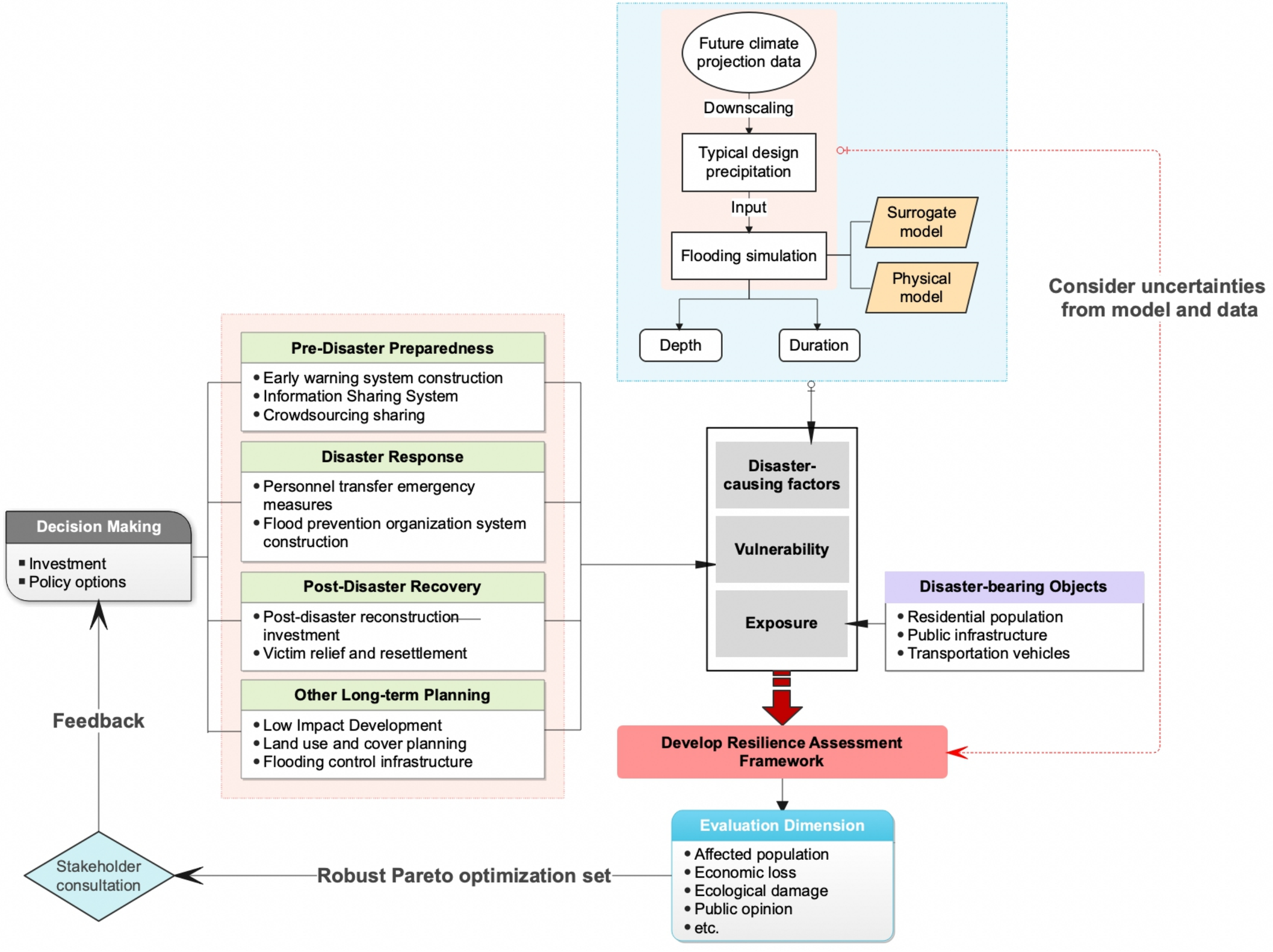
The following schematic shows a brief technical route for flooding management decision support in response to future climate change scenarios. It aims to help decision makers to get robust and reliable investment plans and management policies, while confronting the uncertainty of flooding risk due to future climate change. The difficulties and innovation points of the work may lie in:

- **Building of the flooding simulation model**. The use of future projection data requires the transformation of large-scale but low-resolution data into high-resolution site data. In addition, numerical models are generally computationally intensive or locally invalid when simulating flood inundation. A combination of mechanism-based numerical models and statistical-based surrogate models may be able to better address these issues.
- **Development of the resilience assessment framework**. The resilience assessment framework outputs multiple indicators of concern to decision makers, via considering the disaster-causing factors under climate change scenarios, as well as the vulnerability and exposure of the flooded region. Constructing a resilience assessment framework that considers the entire process of flooding is key to the decision support system. It requires researchers to understand the effects of management measures and planning on the response to various phases of disasters (e.g., pre-disaster preparedness, post-disaster recovery), and ultimately to find a set of evaluation indicators that reflect resilience.
- **Consideration of uncertainties to identify reliable management strategies**. The investment scale and policies made directly influence the flood management measures taken. When both investments and policy preferences are increased, the vulnerability of the system will be reduced, thus increasing resilience. However, in practical decision making, managers need to consider the cost effectiveness of investments as well as policy trade-offs (policies that are beneficial for flood prevention may be detrimental to other sectors). Uncertainties in future climate change, computational models, and measurement data will pose challenges in making "equilibrium" decisions. One of the challenges is to identify and measure uncertainties in order to develop robust measures to help avoid decision risks.


Future climate projection data
Downscaling
Typical design precipitation
Input
Flooding simulation
Surrogate model
Physical model
Depth
Duration
Consider uncertainties from model and data
Pre-Disaster Preparedness
• Early warning system construction
• Information Sharing System
• Crowdsourcing sharing
Disaster Response
• Personnel transfer emergency measures
• Flood prevention organization system construction
Post-Disaster Recovery
• Post-disaster reconstruction investment
• Victim relief and resettlement
Other Long-term Planning
• Low Impact Development
• Land use and cover planning
• Flooding control infrastructure
Decision Making
▪ Investment
▪ Policy options
Feedback
Disaster-causing factors
Vulnerability
Exposure
Disaster-bearing Objects
• Residential population
• Public infrastructure
• Transportation vehicles
Develop Resilience Assessment Framework
Evaluation Dimension
• Affected population
• Economic loss
• Ecological damage
• Public opinion
• etc.
Robust Pareto optimization set
Stakeholder consultation