Summary factsheet:
Forecast principles and products

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Decision-making under uncertainty

Forecasts at sub-seasonal scales always come with uncertainty, so decision-makers use structured approaches to manage risk. Tools like **decision trees** help people weigh different probabilities, such as favourable or unfavourable climate conditions, and compare the costs of acting early versus waiting. Other approaches, such as **decision-making under deep uncertainty**, focus less on optimising for one expected outcome and more on finding choices that remain **robust across many possible futures.**

Risk-based frameworks combine information about hazards, exposure, and vulnerability. Approaches like **impact-based forecasting** and **anticipatory action triggers** help users understand what a forecast means for real-world impacts, not just the climate signal itself.

Using scenarios to guide decisions

Scenario planning plays a key role when forecast information is incomplete or uncertain. Scenarios, including simple representations such as plotting likely trajectories of reservoir levels for example:

Image sources: https://undraw.co/

- allow planners to visualise potential futures and identify when to prepare for drought or flood;
- can be built from both qualitative data and expert judgement; and
- help users make more confident decisions even when forecasts are limited.

Importance of co-production

Different users need different types of information. A dam operator may need precise rainfall amounts, while a disaster manager may only need to know whether conditions are above or below normal. **Co-production**, where forecast providers and users work together, helps ensure that products match real decision contexts. It also avoids the common problem of asking users to respond to a forecast in isolation, rather than starting with the decisions they already make.

Image source: https://undraw.co/

Challenges with current seasonal and sub-seasonal products

Many forecast products present only broad categories like "normal to above normal rainfall", without showing the full range of probabilities. This makes it easy for users to interpret them as **deterministic**, assuming that "above normal" means "it will definitely be wet." In reality, there may still be a substantial chance of dry conditions. Without access to the underlying probability distribution, users can overlook important risks, especially for sensitive sectors such as agriculture, water resources, and energy.

Practical limitations and the path forward

In practice, many formal decision-support methods are rarely used. Vulnerability data may be limited, social or economic factors may change quickly, and forecast skill is not always considered. As a result, anticipatory action frameworks – despite their gaps – are often the most realistic tool currently available. Improving sub-seasonal products for regions like **Madagascar** will require a blend of clearer probability information, better communication of uncertainty, and ongoing collaboration between climate scientists and local decision-makers.

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