




Australian Government  
Australian Centre for  
International Agricultural Research




### Research for Climate Change Adaptation in Rice - Based Cropping Systems

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### The need for research:

- Agricultural is highly vulnerable to the affects of climate change
- Changes in rainfall and temperature = changes in YIELD
- Increased climate VARIABILITY = direct impacts on farmers incomes and food security. Must develop farming systems resilient to increased variability
- IFPRI (2009) estimate that globally an investment of US\$1.3 Billion annually in agricultural research is required to counteract effects of CC on child malnutrition



### About ACIAR

- Part of Australia's overseas aid. Specific agency under our Foreign Affairs portfolio
- Focussed on funding programs in **agricultural research**. Donor that **commissions** research. Fund **international agricultural research centres**
- Formulate **collaborative research programs** for finding solutions to agricultural problems of developing countries.
- Strong **capacity building** focus to help developing countries help themselves
- Develop strong **linkages** between research agencies
- Establish **training schemes** related to our research programs



### Defining & Planning this research

**Consultations (April – Sep 2009):**

- Vietnamese counterparts (policymakers, academic & research institutions, NGOs)
- IRRI (International Rice Research Institute)
- Australian partners

**Initial Project mission (Oct 2009)**

- focussed around a workshop at Can Tho University

**Project Development & Approval (1<sup>st</sup> half of 2010)**

**Project Implementation (mid 2010-2014)**

**Expected budget of US\$3.5M**



### Expected project partners:

Still in the development phase:

- Project Leader – IRRI (International Rice Research Institute, Philippines) Rice & Climate Change Consortium
- Collaborating Institutes in Vietnam (Can Tho University, Cuu Long Delta Rice Research Institute, SIWRP, IAS)
- Collaborating Institutes in Australia (Australian National University, Yanco Rice Research Station)

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### Cultivar Selection

- basic research done at IRRI on identification of genes that confer submergence and salinity tolerance
- Sub1 gene - protection for 10-18 days of submergence
- SALTOL – salt tolerant genes
- Strengthening on-going activities to speed the development and dissemination of high yielding, stress tolerant varieties
- Salinity & submergence tolerance in other crops (soybean)
- Heat Stress

Salinity

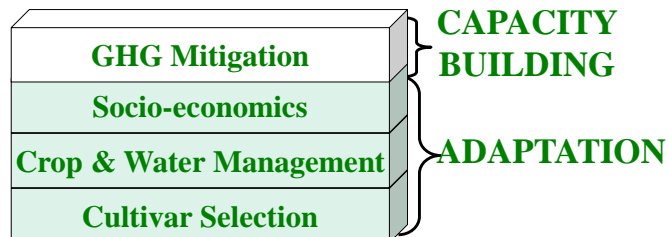


Flooding



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### Project Components



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### Agronomic Practices

- Refined resource management practices for the changing system (flooded, saline, new varieties, new cropping patterns)
- More effective and efficient cropping methods
- Improved fertiliser use efficiency through minimising losses
- Understanding nutrient cycling with changing hydrology regimes
- Maintaining productivity on acid-sulphate soils



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## Water Management

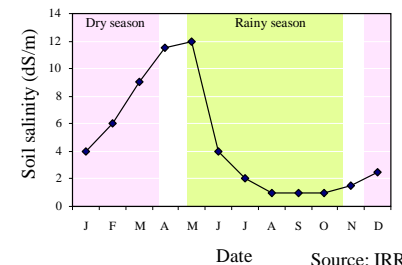
- Water management to cope with hydrological changes, where, when and how much water will be available for different land uses?
- Water saving strategies: eg Alternate Wetting and Drying (and effects on GHG emissions)
- Management of acid-sulphate soils



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## Salt Stress

- Coastal seasonal trend
- **High:** During DS & during crop establishment in the WS
  - **Low:** during wet season except under drought



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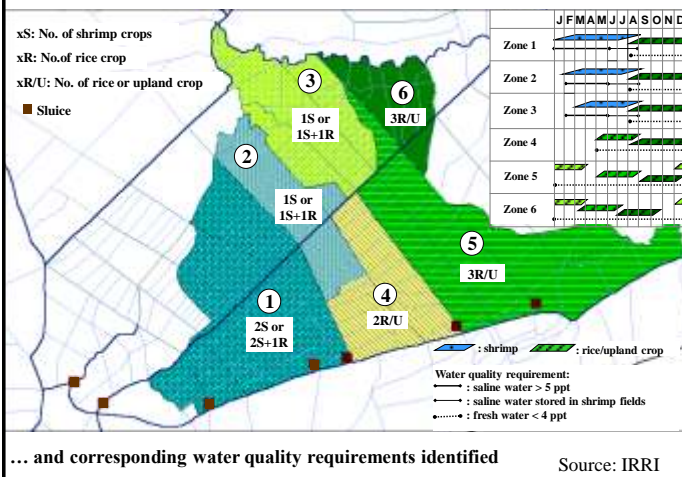
## Cropping systems

- Rainfed areas: farming systems that maximise the capture of rainfall
- Flood prone areas: optimising rice-aquaculture systems
- Salt affected areas: optimising rice-shrimp system and rice-non rice (salt tolerant soybean)
- Systems for acid-sulphate soils that minimise the effects of acidity & increase overall productivity: eg rice-sweet potato

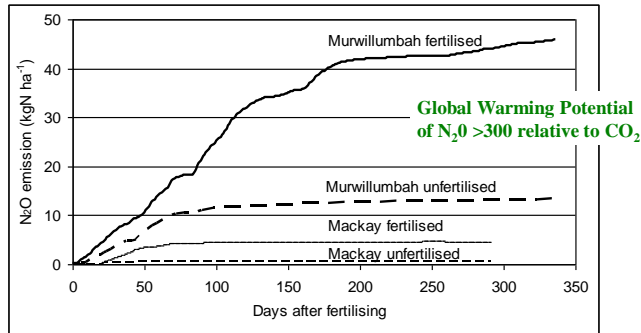


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## Land use zones delineated with local authorities...



### Cumulative Nitrous Oxide Emissions



Source: ANU

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### Socio Economic Aspects



- Good science does not make sense unless we know what the farmers need
- Evaluate the economic benefit of different cropping systems
- Understanding farmers strategies in transition from shrimp to rice, Dry Season to Wet Season
- Incentives for farmers to apply technologies for adaptation and mitigation of climate change
- Cropping systems more responsive to market demand

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### Cropping systems & Acid-Sulphate Soils

- Clear interaction between nitrogen and pyrite
- Different production systems required for acid sulfate soil and non acid sulfate soil areas

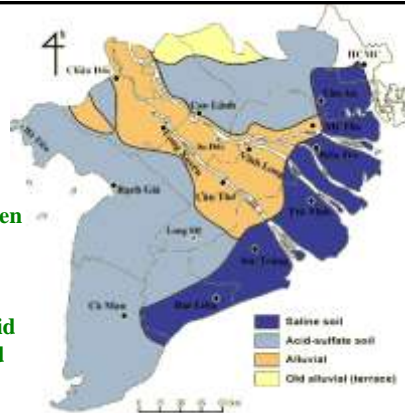


Fig. Distribution of soil status in Mekong Delta

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### Emission measurements



- Understand the emissions from different farming systems, C, N & S
- In the context of studying the nutrient cycling under changed conditions,;
  - what is the fate of Nitrogen, and how can losses in N be reduced
  - what are the methane emissions from these farming systems
- Build capacity in Vietnam for emission measurement

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Anticipated outputs:

- Identify integrated management practices for:
  - raising productivity of RBCS in areas affected by flooding and salinity (adaptation)
  - understand and minimize the emission of greenhouse gases from these systems (mitigation)
- Understand the drivers & constraints to farmers adopting better practices
- Provide a suite of agronomic packages that build a more resilient farming system to cope with temperature & water changes



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