## A pathways approach for adapting to systemic drought risks

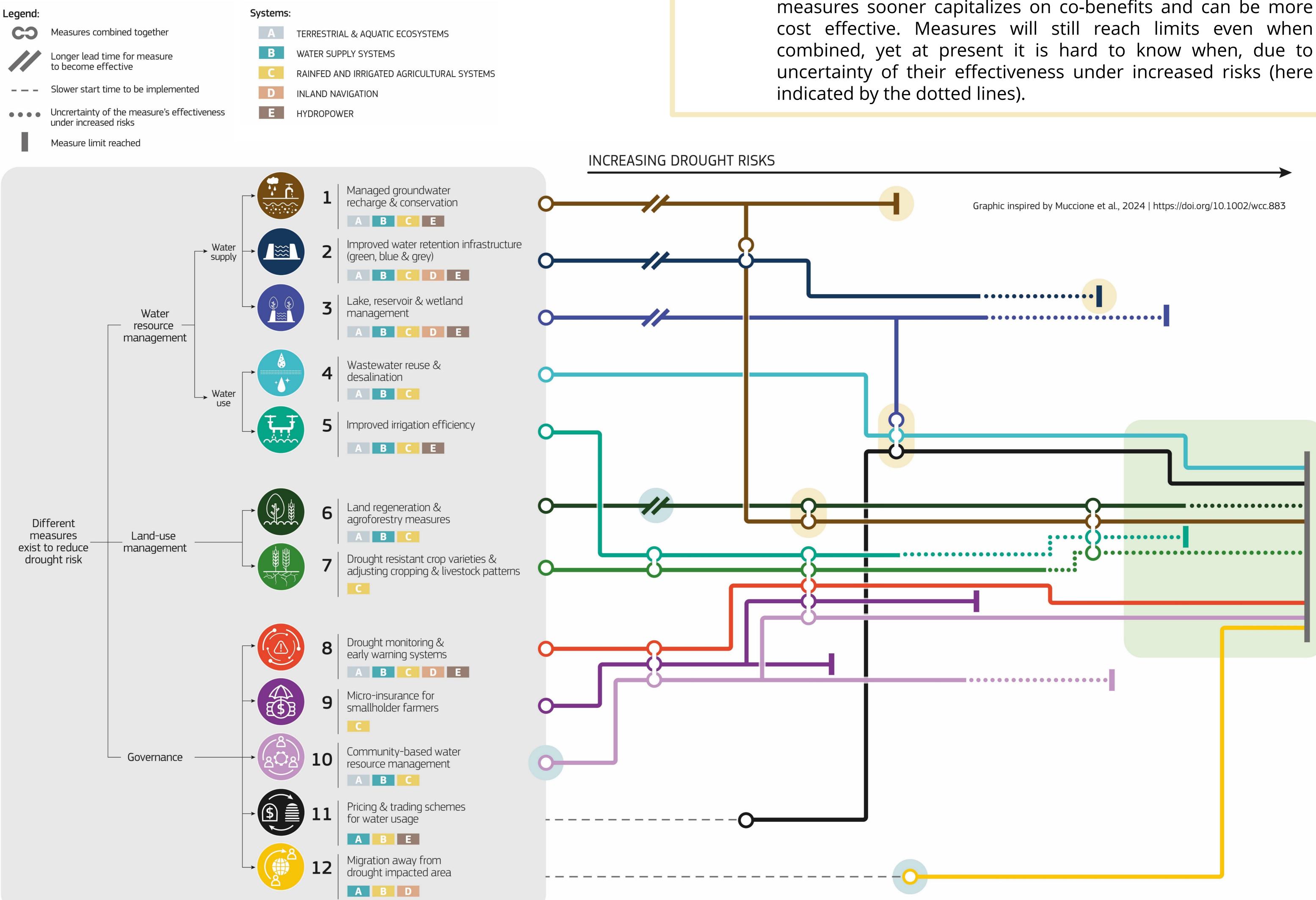
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Introduction: Adaptation pathways are a decision-focused approach that support the implementation of sequences of actions progressively, depending on future dynamics. They allow for more flexible planning that can create synergies between different measures and avoids lock-in. Here, we present adaption pathways for adapting to systemic drought risks. The Figure has been designed for illustrative purposes, to give inspiration and demonstrate the strengths of using a pathways approach. It has been developed in the context of the UNCCD's Global Drought Atlas, that will be launched at COP 16 in Riyadh, Saudi Arabia.

**Different measures exist to reduce drought risks:** Different measures are effective for adapting to droughts, each having cobenefits and trade-offs. Which measures will be effective is dependent on local biophysical and socio-economic factors. Here we have selected twelve measures, effective for reducing drought risks across a range of systems, focusing on water resource management, land-use management and governance.

Measures can and should be combined and implemented together: Under current drought risk conditions, more measures are effective and therefore available to us. With increased warming, certain measures will become ineffective due to adaptation limits (for example measure 1), and will need to be combined to create synergies to take us further in adapting to drought risks. Different combinations of measures can be more synergistic (see measures 1 & 6). Combining measures sooner capitalizes on co-benefits and can be more cost effective. Measures will still reach limits even when combined, yet at present it is hard to know when, due to uncertainty of their effectiveness under increased risks (here indicated by the dotted lines).



*Figure 1:* Adaptation pathways for increasing drought risks (Source: authors (Inspired by Muccione et al., 2024))

The timing of when measures should be implementation will vary: Some measures should be considered now or soon while drought risks are less severe (here measures 1 – 10), while some may be taken later when drought risks are more severe (measures 11 & 12) here indicated by the dashed line. These measures may be less desirable, or taken only after others have been implemented or reached limits. Some measures may have a longer lead time to become effective (see 1, 2, 3 & 6), here indicated by the parallel dashed lines.

In a highly warmed and drought risk affected future, prospective risk management and adaptation will be necessary to avoid the most severe impacts: Most or even all measures may have to be combined and implemented in consideration of one another and risk decision making must be mainstreamed into planning and policies. However, some locations will run into adaptation limits and unavoidable losses and damages will occur regardless. Trade-offs will need to be made regarding water allocation choices.

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