

HANDLING UNCERTAINTY IN OPTIMAL DECISION-MAKING FOR NATURAL HAZARD MITIGATION PLANNING



Graeme Riddell¹, Aaron Zecchin¹, Holger Maier¹, Hedwig van Delden^{1,2}

¹ School of Civil, Environmental & Mining Engineering, The University of Adelaide, SA ² Research Institute for Knowledge Systems (RIKs), Netherlands

LIVES CAN BE SAVED BY ADVANCED PLANNING. MEASURES TO REDUCE RISK WILL GROW EVER MORE IMPORTANT AS OUR CLIMATE CHANGES AND EXTREME EVENTS BECOME MORE FREQUENT AND INTENSE.

BAN KI MOON, UN SECRETARY GENERAL, 2011

Modelling, simulation and decision support systems are critical for decision making for natural disaster mitigation. Long term strategic planning assisted by these methods are vital.

...ESSENTIALLY, ALL MODELS ARE WRONG, BUT SOME ARE USEFUL.

GEORGE E.P. BOX

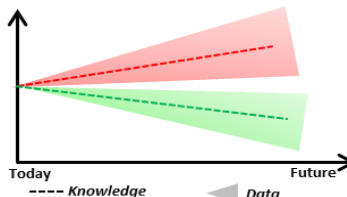
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Data Uncertainty

Either epistemic (due to imperfect knowledge OR stochastic (due to inherent variability)). Data uncertainty is the possible range of values for any model input.

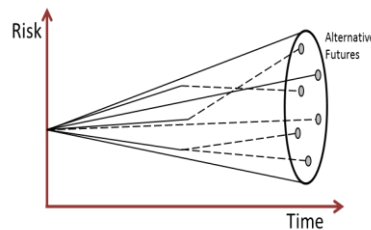
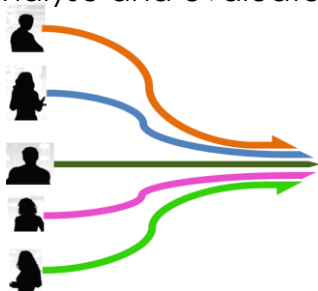


Adapted from Mejia-Giraldo & McCalley (2014)

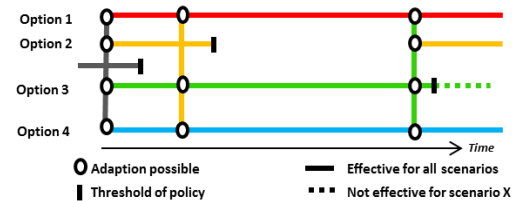
Knowledge Uncertainty

Defined as uncertainty about the future and can lead to a significantly different trend in any future projection.

By combining multiple approaches, listening to stakeholders and comparing objectives an integrated approach to considering uncertainty and improving decision making will be developed. Participatory approaches, scenario planning and adaptive responses will be implemented to analyse and evaluate management responses under uncertainty for mitigation planning.



Adapted from Mahmoud et. al (2012)



Adapted from Haasnoot et. al (2012)

References

Mejia-Giraldo, D. and J. D. McCalley (2014). "Maximizing Future Flexibility in Electric Generation Portfolios." *IEEE Transactions on Power Systems* 29(1): 279-288.
 Haasnoot, M., H. Middelkoop, A. Offermans, E. Beek and W. A. v. Deursen (2012). "Exploring pathways for sustainable water management in river deltas in a changing environment." *Climatic Change* 115(3-4): 795-819.
 Mahmoud, M., Y. Liu, H. Hartmann, S. Stewart, T. Wagener, D. Semmens, R. Stewart, H. Gupta, D. Dominguez, F. Dominguez, D. Hulse, R. Letcher, B. Rashleigh, C. Smith, R. Street, J. Ticehurst, M. Twery, H. van Delden, R. Waldick, D. White and L. Winter (2009). "A formal framework for scenario development in support of environmental decision-making." *Environmental Modelling & Software* 24(7): 798-808.

For further details of research please contact:

Graeme Riddell
 The University of Adelaide
graeme.riddell@adelaide.edu.au

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