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PUSAT PENGAJIAN KEJURUTERAAN AWAM
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Collaborative Teaching Project:
Innovative Water Resource Technologies for Sustainable Paddy Cultivation

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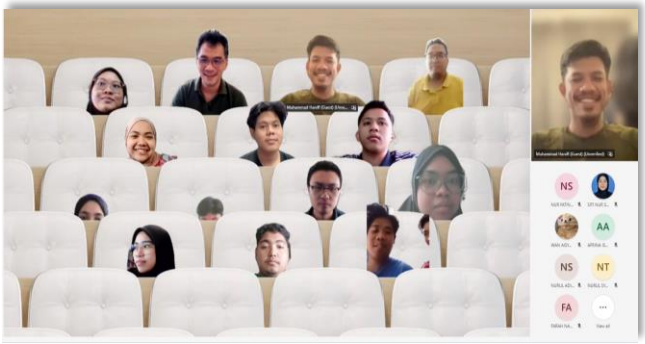
As part of a collaborative teaching program aimed at enhancing knowledge of students in line with developments in the industrial sector, *Mr. Muhammad Haniff Bin Ahmad*—Research Officer at the Engineering Research Center, Malaysian Agricultural Research and Development Institute (MARDI) was invited to deliver a compelling online lecture on 6th December 2024 titled *"Innovative Water Resource Technologies for Sustainable Paddy Cultivation".* The lecture explored advancements in water resource technologies for sustainable agriculture, particularly in the face of climate change in Malaysia.

Mr. Haniff began by highlighting the growing vulnerability of Malaysia's agricultural sector to climate change. Future climate projections suggest increased variability in rainfall patterns, prolonged dry spells, and rising sea levels—all of which pose significant threats to paddy field irrigation. Saline water intrusion into coastal irrigation networks is becoming more frequent, compromising soil health and crop yields. In response, researchers are exploring the viability of cultivating hilly paddy, which are more resilient to water stress and can thrive in elevated terrains with alternative irrigation strategies.



To address these challenges, Mr. Haniff introduced a suite of alternative water resource technologies aimed at reducing dependency on conventional irrigation system that rely on surface water. These include:

- **Water Recycling Systems** (Pond Storage): By capturing excess irrigation runoff and rainwater into dedicated storage ponds, farmers can reuse water during dry periods. Research conducted by Mr Haniff demonstrated that water savings was up to 32%, with improved irrigation efficiency and reduced environmental impact.
- **Drainage Recovery Systems**: These systems intercept and treat agricultural drainage water, allowing it to be reused for irrigation. This not only conserves water but also minimizes nutrient loss and pollution.
- **Shallow Groundwater Wells**: In regions with suitable aquifers, shallow wells offer a reliable backup source during dry seasons. Proper monitoring ensures sustainable extraction without depleting local water tables.
- **IoT-Based Irrigation Monitoring**: Mr. Haniff emphasized the role of smart technologies in modern agriculture. IoT sensors can track soil moisture, weather conditions, and water flow in real time, enabling precise irrigation scheduling and reducing waste.

The session was part of a broader effort to bridge academic learning with industrial practice. Students were exposed to real-world applications of hydrological engineering principles, including system design, water budgeting, and sustainability assessment. Mr. Haniff's insights encouraged students to think critically about the intersection of engineering, environmental stewardship, and food security.

In closing, Mr. Haniff stressed that sustainable cultivation is not merely a technical challenge but a societal imperative. By integrating innovative water resource technologies and adapting to climate realities, Malaysia can safeguard its paddy production while nurturing a new generation of engineers equipped to lead the transformation.