

# SMART AGRICULTURE

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## Connected, Data Driven and Organic Farm

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# ADDRESSING FOOD SECURITY

- The world population is constantly increasing at a rate that is considered not to be sustainable by most environmentalists.
- We are simply going to exhaust earth's resources at the expense of future generations.
- Food shortage continues to be a thorn in the flesh of most governments.
- Growing awareness & immense interest in healthy organic foods.
- Reliance on ineffective conventional farming methods has partly contributed to this scourge.



# The **AGRICULTURE** Landscape

more than **22%**

Asian diet comprises of  
**fish protein**

Families must have year-round access to affordable and nutritious food for a **balanced, healthy diet**, which must include vegetables as a source of many micronutrients.

Southeast Asia must **maximize crop productivity** while minimizing losses, wastage and the overall impact on the environment.

**Urbanization**, land scarcity, and low local food productions of fish and leafy vegetables

**64 %**

ASEAN fisheries' resource base ( **medium to high risk from overfishing**)

South-east Asia is expected to see an increase in food demand by 2050,

**40%**

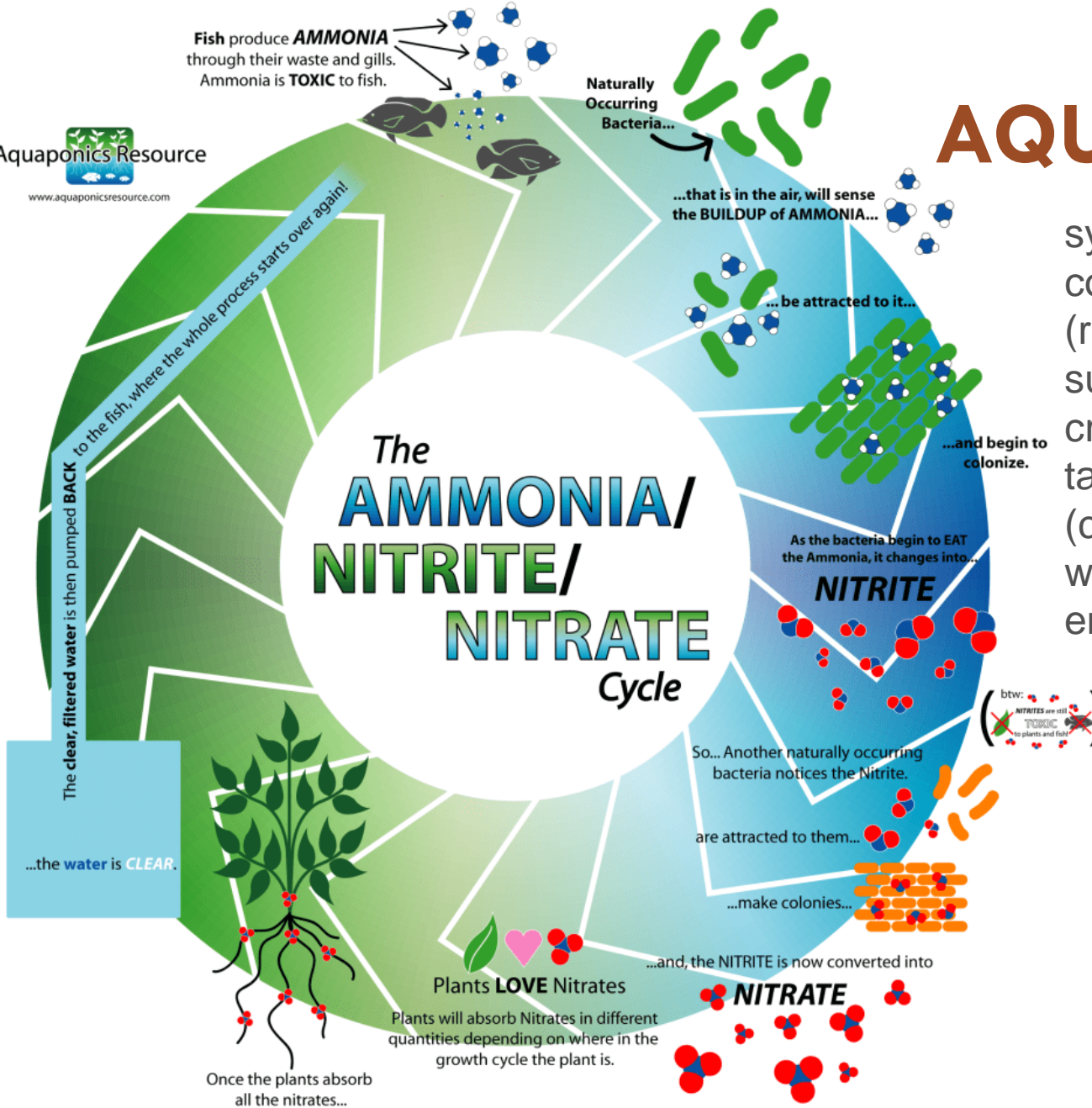
the World Economic Forum on  
ASEAN





# AQUAPONICS

system that combines conventional aquaculture (raising aquatic animals such as snails, fish, crayfish or prawns in tanks) with hydroponics (cultivating plants in water) in a symbiotic environment



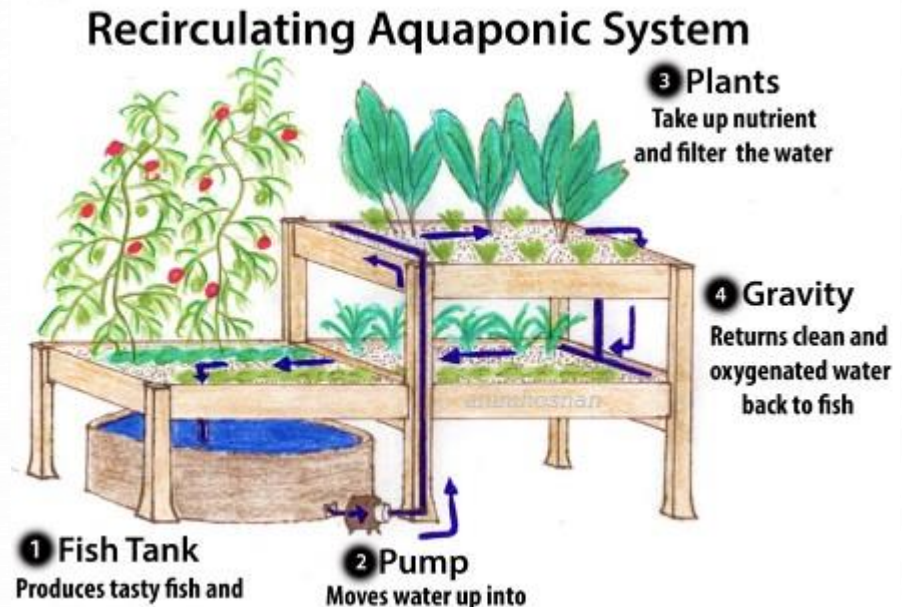
# GENERIC advantages

- **Grow up to 30% more food in the same amount of space**
- **Uses 90% less water than soil based agriculture**
- **Significantly less carbon footprint**
- **No soil required, no pesticides, NO FERTILISERS involved**
- **Year-round production**
- **Closed and indoor system – no discharge into streams, lakes, municipal waste system, etc...**
- **Alleviates overfishing and catch share crisis**



# HOUSEHOLD benefits

- Locally grown nutritious food
- Fresh food from farm to meal
- Sustainable farming practices
- Household involvement
- Income generating possibility





# WHAT FISHES?

## Tilapia

- Grows rapidly 97-9 months to full growth)
- Tolerant of poor water conditions
- Feed to weight conversion of approximately 1:1
- Good filets
- excellent source of protein

## Catfish

- This catfish species generally don't affected by any diseases.
- can stand in any kind of water condition
- full grown in about six months
- contains a lot of vitamins and useful compounds.

- They can feed on algae or any plant-based food
- Can be stocked with success in high densities
- Able to breed quickly (4-6 weeks)



# WHAT GROWS WELL?





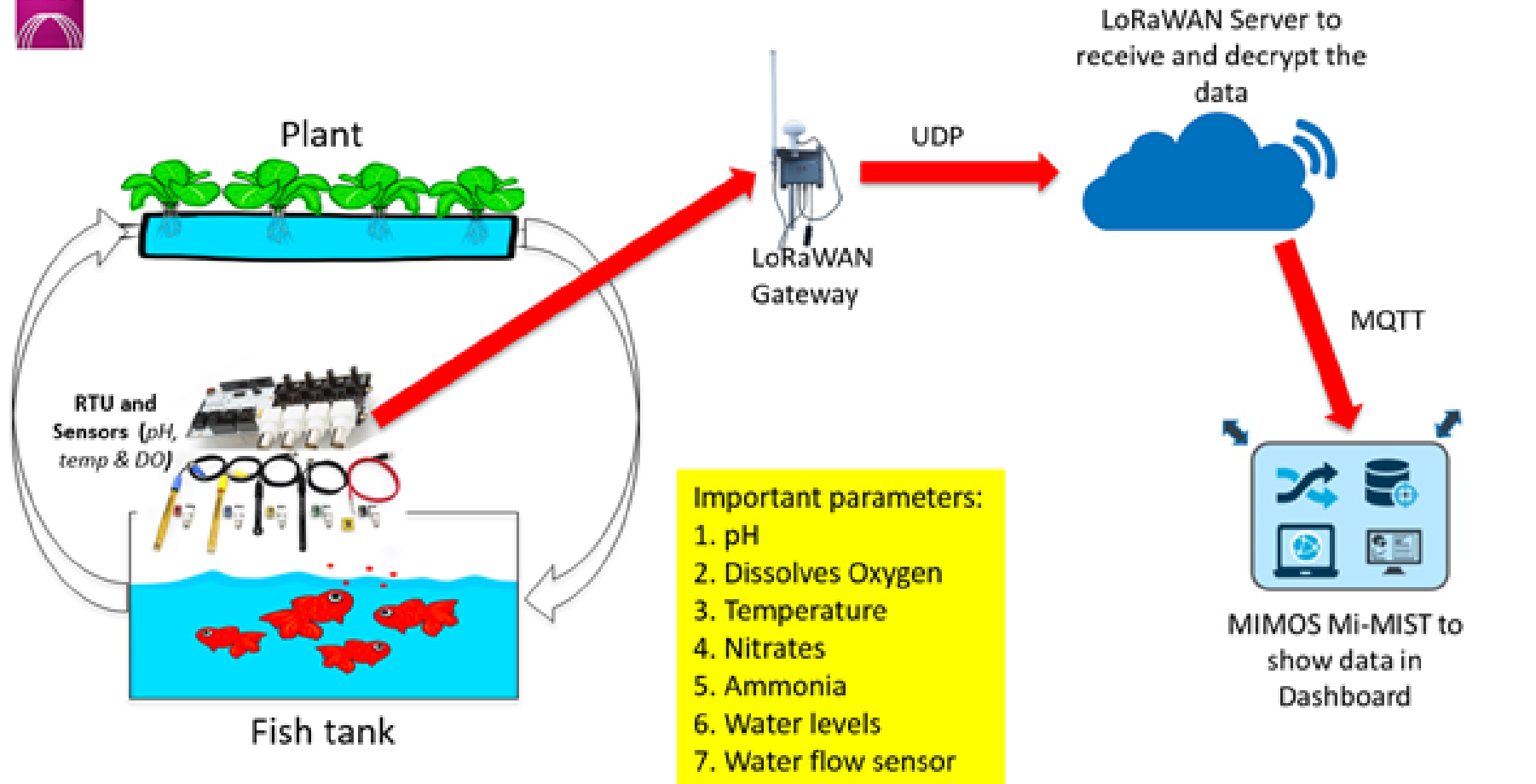
# More reasons for AQUAPONICS

- Healthy eating
  - Fresh and nutritious food
- Scalability
  - Applicable to individual/micro/small/medium enterprises
- Individual/household
- Aquaculture farmers
- Hydroponic farmers
- Fish rearing hobbyist





# The Smart Farming System



# The Smart Farming System

- Monitoring of critical parameters using IoT
- Data analytics, to enable actuators optimize the condition of the farms
- Minimize human interventions
- Little time (busy people) /little knowhow on farming
- Technology savvy generation (access to apps)
- Improving the productivity and cost efficiency





# AGRICULTURE + ICT

- Will the use of internet, sensors and app have practical application on the commercial scale in aquaponics system?
- Can the use of data analytics provide deep insight about fish and plant nutrients?
- Can new formula for fish and plant growth be achieved through the usage of data-driven method?
- Can the use of mobile apps reduce the labour cost and improve the practical application of aquaponics for urban household?
- Can the efficient use sensors, actuators and Internet further improve the productivity of aquaponics systems?



# Challenges SENSOR & ACTUATORS

- Some challenges in deploying sensors and actuators;
  - Alert too late
  - Frequency of reading for optimization of information
  - Power supply – battery life of sensor
  - Placement – positioning
  - Calibration of sensors



# THANK YOU

Seeking collaboration with other researchers

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