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Sustainable Water Management in Rice through "AutoMon^{ph}"

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Agriculture uses approximately 70% of the planet's freshwater supply, of which 40% is used for rice cultivation. The field level, rice receives up to 2-3 times more water than other irrigated crops. Worldwide, water for agriculture is becoming increasingly scarce. The causes are diverse and location-specific, but include decreasing resources, malfunctioning of irrigation systems and increased competition from other sectors such as urban and industrial users. Currently, rice constitutes a staple food for half of the world's population; more than three billion people rely on the grain for their main source of livelihood. Enhancing rice production and increasing water productivity will be essential to ensure food security for this population. We present sustainable water management options to help farmers to cope with water scarcity at the field level.

Sustainable water management at field scale

There are many technologies that can reduce irrigation water input and increase water productivity. These include:

- Field design and land gradient
- Land levelling
- Tillage: reducing soil permeability
- Bund preparation and maintenance

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- Alternate establishment method-changing crop establishment to dry seeding or non-puddle transplanting
- The System of Rice Intensification
- Saturated soil culture
- Irrigation scheduling using safe alternate wetting and drying (safe AWD) principles
- Micro-irrigation
- Drought-tolerant rice varieties
- Improved crop management - includes altering planting calendar to reduce evaporation losses, mulch and harnessing residual moisture
- Conservation agriculture.

AutoMon^{PH}

Despite these, the World's irrigation sector faces many challenges, such as water scarcity, the absence of effective and real-time water-use monitoring system, multifaceted water governance and inequitable distribution of irrigation water within the basin. To address these problems, the Philippine Rice Research Institute (PhilRice) and the International Rice Research Institute (IRRI) are developing an irrigation advisory service using internet of things (IoT) tool called AutoMon^{PH} for catalyzing the adoption of sustainable water management and improving irrigation operational efficiency. The AutoMon^{PH} is based on a scientifically proven method for irrigation scheduling called alternate wetting and drying (AWD), which saves water up to 30% without a yield penalty.

The digital tool for water management will

AutoMon^{PH} is an Internet of Things (IoT) solution, which refers to a network of objects – things-that communicate with water level sensors using wireless connectivity. As an IoT solution, it provides;

- Efficient water management.
- Allow effective and real-time monitoring of water status at multiple levels (from plot to river basin).
- Enable computation of water demand at multi-scale.

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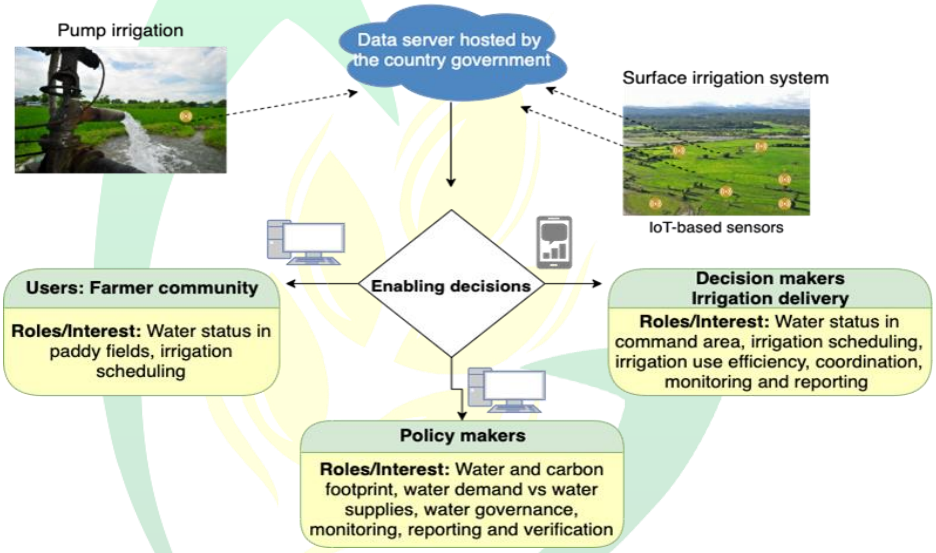
- Provide improved access to information that will guide decision-making of different stakeholders.
- Reduce transaction time and cost of effective coordination among stakeholders.
- Enhance transparency in water governance.
- Create a real-time analytics platform for monitoring, evaluation, and learning.
- Establish an evidence repository to trigger policy change. Facilitate computation of methane emission/C-footprint in rice with real time water management information.

Conceptual framework of AutoMon^{PH} operation



Challenge

AutoMon^{PH} aims to address the following core issues;

- Inefficient water use and management for irrigation.
- Uncoordinated, ineffective water governance.
- Lack of sustainable, scalable programs providing holistic solutions from field to policy.
- Lack of real-time data to drive decision making for irrigation.