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Monster assimilation and adaptation in FRM: High Beck fluvial flood-mitigation case study

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Knotters et al. (2024) use the monster metaphor to propose coping strategies to deal with uncertainties in Flood Risk Management (FRM). The uncertainty monster can come in different forms and shapes. Van der Sluijs (2005) considers four coping strategies to deal with the monster of uncertainty, to which Knotters adds two ones dealing with unwelcome uncertainty:

- Monster exorcism consists of trying to reduce uncertainty even if that is not realisable.
- Monster embracement consists of magnifying uncertainties possibly leading to trivialization of uncertainty.
- Monster adaptation attempts to adjust uncertainty, rationalise risk mitigation and optimise a chosen utility (function).
- Monster assimilation, wherein one learns from uncertainty (quantification) and accordingly makes changes.
- Monster denial involves not mentioning or denying uncertainty as part of the strategy.
- Monster anesthesia, wherein the monster of uncertainty is prevented by striving for consensus or agreeing about the quality of information.

In a mock case study based on stylising a realistic case of flooding, these coping strategies will be illustrated. High Beck is an urban stream of circa 2000m long with a drop of circa 100m before it flows into a main river. The beck intermittently floods a local neighbourhood next to a larger river, when its final culverted course is also blocked by high water levels in the river and the river's new flood-defence walls (protecting against 1:200 year river floods). Using the graphical cost-effectiveness tool of Bokhove et al. (2020), three flood-mitigation measures (canal storage, upstream bunds, downstream storage) combine into five scenarios which provide protection against 1:50 year return-period beck floods. Each measure has co-benefits and there are associated breach probabilities and damage costs, to assimilate uncertainty. Depending on the choice of utility function, how do we value the monsters and fairies involved, in a just and science-based decision-making process, and choose the "best" solution among the five flood-mitigation scenarios? The discussion, without as-yet final answers, will also highlight the difficulties in obtaining the probabilities and damage/repair costs required for making (sufficiently) informed decisions.

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