

## **Understanding risk: floods through unsafe, gated, dual purpose dams**

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Problems have emerged for organisations and authorities in their understanding of the risks, and the management of the risks, with controlling floods through unsafe, gated, dual purpose (water supply, flood mitigation) dams. This paper sets out those misunderstandings against the rules of risk management, and results from dam operations that have been based on the rules versus those that have been operated by applying the misunderstandings of the rules.

The paper offers definitions of deterministic thinking versus risk centric thinking, and how the deterministic concepts of certainty, accuracy and reliability can bring misunderstanding to thinking that has a focus on probability, on the range of possible outcomes, on the worst case, on expectation of error and on readiness to adjust. An analogy of the carpenter versus the meteorologist versus the tactician is offered. Quotations from published documents and professional papers are used to give examples of where such misunderstandings may be in evidence. Examples of where both risk centric thinking and also any deterministic thinking have been applied to the same flood control event are used to show the relative benefits of the two approaches for the particular situation so managed. The ranges of situations where each type of thinking may provide the least flood damage is offered.

The main findings are that the critical profession for decision-making downstream of the meteorologist is not dam engineering or hydrology or hydraulics, it is risk management, that risk management will provide the best approach for the likely history of flooding during the life of a dam, and that provisions made for worst cases may be the state of the art in risk management. The principal conclusion is the need for training in both risk management as a discipline, and also in the application of risk management rules to representative flooding scenarios.