Fariba Babaeian, Majid Delavar, Saeed Morid and Raghavan Srinivasan, 2021, Robust climate change adaptation pathways in agricultural water management, June 2021, *Agricultural Water Management*, 252(3): 106904, DOI: 10.1016/j.agwat.2021.106904

Highlights

- Linkage the Adaptation Pathways and SWAT to determine robust adaptation actions.
- Designing robust adaptation pathways based on sequences of robust adaptation actions.
- Changing cropping patterns is the most robust adaptation pathway.

Abstract Analysis of climate change impacts as well as conscious decision-making and long-term planning in complex water resources systems require use of innovative approaches under conditions of deep climate uncertainty. This research aims to design and evaluate robust adaptable plans under deep climate uncertainties in the agricultural sector. For this purpose, a combination of the Adaptation Pathways (AP) approach in conjunction with the Soil and Water Assessment Tool (SWAT) model is used to evaluate the robustness of adaptation actions and to design robust adaptation pathways under future climate uncertainties in the Hablehroud River Basin, Iran. Deep climate uncertainties are specified as plausible climate scenario combinations according to the average precipitation and temperature changes in Representative Concentration Pathways (RCPs) 4.5 and 8.5, 2020–2080. According to the results, changes in cropping patterns represent the most robust adaptation action across various combinations of climate scenarios. Other adaptation actions, including deficit irrigation, changes in crop planting dates, and improving irrigation efficiency, are fairly robust in the specific time period from 2020 to 2080. Sequencing of these adaptation actions based on their robustness and expiry date results in designing adaptation pathway maps under RCPs 4.5 and 8.5. Finally, different preferred pathways are identified based on the expiry date of each robust adaptation action. Changes in cropping patterns can be selected as the most robust adaptation pathway (robustness greater than 80) under deep climate uncertainty among these different pathways. Suggesting other preferred pathways can be helpful to select reasonable pathways for implementation.

Keywords Climate change, Deep uncertainty, Info-gap theory, Water management, Decision making, Adaptation pathways,

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