# ADB supported project

# Climate-smart practices and varieties for intensive rice-based systems in Bangladesh and Cambodia

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# Activities

- Identify constraints for adoption of climate smart water saving mechanized technologies.
- Identify policy, institutional support and logistics need to scale up high level climate smart- water saving mechanized technologies.
- Conduct 6 field demonstrations for one-year crop cycles at two sites in Bangladesh (AWD) and 4 field demonstrations at two sites in Cambodia (mechanized DSR) and organize training, visits of progressive farmers, government officials, and representatives from NGOs and the private sector.
- Multiply 13.5 ton quality seed of rice and other crops and distribute to 8500 farmers
- Demonstrate the benefits of water-labor-energy savings, reduction in GHG, and increase in yield, farmers' income, and system productivity in Bangladesh and Cambodia.

# Dissemination of AWD varieties and management practices in Muhuri irrigation project, Chittagong, Bangladesh: ADB supported project

| Activities | Accomplishments |
|---|---|
| Dissemination of AWD water saving rice technology, associated management practices, rice varieties suited to AWD | **Farmers:** 508**, Area:** 125 ha, **Region:** 8 villages of 6 upazilas in two 2 districts (Feni, Chittagong) |
| Training to extension workers as well as farmers on AWD and associated management practices | **Number :** 9; **Participants:** DAE field stuff, NGO workers, 508 farmers |
| On-farm water saving and reduced GHG emission under AWD as compared to flooded cultivation | Completed |


Dhaka Meeting


Chittagong Meeting


Farmer's training


Experimental Site

# Yield and water saving achieved in Muhuri project area

| Trait | Treatments | Locations | | | | | |
|---|---|---|---|---|---|---|---|
| | | Nurpur | Valukia | Korerhat | Pathangor | Dakkin Adhar manik | Mean |
| GY (t/ha) | AWD | 6.4 | 6.6 | 5.4 | 6.7 | 5.5 | 6.1 |
| | Conventional | 6.7 | 6.4 | 5.2 | 6.3 | 5.5 | 6.0 |
| | LSD (0.05) | | | | | | 0.3 |
| Maturity (days) | AWD | 134 | 135 | 138 | 136 | 136 | 136 |
| | Conventional | 139 | 138 | 139 | 140 | 141 | 139 |
| | LSD (0.05) | | | | | | 2.15 |
| Number of panicles per square meter | AWD | 263 | 324 | 317 | 228 | 325 | 291 |
| | Conventional | 235 | 300 | 269 | 383 | 284 | 294 |
| | LSD (0.05) | | | | | | 10.62 |
| Number of filled grains/panicle | AWD | 117 | 105 | 118 | 129 | 100 | 114 |
| | Conventional | 116 | 104 | 126 | 122 | 114 | 116 |
| | LSD (0.05) | | | | | | 9.33 |
| % Sterility | AWD | 22.18 | 13.72 | 19.21 | 13.49 | 22.79 | 18.28 |
| | Conventional | 16.39 | 12.57 | 10.43 | 10.71 | 14.84 | 12.98 |
| | LSD (0.05) | | | | | | 4.06 |
| Number of required irrigation | AWD | 6 | 7 | 8 | 7 | 8 | 7 |
| | Conventional | 8 | 10 | 10 | 9 | 10 | 10 |
| | LSD (0.05) | | | | | | 0.56 |

# GHG,GWP under AWD, flooded irrigation: BRRI

| Water management | GHG (kg ha$^{-1}$) | | | |
|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $N_2O$ | GWP |
| AWD | 148b | 543a | 1.1a | 4585b |
| Continuous flooding | 247a | 570a | 1.1a | 70821a |

*letters in a column represent the comparison of means at 5% level of significance by LSD*

GHG measurement, BRRI


AWD crop at farmers site

# Water saving varieties released

| Name | Designation | Country, release year |
|---|---|---|
| CRdhan 40 | IR55423-01 | India 2012, Aerobic |
| CR Dhan 201 | IR 83380-B-B-124-1 | India 2013, Aerobic |
| CR dhan 202 | IR 84899-B-154 | Indian 2013, Aerobic |
| CR dhan 203 | IR 84899-B-185 | India 2013, Aerobic |
| CR dhan 204 | IR 83927-B-B-279 | India 2013, Aerobic |
| CR dhan 205 | IR 86931-B-578 | India 2014, Aerobic |
| Kathian 2 | IR 82635-B-B-47-2 | Philippines 2014, Aerobic |
| Sabour Ardhjal | IR 87638-10-1-1-3 | India, 2016, Aerobic |
| Kathian 3 | IR 86857-101-2-1-3 | Philippines 2014, Aerobic |
| CAR 14 | IR80463-B-39-3 | Cambodia, 2015, Aerobic |
| Rajendra Neelam | IR 80312-6-B-3-2-B | India, Bihar, 2017, Aerobic |

## Accomplishments

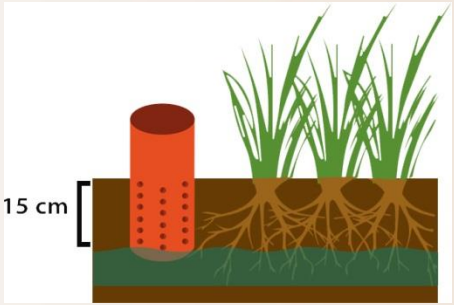
- Discussion on project activities with CARDI, Cambodia and BRRI, Bangladesh

### Cambodia:

***Site Selection:*** Kampong Thom (10 ha) and Takeo Province (10 ha)
***Variety Selection:*** Phka Rumduol and CAR14
***Crops after rice:*** Mungbean, watermelon, bitter gourd, cassava, vegetables
**Participation of farmers:** Confirmed
**Seed multiplication, distribution**: Planned

### Bangladesh

***Site Selection:*** Nurpur (10 ha) and Korerhat Village (10 ha) in Muhuri Project area sites.
***Variety Selection:*** BRRI dhan 71 and BRRI dhan 75
***Crops after rice:*** *Mustard, vegetables*
**Participation of farmers:** Confirmed
**Seed multiplication, distribution**: Planned



Bangladesh- AWD


Cambodia-DSR


Site selection Visit Kampong Thom, Cambodia


Site selection visit Takeo, Cambodia


Discussion with Farmers during site selection visit Bangladesh

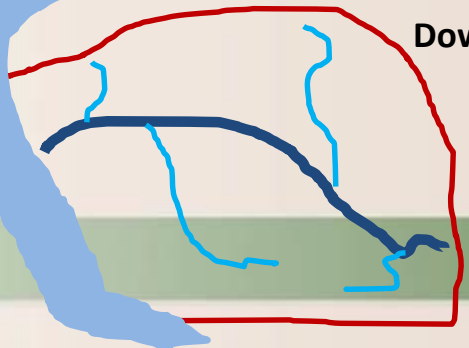

Site selection Nurpur , Bangladesh

# Challenges for adoption of AWD

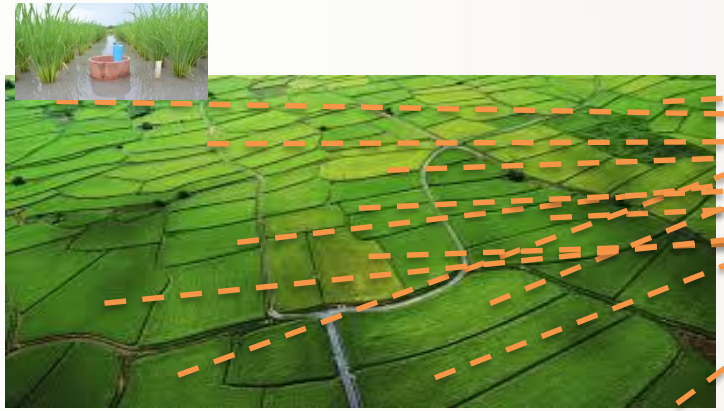

- Field to field irrigation
- Who are decision makers
- Staggered demand within small hydrological unit

Visible benefits

- Laborious and time consuming
- Knowledge intensive



# Decision tool for Water Management



Water level telemetry data

Cloud Infrastructure
(iGovPhil, PhilRice)

Gateway

Data

Information

Insight

Irrigation Association
Operator

IA President

IA Vice President

Turnout Leader

Farmer

Irrigation Dept

Agriculture Dept

# Potential CS water-saving technologies

- Improved rice varieties
  - High yield, short-duration, abiotic stress tolerant, water efficient, aerobic rice, and demand-driven
- Diversification of rice-based cropping system
  - Improved rice varieties and non-rice crops, crop management
- Conservation agriculture
  - Minimum tillage, compost and mulching,
- Mechanized crop planting
  - DSR, machine sowing, harvesting of crops
- Smart irrigation system
  - AWD, irrigation scheduling, volumetric pricing, solar pumping, smart pre-paid card system, efficient infrastructure, community-based irrigation

# Constraints in adoption of CSA technologies

| | |
|---|---|
| Biophysical | • Landscape<br>• Soil and water<br>• Climatic risk |
| Production system | • Limited access to technologies (crop, variety, machine, irrig., input)<br>• Limited information, knowledge, and skills on CSA |
| Economic | • Low additional benefit (yield, income, livelihood)<br>• Higher investment cost (inputs, weeds)<br>• Limited capital, incentives, and infrastructure. |
| Sociocultural | • Food self-sufficiency is a first priority<br>• Traditional practices (community, labor, gender, norms and values)<br>• Human behavior (resist change, risk-averse, women participation) |
| Enabling environment | • Limited access to credit and market<br>• Weak institution (extension, information, credit, land tenure)<br>• Poor governance (policy, rule and regulation, support, coordination) |

# Needed policies and institutions for scaling: Dialogue, suggestions

- Investment to develop, validate, and disseminate appropriate CSA technologies
- Smart extension that improves farmers' access to information, technology, and knowledge
- Train farmers to sensitize, make them aware and enhance capacity (knowledge and skills) on CSA technologies
- Provide support and incentives to farmers for adoption of CSA technologies
- Facilitate access to credit and market
- Promote agricultural service provision and insurance
- Develop infrastructure (e.g., irrigation and communication)
- Promote public-private partnership for technology dissemination
- Mainstream CSA in national development programs

# Needed logistics for scaling out: Bangladesh, Cambodia

- Review of government policies and priorities and align activities
- Propose methods to scale-out technologies and services through public-private partnership
- Conduct survey and generate evidence on adoption and impact
- Assess current practices, mechanization status, and service provision for machines and agricultural insurance

# Needed logistics for scaling out

- Examine current business models on agricultural service provisions and recommend viable business models: Bangladesh, Cambodia
- Sensitize policymakers and get policy support through policy dialogues and visits in research sites: Bangladesh, Cambodia
- Identify needs for policy and institutional support for strong farmer-market linkages: Bangladesh, Cambodia
- Raise profile of CSA by communicating successes to wider audiences: Bangladesh, Cambodia
- Establish knowledge sharing platform: Bangladesh, Cambodia

# Quality seed multiplication and distribution

- Quality seed multiplication of improved rice Varieties – 8 tons ( for wet and dry seasons) in Bangladesh, 5 tons in Cambodia
- Seed multiplication of 0.5 ton in mustard in Bangladesh and 0.5 ton Mungbean in Cambodia
- Distribution of quality seed to 5500 farmers in Bangladesh and 3000 in Cambodia
- Training farmers on quality seed production

ASTV, Cambodia

ADB, Bangladesh

# Training farmers, extension workers, NGOs

- Train 300 farmers on adoption of mechanized AWD in Bangladesh
- Demonstrate to farmers the benefits of AWD on water- labor saving and GHG reduction
- Train 300 farmers in Cambodia on mechanized DSR adoption
- Demonstrate to farmers the benefits of DSR for labor-water saving and GHG reduction

# IRRI thank ADB for continuous support for research on water saving rice varieties and technologies

- Development and Dissemination of Water-Saving Rice Technologies in South Asia: 2006-2011- Jengfeng Zhang
- Development and dissemination of climate-resilient rice varieties for water-short areas of South Asia and Southeast Asia: 2014-2016- Michiko Katagami
- Dissemination of AWD varieties and management practices in Muhuri irrigation scheme, Chittagong, Bangladesh: 06 months- Nov 16-May 17- Michiko Katagami
- Climate-smart practices and varieties for intensive rice-based systems in Bangladesh and Cambodia: 2017 onwards- Abul Basher

## Thanks to all of you for your kind attention