

Campus Practices and Ongoing Research on SDG 6 @ Shiv Nadar University, Delhi NCR

SHIV NADAR
| INSTITUTION OF EMINENCE DEEMED TO BE |
— UNIVERSITY —
DELHI NCR

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Current Practices of SDG6 @ Shiv Nadar University, Delhi NCR

Shiv Nadar Institution of Eminence :

Campus Context

- **300-acre (122 Hectare) stand alone campus**
- **3.5 million sq. ft. of LEED-certified dispersed buildings**
- **60 Acre of Land is for preservation of biodiversity of the campus, the wildlife and Planned Horticulture**
- **Over 4,500 campus residents** , supported with 24x7 water and sanitation infrastructure
- **1600 Third Party Support staff** commute daily for work relying on University's water resources



Safe & Sustainable Water Management

Target 6.1: Safe drinking water for all

Target 6.4: Increase water-use efficiency



 In-house water treatment & purification plants

 Continuous quality monitoring

Campus Groundwater TDS: 200–250 mg/L
(Well within IS standard -10500 of 500 mg/L)

 Leak detection to improve efficiency

 Rain water harvesting across academic and residential blocks

Water Management

Highlights

100% of treated wastewater is reused within the organisation, ensuring environmental responsibility.

Daily water consumption per head per day is 15.87 liters during operational hours, significantly less than the NBC BIS standard of 25 litres.

Sanitation and Hygiene



Target 6.2

- **100% modern sanitation facility access**
Across all hostels, academic blocks, and residential areas
- **Gender-sensitive, accessible restrooms**
Designed for inclusivity and comfort for all campus users
- **Hygiene & water conservation awareness**
Regular campaigns and educational programs
- **Greywater segregation pilot projects**
Testing innovative systems in selected campus areas

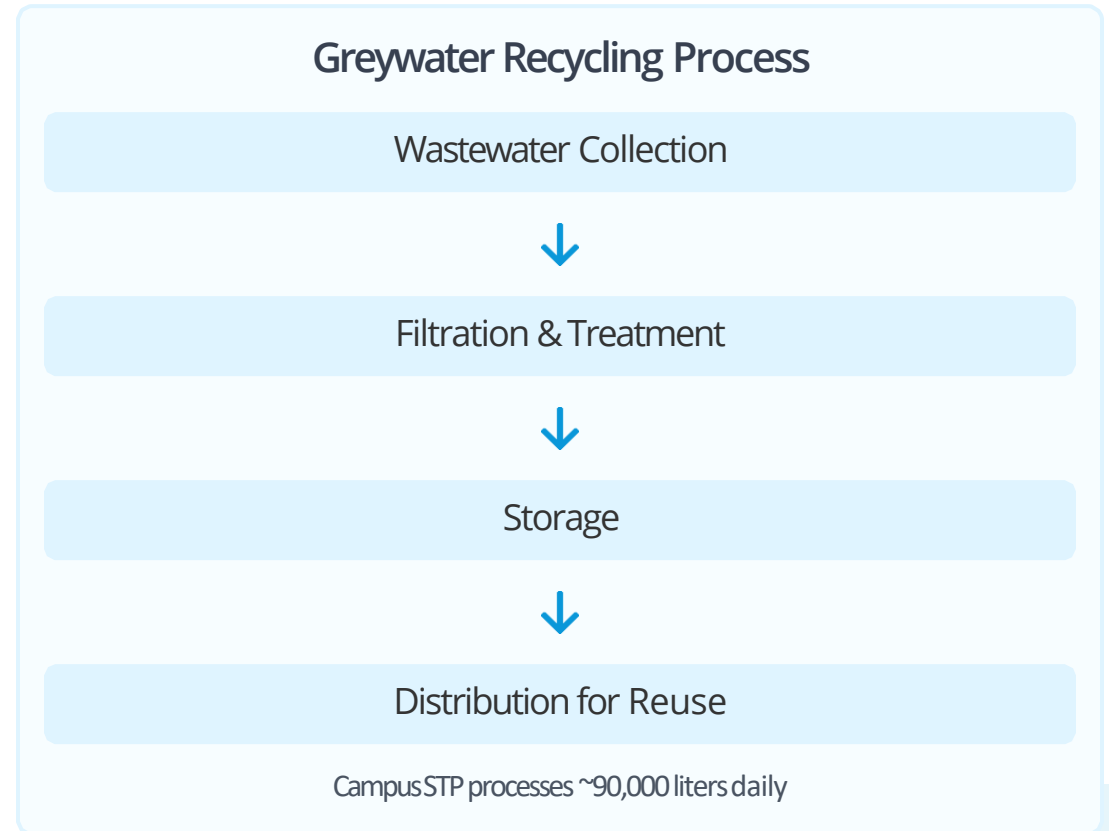


Wastewater Management & Reuse

Target 6.3





"Improve water quality, wastewater treatment and safe reuse"

- 🏭 Sewage Treatment Plant (STP) operational on campus
- ♻️ 90% treated wastewater reused for:
 - 🌿 Landscaping & horticulture
 - 🚽 Flushing and utility purposes
- 🧪 Research collaborations on water recycling technologies



Ecosystem Protection & Recharge

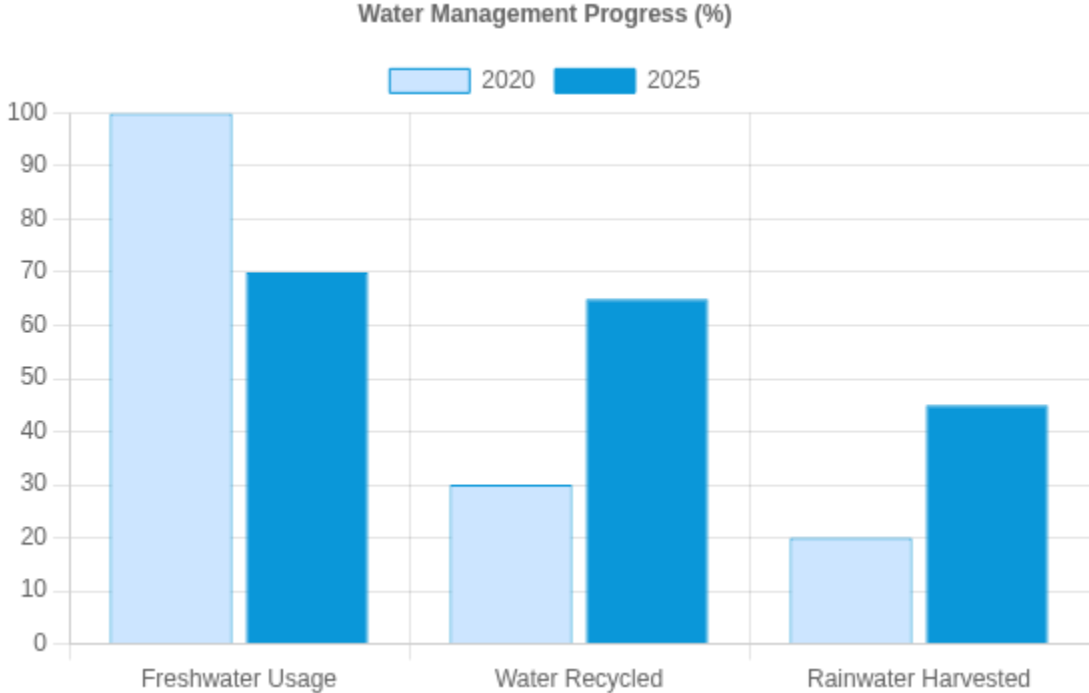
Target 6.6

-  Restoration of campus water bodies (ponds & recharge pits)
-  Green cover management with treated water irrigation
-  Wetlands and natural landscaping to enhance groundwater recharge
-  Plantation drives and biodiversity conservation



Outcomes & Impact

-  **Reduced freshwater dependency**
Decreased groundwater extraction by implementing water recycling systems and rainwater harvesting
-  **100% sanitation coverage**
Complete access to modern sanitation facilities across the entire campus
-  **Campus as a model**
Established benchmark for integrated water resource management in higher education
-  **Supporting India's SDG 6 targets**
Contributing to national sustainability goals through campus practices and research



Water Resource Management Impact (2020-2025)



Ongoing Research on SDG6 @ Shiv Nadar University, Delhi NCR

Ongoing Research on SDG 6 @ Shiv Nadar University, Delhi NCR

1

Agricultural Water
Management

2

River Basin
Management

3

Water Quality
Monitoring



GOAL 2
End hunger, achieve food security and improved nutrition and promote sustainable agriculture.



GOAL 6
Ensure availability and sustainable management of water and sanitation for all.



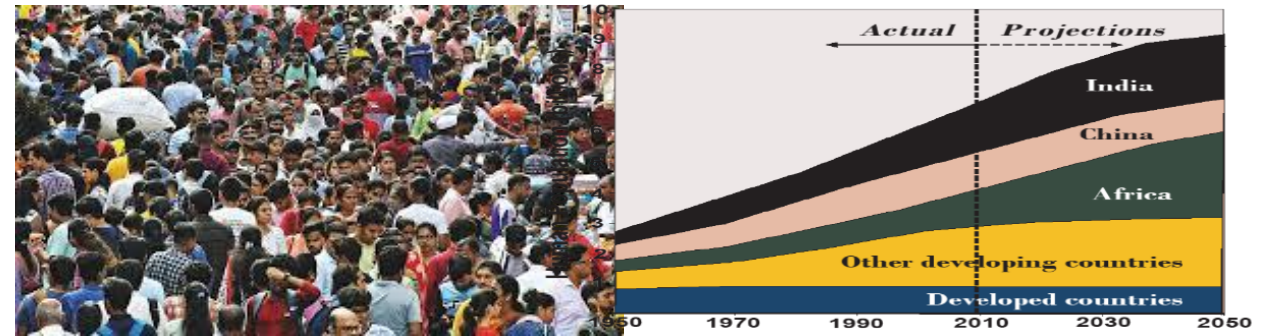
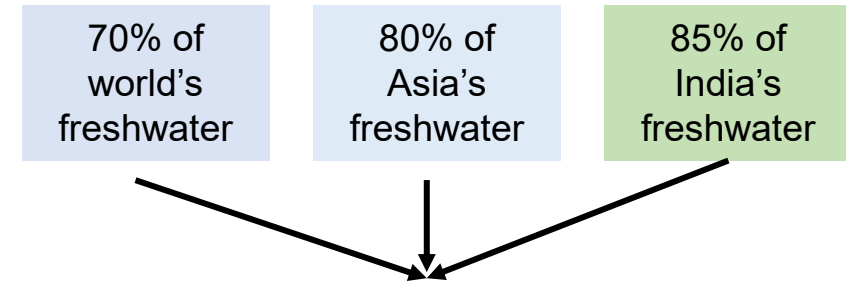
GOAL 13
Take urgent action to combat climate change and its impacts.



Agricultural Water Management

Introduction

Water, Population and Agriculture



➤ Rising population & climate change: Global water resources under stress

➤ Water withdrawal is estimated to increase by 15% by 2050 (World Bank)

➤ Water-saving in agriculture is essential

A suitable **irrigation schedule** can save water in agriculture by optimizing the irrigation supplied to the crop

Key Areas of Ongoing Research

Water, Population and Agriculture

- Development of *irrigation strategies for water saving and increasing crop yield*
- **Monitoring of crop and crop water stress** using satellite and drone remote sensing
 - Open-source, mid-resolution satellite data
 - Drone multispectral and hyperspectral data
- Technology driven solution
 - Development of **ML-based crop model**
 - Development of **IoT-based smart irrigation system**



Research Infrastructure



Image. Agricultural Water Management Field Laboratory



Image. Experimental field plots with drip irrigation system



Image. Automatic weather station installed at the field laboratory



Image. Different research grade equipment used for the monitoring of soil and crop parameters

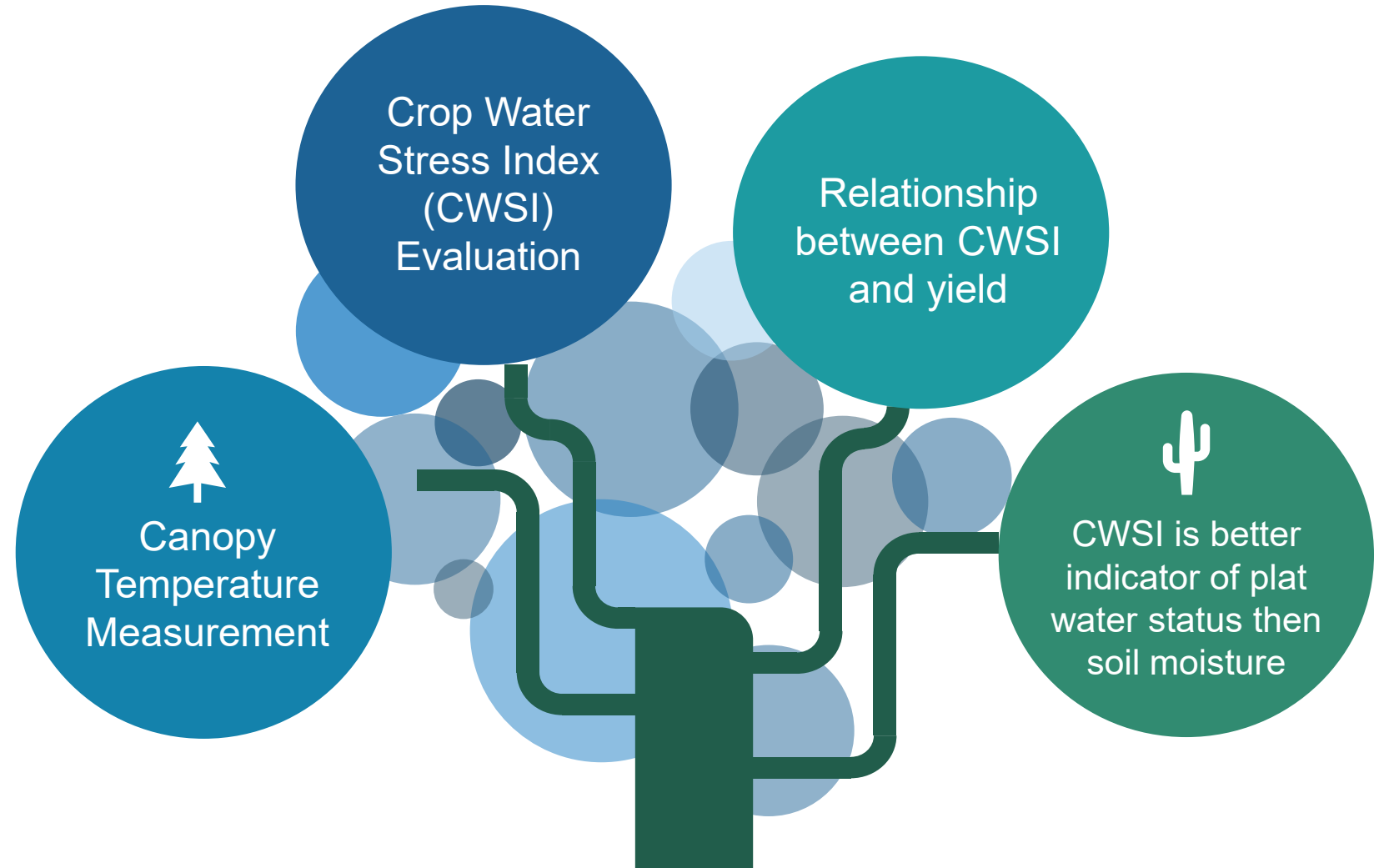


Image. Hyperspectral and multi spectral camera mounted on drone

Assessment of Crop water stress



Image. Crop temperature
Data collection through IRT



Key finding

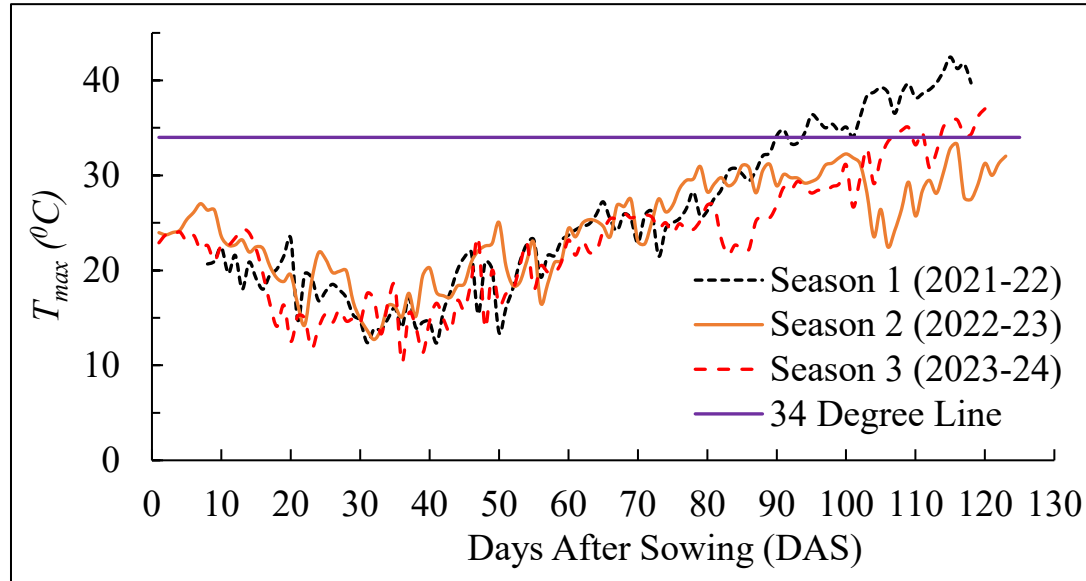


Figure: Time series of daily maximum temperature across three seasons

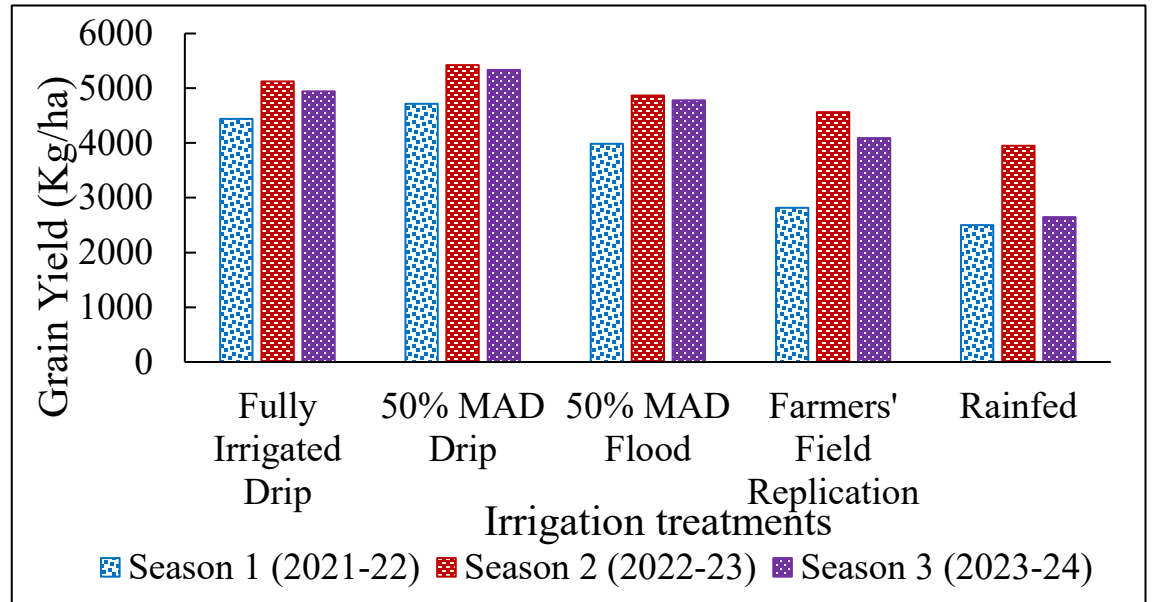


Figure: Average observed grain yield (GY) for different irrigation treatments across the three seasons

Table: % increment in GY compared to the farmers' field replication

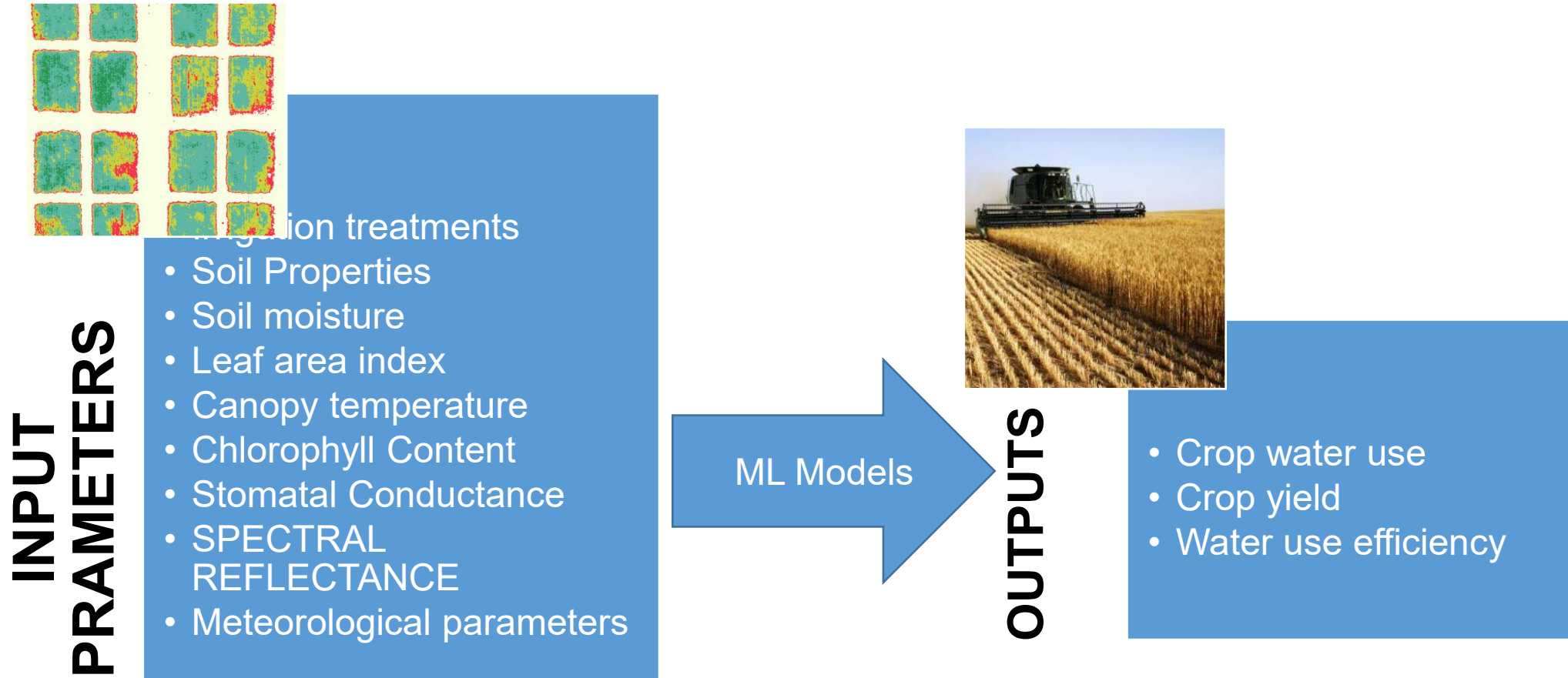
Irrigation Treatments	Season 1 (2021-22)	Season 2 (2022-23)	Season 3 (2023-24)
Fully Irrigated Drip	57.9	12.3	21.0
50% MAD Drip	67.6	18.8	30.5
50% MAD Flood	41.7	6.7	16.9

Table: % reduction in irrigation amount compared to the farmers' field replication

Irrigation Treatments	Season 1 (2021-22)	Season 2 (2022-23)	Season 3 (2023-24)
Fully Irrigated Drip	2.0	29.7	2.8
50% MAD Drip	15.2	40.3	16.4
50% MAD Flood	2.9	24.4	7.9

MAD:
maximum allowable deficit

Ongoing Research: ML-based Crop Modeling



Ongoing Research: IoT-based Irrigation System

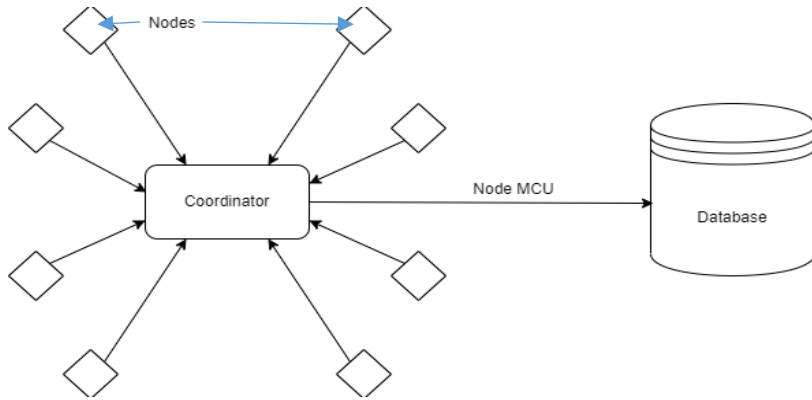


Fig. Basic architecture of the IoT-based irrigation system



Image. Node

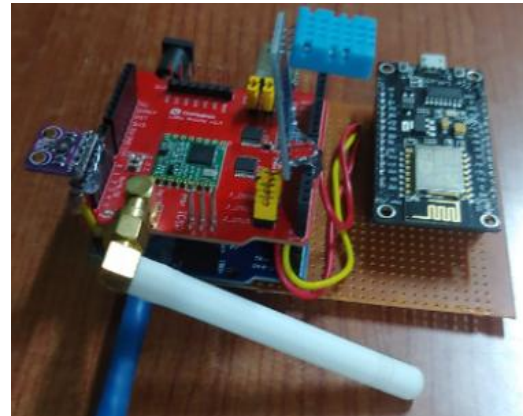


Image. Coordinator

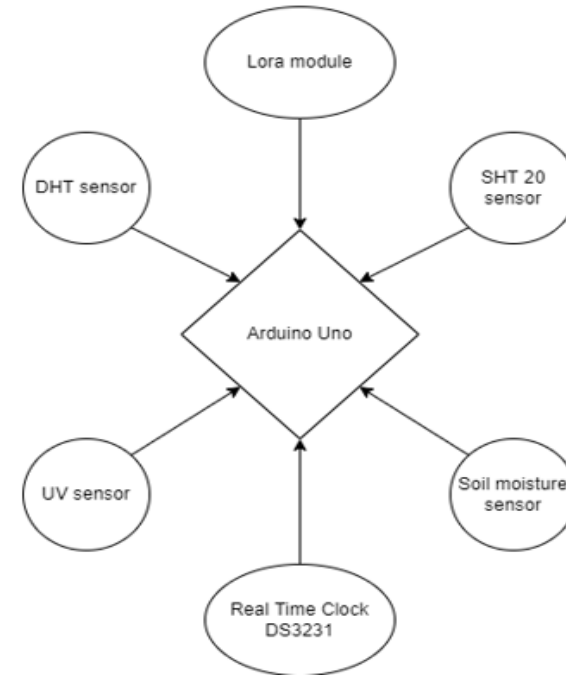


Fig. Basic architecture of the sensor node for collecting data in agricultural fields



River basin Management

Key Areas of Ongoing Research

- River system water management
 - Mitigating Local Scour Around Bridge Piers Using Optimized Submerged Vane Systems
 - Local Scour Protection and enhance energy dissipation by upgrading stilling basin design



Images: Recirculating indoor experimental flume



Image: Recirculating outdoor experimental channel

Developing innovative solutions to ensure consistent water availability for sustainable water use in the backdrop of climate change

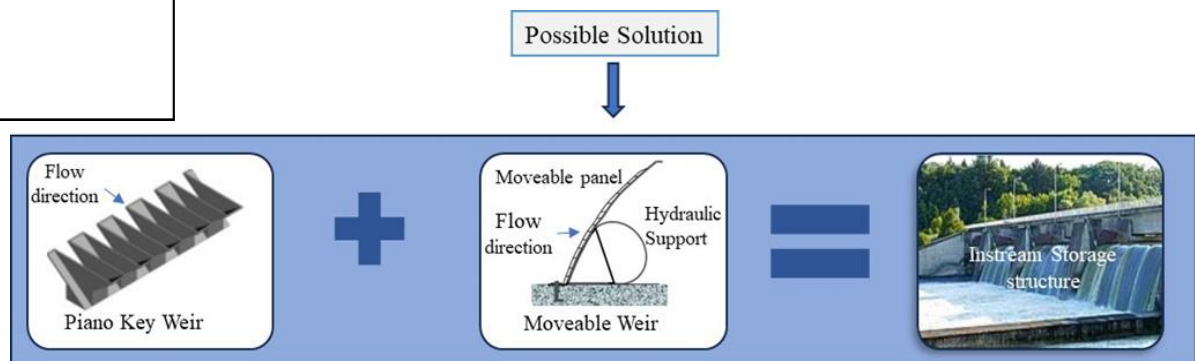
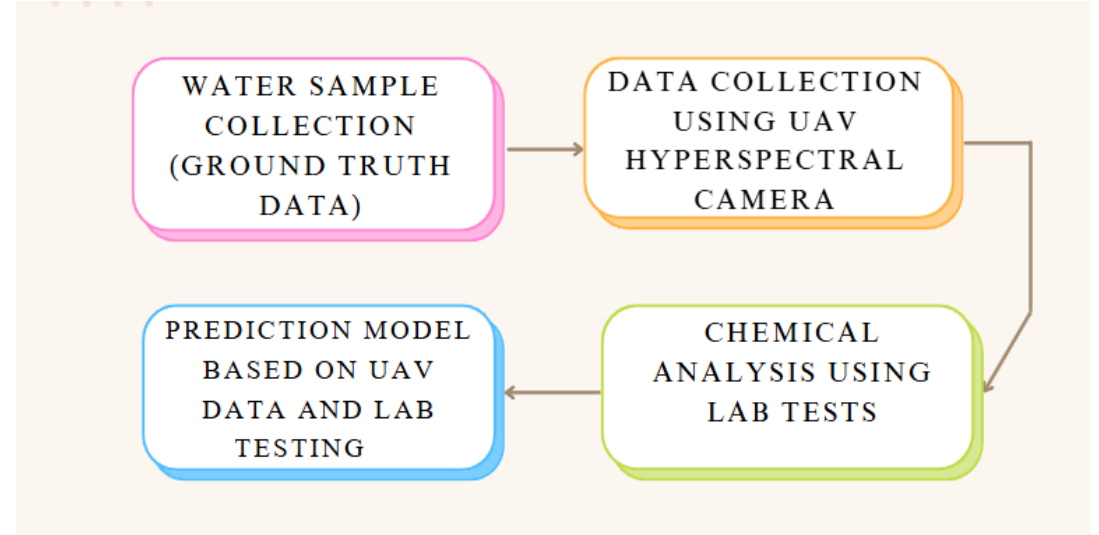


Fig. Problem arises due to unprecedented rainfall and the possible solution.



Water Quality Monitoring

Ongoing Research (Prediction of surface water quality using drone with Hyperspectral camera)



Community Engagement

Water Saving Strategy in the Local Farmers' Field for Agricultural Practice Management



Image: Installation of access tubes and soil moisture data collection



Image: Visual inspection of phenology and health of wheat and mustard



Image: Data collection from the Farmer's field



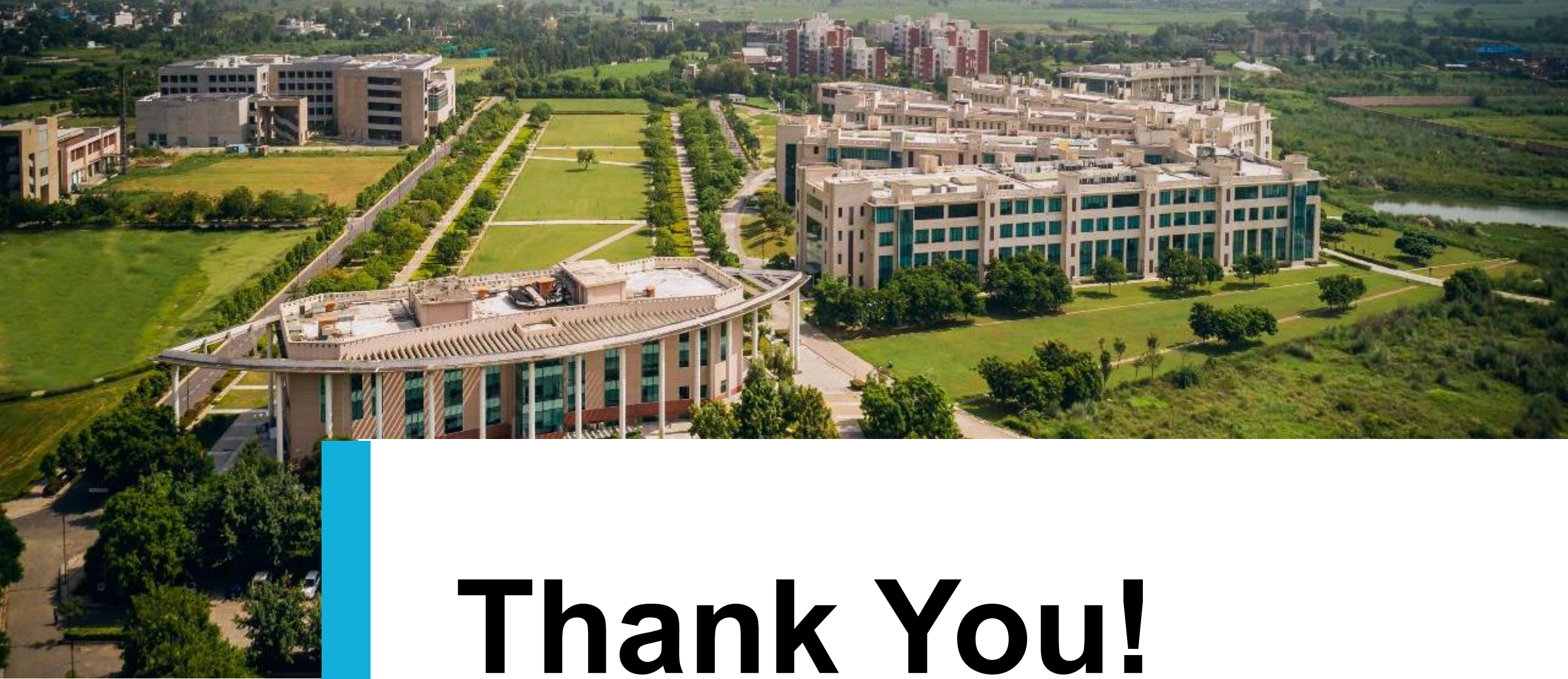
Image: Collection of Crop Yield Data



Image: Interaction with School students at a farmer's field

Direction of future plan for community Engagement

- Enhancing farmers' livelihood in the vicinity of Shiv Nadar University by assessment of crop health and water quality using emerging technologies in the backdrop of climate change
- Rural women's empowerment use of technologies in agriculture and drinking water quality & availability in the backdrop of climate change



Thank You!