Outsmarting Disaster

Empowering Communities with Low-Cost Tech to Build Climate Resilience in the Kyrgyz Republic

CAREC Technology Forum

April 7-8, 2026

Inspire Indonesia

Samudra Sains Teknologi

DACRYN

The Spectacular Failure of Generic AI

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https://restofworld.org/2026/ai-agriculture-local-data/

Lacking exposure to diverse ecosystems, and unique local conditions

Data Bias

Models trained on European/American datasets cannot recognize tropical biodiversity, soil profiles, or forest structures

Critical Risk

Unadapted digital tools lead to catastrophic failures for farmers and environmental practitioners

Paradigm Shift

Transition from "Universal AI" to context-aware systems that value local ground-truthing and indigenous knowledge

Global Unpreparedness & The Climate Assessment Gap

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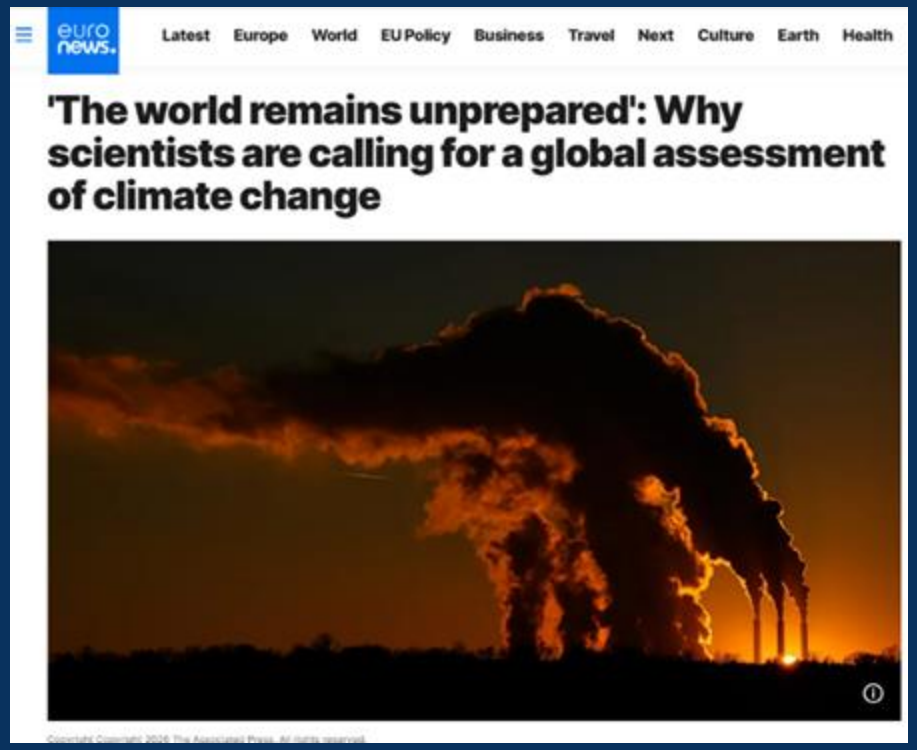

'The world remains unprepared': Why scientists are calling for a global assessment of climate change | Euronews

Scale Mismatch

Global satellite assessments overlook granular, location-specific geological and hydrological hazards

Infrastructure Lag

Policy frameworks and physical infrastructure fail to match the accelerating pace of climate anomalies

Call to Action

Comprehensive multi-scale assessment connecting global remote sensing with local geological realities

The Climate Resilience Crisis

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Chronic Water Insecurity

Inefficient Soviet-era irrigation systems strain resources across agricultural communities

Acute Flood Danger

Unpredictable floods and mudflows from rapid glacier melt threaten lives and livelihoods

The Data Desert

Absence of real-time, localized environmental information leaves communities blind to threats

Agriculture at Risk

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60%

of population depends on agriculture for survival

Without real-time environmental data, communities cannot manage scarce water resources effectively or protect themselves from sudden disasters.

> "The challenge isn't lack of will—it's lack of information"

Our Solution:
Community co-design Sensor Networks

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Low-Cost Sensors

Transform everyday devices (old android phones) and microcontrollers into environmental sensors

One antenna • Multiple insights

River monitoring, Snow depth observation and Soil moisture

Community Empowerment

Sustainable socio-technical model putting tools in local hands

How It Works

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What is GNSS-IR?

Understanding the technology behind RiverSense monitoring system

GNSS Interferometric Reflectometry (GNSS-IR) is a remote sensing technique that utilizes navigation satellite signals (GPS, GLONASS, Galileo, BeiDou) to measure various environmental parameters, including water surface height.

Working Principle:

1. Direct Signal: GNSS antenna receives direct signals from satellites above.
2. Reflected Signal: The same signal is also reflected by the water surface before being received by the antenna.
3. Interference: Both signals (direct and reflected) interfere, creating patterns that can be analyzed.
4. Height Calculation: From interference patterns, we can calculate the distance between antenna and water surface with centimeter precision.

GNSS-IR Advantages:

- Low cost - Uses existing satellite infrastructure
- Non-invasive - No direct contact with water needed
- Accurate - Precision up to several centimeters
- Reliable - Works 24/7 in various weather conditions

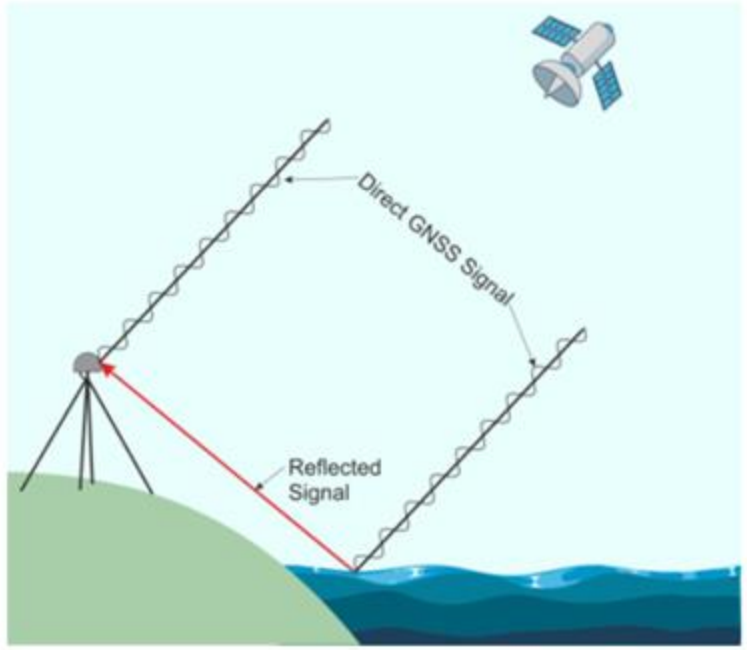

Image: Simon Williams

The diagram shows how direct GNSS signals (dashed lines) and reflected signals (solid lines) interfere to produce water surface height measurements. An antenna mounted at a certain height receives both signals, and the phase difference between them is used to calculate the distance to the water surface.

https://riversense.uinspire.id

On-Archa River Site

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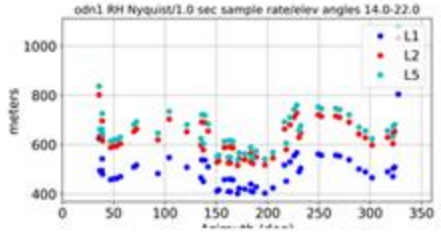
GNSS-IR Reflection Zone Mapping

If you use images from this API, please be courteous and cite
GNSS-IR Reflection Zone Mapping, https://gnss-reflections.org/rzones, version 2.0, and date of use.

Station: odn1
Latitude: 41.574025
Longitude: 75.870123
Ellipsoidal Height(m): 2076.3
Reflection Ht. (m) : 3.18
Elevation Angles (deg) : 14-16-18-20-22
Azimuth Angles (deg) : 106 to 120
Constellation : GPS
Frequency: L1



Return to the Reflection Zone API

The Partnership Advantage

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- Proven industry-tested scientific analysis
- Advanced in emerging technology for monitoring & observation
- Partnered with Indonesian Meteorological Agency

U-INSPIRE Indonesia

- Proven community-tested sensor kits
- Established training modules
- Successful technical methodology in Bali & Central Java

U-INSPIRE Central Asia - Dacryn

- Deep local knowledge
- On-ground presence

Goal

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20%

Water Use Efficiency

Projected decrease in consumption through optimized irrigation

15%

Yield Improvement

Expected increase in marketable agricultural output

Additional Benefits

Better resilience against droughts, mudflows, landslides

A Replicable Blueprint

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01

Train Local Champions

Build self-reliance through comprehensive training programs

02

Foster Organic Expansion

Create blueprint for community-led replication and growth

03

Ground-Truthing Network

Enhance national climate models with local data collection

04

Regional Asset

Transform local project into foundational national infrastructure

Implementation Timeline

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01

Week 1–2

Desktop reconnaissance and candidate identification

02

Week 3–4

Field validation and risk calibration scoring

03

Week 5–6

Final site selection and permit acquisition

04

Week 7–8

Equipment installation and system commissioning

Key Team Members

Local Presence & Global Expertise

Kunduz Kurmanbaeva

In-Country Project Manager • U-INSPIRE Central Asia - Dacryn

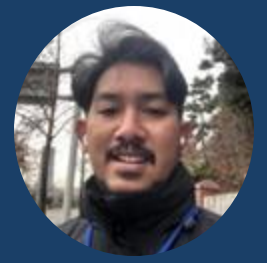
On-ground authority in Kyrgyz Republic • Responsible for implementation, adaptation, and long-term ownership

Hilman Arioaji

Project Lead • Outsmarting Disaster – SSTekno – U-INSPIRE Indonesia

"This project is not about giving a solution; it is about co-creating the capability to build one, fostering a sustainable, community-owned model for climate resilience."

Ida Bagus Oka Agastya



Technical Lead • U-INSPIRE Indonesia

Master's in Disaster Management • Geospatial technology expertise • Ensures solution is robust, scalable, and scientifically sound

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Looking Forward

https://naryn.outsmartingdisaster.net/water-level.html

Let’s build a local Resilient Future Together One village at a time

Piloting

Collaborators & donors for pilot in 2 -3 locations in Naryn province

Sustainable O&M

Long-term maintenance plan with local capacity building and technical support

Regional Scaling

Replication in other catchments across Central Asia's vulnerable mountain communities