Modernizing Irrigation Systems in Drought Affected Provinces of Viet Nam

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ADB Response

- Asia Pacific Disaster Response Fund Emergency Grant (June 2016)
- Water Efficiency Improvement in Drought Affected Provinces (WEIDAP) Project – $120 Million Investment Loan (2018)
- Preliminary drought analysis – IHE Delft
- Awareness and knowledge sharing:
  - Workshop on good practices in irrigation modernization
  - Overseas exposure (Netherland and Australia Water Learning Weeks)

Partnerships during PPTA

- Australian Water Partnership: *Irrigation Modernization and Groundwater Assessment*
- UK Met Office: *Climate Risk and Vulnerability Assessment*
- IHE Delft: *Water Productivity Assessment*
- IFPRI – *Water Energy Links*

Irrigation modernization knowledge transfer – Australian Water Partnership

- Designing to meet farmer's expectations - an equivalent or better level of service.
- Improvements to the technical designs
- Designing for conjunctive use of surface and groundwater

Current Irrigation Practices

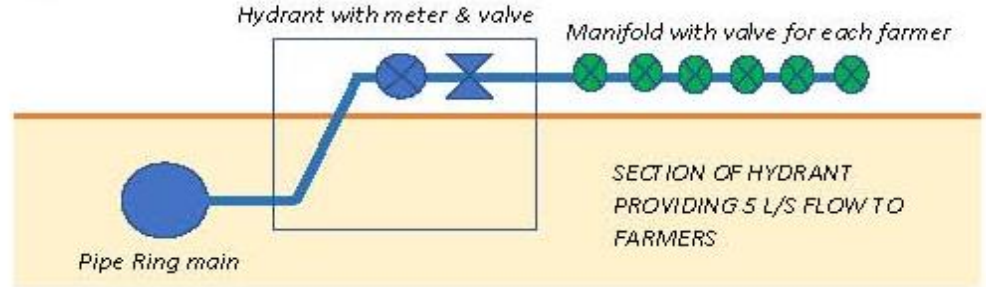





DIAGRAMMATIC ILLUSTRATION OF SUBPROJECT MODERNISATION AND LEVEL OF SERVICE CONCEPT

Management Tiers:

i. Reservoir and/ or main canal
ii. Pipe system supply to hydrants
   a. 5 l/s hydrants with manifolds (farmers want 2-3 l/s flow typically)
   b. Number of hydrants is supply flow divided by 5 l/s
   c. 500 m maximum distance from plot
   d. Indicative spacing 50-100 m along pipelines
   e. Residual heads (1 m – 10 m minimum)
iii. Farmer hydrant to plot pipe and on-farm irrigation equipment



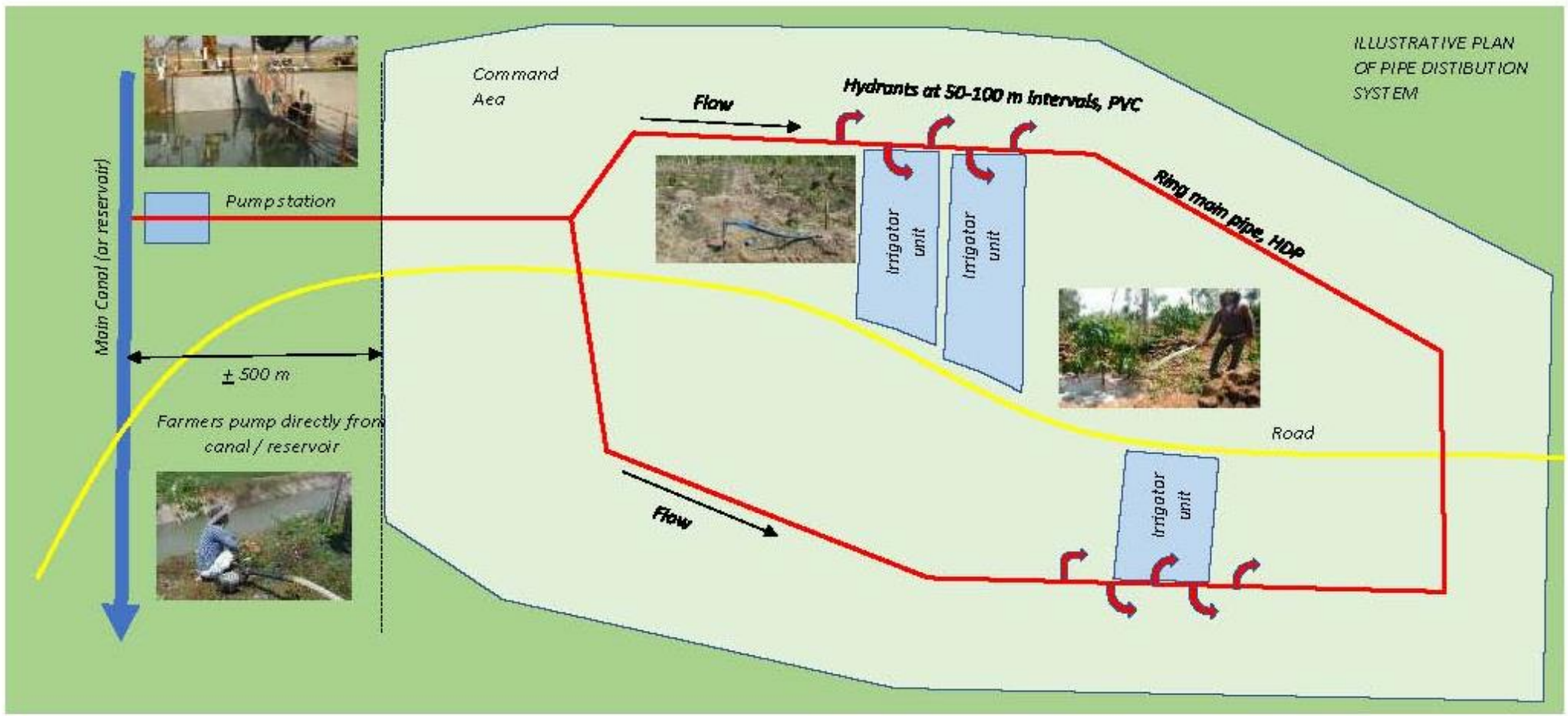
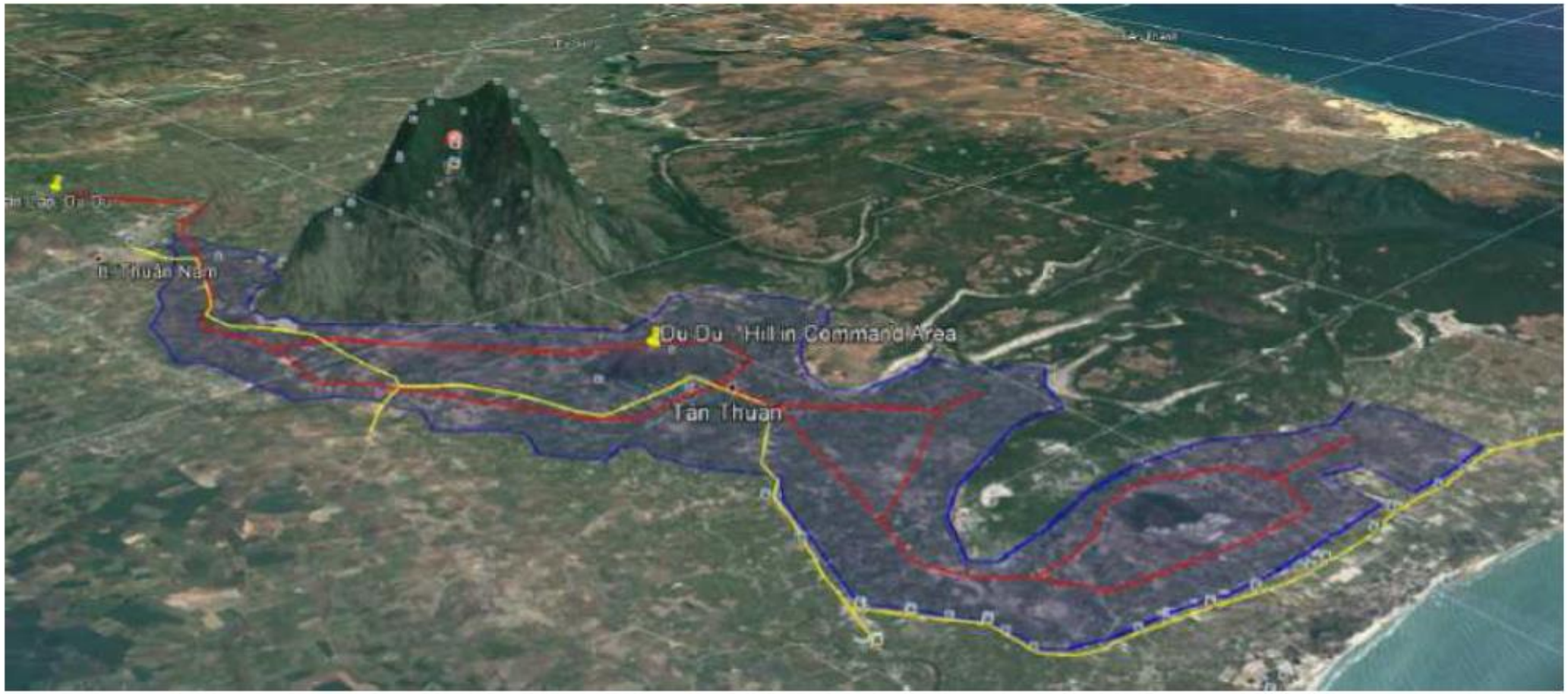
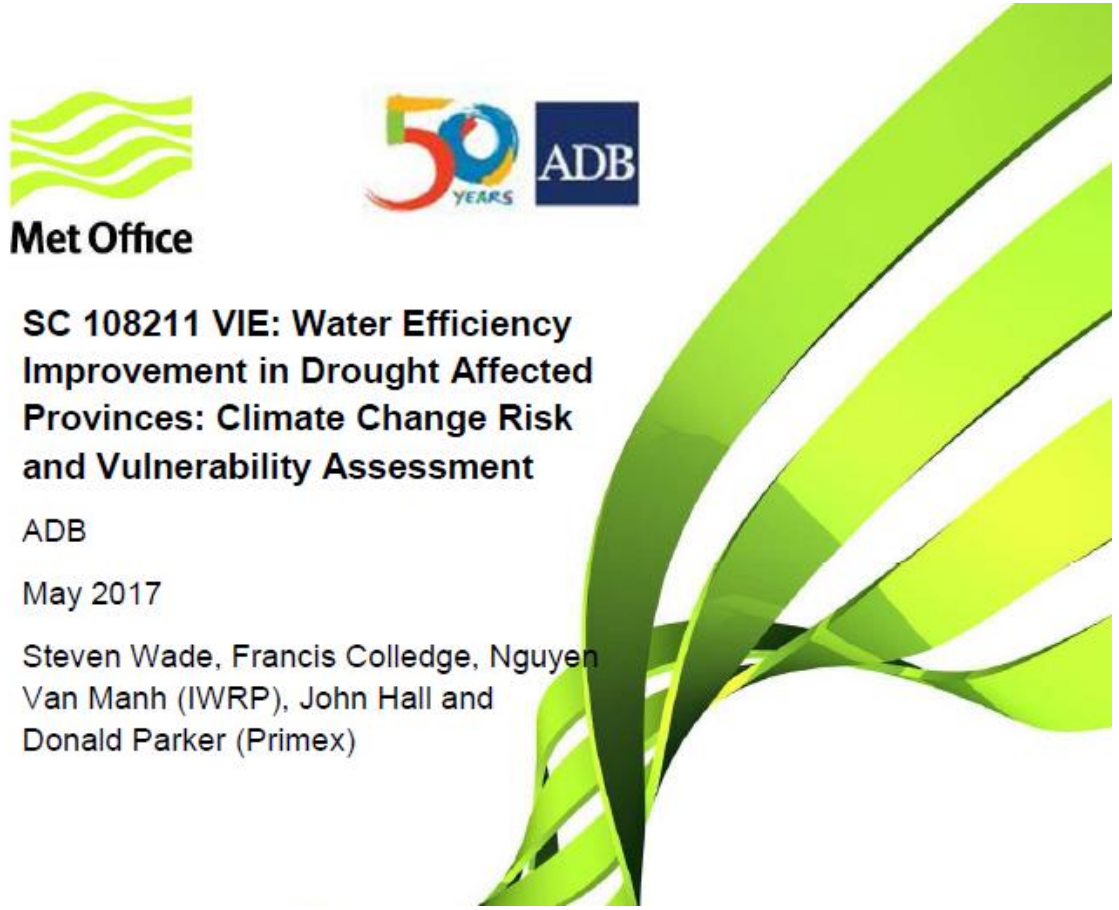


Figure 10: Layout of gravity piped system and command area for Du Du Tan Thanh (Source: PRIMEX, 2017)



UK Met Office: Climate Risk and Vulnerability Assessment

- Review of climate change projections and scenarios
- Vulnerability to future climate and socio-economic changes
- Climate risks
- Adaptation assessment



Scenarios

Box 3 Bin Thuan, 2050s sensitivity scenarios

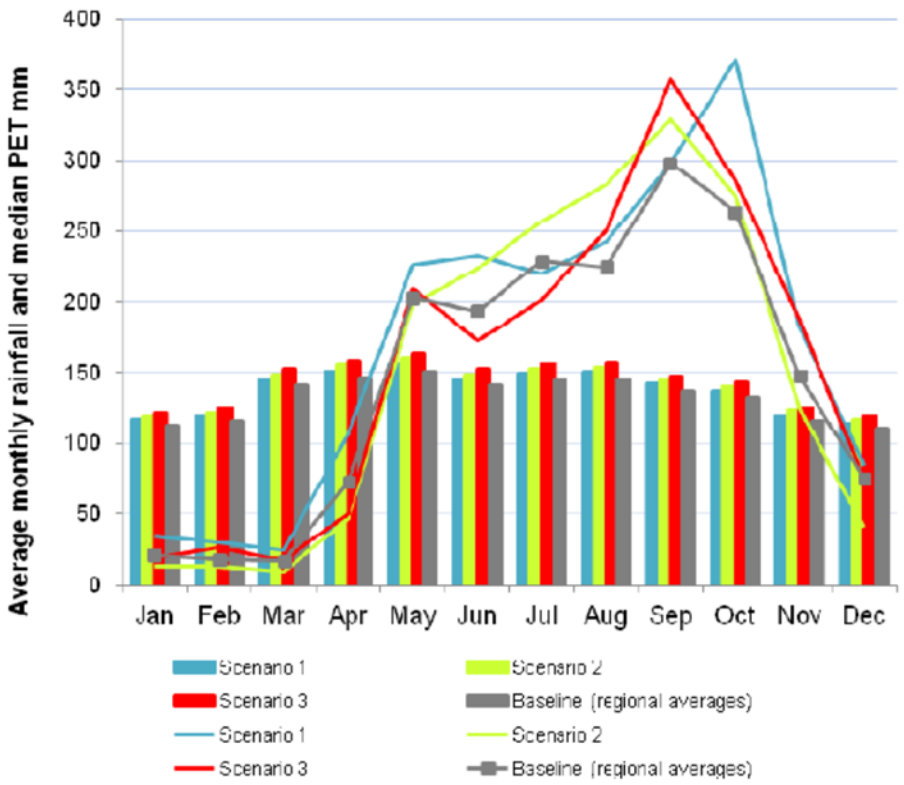


Figure 6 shows the models that were selected for Binh Thuan province for the: RCP4.5 'warm and wet' (blue line), RCP8.5 'hotter and wet' (green line), and RCP8.5 'hotter' (red line) scenarios. The bar and line plot shows the monthly average of daily precipitation and median estimated PET mid-century (2041 to 2070) percentage changes applied to the models (grey line) baseline period (1976 to 2005) for each scenario

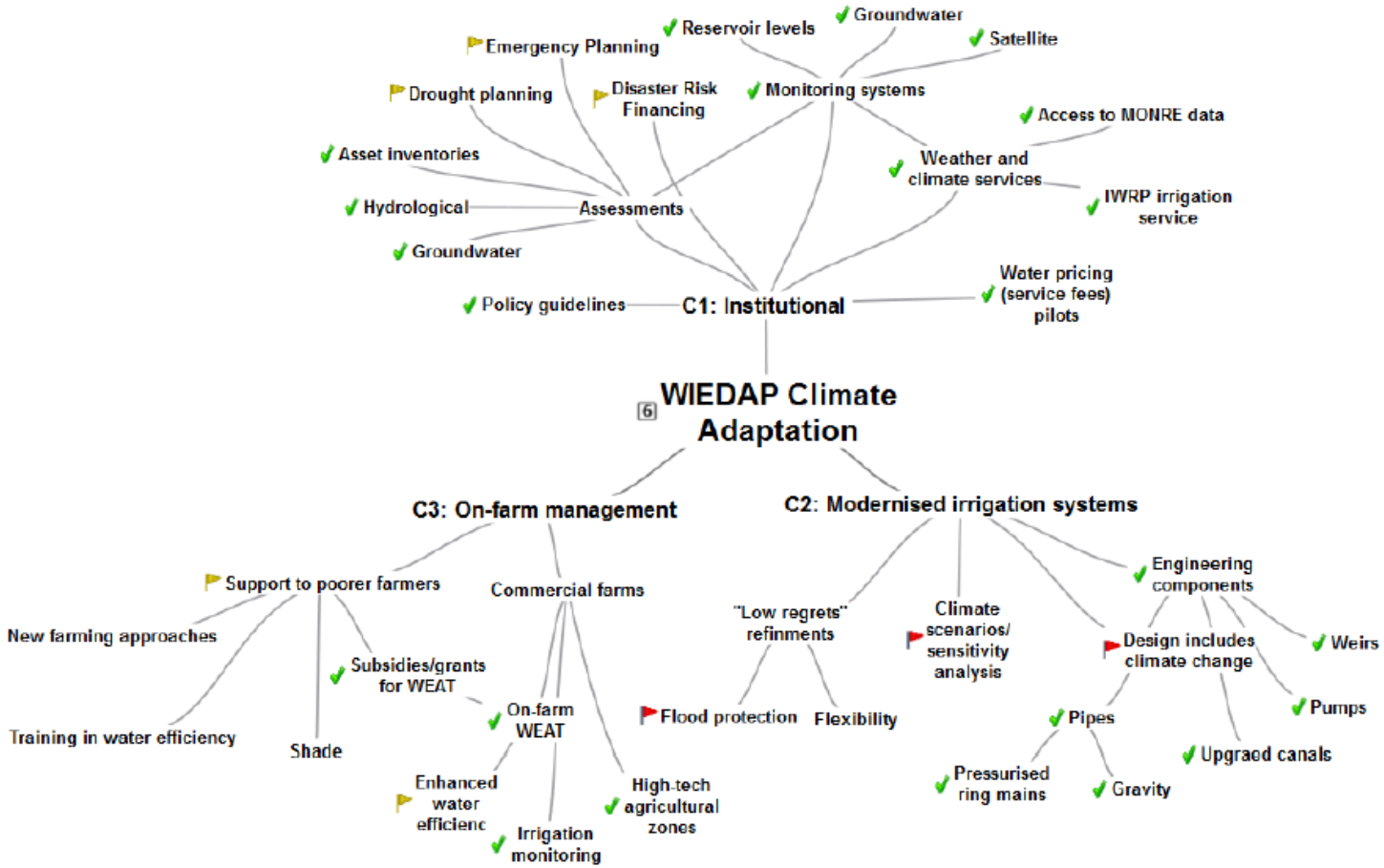
(Source: Met Office).

Risks

Table 4: General scorecard of climate risks for three simplified climate futures (Yellow~low risk; orange~medium risk; red~high risk; +/- indicating direction and magnitude of changes)

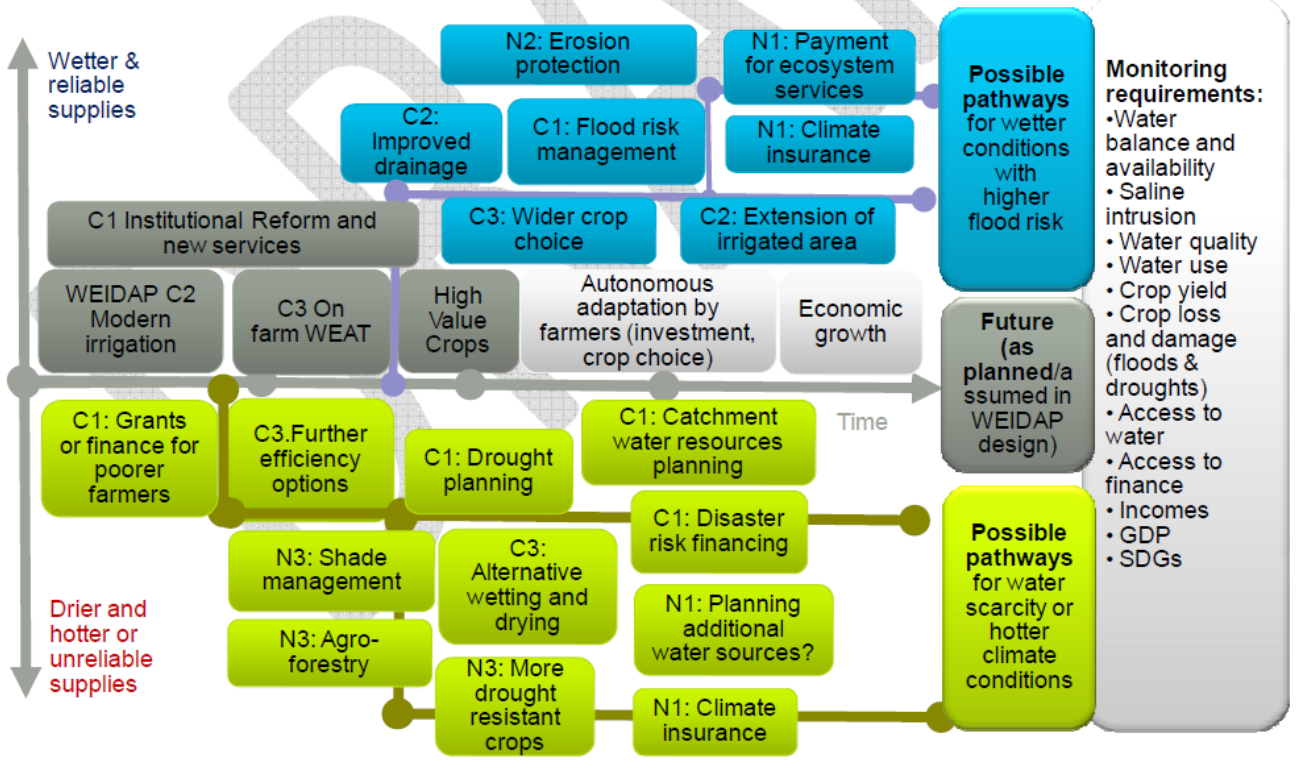
Climate risk	Warm and wet	Hot and wet	Hotter scenario	Comments
Water resources				
Increase in evaporation ~ increasing crop water demand and reservoir losses	+3~4%	+5~6%	+7~8%	Estimated based increase in temperature for each scenario and ETo formula.
Change in annual average river flows (risk to water availability)	+22~27% (increase)	+10~11% (increase)	-13~14% (decrease)	Estimated based on case study modelling on 3 river basins. In the hottest scenario, high ETo and delayed monsoon rains reduce water flow.
Decrease in groundwater table due to decrease in groundwater recharge	(increase)	(increase)	(decrease)	Expert opinion; increases under wet scenarios but some reductions in the hotter scenario may reduce groundwater levels.
Saline intrusion into groundwater, reducing quality	+ (increase)	++ (increase)	+++ (increase)	Higher rates of sea level rise with higher rates of warming; up to 10% land area loss in BT for 0.5 m sea level rise.

Adaptation Options



Climate Resilient Pathways for WEIDAP

Figure 15: The concept of flexible adaptation pathways for WEIDAP implementation

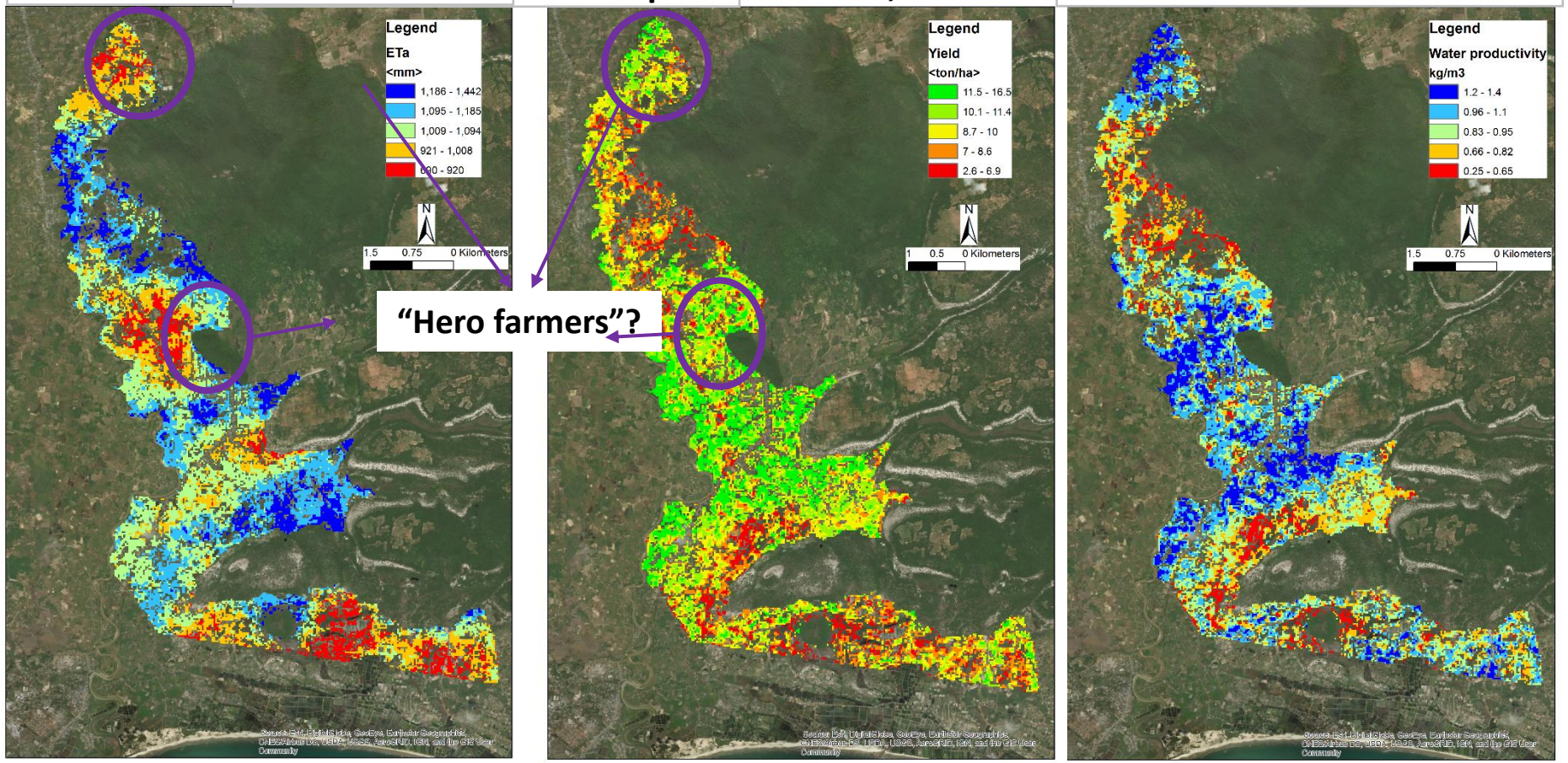


Water Productivity Assessment – IHE Delft

Avg. ET: 1059mm (10,590 m^3/ha)
CV: 0.1
Total water consumption:
17.5 million m^3

Avg. Yield: 9.6 ton/ha
CV: 0.19
Total Area: 1651 ha
Total production: 15,850 ton

Avg. WP: 0.91 kg/m^3
CV: 0.2



IFPRI Study: Energy Water Links

- A comprehensive mapping of energy consumption in irrigation
- Develop a prototype energy checklist for irrigation projects
- Findings:
  - Indirect energy consumption (fertilizer, pesticides) significantly exceeds direct energy use (pumping)
  - Incentives needed to promote high efficiency irrigation technology

Water Efficiency Improvement in Drought Affected Provinces (WEIDAP) Project

Impact

To improve climate resilience, environmental sustainability and agricultural water productivity in drought-affected provinces

Outcome

Climate resilient and modernized irrigation systems providing flexible and affordable services to beneficiary farmers in the five participating provinces

Outputs

1. Climate resilient irrigation management services adopted
2. Flexible and modernized irrigation systems developed
3. Efficient on-farm water management practices adopted

Take Home Messages

- Integrating climate variability has multiple dimensions
- Timely CRVA needed to incorporate adaptation interventions
- Modernization begins with understanding ground realities
- Meeting the level of service desired by farmers is key to modernizing irrigation systems
- Partnerships significantly enrich project designs

Government response to modernization initiatives

- Response to irrigation modernization with piped systems
- Response to enhanced level of service to farmers (flexible, on-demand water)