

Smart Innovation, Systems and Technologies 228

Suman Bhattacharjee  
Siuli Roy  
Sipra Das Bit



# Post-disaster Navigation and Allied Services over Opportunistic Networks

KES  
International

 Springer

# **Smart Innovation, Systems and Technologies**

Volume 228

## **Series Editors**

Robert J. Howlett, Bournemouth University and KES International,  
Shoreham-by-sea, UK

Lakhmi C. Jain, KES International, Shoreham-by-Sea, UK

The Smart Innovation, Systems and Technologies book series encompasses the topics of knowledge, intelligence, innovation and sustainability. The aim of the series is to make available a platform for the publication of books on all aspects of single and multi-disciplinary research on these themes in order to make the latest results available in a readily-accessible form. Volumes on interdisciplinary research combining two or more of these areas is particularly sought.

The series covers systems and paradigms that employ knowledge and intelligence in a broad sense. Its scope is systems having embedded knowledge and intelligence, which may be applied to the solution of world problems in industry, the environment and the community. It also focusses on the knowledge-transfer methodologies and innovation strategies employed to make this happen effectively. The combination of intelligent systems tools and a broad range of applications introduces a need for a synergy of disciplines from science, technology, business and the humanities. The series will include conference proceedings, edited collections, monographs, handbooks, reference books, and other relevant types of book in areas of science and technology where smart systems and technologies can offer innovative solutions.

High quality content is an essential feature for all book proposals accepted for the series. It is expected that editors of all accepted volumes will ensure that contributions are subjected to an appropriate level of reviewing process and adhere to KES quality principles.

Indexed by SCOPUS, EI Compendex, INSPEC, WTI Frankfurt eG, zbMATH, Japanese Science and Technology Agency (JST), SCImago, DBLP.

All books published in the series are submitted for consideration in Web of Science.

More information about this series at <http://www.springer.com/series/8767>

Suman Bhattacharjee · Siuli Roy · Sipra Das Bit

# Post-disaster Navigation and Allied Services over Opportunistic Networks

 Springer

Suman Bhattacharjee  
Information Technology  
Dr. B. C. Roy Engineering College  
Durgapur, West Bengal, India

Siuli Roy  
Information Technology  
Heritage Institute of Technology  
Kolkata, West Bengal, India

Sipra Das Bit  
Computer Science and Technology  
Indian Institute of Engineering Science  
and Technology, Shibpur  
Howrah, West Bengal, India

ISSN 2190-3018                      ISSN 2190-3026 (electronic)  
Smart Innovation, Systems and Technologies  
ISBN 978-981-16-1239-8              ISBN 978-981-16-1240-4 (eBook)  
<https://doi.org/10.1007/978-981-16-1240-4>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.  
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

# Chapter 1

## Introduction



Over the last couple of decades, countries across the globe, both developing and developed, have witnessed a significant number of disasters. A disaster is an unanticipated disastrous event that severely disturbs the normal functionality of a community or society and causes heavy casualties as well as enormous damage to property. Typically the entire region is not affected by the disasters uniformly. A few portions are harshly hit owing to their topography. Such portions are called affected areas in disaster management vocabulary [1–3]. Disaster management refers to organizing and managing the resources and liabilities in order to mitigate the influence of disasters. It is further subdivided into two: pre-disaster management and post-disaster management [4]. Pre-disaster management involves the works done in advance of disasters to reduce the severity through prevention and mitigation, as well as improve response through preparedness and planning. Post-disaster management involves the works done in disaster aftermath to reduce human casualties and restore normal social activities in the affected areas with the help of response and recovery. In a post-disaster scenario, normal human activities are severely impaired. As a result, different disaster response agencies mobilize their resources such as human resources, aid, etc. to the affected areas in order to expedite the process of disaster management.

### 1.1 Disaster Management Cycle

The disaster management cycle demonstrates the continuing practices by which the governments, disaster response agencies and civil society plan for disaster response operations and react after a disaster has occurred. Figure 1.1 illustrates the modern disaster management cycle involving four phases, such as mitigation, preparedness, response and recovery [5–7]. The aforesaid four phases of disaster management are defined by Coppola [8] as follows.

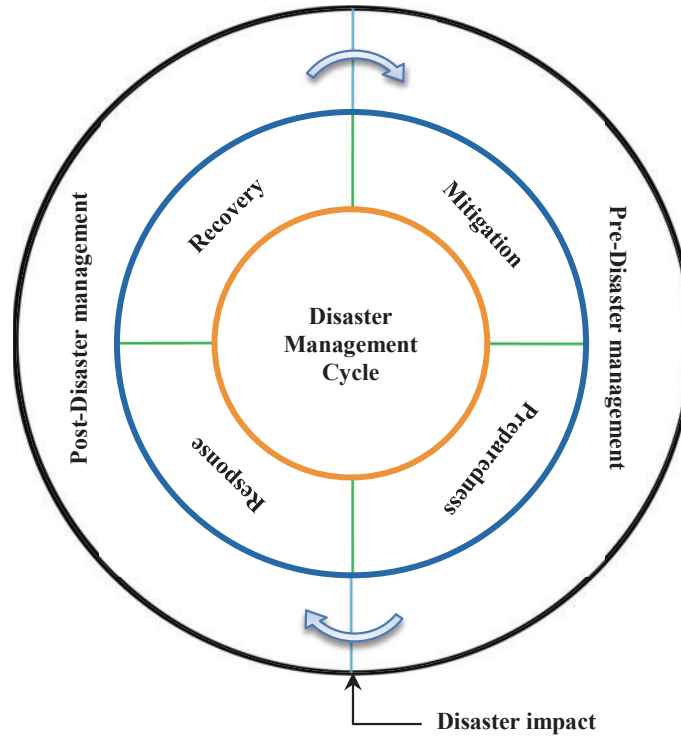


Fig. 1.1 Disaster management cycle

### 1.1.1 Mitigation

Mitigation is a proactive phase aimed at reducing the number of casualties as well as the loss of properties by diminishing the impacts of disasters. This phase reduces or eliminates the impacts and consequences of a disaster through proactive and pre-determined measures, which include an assessment of hazards and recurrent problems, building a plan to mitigate such problems and adopting subsequent actions to implement the plan. The mitigation phase primarily involves three activities, such as risk analysis, risk reduction and risk insurance. The mitigation measures help the community to prevent severe damages to their assets and help them remain operational in the face of disasters.

### 1.1.2 Preparedness

Disaster preparedness typically refers to the actions taken in the pre-disaster scenario in order to ensure adequate response and relief in a post-disaster scenario. This phase