Coping with floods and inundations

Senior scientists

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Research Field and Subjects

One of the probable consequences of global climate change is the worsening of hydrological extremes, especially flood events. Most of the protective structures (dams and dykes) will undergo threats probably greater than expected at the time of their design.

Dams and levees are indeed constructed throughout the world for water supply, irrigation, navigation, flood protection, electrical power, and water-based recreation. These hydraulic structures are of great benefit to society; however, inundation caused by dam failure and levee breach has disastrous consequences. The failure of a large dam has the potential to cause more death and destruction than the failure of any other man-made structure. Large flood waves resulting from these failures commonly cause loss of life, human suffering, and destruction of properties and ecosystems for hundreds of miles in the inundated valley. Depending on the terrain, flood waves can cause extensive scour and erosion, and large-scale movement of sediment and debris. The potential failure of tailing dams can cause significant damage to the environment through rapid dispersion of hazardous materials and contaminants, including heavy metals.

Failure of such structures and the consequences of these failures must be considered in a context of sustainable development. This is achieved through leading research in the fields of:

- Physical and digital modelling of flood waves due to dam- or dyke-break and consecutive inundations, including the consequences of sediment transport and morphological evolution.
- Study and design of preventing and protecting works against inundation: storage reservoir, flood plains, etc.

Representative References

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- Università degli Studi di Pavia
- CEMAGREF Lyon
- Università degli Studi di Napoli Frederico II
- University of Mississippi, Oxford
- Rijksuniversiteit Gent

Main Equipment

- Test flume 36 m length, 3.60 m width and 0.50 m depth; discharge up to 250 l/s
- Sedimentological test flume, 7.5 m length, 0.50 m width and 0.45 m depth; discharge up to 40 l/s; slope from 0 to 5 %
- Compound channel test flume, 10 m length, 1.20 m width and 0.30 m depth; discharge up to 40 l/s; slope from 0 to 3 %
- Test flume for dam-break over mobile sediments, 6 m length with jack-controlled downwards moving gate, 0.25 m width adjustable up to 0.50 m over half of the length

Products and Services

- Prediction of water level evolution in rivers by one- and two dimensional modelling;
- Real-time flood forecasting;
- Sediment transport in rivers and navigation canals: prediction and management
- Design and optimisation of lock-filling systems
- Critical analysis of river models and procedures for inundation mapping

Keywords

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