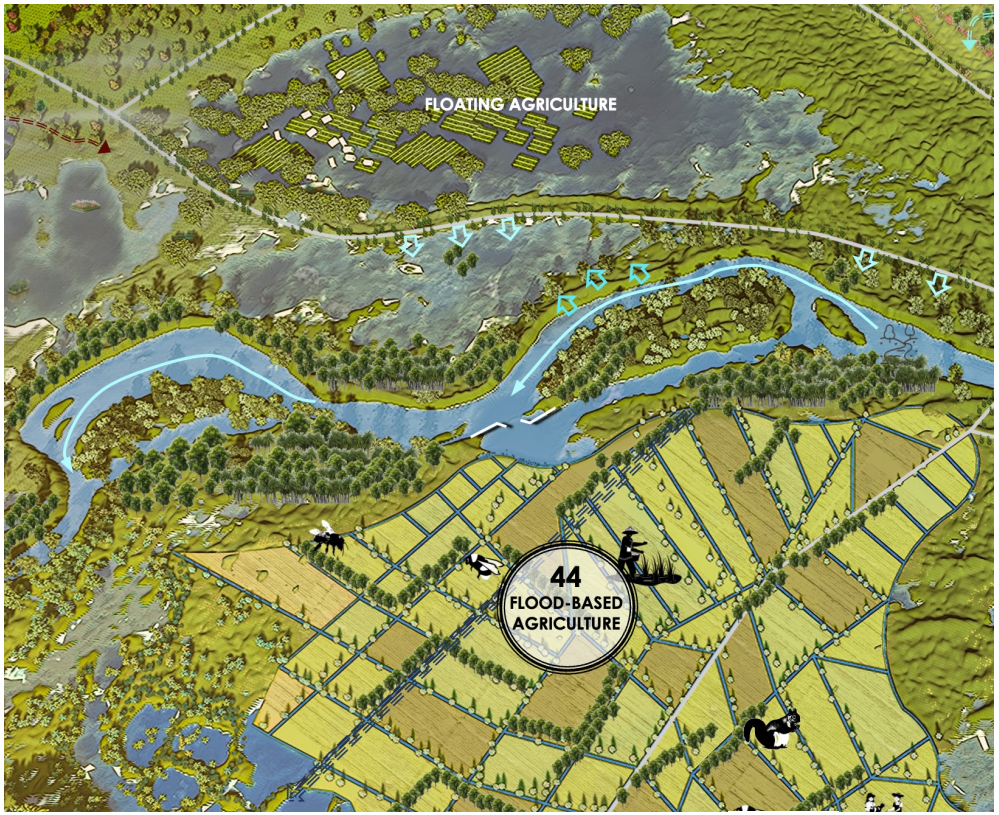
NbS-44: FLOOD-BASED AGRICULTURE



Flood-based agriculture is a nature-based solution (NbS) that leverages seasonal floods to enhance agricultural productivity, improve food security, and build climate resilience in flood-prone areas of Southeast Asia, such as the Mekong River Delta and Tonle Sap Biosphere.

This approach utilizes the natural inundation cycles to deposit nutrient-rich sediments, replenish soil fertility, and provide water for crops, reducing reliance on synthetic fertilizers and irrigation.

Technically, it involves practices such as flood recession farming, floating crop cultivation, and integrated aquaculture-agriculture systems that maximize the benefits of water and sediment flows.
On a landscape level, it preserves floodplains, wetlands, and riparian ecosystems, which act as natural buffers against extreme weather events while enhancing biodiversity.
Socially, it supports rural livelihoods by offering sustainable income streams, promoting traditional knowledge, and strengthening community resilience to climate-induced disruptions such as droughts and floods.

LANDSCAPES SUPPORTED

EbA (ECOSYSTEM-BASED APPROACHES)

- NUTRIENT CYCLING
- HABITAT CONSERVATION
- INTEGRATED WATER RESOURCES MANAGEMENT
- DISASTER RISK REDUCTION
- CARBON SEQUESTRATION
- SUSTAINABLE LAND MANAGEMENT

MAIN PROBLEMS ADDRESSED

- SOIL EROSION
- BIODIVERSITY LOSS
- FLOOD CONTROL
- DISASTER RISK REDUCTION
- FLOOD SECURITY

ECOSYSTEM SERVICES AND ACTIONS

SUPPORTING

- **Soil Fertility Restoration**: Seasonal floods deposit nutrient-rich sediments, replenishing soil organic matter and fertility.

REGULATING

- **Flood Regulation**: Preserves natural floodplains, reducing downstream flood risks and enhancing water retention in landscapes.

PROVISIONING

- **Enhanced Crop Production**: Provides nutrient-enriched soils and natural irrigation, improving agricultural yields and food availability.

SOCIAL BENEFITS

- **Food Security and Livelihoods**: Supports rural communities with sustainable farming practices and diversified income opportunities.

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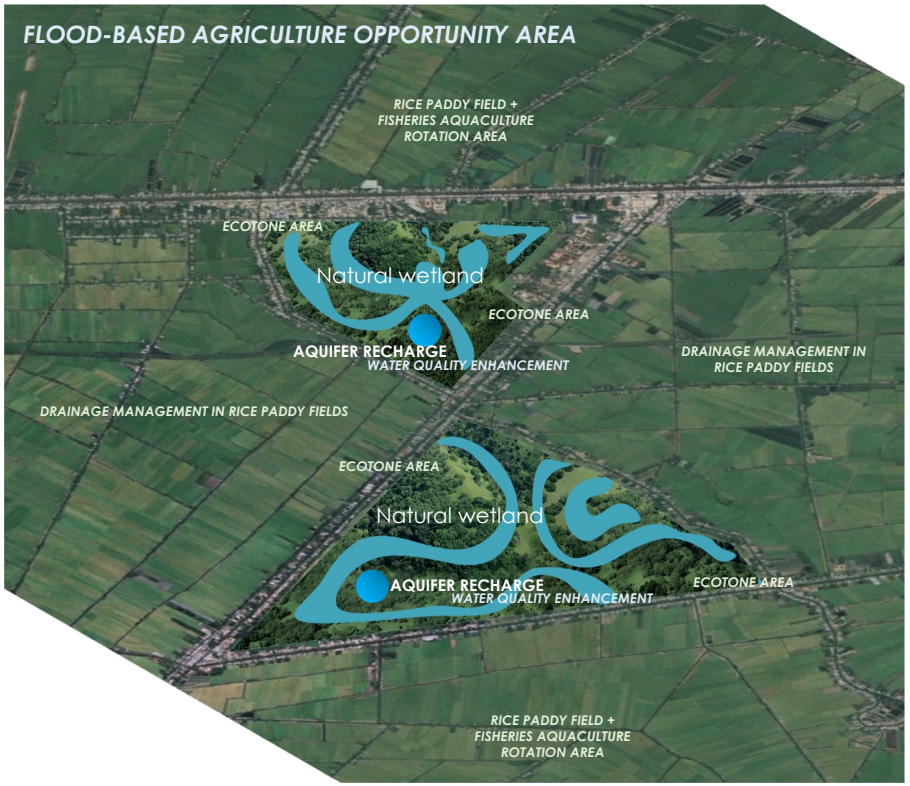
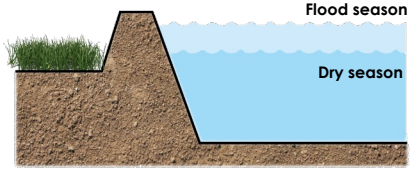
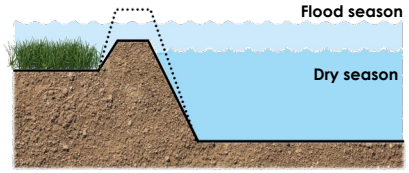


CURRENT AGRICULTURAL MODEL WITH HIGH DIKES



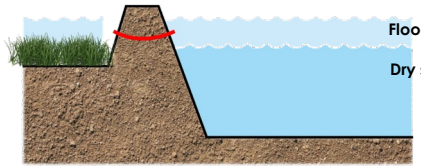
High dike constructed to prevent flood water

FLOOD-BASED AGRICULTURE WITH LOW DIKES



Low dike allowing water to enter during the flood season

FLOOD-BASED AGRICULTURE WITH HIGH DIKE WITH CULVERTS



High dike with culverts, allowing water to periodically enter in the flood season.

Source: RHDHV – ONE Architecture, 2021

PROJECT'S CHALLENGES & RISKS

- **Unpredictable Flood Patterns**: Climate change-induced variability in flood timing and intensity can disrupt agricultural cycles and reduce yields.
- **Land Use Conflicts**: Competing demands for floodplains, such as urban expansion or infrastructure development, can limit the availability of land for flood-based agriculture.
- **Community Adaptation**: Traditional knowledge of flood-based farming may be lost or insufficient, requiring significant training and capacity-building efforts.
- **Water Quality Issues**: Floodwaters may carry pollutants, such as agricultural runoff or industrial waste, posing risks to soil health and crop safety.

NbS co-BENEFITS AND THEIR INDICATORS

- **Increased Soil Fertility**
  Improvement in soil organic matter content and nutrient levels (e.g., nitrogen, phosphorus) after flood events.
- **Enhanced Water Retention**
  Higher groundwater recharge and sustained soil moisture during dry periods compared to non-flooded areas.
- **Improved Crop Resilience**
  Higher crop survival rates during droughts or extreme weather events due to better soil moisture and nutrient availability.
- **Biodiversity Conservation**
  Increased diversity of aquatic and terrestrial species in floodplain ecosystems, monitored through biodiversity indices.
- **Carbon Sequestration**
  Measurable increase in soil carbon stocks, tracked by soil carbon content assessments post-flooding.
- **Strengthened Local Livelihoods**
  Increased income from diversified agricultural activities and improved food security for local communities.

COST ANALYSIS

- **Direct Costs**
  The costs of land preparation, flood management, and crop inputs range from $300 to $500 per ha annually.
- **Indirect Costs**
  Between $50 to $150 per ha per year for training, extension services, and monitoring programs.
- **Time Horizon**
  10 to 20 years, with a discount rate of 5–7% to reflect long-term benefits like soil fertility and water management.
- **Direct Benefits**
  Increased crop yields provide direct economic benefits of $100 to $400 per ha annually.
- **Indirect Benefits**
  Flood regulation and improved biodiversity can save $50 to $150 per ha annually in disaster risk reduction and ecosystem health.
- **Risk Assessment**
  Unpredictable flood patterns may generate costs of $50 to $200 per ha annually for risk management or adaptive strategies.

REFERENCES:

Vietnam and Cambodia, Integrated Rice-Fish Farming Systems in the Mekong River Delta.
Cambodia, Floating Agriculture in Tonle Sap.

IMPLEMENTATION OPPORTUNITIES:

Thailand, Chao Phraya Basin.
Myanmar, Irrawaddy Delta.
Indonesia, South Kalimantan.
Vietnam, Mekong River Delta.