

## Using Bayesian Networks in Climate Storylines

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### Abstract

Climate events occurring outside Europe, such as droughts in West Africa or floods in Southeast Asia, could have major impacts on European society through connections such as supply chains, financial ties, and trade networks. These impacts could amplify in the future climate, with an increasing number of extreme events occurring globally. The RECEIPT project (<https://climatestorylines.eu/>) examines these impacts on Europe by developing climate storylines, which are physically self-consistent unfoldings of past events, or of plausible future events and pathways (Shepherd et al. 2018). These storylines are being developed with a focus on the specific sectors of agriculture, finance, international development, manufacturing chains, and coastal infrastructure.

As part of the RECEIPT project, we synthesize the storylines that are obtained through the sectoral analyses using Bayesian Networks (causal networks), which are graphical models that show the causal relationships between observed events and incorporate (both epistemic and aleatoric) uncertainty as conditional probabilities. Through the modelling process, we introduce a quantitative narrative into the storyline approach, and at the same time uncover systemic risks that may not be recognizable in the individual sectoral analyses. The synthesis process also involves stakeholder engagement, thus incorporating expert evaluation along with quantitative data, and resulting in outcomes of interest for policymakers in need of effective actionable policy recommendations. In this presentation, we will outline this modelling process, starting from an individual sectoral model of the effects of tropical cyclones on the European Union Solidarity Fund, and then towards a synthesized cross-sectoral model for systemic risk assessment.