Optimal Investment Strategies to Minimise Flood Impact on Road Infrastructure Systems in Vietnam (GCRF OSIRIS)

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https://research.kent.ac.uk/gcrf-osiris/
Agenda

- Introduction to the project
  - GCRF Cities and Infrastructure Programme
  - Aims and methodology
  - Our team
  - Inter-disciplinary approach
- Ingredients for a successful proposal
- Challenges
- Opportunities
Cities & Infrastructure Programme

- Launched by British Academy
- To lead an interdisciplinary, problem-focused research programme …
- That supports development of sustainable and resilient cities in developing countries
- 17 projects funded (up to £300,000 each)
- Duration: 16 months
- Started February 2018
OSIRIS Aim and Methodology

Overarching aim

- Reduce the impact of floods on Vietnam’s urban road networks …
- By building a decision support tool which optimizes long-term investments in flood mitigation measures

Methodology

- Operational research (aka management science)
- Integrated with other disciplines (e.g. social science, transport economics, hydrology, climatology)
What is Operational Research?

- **Operational Research** (O.R.) is the discipline of applying advanced analytical methods to help make better decisions.

- Applications in very diverse areas including:
  - Transportation, healthcare, telecommunication, manufacturing, government, defence and ... disaster management

- A variety of methodologies:
  - Problem structuring
  - Optimisation
  - Simulation
  - Game theory
  - Decision analysis
Flood Disasters

- Between 1995 and 2015
  - 3,062 flood disasters
  - 157,000 people have died as a result of floods
  - 2.3 billion people were affected

- Increasing number
  - 20% of the world population will be exposed to floods by 2050
  - 54 million affected every year by 2030
Countries exposed to floods

15 Countries Account for 80% of Population Exposed to River Flood Risk Worldwide

<table>
<thead>
<tr>
<th>Country</th>
<th>Annual Expected Population Affected by River Floods (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>4.84</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>3.48</td>
</tr>
<tr>
<td>China</td>
<td>3.28</td>
</tr>
<tr>
<td>Vietnam</td>
<td>0.93</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0.71</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.64</td>
</tr>
<tr>
<td>Egypt</td>
<td>0.46</td>
</tr>
<tr>
<td>Myanmar</td>
<td>0.39</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>0.33</td>
</tr>
<tr>
<td>Nigeria</td>
<td>0.29</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.27</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.25</td>
</tr>
<tr>
<td>Congo, Dem. Rep.</td>
<td>0.24</td>
</tr>
<tr>
<td>Iraq</td>
<td>0.19</td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.19</td>
</tr>
<tr>
<td>Rest of the World</td>
<td>4.24</td>
</tr>
</tbody>
</table>

The top 15 countries with greatest population exposed to river flood risk are either least developed or developing countries, which are the most vulnerable to natural disasters and climate change.
Hanoi’s floods
Hanoi’s recent floods

Problem exacerbated by:
- Fast urbanisation
- Aging drainage system
- Climate change
Project Team

The University of Nottingham

University of Kent

IMHEN

AMDI

V.A.S.T

TDSI
Project Team

Inception Workshop 29.03.2018
Interdisciplinary Approach

Impact Assessment

Investment Programmes Review

Rainfall simulation
Flood map generation

Optimised schedule of mitigation actions

GIS-Based DSS
Ingredients for a successful proposal

- Challenge-led, impact-focused research
- Stakeholder engagement
- Genuine and equitable partnerships (consolidated and balanced team)
- Innovative, excellent, interdisciplinary research
- Demonstrable track record of researchers
- Solid capacity building strategy
- Realistic and clear pathways to impact
- Value for money
Challenges

- Timeline
- Recruitment / retention of personnel (RA)
- Communication across disciplines
- Managing multiple teams in different cultural contexts (e.g. language, culture, public engagement, legal frameworks)
- Budget estimation (e.g. visa, trips, translator)
- Time allocation (e.g. PI)
- Project management and administration (including communication / dissemination)
Opportunity

- Integrate results into future planning and interventions through stakeholder engagement
  - Ministries (Transport, Natural Resources and Environment)
  - City level (Hanoi Urban Planning Services)
  - NGOs (CC and DRR networks)
- Improve quality of life and sustainable development in cities affected by flood
- Extend methodology / findings to other regions in Vietnam and South East Asia
- Strengthen Vietnam and UK research capacity in the area of flood mitigation planning
- Promote the use of O.R. for achieving the SDGs (green logistics, transport, agriculture, healthcare)
Thank you!

GCRF: Cities & Infrastructure