PolluScan: Guardians of the Soil & Water

Big Idea: Sustainable Agricultural Resource Protection

Essential Question: How can integrated AI and IoT technologies empower rural farmers to monitor and mitigate soil and water contamination in real-time?

Location: Delhi, India

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School/Organization Name: Vikas Bharati Public School, Delhi

A national threat to natural resources and food security.

India’s agricultural backbone is breaking under the weight of pollution

The nation’s agricultural landscape is facing a severe, escalating crisis driven by widespread pollution and environmental degradation.

Contamination is poisoning the well and the harvest

- Contaminated water sources directly affecting both crop irrigation and local human consumption.

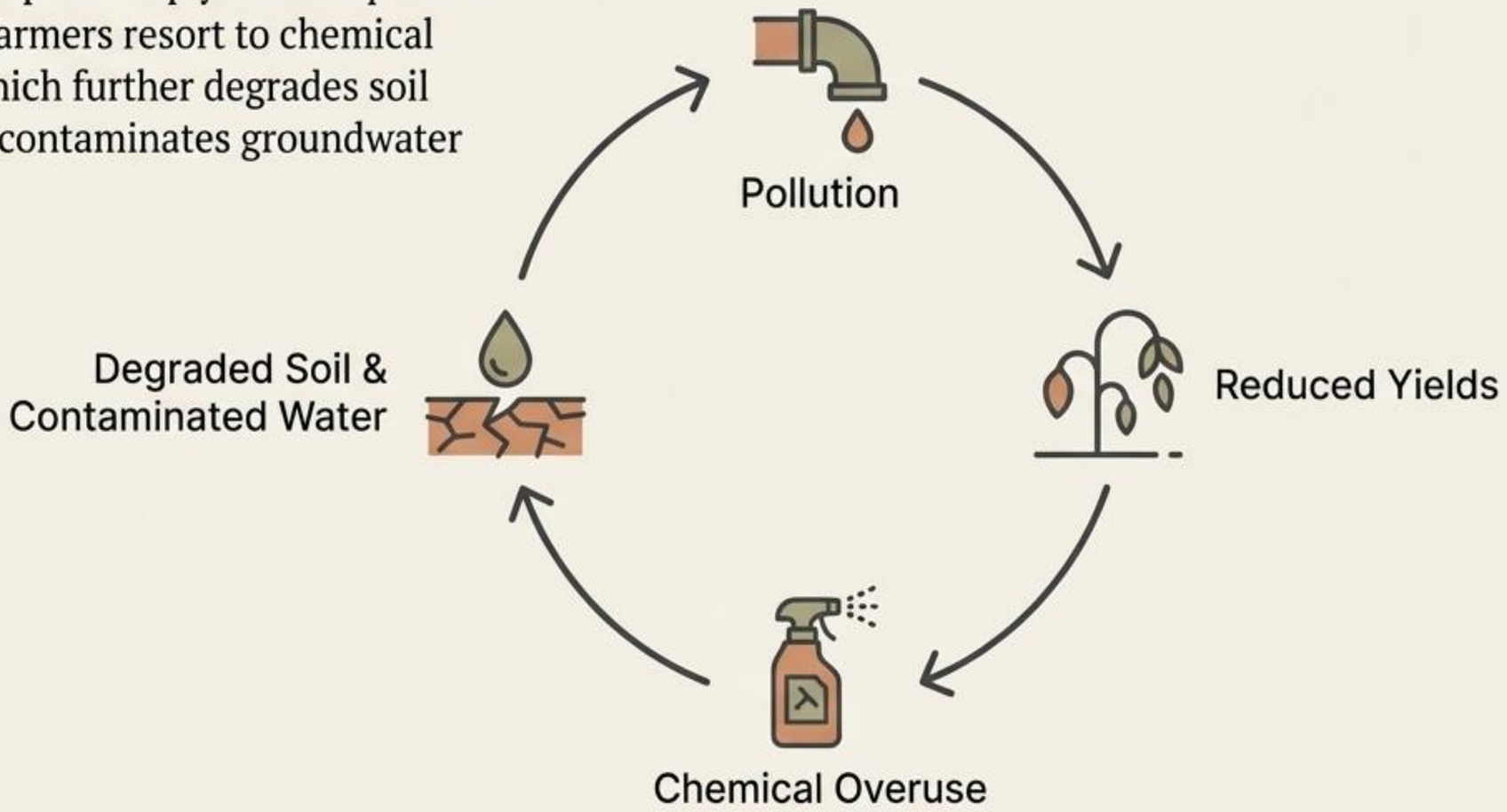
- Diseased crops resulting in massively reduced agricultural output and wasted labor.

The human cost of environmental degradation

When soil and water fail, livelihoods collapse. The current trajectory threatens the very survival of rural farmers and destabilizes India's overall national food security.

Uncovering the devastating cycle of chemical overuse

Field investigations revealed a critical feedback loop: as crop yields drop due to pollution, farmers resort to chemical overuse, which further degrades soil health and contaminates groundwater over time.



Listening to the guardians of the land

We adopted a community-centric approach to implementation.

- **Direct Engagement:** Working hand-in-hand with agricultural communities to document specific local needs.
- **Identifying Roadblocks:** Uncovering the technical limitations and the lack of awareness regarding sustainable practices among rural populations.

The mandate for accessible, real-time intelligence

Farmers need actionable insights to make informed decisions about their land. However, any technological intervention must operate independently of unreliable rural power grids and be intuitive enough for immediate use.

Rural Roadblocks

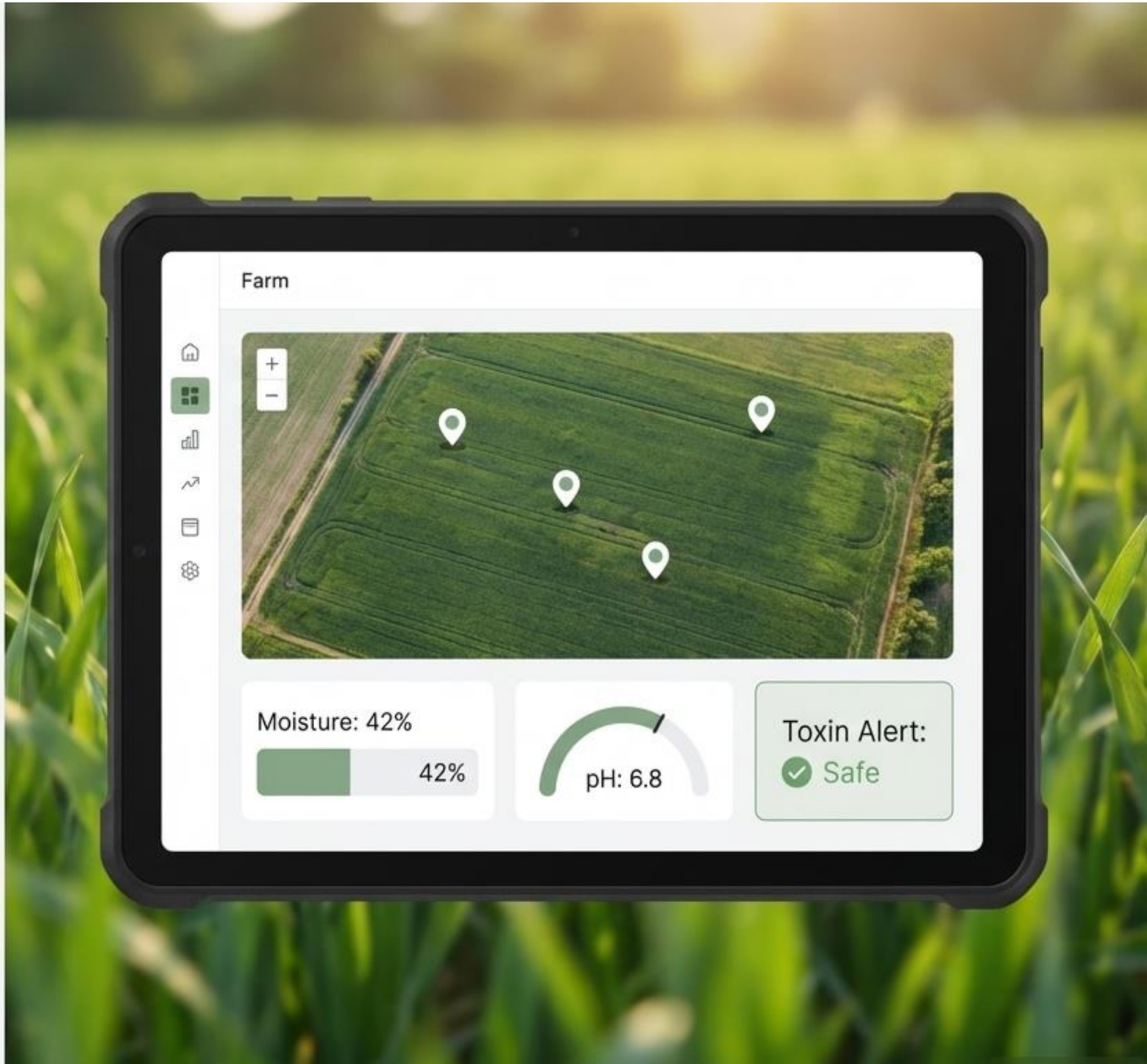
Empowered Farmers

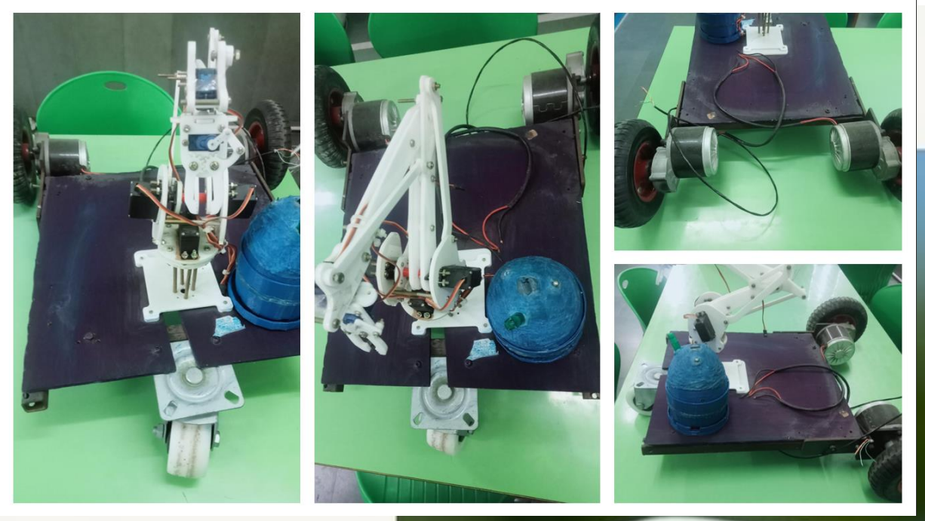
Introducing PolluScan: A smart agricultural ecosystem

A comprehensive monitoring system designed to protect natural resources by delivering real-time data on environmental health and empowering farmers with actionable insights.

Integrating cutting-edge technology into the soil

- **Artificial Intelligence (AI):** Powering data analysis and predictive modeling to monitor and forecast environmental trends.
- **Internet of Things (IoT):** A robust network of sensors providing continuous, real-time monitoring of soil and water metrics.





Engineered for sustainability and rural resilience

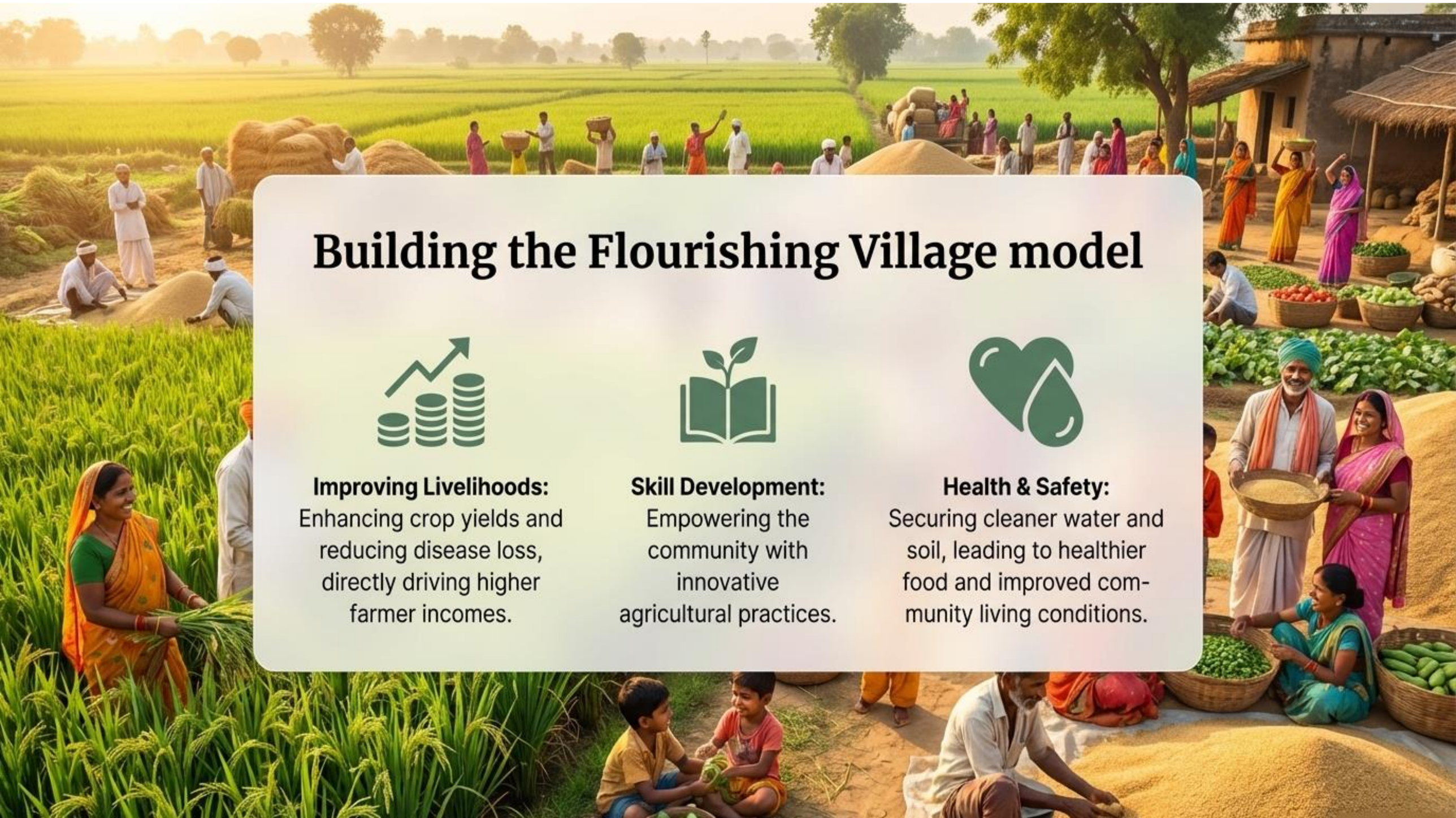
Technology must adapt to its environment.

- Solar-Powered Sensors: Ensuring the hardware remains completely viable and sustainable in rural areas with limited power infrastructure.
- Collaborative Development: Continuous refinement of hardware prototypes based directly on farmer feedback and real-world testing.

Moving from prototype to practical application

We conducted hands-on workshops and practical training sessions directly in the fields.

- Farmers tested the prototypes themselves.
- Taught sustainable mitigation techniques to reduce unnecessary chemical applications.



Building the Flourishing Village model

Improving Livelihoods:
Enhancing crop yields and reducing disease loss, directly driving higher farmer incomes.

Skill Development:
Empowering the community with innovative agricultural practices.

Health & Safety:
Securing cleaner water and soil, leading to healthier food and improved community living conditions.

Local action driving global sustainable development

PolluScan's vision for a **Sustainable India** directly advances four critical SDGs:

SDG 2: Improving agricultural productivity and food security.

SDG 6: Monitoring and protecting vital water sources.

SDG 12: Reducing chemical overuse.

SDG 13: Building environmental resilience through solar power and soil health.

The Changemaker Vision for 2047

We envision a future where advanced technologies like AI and solar-powered sensors is not a luxury, but a standard that revolutionizes farming across rural India. A complete balance between maximum agricultural productivity and total environmental preservation.

Scaling the impact to secure India's future

To turn this localized success into a national agricultural standard, PolluScan is actively seeking:

- Mentorship from industry experts to refine the AI/IoT integration.
- Funding to sustain continuous hardware innovation.
- Partnerships with local organizations and government bodies to deploy sensor networks nationwide.