Flood and drought management: Challenges for civil engineering

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Droughts and floods are global extreme events with heavy social, economic and environmental impacts. Climate change effects will aggravate their occurrence, frequency and damage of such extrem events.

Water policies to manage droughts and floods have evolved from traditional emergency actions to risk management plans. This paper defines a general methodological framework for these extreme events and describes different case studies around the world, which show this evolution focusing on the contribution of civil engineers to this approach and how the solutions address complex systems and uncertainty.

Formerly, civil engineers have designed and constructed flood defenses so-called “grey solutions”, from (dikes, dams , embankments,etc.) Currently, cost-benefit analysis is used as a basis for decision-making of this type of solutions, as required by EU's Flood Directive in the Flood Risk Management Plans. New approaches based on risk management, where prevention, protection and preparedness are prioritized, are being applied all over the world.

Droughts policies have evolved from a crisis management approach focused on emergency works to drought risk management where its associated measures often result in comprehensive drought risk management plans with water stress area mapping, alert levels, indicator systems and warning systems. High scientific and technical level tools are being developed as part of Support Decision Systems which provide valuable input in the related decision making process.