**Microsoft**

# AgriVision
## Core AI with Azure ML Studio

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# ML for Satellite Imagery Analysis: Kerala Case Study

**2018 Kerala floods in India highlight ability to leverage ML in low tech-infrastructure environments**



- **Death toll**: 435 lives lost due to flooding in an area of 15,005 sq miles (similar to CT and NJ combined).
- **Farmland affected**: Over 26,106 hectares (~100 sq miles) impacted in a densely populated area (2332 people per sq mile).
- **High risk**: Nearly half of Kerala's 35 million people faced threats to livelihood and food supply.
- **Economic loss**: Ripple effects extended to India's 1.4 billion people, with losses estimated at $95 million USD.
- **Climate impact**: Increasing frequency and severity of weather-related events globally.

# Actionable Insights for Government and Industry with Azure Cloud and AI/ML

**Enhancing Disaster Resilience, Emergency Response, and Recovery**

- **Satellite imagery analysis** for monitoring agriculture, urban areas, and the environment.
- **Predictive response** to natural disasters with accurate, timely data.
- **Effective resource allocation** for disaster preparedness, response, and recovery.
- **Data-driven policy-making** for sustainable development.
- **Economic impact assessment** for better planning and recovery.



*Rescue worker carries infant.*

*Boat rescue.*

*Navy rescues residents.*

Image Source: Economic Times

# Technology and Methodology

**AgriVision demonstrates change analysis, categorization, counting, and predictive analysis using satellite imagery with multiple remote sensing bands available for analysis with Azure ML Studio**

- Our project aims to assess the impact of these floods on agricultural productivity using change analysis on **Normalized Difference Vegetation Index (NDVI)** data.

- By analyzing NDVI we aim to **provide insights** into the extent of agricultural damage and the rate of recovery post-flood.

- This application can help government agencies, industry, local communities, and policymakers improve disaster preparedness, response strategies, and agricultural planning to address **human safety, financial loss prevention, and food security**.

- We utilize **Azure Storage** and **Azure Machine Learning Studio** which provides us with:

  - **Foundational Models:** Use of pre-trained models and other state-of-the-art models.

  - **Speed & Efficiency:** Saves cost to build from scratch and speeds up the process with access to large file storage for processing, training, and analysis.

  - **Customization:** Features to customize/fine-tune the model using custom scripts and more, with Python and options for CPU and GPU utilization.
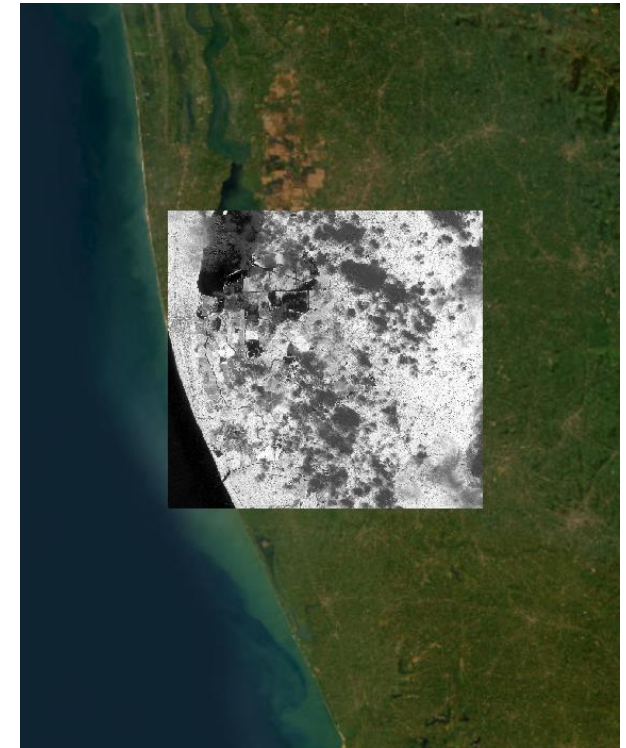


Sentinel-2 satellite imagery of a section of Karala impacted by flood

# Demo: Azure Storage & Azure ML Studio Notebook



State of Kerala
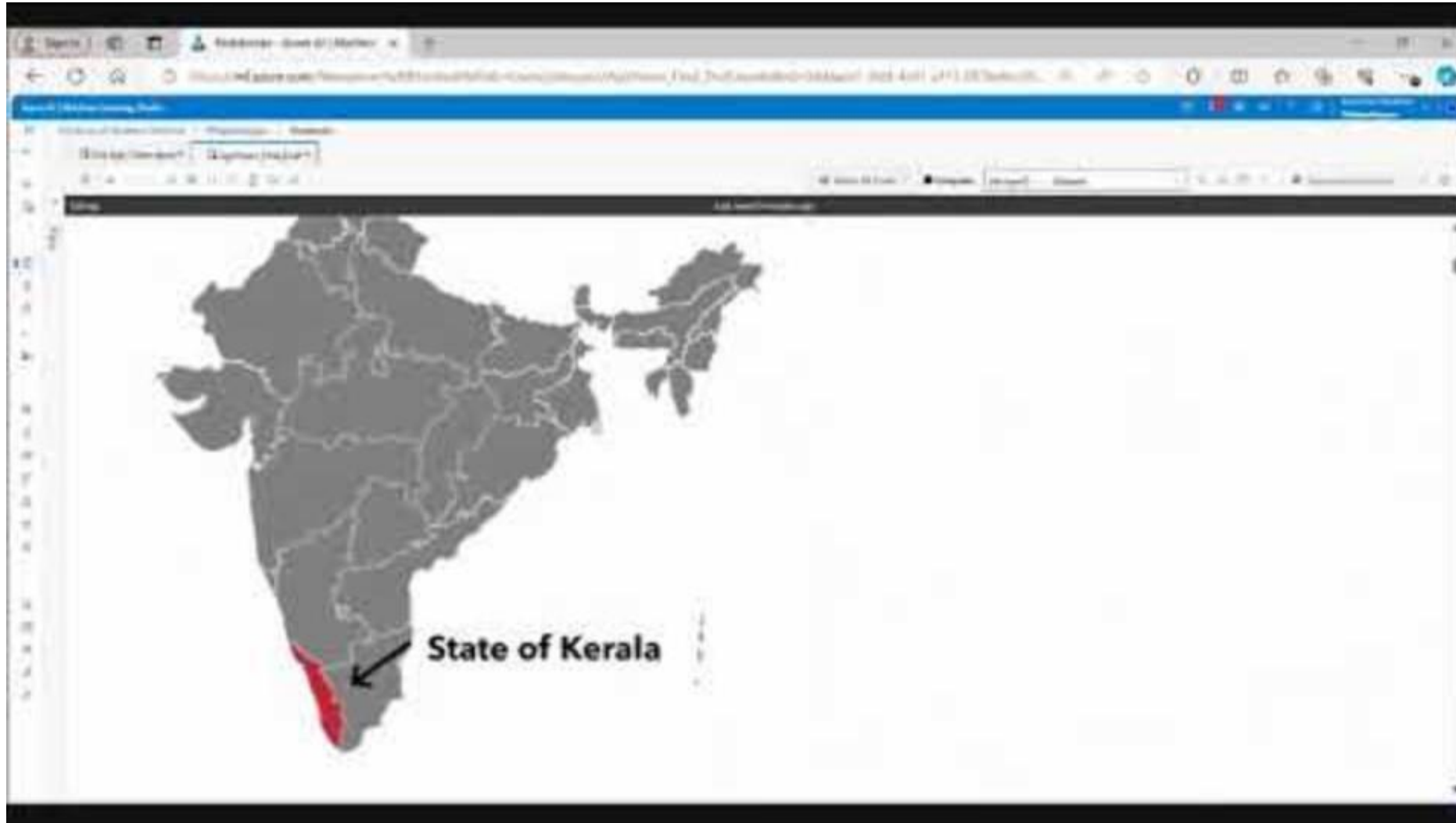
# Key Takeaways and Recommended Action

## Empowering Global Disaster Management and Human Security with Azure AI

**Leverage Azure ML for Impact Analysis:**
- Enable local authorities to use Azure ML tools for and disaster impact analysis.

**Integrate Insights into Policy and Planning:**
- Equip government, industry, communities and policymakers with accessible technology to ensure disaster preparedness and recovery response.

**Enhance Efficiency and Cost-Effectiveness:**
- Streamline data processing, reduce costs, and deliver actionable insights.

**Support Vulnerable Populations:**
- Promote low-cost, scalable methods for disaster preparedness and recovery to underserved populations including those in developing countries such as India.

**Achieve Long-Term Benefits:**
- Achieve ROI for sustainable disaster management to protect lives and agriculture

**Stop/Start:**
- Stop relying solely on traditional methods for disaster management and start integrating advanced analytics and remote sensing data into regular monitoring.

**Self-Sufficiency, Efficiency and Cost Reduction:**
- Empower local authorities, simplify workflows, and reduce IT infrastructure needs.
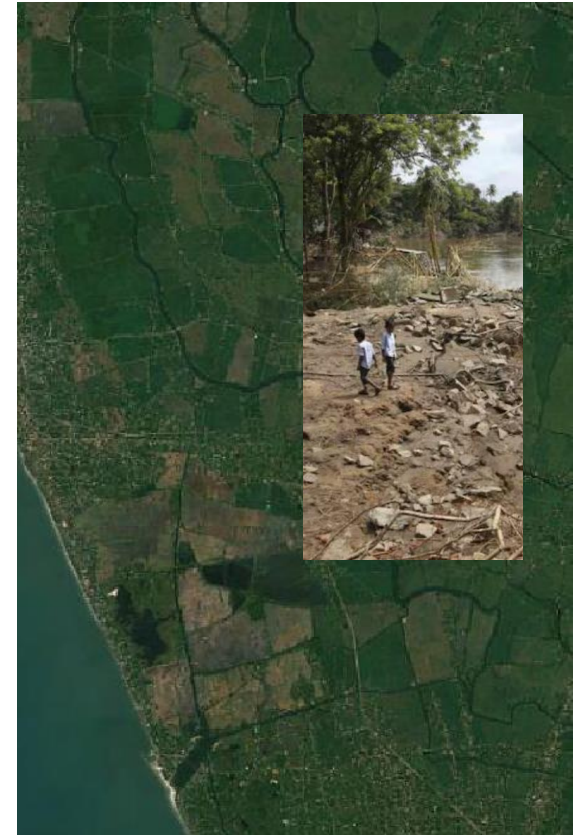
Kerala agricultural land. Inset: Children in Karela amid destruction of local rice paddy, banana and spices fields