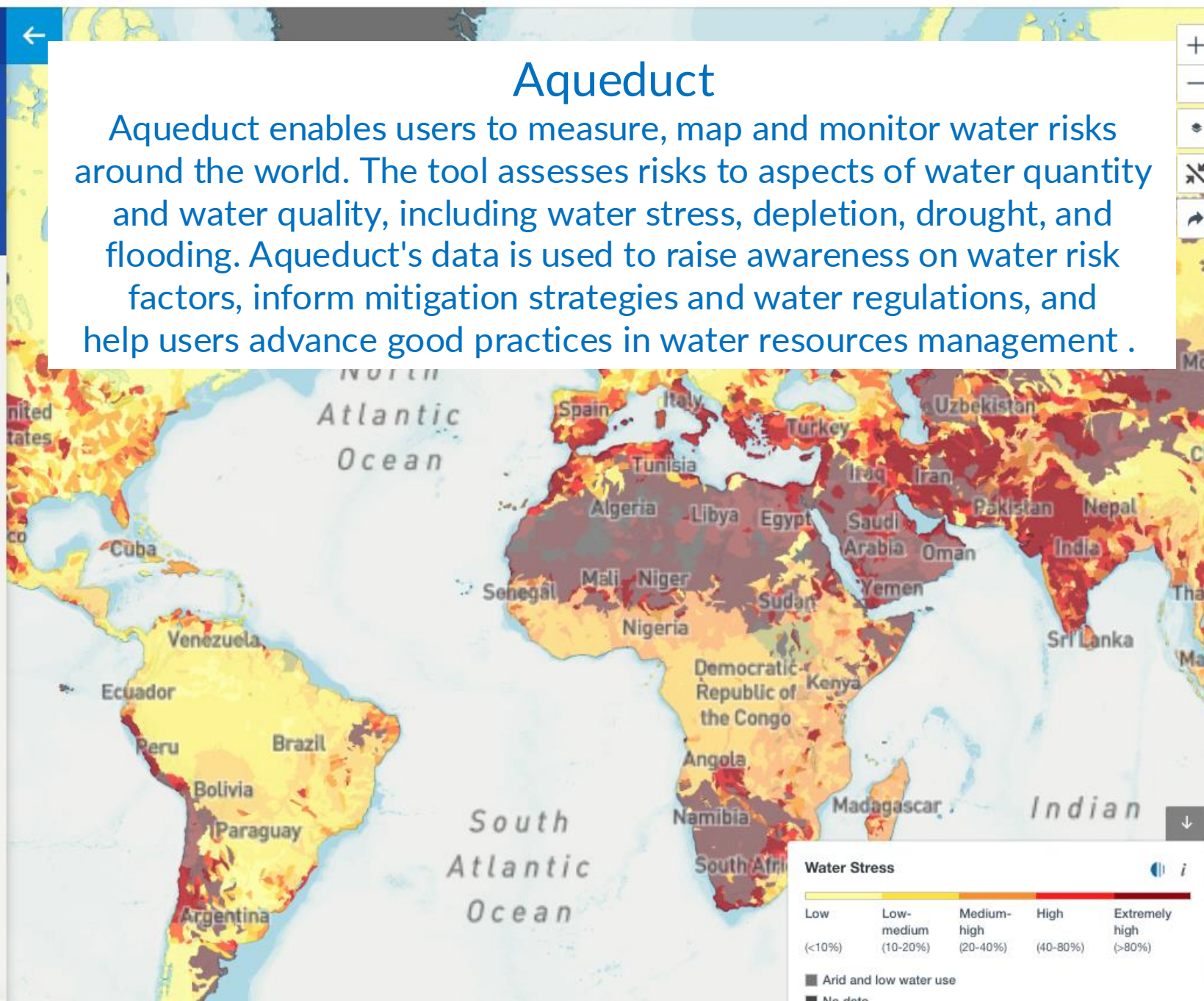
Coastal Eutrophication Potential ?

REGULATORY AND REPUTATIONAL RISK ?

Unimproved/No Drinking Water ?

Unimproved/No Sanitation ?

Peak RepRisk Country ESG Risk Index ?



Aqueduct

Aqueduct enables users to measure, map and monitor water risks around the world. The tool assesses risks to aspects of water quantity and water quality, including water stress, depletion, drought, and flooding. Aqueduct's data is used to raise awareness on water risk factors, inform mitigation strategies and water regulations, and help users advance good practices in water resources management .

	pfaf_id	gid_1	aqid	gid_0	name_0	name_1	area_km2	bws_raw	bws_score	bws_cat	bws_label	bwd_raw	bwd_score
0	111011	EGY.11_1	3365	EGY	Egypt	Al Qahirah	4.22375377	9999	5	4	Extremely High	9999	5
1	111011	EGY.15_1	3365	EGY	Egypt	As Suways	1846.01234	9999	5	4	Extremely High	9999	5
2	111011	EGY.15_1	-9999	EGY	Egypt	As Suways	30.5260672	9999	5	4	Extremely High	9999	5
3	111011	-9999	3365				0.74271239	9999	5	4	Extremely High	9999	5
4	111011	-9999	-9999				13.4309948	9999	5	4	Extremely High	9999	5
5	111012	EGY.11_1	3365	EGY	Egypt	Al Qahirah	258.364251	1	5	-1	Arid and Low	1	5
6	111012	EGY.15_1	3365	EGY	Egypt	As Suways	2161.81495	1	5	-1	Arid and Low	1	5
7	111012	EGY.15_1	-9999	EGY	Egypt	As Suways	1.74824796	1	5	-1	Arid and Low	1	5
8	111012	EGY.8_1	3365	EGY	Egypt	Al Jizah	510.53507	1	5	-1	Arid and Low	1	5
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12	111013	EGY.2_1	3365	EGY	Egypt	Al Bahr al Ahr	13.8671268	1	5	-1	Arid and Low	1	5
13	111013	-9999	3365				12.9198047	1	5	-1	Arid and Low	1	5
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15	111014	EGY.15_1	3365	EGY	Egypt	As Suways	3.017202	1	5	-1	Arid and Low	1	5
16	111014	EGY.9_1	3365	EGY	Egypt	Sadi Suways	96.18475	1	5	-1	Arid and Low	1	5
17	111014	EGY.2_1	1732	EGY	Egypt	Al Bahr al Ahr	26.6528666	1	5	-1	Arid and Low	1	5
18	111014	EGY.2_1	3365	EGY	Egypt	Al Bahr al Ahr	2653.07771	1	5	-1	Arid and Low	1	5
19	111014	EGY.2_1	-9999	EGY	Egypt	Al Bahr al Ahr	0.01410263	1	5	-1	Arid and Low	1	5
20	111014	EGY.8_1	3365	EGY	Egypt	Al Jizah	35.7415493	1	5	-1	Arid and Low	1	5
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23	111015	EGY.10_1	1732	EGY	Egypt	Al Minya	297.079511	1	5	-1	Arid and Low	1	5
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25	111015	EGY.2_1	1732	EGY	Egypt	Al Bahr al Ahr	717.36468	1	5	-1	Arid and Low	1	5
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27	111015	EGY.2_1	3365	EGY	Egypt	Al Bahr al Ahr	14709.2109	1	5	-1	Arid and Low	1	5
28	111015	EGY.2_1	-9999	EGY	Egypt	Al Bahr al Ahr	356.779312	1	5	-1	Arid and Low	1	5
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31	111015	-9999	-9999				170.531345	1	5	-1	Arid and Low	1	5
32	111016	EGY.2_1	1775	EGY	Egypt	Al Bahr al Ahr	43.1399643	1	5	-1	Arid and Low	1	5

Old Aqueduct → Aqueduct 5.0



From static maps →
to dynamic, AI-powered
water intelligence

1

Static maps → Interactive, question-driven exploration

2

Single-model risk → Ensemble modeling with explainability

3

Global focus → Linked to local data, research and projects

4

Periodic updates → Near-real-time alerts

5

Fragmented tools → Unified data and AI foundation



Global Nature Watch is an experimental, open, AI-powered system that combines peer-reviewed research in **a simple, chat-style interface**. Integrating near-real-time and annual satellite data, it reveals change across ecosystems, from forests to wetlands, and other landscapes.



Users can ask questions in plain language in dozens of languages and receive responses backed by data from WRI's Land & Carbon Lab and Global Forest Watch, supported by maps, statistics and context.



As the platform continues to improve, it aims to make environmental monitoring **more comprehensive, faster and easier**, helping people protect and restore ecosystems, support livelihoods and address climate challenges.



www.globalnaturewatch.org

Global Nature Watch

Where are the most disturbances to nature happening now?



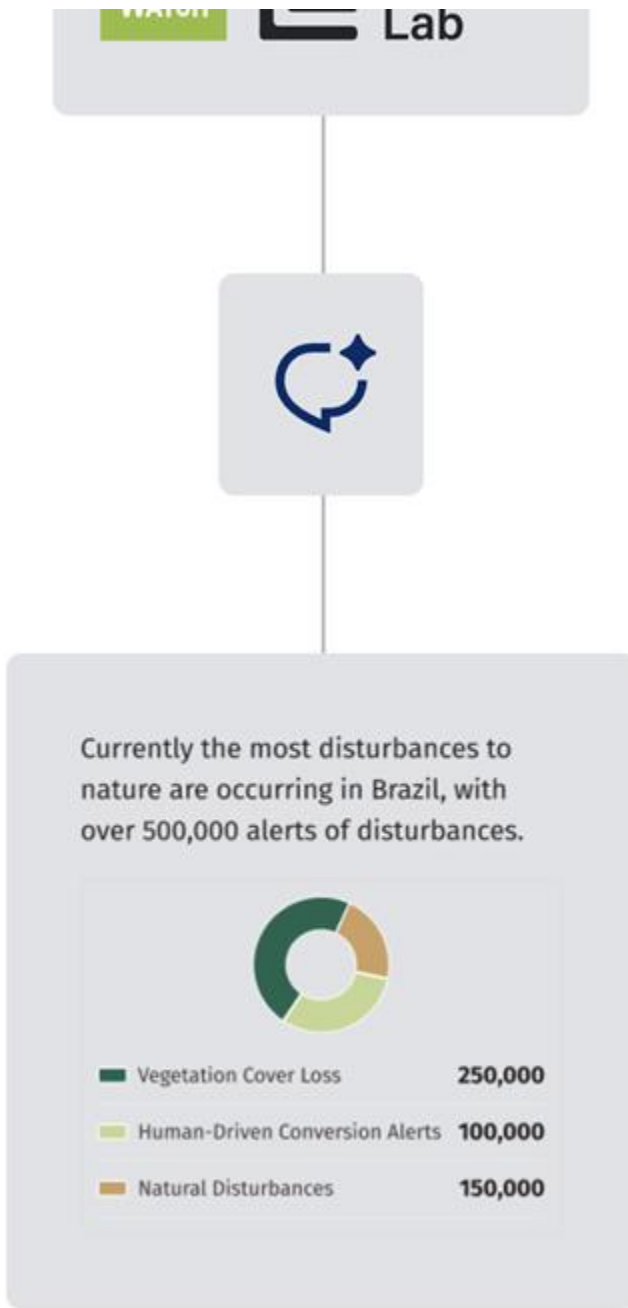
How it works

Processing your intent

When you ask Global Nature Watch a question, our system of AI agents work together to understand your request and analyze a trove of data to provide the most relevant answers.

Retrieving quality data

Our peer-reviewed data comes Global Forest Watch and Land & Carbon Lab and is developed by leading experts around the globe. This means verifiable data from authoritative sources.



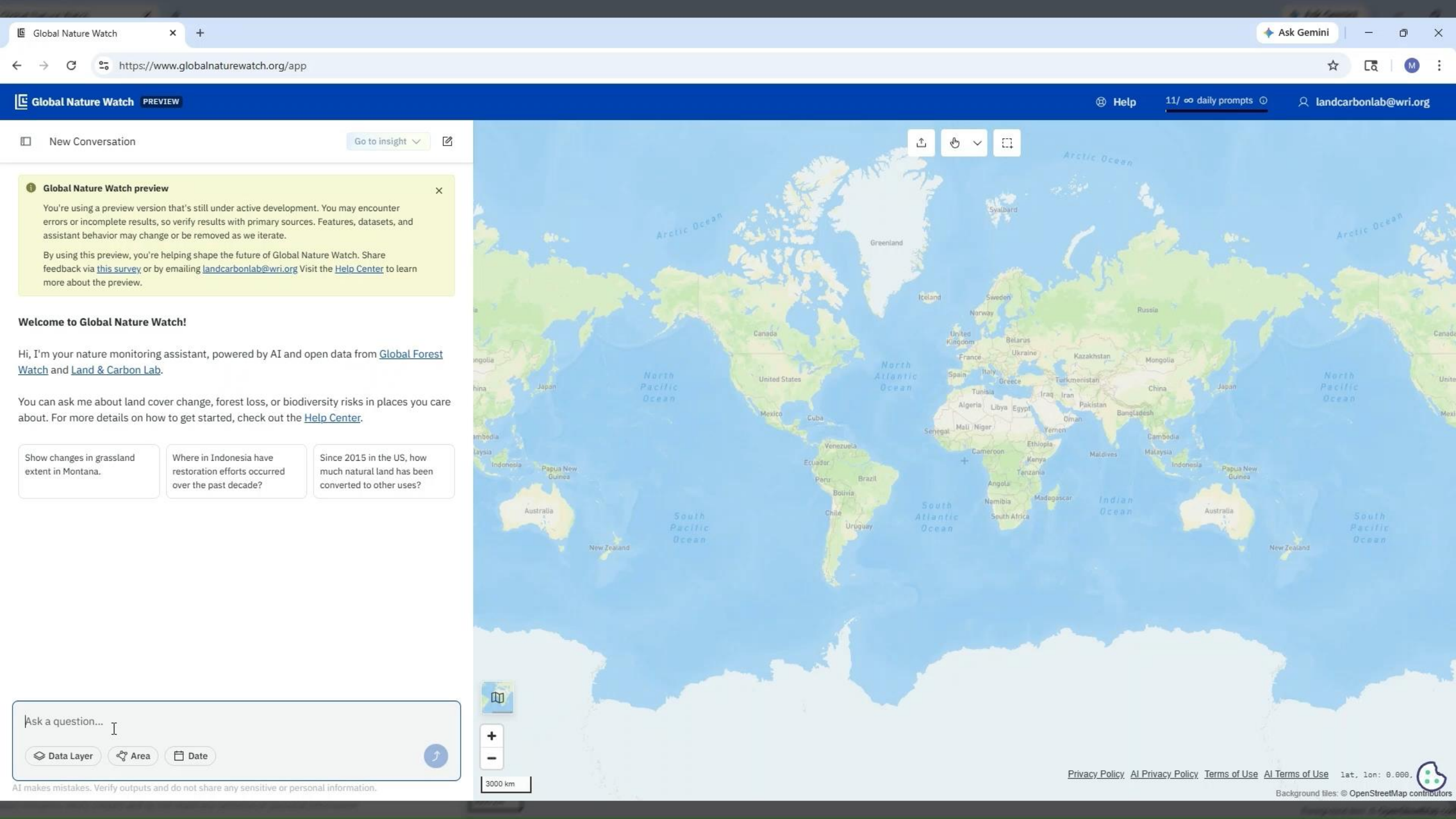
How it works

Tuning the AI model's response

We use Retrieval-Augmented Generation (RAG) to link data retrieved via our trusted APIs with real documentation, methods papers and metadata from our research.

Returning the response

Our agents create summaries of spatial data, search through data sets, and explain insights clearly in over 100 languages.



New Conversation Go to insight [Icon]

Global Nature Watch preview
You're using a preview version that's still under active development. You may encounter errors or incomplete results, so verify results with primary sources. Features, datasets, and assistant behavior may change or be removed as we iterate.
By using this preview, you're helping shape the future of Global Nature Watch. Share feedback via [this survey](#), or by emailing landcarbonlab@wri.org. Visit the [Help Center](#) to learn more about the preview.

Welcome to Global Nature Watch!

Hi, I'm your nature monitoring assistant, powered by AI and open data from [Global Forest Watch](#) and [Land & Carbon Lab](#).

You can ask me about land cover change, forest loss, or biodiversity risks in places you care about. For more details on how to get started, check out the [Help Center](#).

- Show changes in grassland extent in Montana.
- Where in Indonesia have restoration efforts occurred over the past decade?
- Since 2015 in the US, how much natural land has been converted to other uses?

Ask a question... [Input Field]

[Data Layer] [Area] [Date] [Submit]

AI makes mistakes. Verify outputs and do not share any sensitive or personal information.

[Map Controls: Upload, Hand, Zoom, Full Screen]

[Map Scale: 3000 km]

[Map Legend: +, -]

[Map Info: [Icon]]

Privacy Policy | AI Privacy Policy | Terms of Use | AI Terms of Use | lat, lon: 0.000

Background files: © OpenStreetMap contributors



Integrating water cycle intelligence at the land-water-climate nexus

Questions Geospatial AI might help us answer

1

Diagnosis: where is land use/cover change driving water depletion – in soils, surface water, groundwater, or rainfall?

2

Scenarios: how might climate change, land use/cover change, and water extraction impact water availability in my area in the future?

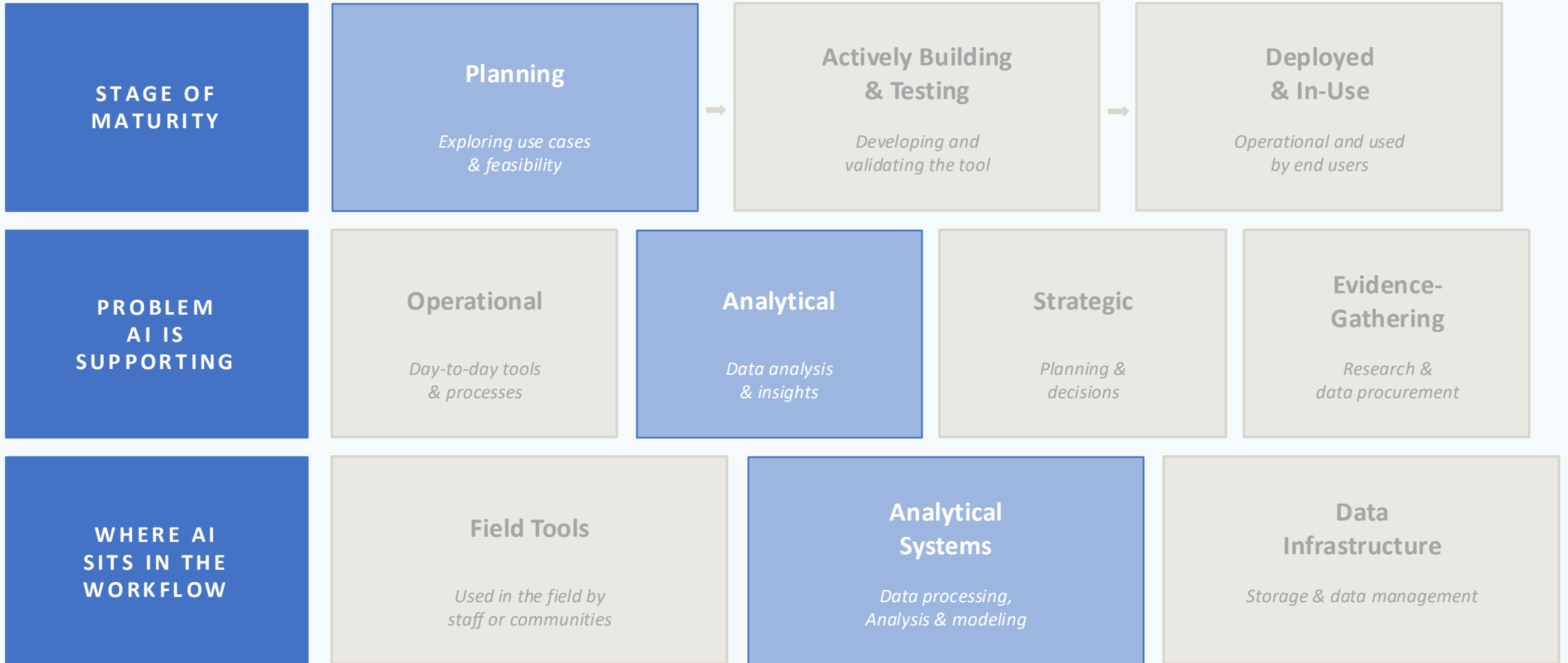
3

Planning: where to prioritize land/watershed conservation and restoration for water benefits?

4

Impact monitoring: what measurable impact has my intervention had on water outcomes?

AI Application at a Glance





What We've Learned

1

AI is enabling the automation of labor-intensive tasks, helping accelerate our understanding and monitoring of the natural environment.

2

Reliance on AI introduces risks such as providing incorrect information (the responses will only be as good as the data it ingests).

3

AI is using significant water and energy resources that can hinder environmental systems.

4

Broader participation in AI can improve the quality, speed and scale data is produced and used to inform better decisions.

5

AI is a tool that can reduce technical barriers and empower broader participation in environmental conservation and protection efforts.



WRI's Approach to Responsible Artificial Intelligence

1

Evaluate and learn at every stage of product development.

2

Measure and manage the environmental and financial costs of using AI.

3

Clarify methods and product maturity for external users.

4

Set clear rules of the road for internal users.

5

Build human capacity and community.

<https://www.wri.org/data/approach-responsible-artificial-intelligence>



PANEL & AUDIENCE Q&A

Moderated by Olivier Mills, Baobab Tech

Panelists:

- Kelvin Gacheru, Mobi-Water
- Nick Dickinson, WASHNote
- Tinebeb Yohannes, World Resources Institute
- Peter Chasse, The Water Project
- Dayna Hansberger, The Aquaya Institute
- Dr. Samuel Segun, Global Center on AI Governance



CLOSING & NEXT STEPS

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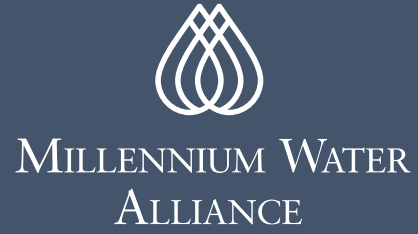
CLOSING & NEXT STEPS

FOLLOW-UP & KEY RESOURCES

- Scan the QR code on the right for the event resource guide
- The session recording and slides will be shared via email
- Stay tuned for a post-event learning brief to be posted on the MWA website (mwawater.org) and LinkedIn page.

Resource Guide





THANK YOU!



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