



An integrated water-energy-economic model for simultaneous assessment of climate change adaptation and mitigation options in river basins



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1 PROBLEM STATEMENT

- Adaptation is essential in irrigation sector which is vulnerable to climate change
- Mitigation potential is also high as irrigation water supply heavily depends on energy
- IAM literature focused on energy sector and aggregated technology options

2 NOVELTIES

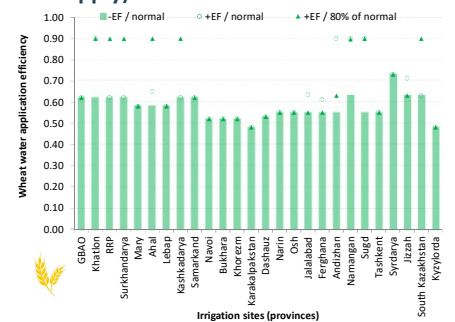
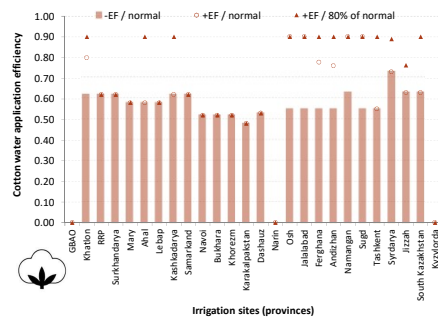
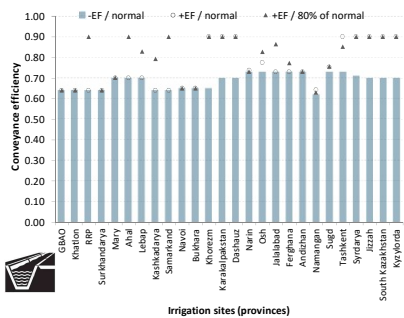
- Improved representation of water and land use systems in climate change IAM
- Concrete technologies of adaptation (water conservation) and mitigation (renewable energy) rather than abstract modeling of TFP change

3 METHOD

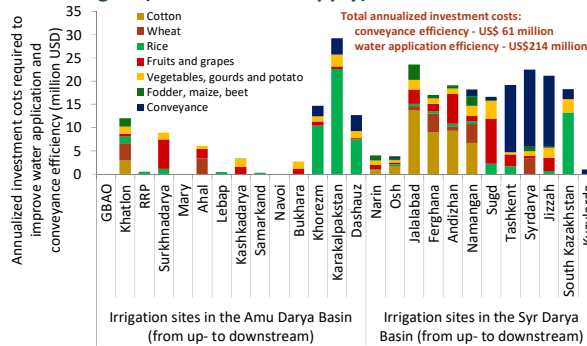
- Multi-node (irrigation, hydropower, M&I) hydro-economic optimization model
- Detailed water supply and demand balances across river basin
- Additional energy supply -demand module
- Applied to the case of the Aral Sea Basin in Central Asia

5 RESULTS: Reduced water supply (Climate Change) impacts on adaptation options (water use efficiency improvements)

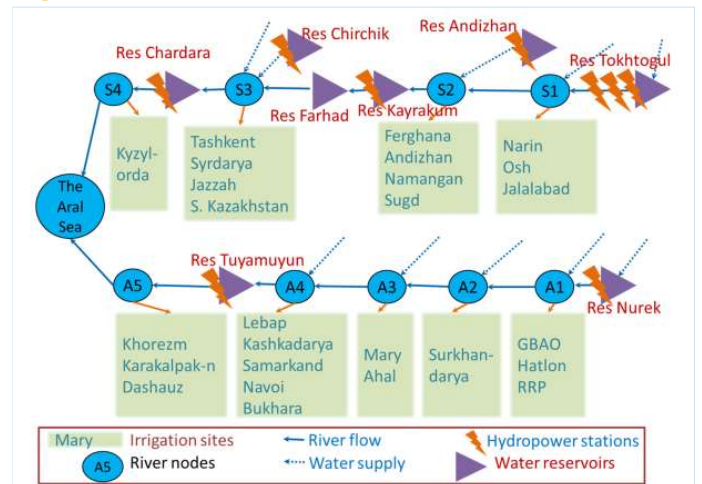
(Notes: 'EF' – efficiency improvement; '-' - not allowed; '+' – allowed; 'normal' – normal water supply)



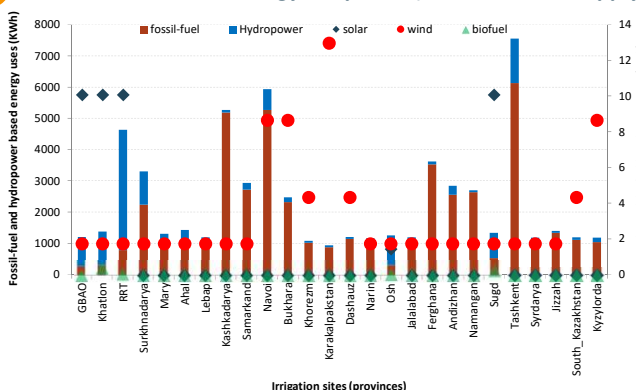
6 RESULTS: Investment costs of adopting adaptation technologies (normal water supply)



4 River node network scheme of the Aral sea Basin as modeled



7 RESULTS: Renewable energy adoptions (80% of normal supply)



8 CONCLUSION AND RECOMMENDATIONS:

Adaptation is as important as mitigation to cope with climate change effects. Reduced costs of renewable energies may make them financially attractive over time. Inclusion of detailed water and land use system accounts and concrete adaptation and mitigation technologies improves the policy relevance of the climate IAMs.

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