Trends in Crop Production and Environment
-- Emphasizing Climate Change --

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INTERNATIONAL RICE RESEARCH INSTITUTE

Los Baños, Philippines

Mission:

Reduce poverty and hunger;

Improve the health of rice farmers and consumers;

Ensure environmental sustainability;

Capacity buiding in rice-growing countries.

Established 1960

www.irri.org

Climate Change Themes

Impact Assessment

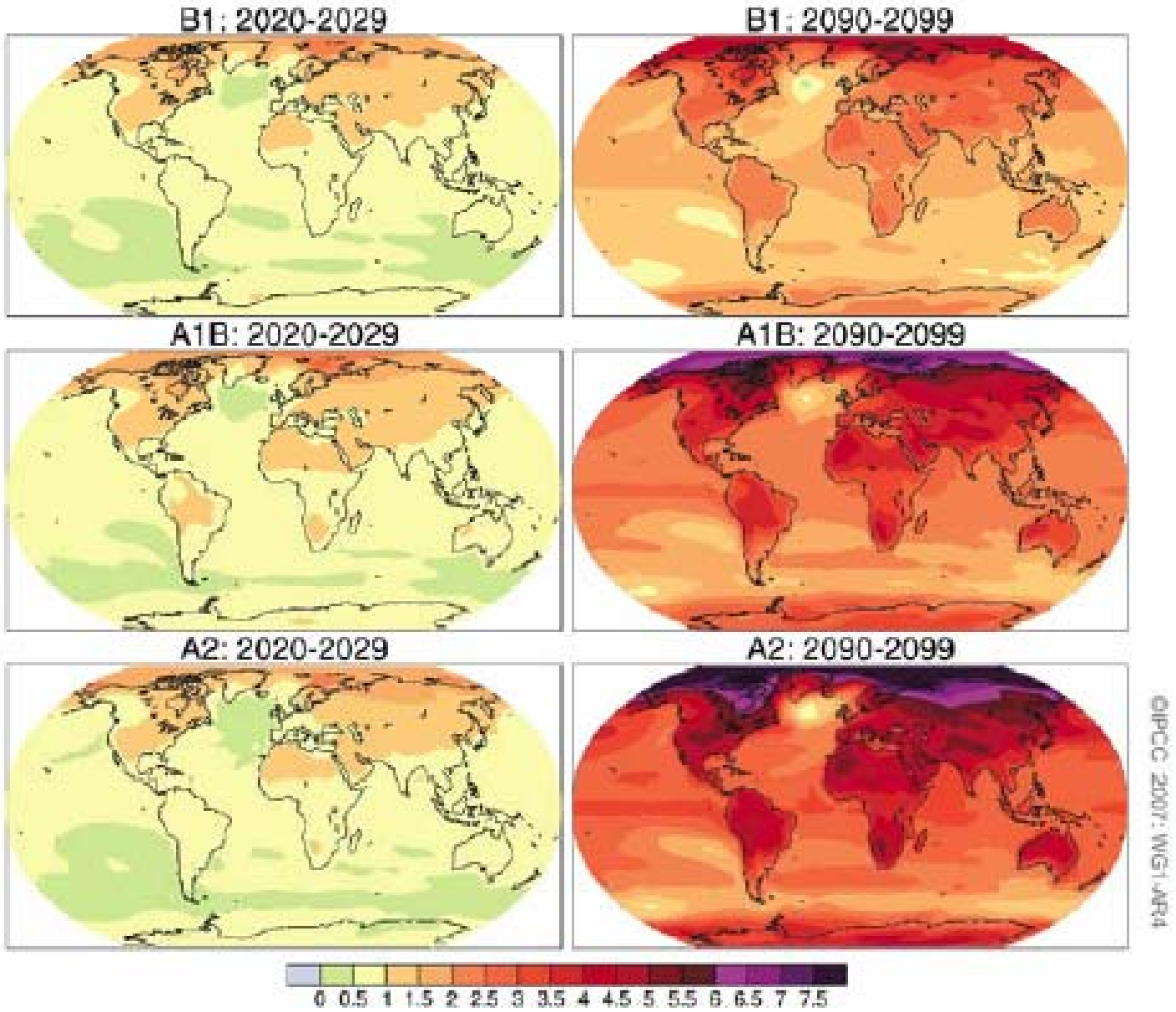
- General Circ. Models
- Regional Assessments
- Coupling to Sector Models

Mitigation

- GHG Inventories
- Technology Development
- Mechanisms (CDM)

Adaptation

- National Adapt. Plans???
- Technology Developm. ???
- Mechanisms???

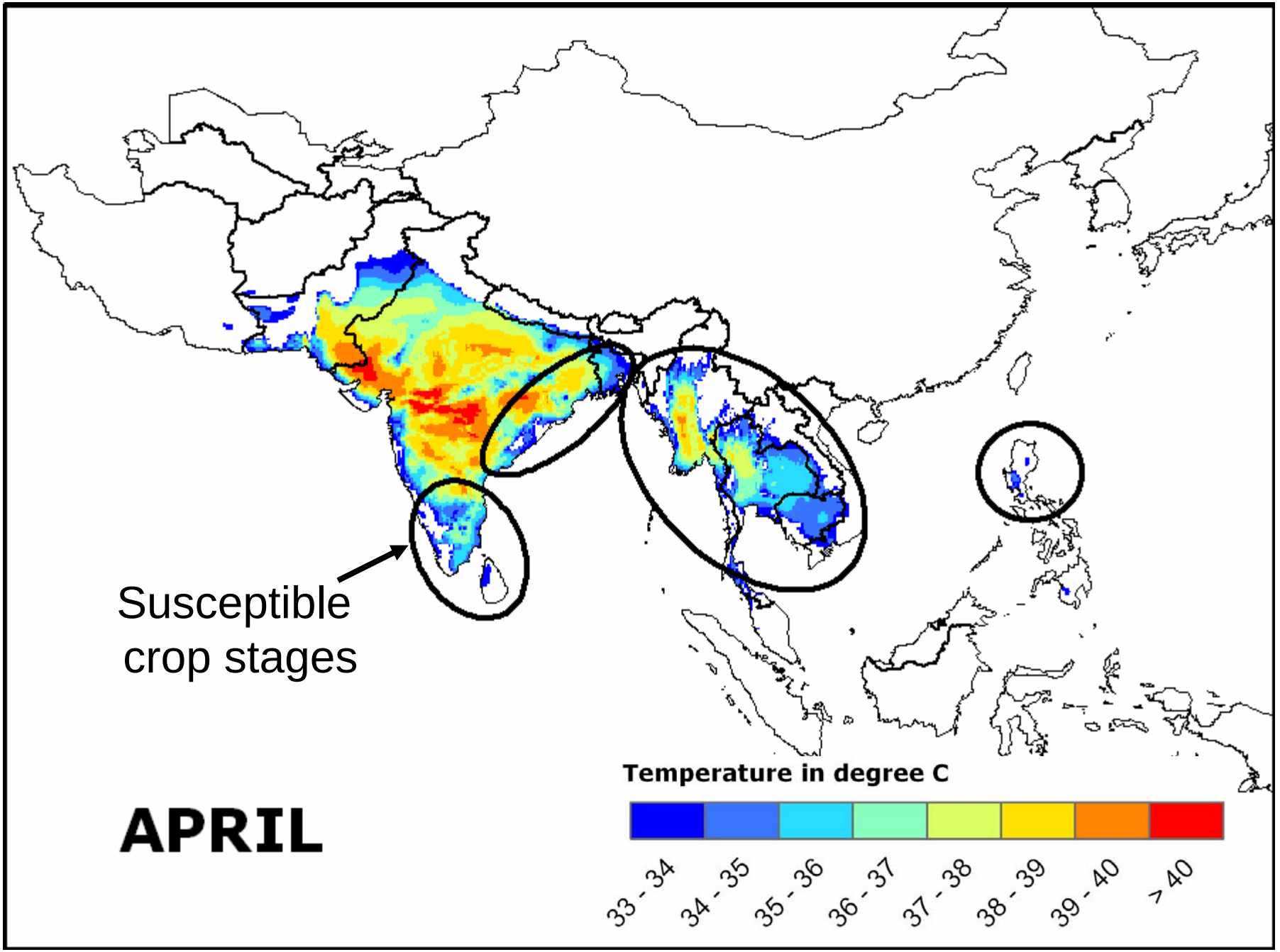


Regional Resolution of Global Climate Models

Universal Trends:

1) Higher Temperatures

2) More Extremes


Susceptible
crop stages
APRIL
Temperature in degree C
33 - 34
34 - 35
35 - 36
36 - 37
37 - 38
38 - 39
39 - 40
> 40

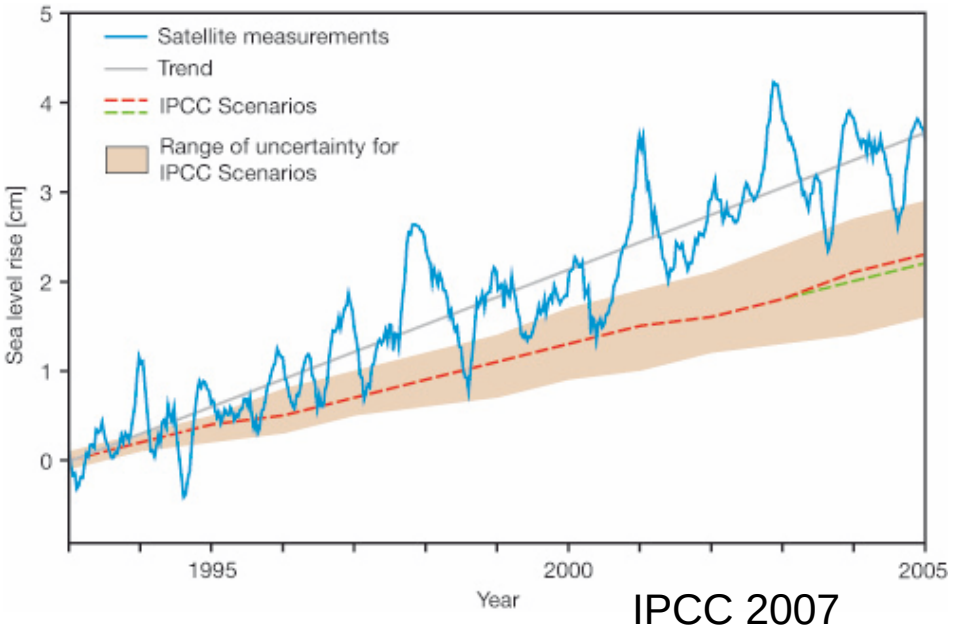
Hotspots of Climate Change Impacts

IPCC 4th Assessment Report (2007) identified 2 'hotspots' in Asia:

1. River Basins relying on Himalayan Glaciers, namely Indo-Gangetic Plains
   => Cereal Systems Initiative for South Asia (funded by Gates Foundation and USAID)

2. Mega-Deltas
   => Only Smaller Pojects in Agricultural Sector

Causes of Delta Vulnerability

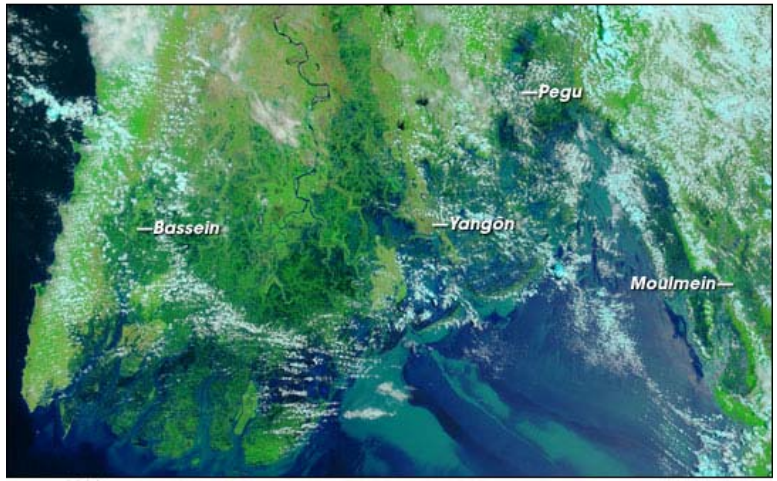


IPCC 2007

Sea Level Rise

Tropical Cyclones

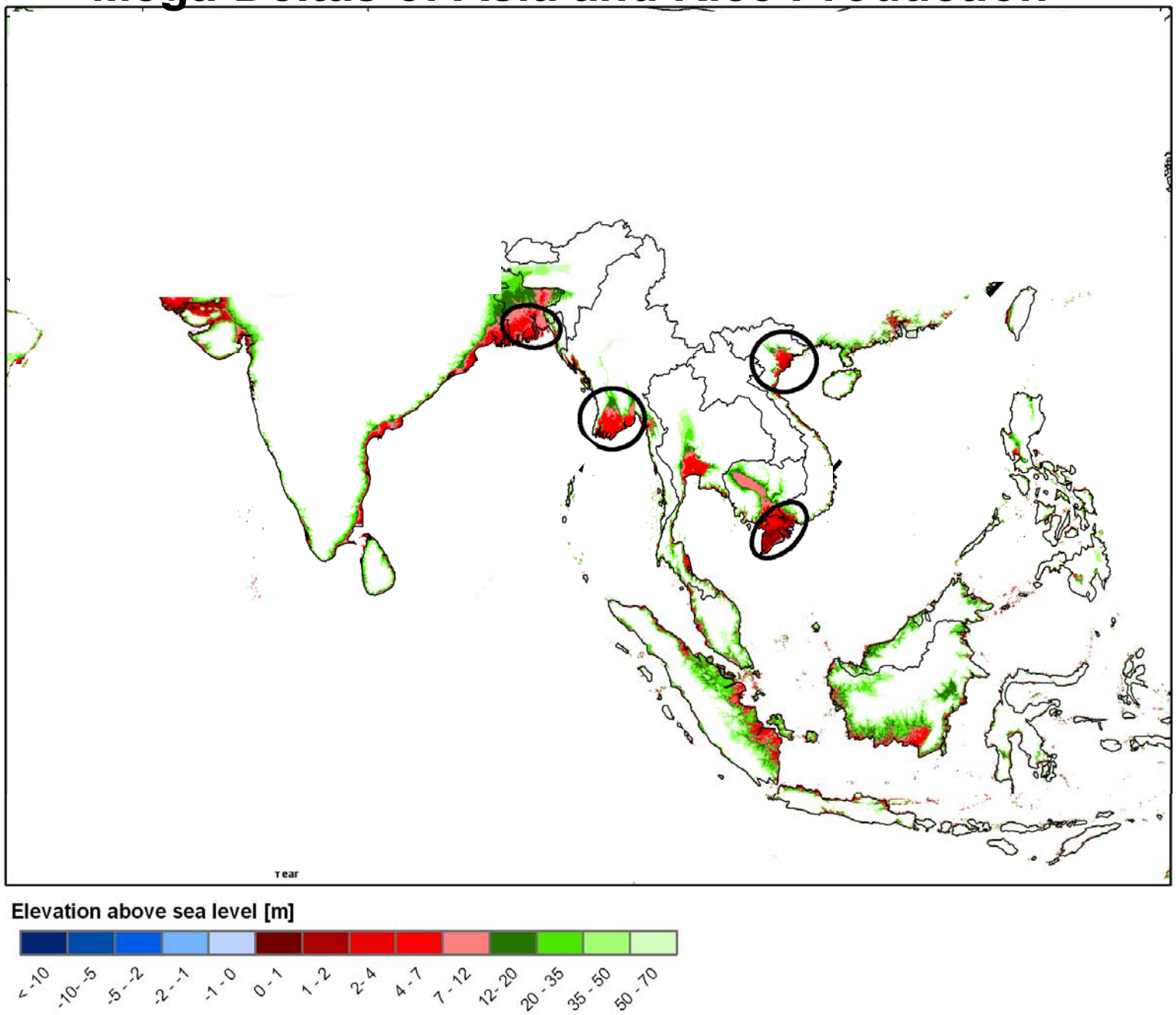
April 15, 2008



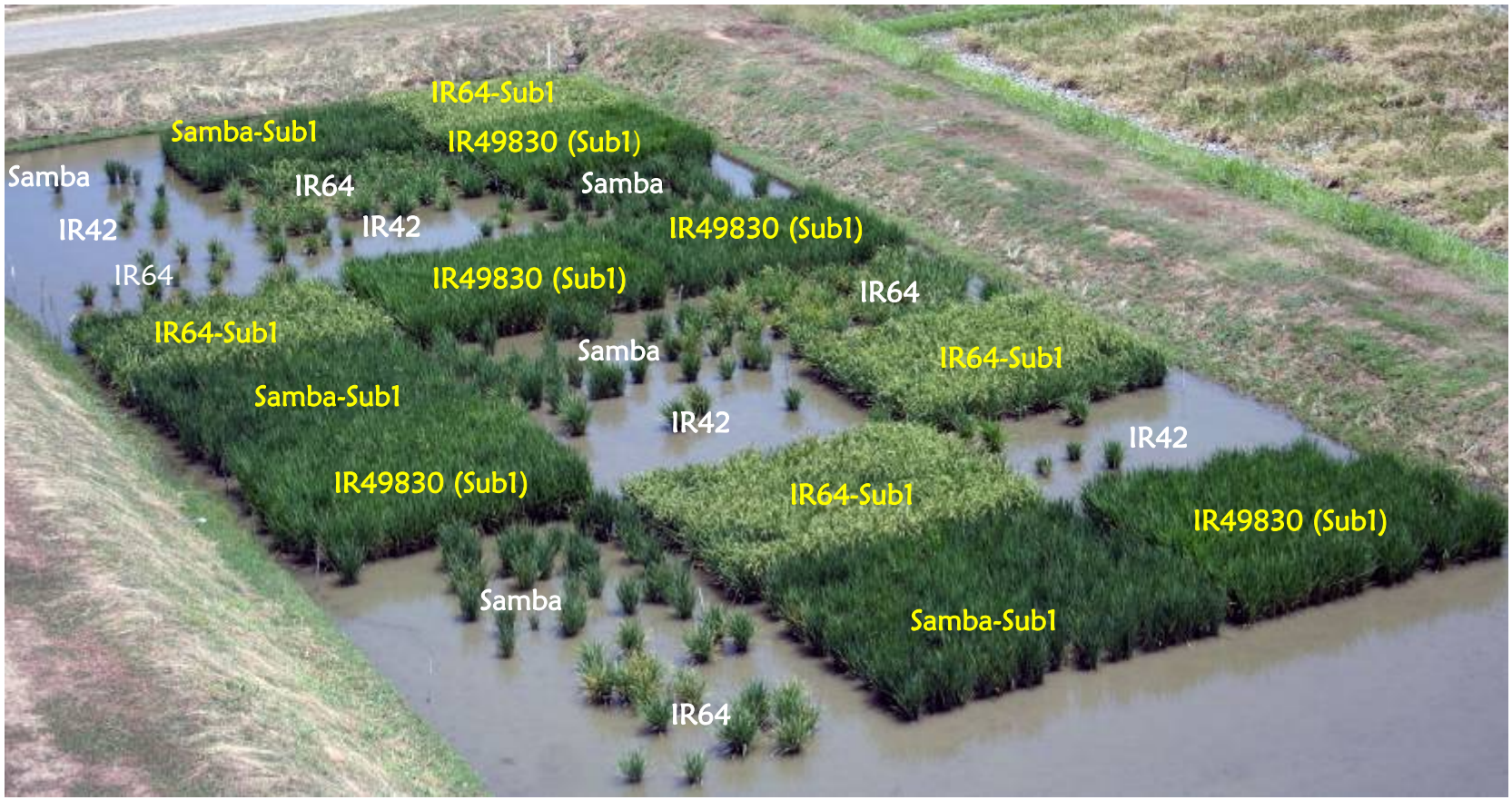
May 5, 2008

Irrawaddy Delta after Cyclone 'Nargis' (May 2008)

Mega-Deltas of Asia and Rice Production



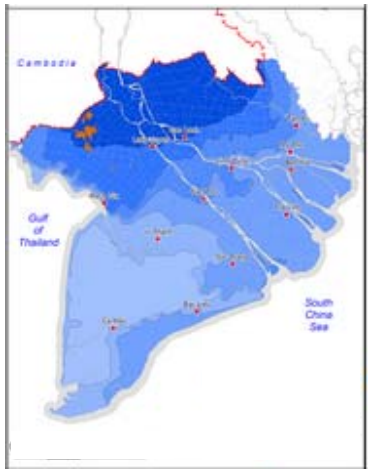
New *Sub1* lines after 17 days submergence in field at IRRI



Stress-tolerant crops CAN be developed

- Currently-grown varieties are often intolerant of new climatic stresses
- Good genetic donors for tolerance to abiotic stresses have been identified, but are low-yielding.
- Tolerance is usually controlled by a small set of genes.
- Identifying these genes and transferring them into popular high-yielding varieties can be accelearted by advanced molecular tools (Marker Assisted Selection and Backcrossing)

Mekong Delta: Maximum Water Levels of the Year 2000



Present Sea Level

Water level (m asl)

0 0.5 1 1.5 2 2.5 3

Canals

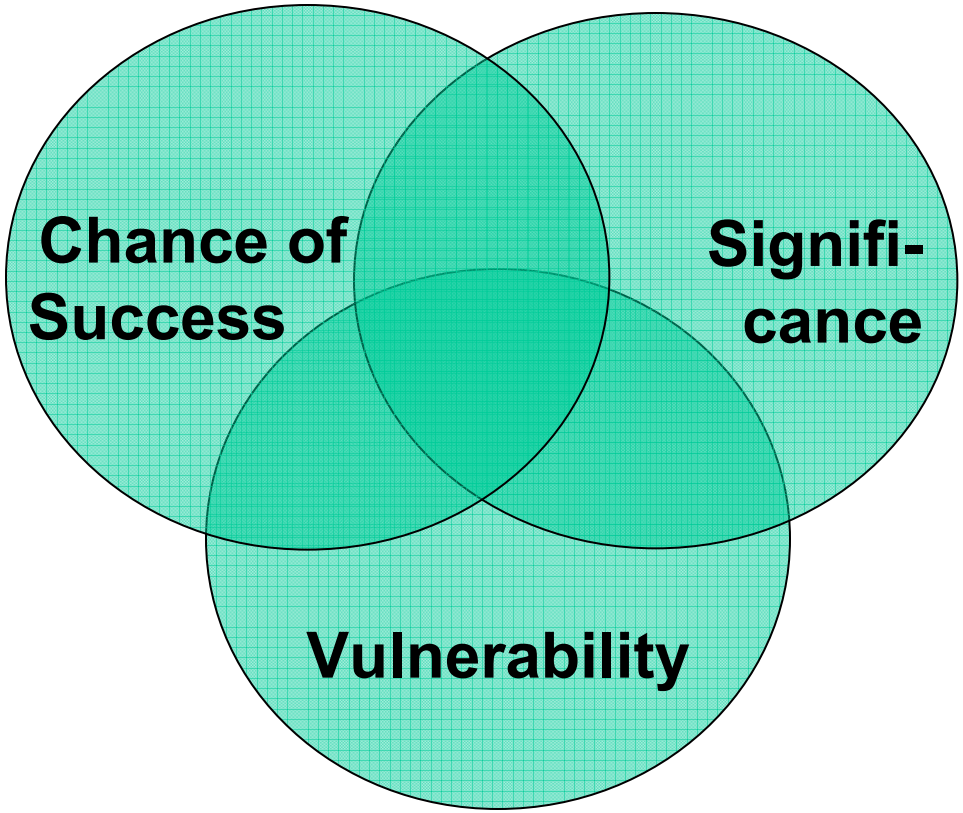
River/
Sea shore

Country border

Central town

0 100 km

Criteria for Projects



Prototype of Adaptation Projects at Country Scale/ Part 1

1. Selecting regional case studies (province/ county level) encompassing different rice growing environments

2. Detailed resource use analysis:
   * Data mining (statistics, soil maps etc.)
   * Farm surveys
   * Remote sensing

3. Climate Analysis:
   * Decadal trends
   * Downscaling of Climate Change Scenarios

Prototype of Adaptation Projects at Country Scale/ Part 2

4. **Networking with local stakeholders**
   * **National and local government agencies**
   * **Existing networks and farmers association**

5. **Dissemination of improved technologies coping with climate extremes**

6. **Participatory Research on Breeding and Improved Resource Management**

7. **Upscaling for National Master Plans**

Conclusion

Consequences of Climate Change :

Crop systems will experience more…

- **Drought**
- **Submergence**
- **Salinity**
- **Heat waves**

Challenges of Climate Change =
Challenges in unfavorable environments