

Irrigation Trends in Asia and Mekong Under Climate Change: Challenges and Opportunities

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#### LAYOUT

1. The irrigation status in Asia and Mekong

3. Future climate change and variability

4. Sustainable irrigation water management

5. Challenges and Opportunities for Sustainable Irrigation Water Management

### THE IRRIGATION STATUS IN ASIA

Irrigated cropland has roughly doubled globally in the last 50 years

Asia contains 70% of the world's irrigated area

On average, around 45% of cultivated area in Asia is irrigated



#### IRRIGATION STATUS IN MEKONG

Irrigation water-use accounts for more than 70 percent of current utilization

Rice is the dominant crop in the LMB, using 70% of water and 80% of land for agriculture

The LMB countries aim to boost rice output and exports, as well as diversify crops and markets

the total irrigation area in the LMB could nearly double, reaching 7 million hectares by 2040.



Spatial distribution of area equipped for irrigation expressed as a percentage of total area (Nature, Tiwari, 2023)

#### 2. FUTURE CLIMATE CHANGE AND VARIABILITY AND THEIR IMPACTS ON THE IRRIGATION SECTOR

#### Availability:

• Agriculture Water availability will change due to climate change

#### Demand:

- Increasing air temperatures, causing increased evapotranspiration, increased crop water demand
- Changing temperature and precipitation conditions, causing change in cropping patterns and growing seasons of an irrigated area are

#### ; and

- Extreme events, rising sea levels, causing salinization of water resources.
- Uncertainties



Effects of climate change on the elements of the water cycle and their impacts on agriculture, Source: FAO

## CLIMATE CHANGE IMPACTS ON FISHERIES

- Fish habitat by changing water temperature and flow regimes, which can stress, displace and disrupt their ecosystems.
- Fish reproduction by altering the timing and conditions of spawning.



#### CLIMATE CHANGE IMPACT IN THE MEKONG



change left: in mean annual sub-basin precipitation (%) and right: annual sub-basin average temperature (°c) during 2010–2050 compared to 1985–2000

### **PROBLEM DEFINITION**

Mostly the area with the largest climate change impacts on agricultural water availability are the one most depended on irrigation and the ones with bigger plan to expand their irrigation lands





#### **3. SUSTAINABLE IRRIGATION WATER MANAGEMENT**

• Increasing efficiency and real water saving: Water scarcity often leads to calls for an increase in water use efficiency. This generally leads to an *increase* in water consumption at the basin scale. Residual water users, like ecosystems and fish, bear the brunt of poorly designed interventions to address water scarcity.



## BASIN-WIDE APPROACH IN TRANSBO UNTERMANAGEMENT Large farmers and smallholders Unit of the second state of t

Upstream and downstream farmers



#### CHALLENGES

Lack of reliable and consistent data on water availability, use and consumption at different scales and locations

Uncertainty and variability in future climate scenarios and their impacts on water resources and crop production and flow regiems

Inadequate institutional capacity and coordination among different agencies and stakeholders

Low awareness and acceptance of real water saving concept among farmers and irrigation managers

### **OPPORTUNITIES**

Using climate-smart water technologies. These include technologies such as rainwater harvesting, deficit irrigation, alternate wetting and drying, crop diversification, etc

Using simulation, artificial intelligence and big data These can help farmers make informed decisions on when, where and how much to irrigate, and also provide feedback and recommendations for improving water use efficiency

**Implementing integrated water resources management** that can coordinate the use and allocation of water among different sectors and stakeholders, taking into account the environmental, social and economic aspects of water-irrigation-farming.

#### OPPORTUNITIES FOR FISHERIES

Irrigation modernisation, where old infrastructure is replaced with new designs, provide a **once-in-ageneration** opportunity to increase fisheries productivity

The fish friendly irrigation technique also **needs to adopt to future climate change by considering the uncertainties range**, as climate change can impact the design criteria such as water flow and level, also fish migrating calendar.

Irrigation and environment sectors are still very siloed. But there is increasing understanding of the need for an **ecosystem approach** which leads to meet Environmental Flow Requirement which protect fish habitat

# Thank you!