

Details of Grant

EPSRC Reference:	EP/T003979/1		
Title:	RESilient Emergency Preparedness for Natural Disaster Response through Operational Research(RESPOND-OR)		
Principal Investigator:	Zografos, Professor K		
Other Investigators:	Glazebrook, Professor KD	Kheiri, Dr A	Komarudin, Dr K
	Sopha, Dr B	Mohamed Ali, Dr HHS	Sutanto, Professor J
	Hidayatno, Dr A	Suhartanto, Professor H	Abushama, Dr H M
Researcher Co-Investigators:			
Project Partners:	BNPB (Nat Disaster Man Agency)	BNPB Nat Disaster Man Agency (replace)	Humanitarian Forum Indonesia (HFI)
	Nile Basin Initiative NBI	RedR Indonesia	
Department:	Management Science		
Organisation:	Lancaster University		
Scheme:	GCRF (EPSRC)		
Starts:	01 October 2019	Ends:	31 March 2022
		Value (£):	515,924
EPSRC Research Topic Classifications:	Mathematical Aspects of OR		
EPSRC Industrial Sector Classifications:	Environment		
Related Grants:			
Panel History:	Panel Date	Panel Name	Outcome
	12 Jun 2019	SI GCRF 4 - Maths Research and GCRF 5 - Maths Capability	Announced

Summary on Grant Application Form

Natural disasters have grave consequences for human, social and economic environment. Although large-scale natural disasters occur worldwide, statistical evidence suggests that their negative impacts are much more pronounced in less developed countries. Between 2003-2013, natural disasters in developing countries cost about \$550 billion and affected 2 billion people. Indonesia and Sudan are among the countries enormously affected by the economic and societal consequences of natural disasters. In Indonesia, a natural disaster may trigger another natural disaster, either simultaneously or in a sequential order. In addition, the disaster response in Indonesia needs to take into consideration the archipelago structure of the country. In Sudan, the prevalent disaster, which is flooding may trigger a health emergency that requires simultaneous consideration. Furthermore, the disaster response operations in Sudan are characterized by high risk due to civil conflicts.

The optimization of disaster preparedness and response interventions provides ample potential to decrease the magnitude of the negative impacts of the disasters with significant economic and societal benefits for the sustainability of the impacted communities. However, available approaches are mostly based on generic assumptions that tend to oversimplify the decision-making needs of disaster management agencies. Specifically, available disaster preparedness and response models do not adequately address the following challenges:

1. Modelling of the allocation of disaster response resources for combined large-scale natural disasters that happen simultaneously and/or sequentially, i.e. earthquakes triggering tsunamis, or outbreak of diseases following floods.
2. Integrated modelling of strategic disaster preparedness and operational disaster relief decisions.
3. Modelling the routing and scheduling of humanitarian support resources in the presence of civil disobedience and social conflict.
4. The incorporation of fairness criteria in modelling disaster preparedness and response decisions.

The lack of models capturing the real world complexities leads to inefficient allocation and use of scarce disaster preparedness and response resources. Therefore, there is an urgent need to address the mathematical modelling and associated computational and data management challenges stemming from the complexity of the real world decision-making environment of disaster management agencies. The RESPOND-OR project will develop the next generation of models which will incorporate the requirements of all relevant stakeholders. The complexity of the proposed models will necessitate the development of new hyper heuristics that will provide good quality solutions in very short computational times.

The mathematical models, the solution algorithms, and the data management and visualization tools will underpin the development of a Decision Support System (DSS) that will enhance the decision-making capabilities of disaster preparedness and response organizations in Indonesia and Sudan. The research team has an internationally leading profile in the areas of mathematical modelling, heuristic development, stochastic optimization, data management and visualization, and disaster preparedness and response management. The research team has an excellent record in stakeholder engagement. We will work very closely with our stakeholder partners to ensure that the outcome of RESPOND-OR will be scientifically sound and fully aligned with their needs.

Key Findings

This information can now be found on Gateway to Research (GtR) <http://gtr.rcuk.ac.uk>

Potential use in non-academic contexts

This information can now be found on Gateway to Research (GtR) <http://gtr.rcuk.ac.uk>

Impacts

Description	This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk
Summary	
Date Materialised	

Sectors submitted by the Researcher

This information can now be found on Gateway to Research (GtR) <http://gtr.rcuk.ac.uk>

Project URL:	
Further Information:	
Organisation Website:	http://www.lancs.ac.uk