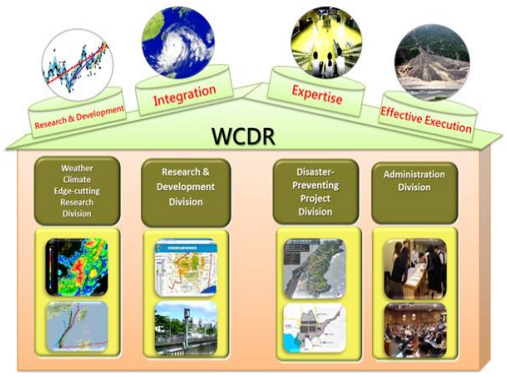
Center for Weather Climate and Disaster Research, National Taiwan University

No. 1, Sec. 4, Roosevelt Rd., Taipei 10617, Taiwan (R.O.C.)
http://www.wcdr.ntu.edu.tw

Outline

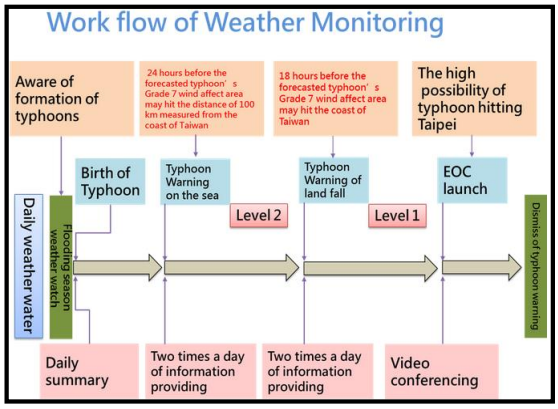
In 2003, the Disaster Research Center (DRC) of National Taiwan University was established for researches on various types of disaster reduction. The center name changed from DRC to Center for Weather Climate and Disaster Research (WCDR) in 2010. WCDR has promoted interdisciplinary collaboration in natural disaster research with research communities, including universities, institutions, government agencies and private sectors in Taiwan. Located in the hot zone of typhoon tracks in the Western Pacific, Taiwan suffers three to five major typhoons annually. In the recent decades, extreme weather events have occurred more frequently in Taiwan and all over the world. In addition, global climate change has frequently generated more natural disasters such as floods, mudflows and landslides. Due to extreme events in powerful typhoons such as Tyhoon Nari, Aere, Kalmaegi, Morakot, Fanapi and Megi, catastrophe has incurred enormous damages and life loss in Taiwan. Reinforce international research communities and academic-industry collaboration to provide high quality research outcomes and services for disaster risk reduction.

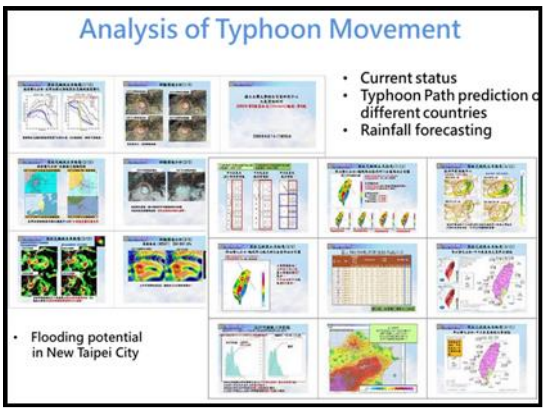


In WCDR, there are four research divisions: weather climate edge-cutting research division, research & development division, disaster preventing project division and administration division. The mission of WCDR is to promote integrated research developments and to investigate methodologies for disaster reduction based on science, engineering and informatics. Its major objective is to develop and integrate information of hydro-meteorology, fluvial-pluvial flood, landslide and soil erosion disasters in decision-making process. The research outcomes of WCDR provide scientific modelling and monitoring results and knowledge on natural hazards to the public, and they also help national and local government agencies on prevention strategies as well as emergency responses for disasters.

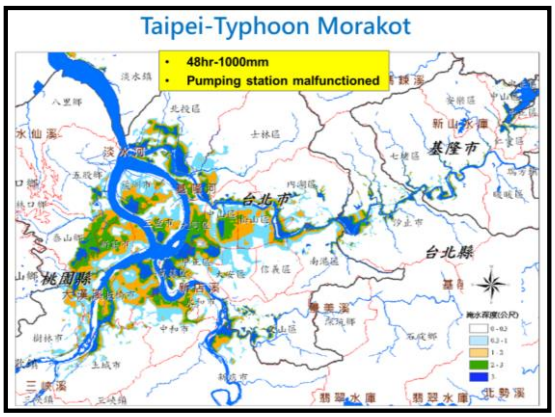
Research Achievements and Challenges

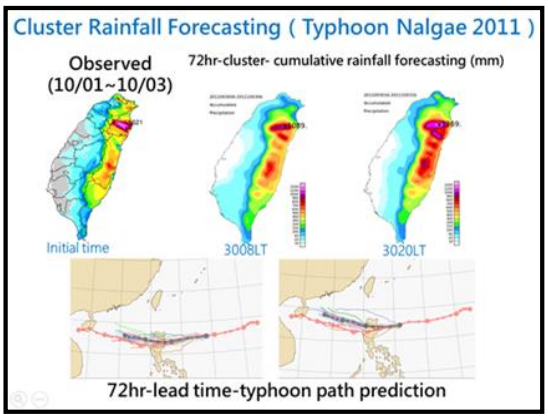
The recent studies focus on the impacts of the radar monitoring data integrated with different densities of rain gauge networks on rainfall-runoff processes through a semi-distributed parallel-type linear reservoir rainfall-runoff model. In general, the more precise in locating the center of the storm indicates the better estimation on the large-scale variability. We also focus on the impacts of urban heat island effects on the hydrological pattern, including typhoon, frontal and convective rainfall. The results can promote the emergency operation for short-duration extreme weather events.





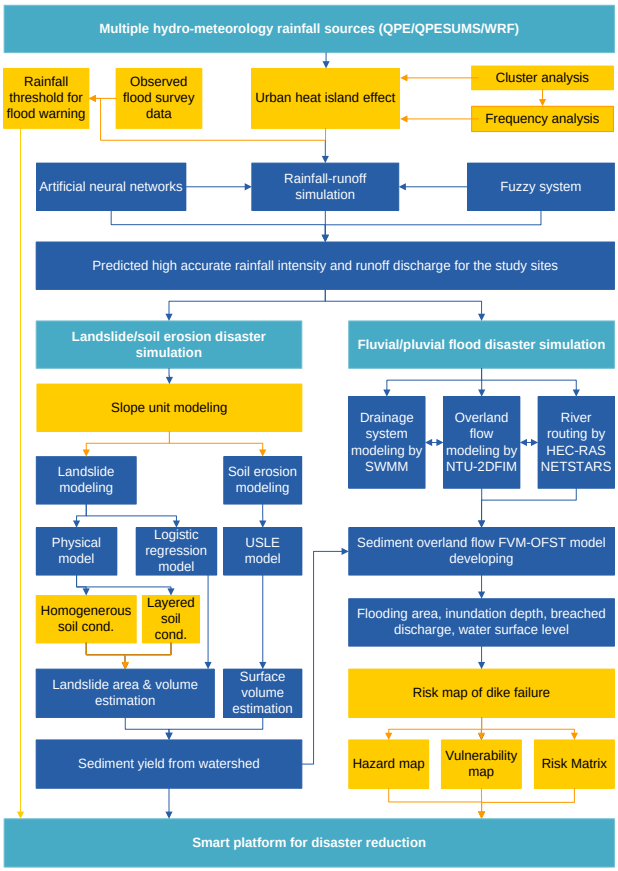
Many metropolises situated on lowlands suffer from pluvial inundation disasters more than fluvial flood disasters. The design capacity of a drainage system is often smaller than that of a fluvial protection facility such as levees. In order to improve mitigation strategies, flood risk assessment is an important tool in non-structural flood control measures, especially in the countries suffering from frequent tropical cyclones and monsoons. A risk evaluation of dike failure is proposed, and the methodology is proposed and is verified by Typhoon Morakot event. As a results of urbanization in Taiwan, heavy rainfalls cause inundation disaster rising with the increase of population and the demand of land development. The above mentioned task is undergoing Emergency Response Project for the New Taipei City.



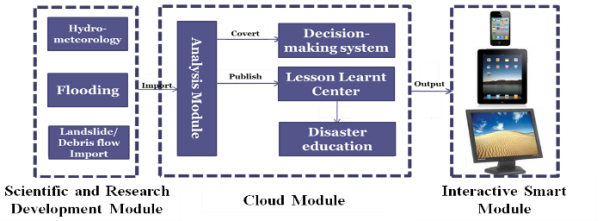


In the research of presenting and visualizing disaster information, the integrated decision support system (DSS) has incorporated not only the database of land use, buildings, resident and rescue resources, but also the knowledgebase of engineering and non-engineering strategies for hazard management and emergency responses.

Future Disaster Research Roadmap



- Long-term hot spot field investigation through monitoring and modeling.
- Application of real-time sensor network for data collection, equipment and model development.
- Integrated management and perspective strategy for reducing risk of multi-hazards.
- Developing comprehensive disaster risk assessment tools in smart platform.
- Establishing river basin database for potential inundation map and potential debris flow map.
- Short-term training classes for international students in Taiwan to exchange experiences and learn techniques.
- Implementation of interdisciplinary approaches to meaningfully combine efforts in technological innovations, applications, governances, and education.



Hazards and emergency requirements are a part of living with nature while hazards are inevitable. The elimination of all risk is impossible. Through sharing and exchanging inter-disciplinary knowledge on natural hazard researches, discussion over hazard-related issues should highlight mutual collaborations between government, business and community partners to foster integration of hazard prediction, mitigation and recovery, and provide solutions to regional and global challenges.

Based on teaching and research efforts, technological innovation, transfer and application can be enhanced due to effective communication to the decision makers and public for natural disaster reduction.