

Using Volunteered Geographic Information (VGI) to support decision-making in Disaster Management

Systematic Literature Review

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Agenda

- Disaster Management
- Volunteer Geographic Information (VGI)
- Protocol
- Initial Conduction

Disaster Management

TX - High Temperature

IF - Florestal Fire

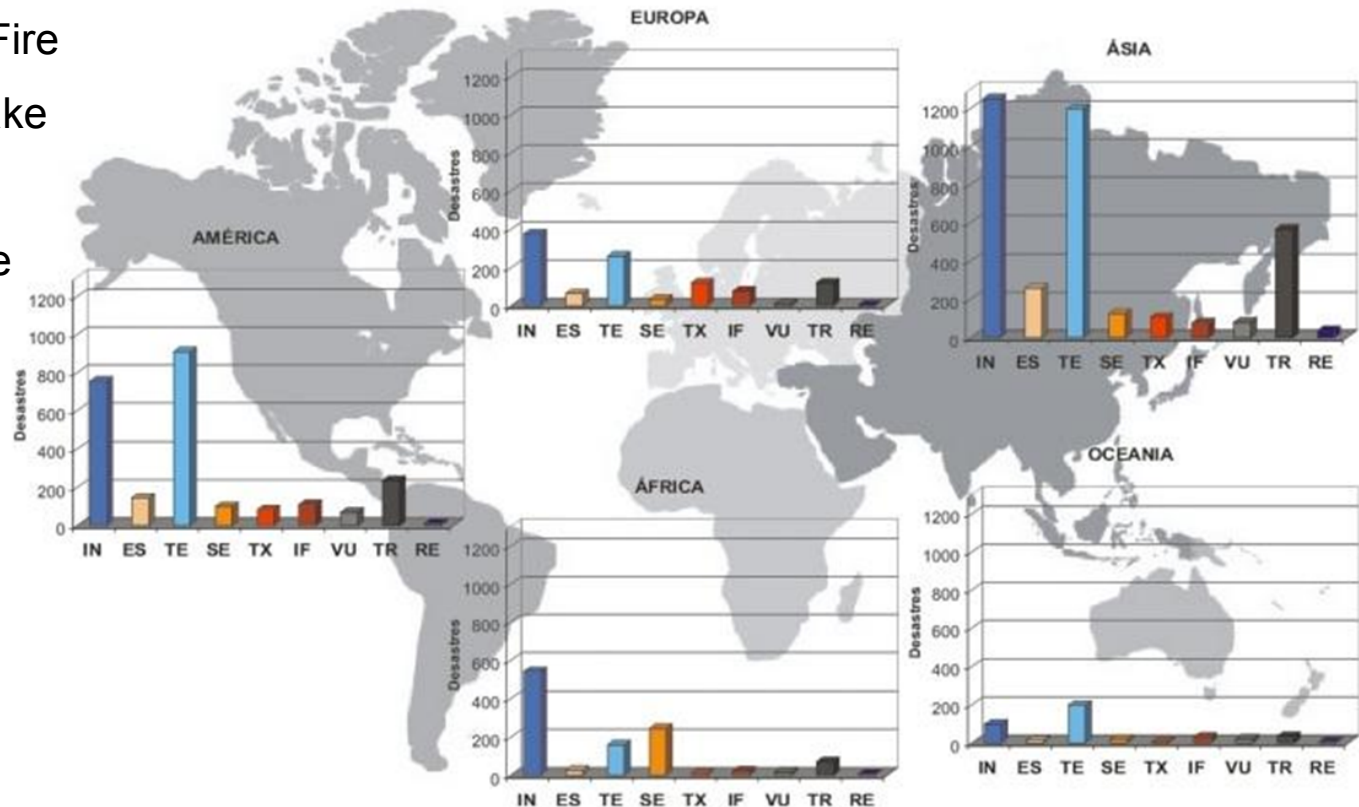
TR - Earthquake

IN - Floods

ES - Landslide

TE - Storms

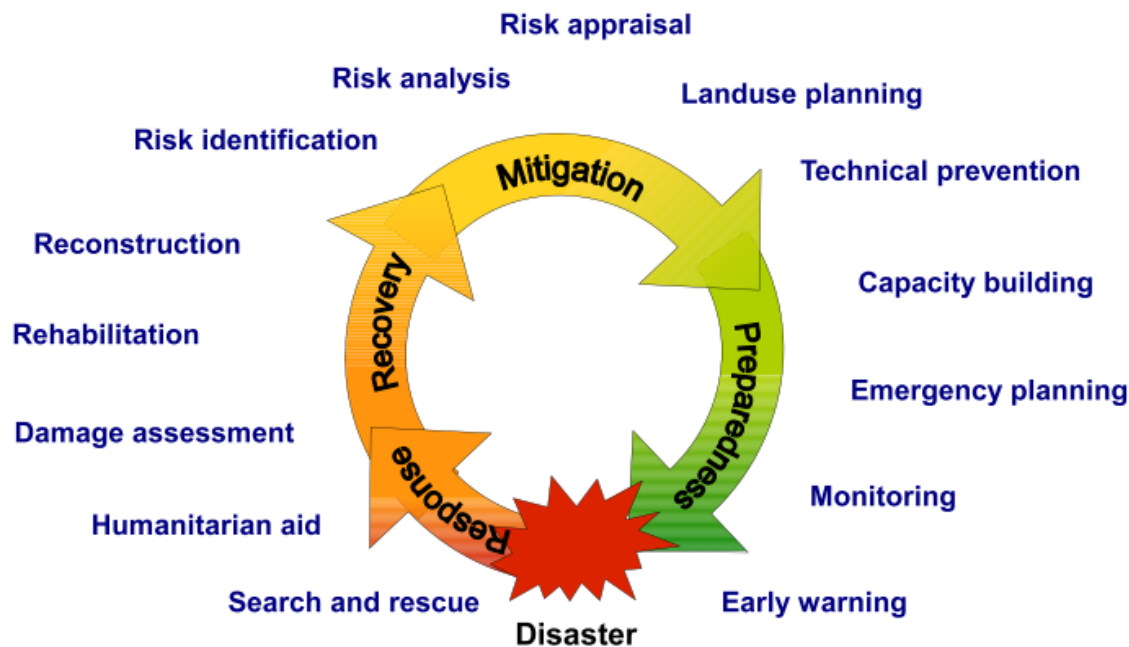
SE - Drought



INPE (1900 - 2006)

Disaster Management

Disaster management is an alternative to improve resilience and therefore avoid or reduce the impact of natural disasters (Baharin *et al.*, 2009).



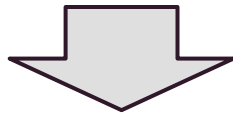
Disaster Management



In all these phases, **information** used plays a key role in ensuring the reduction of impacts.

Disaster Management

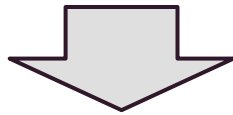
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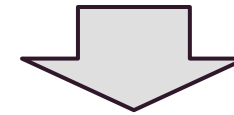
Scientific predictions
about the upcoming changes
and their associated impacts
are important.

Disaster Management

In all these phases, **information** used plays a key role in ensuring the reduction of impacts.



Scientific predictions about the upcoming changes and their associated impacts **are important.**



But the **accurate, timely and complete** information about the current state of environmental variables are **also important.**

Volunteer Geographic Information (VGI)

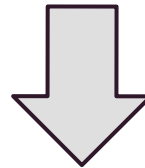
However, the largely damages caused by the disasters:

- affects the coexistence of people,
- brings difficulties to the Emergency Agencies (EA), and
- **delay** the **response** processes...

Volunteer Geographic Information (VGI)

However, the largely damages caused by the disasters:

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- **delay** the **response** processes...



that necessarily needs to be **fast** and **reliable**, because a **slow response** based on incorrect data can lead to **serious consequences**, such as **loss of lives**.

(Ostermann and Spinsanti, 2011; Erkine and Gregg, 2012)

Volunteer Geographic Information (VGI)

*"Volunteered Geographic Information (VGI) is defined as a collection of digital spatial data produced by **individuals** and **non-formal institutions** using appropriate tools to gather and disseminate their views and **geographical knowledge** on the web."*

(Goodchild, 2007)



Volunteer
Information

Protocol

Objective: Identify relevant primary studies that address the use of Volunteer Geographic Information (VGI) as a source of information to increase the quality and accuracy of decision-making process at the disaster management.

Research Questions

RQ1: How volunteer information can help on the decision-making process used at the disaster management?

- **Secondary Question 1:** What are the **techniques, processes or models used to decision-making?**
- **SQ2:** What is the **type of disaster** treated in the study?
- **SQ3:** What is the **type of decision-making?**
- **SQ4:** What are the mechanisms used to collect data?
- **SQ5:** What are the mechanisms used to share data?
- **SQ6:** What is the **phase** of disaster?
- **SQ7:** Which is the **domain model** used, i.e. hydrologic models?

Sources Selection

Keywords: The keywords related with this review are “Volunteered Geographic Information”, “Decision Support System” and “Disaster Management”:

Volunteered Geographic Information: "VGI", "Crowdsourcing", "User-generated content", "Social Media", "Collaborative System", "Collective Intelligence", "Collective Knowledge", "Citizen Based", "Social Computing", "Citizen Based", "UGC";

Decision Support System: "DSS", "Decision Making", "Decision-making", "Decision Model", "Decision Support Model", "Decision Support";

Disaster Management: "Disaster Management" OR "Crisis Management" OR "Emergency Management" OR "Disaster Response" OR "Emergency Response" OR "Flood" OR "Earthquake" OR "Tsunami" OR "Crisis Situations" OR "Crisis Response" OR "Natural Hazard" OR "Disaster Relief".

Inclusion Criteria

- IC1:** The primary study uses volunteer information to help on the decision-making process at the disaster management;
- IC2:** The primary study presents some resource to make decision using volunteer information at the disaster management.

Exclusion Criteria

- EC1:** The primary study isn't write in English;
- EC2:** The primary study isn't available;
- EC3:** The primary study is duplicate;
- EC4:** The primary study isn't published;
- EC5:** The primary study that didn't archived more than 2 on the quality criteria;
- EC6:** The primary study is related with disaster management but not uses volunteer information for decision-making;
- EC7:** The primary study uses volunteer information for decision-making but isn't related with disaster management;
- EC8:** The primary study related only with volunteer information;
- EC9:** The primary study related only with decision-making process;
- EC10:** The primary study related only with decision-making process for disaster management;
- EC11:** The primary study related only with volunteer information for disaster management;
- EC12:** The primary study isn't related with any topic of this review;
- EC13:** The study is a previous version of a more complete study about the same research;
- EC14:** The primary study is a posters, guidelines, course end work, MSc and PhD thesis, technical reports or workshops proposals.

Quality Criteria

QC1: Is there a clear statement of the research objectives?

QC2: Were the results evaluated in an unbiased manner?

QC3: Are the results reported clearly?

QC4: Is there a clear background which supports the research?

QC5: Is the method used for validation of the study clear?

Initial Conduction

Initial Selection: First, we will select only studies obtained by applying the search string in the data sources defined for this review. Pay attention to the selection of just-focus fields (**Title, Abstract, Keywords**) in search engines. In this step, you must also be stored in the file *BibTex* each item returned in the selection, they will be imported into the tool *JabRef*;

Second Selection: The studies selected in the previous stage will be evaluated according to its title, abstract and keywords and a list containing only those considered potentially relevant should be generated. In this step, the PDF file of the articles in this list must also be stored;

Data Extraction: Then, **the studies will be read and evaluated in its entirety**. The strategy adopted for the extraction of data consists of the evaluation of the review by the student and his supervisor in order to eliminate any bias that might arise during its implementation. We will use an automated tool in a questionnaire form aiming to facilitate this extraction.

Initial Conduction

Source	Results
ScienceDirect	8
Scopus	47
SpringerLink	142
ISI Web of Science	7
AISeL	31
Total	235

Initial Conduction

ACM Digital Library:

Separated in blocks;

We do not exclude papers duplicated because this will be execute on next step of the review.

Title: Disaster management AND VGI	20
Title: Disaster management and DSS	10
Title: VGI and DSS	2
Abstract: Disaster management AND VGI	71
Abstract: Disaster management and DSS	135
Abstract: VGI and DSS	44
Keywords: Disaster management AND VGI	32
Keywords: Disaster management and DSS	8
Keywords: VGI and DSS	6
Total	328

Initial Conduction

IEEEExplore

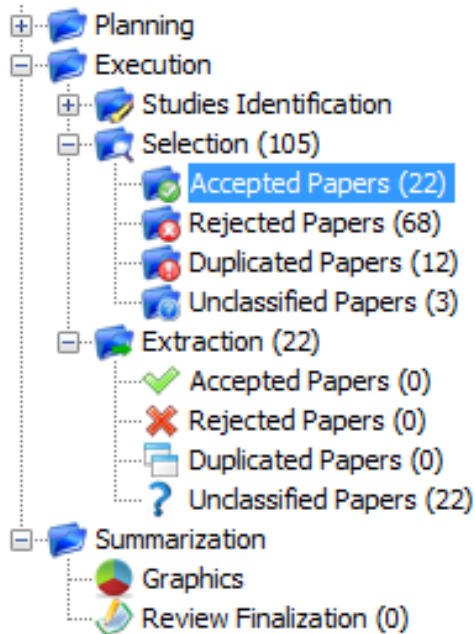
- *Split into two substrings;*
- *Does not allow searching in the abstract and title in the same string.*

Title: Disaster management AND VGI AND DSS	0
Abstract: Disaster management AND VGI AND DSS	12
Total	12

Initial Conduction

Source	Results
ScienceDirect	8
Scopus	47
SpringerLink	142
ISI Web of Science	7
AISel	31
ACM Digital Library	328
IEEEExplore	12
Total	575

Initial Conduction



Initial Conduction

*C:\vaqu\Dropbox(SSC5905)\slr-vgi-dm-dss.start

File Review Help

The use of Volunteered Geographic Information (VGI)

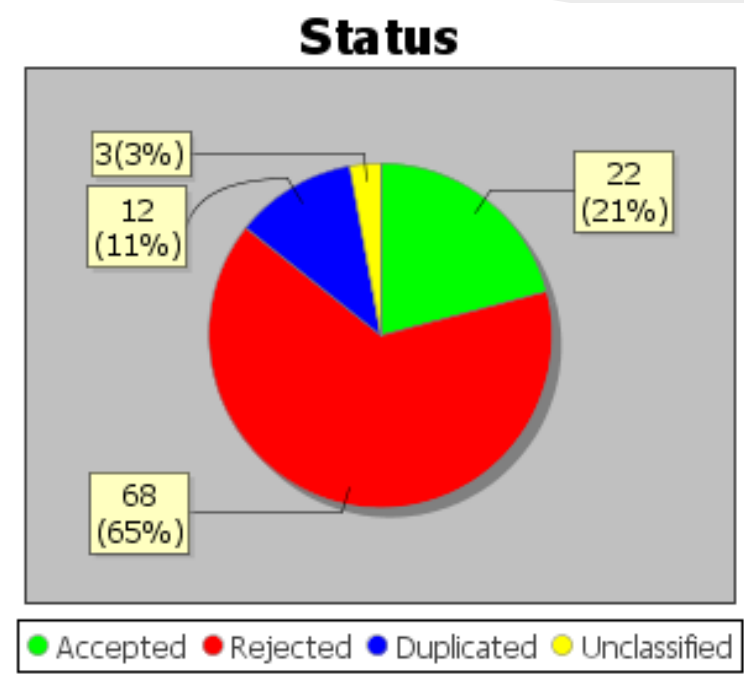
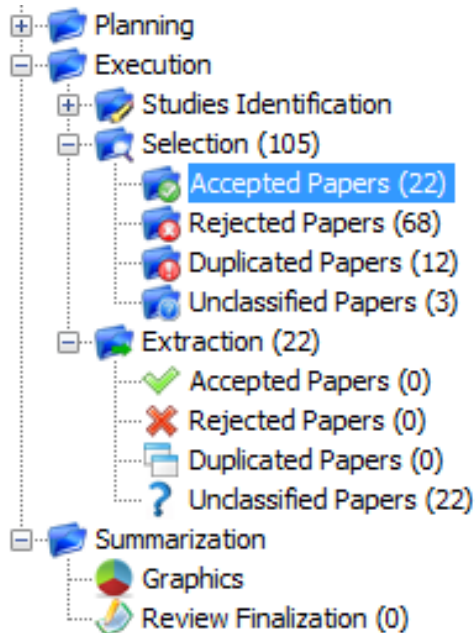
- Planning
- Execution
 - Studies Identification
 - Selection (105)
 - Accepted Papers (22)
 - Rejected Papers (68)
 - Duplicated Papers (12)
 - Unclassified Papers (3)
 - Extraction (23)
 - Summarization

Accepted papers

ID SS	ID Paper	Title	Author	Year	Status/Selection	Status/Extraction	Reading Priority	Score
7	2057	Aggregating, Analyzing, and Diffusing Natural Disaster Inform...	Michael A. Erskine	2013	Accepted	Unclassified	Low	0
7	2060	Critical Factors Affecting Compliance to Campus Alerts	Wencui Han and Serkan ada and Raj Sharman ...	2011	Accepted	Unclassified	Low	0
7	2080	Towards an Oil Crisis Early Warning System based on Absolute ...	Felix Wex and Natascha Widder and Markus H...	2012	Accepted	Unclassified	Low	0
8	2085	A voice in the crowd: Broader implications for crowdsourcing tr...	Sutherland, G.	2013	Accepted	Unclassified	Low	5
8	2090	uEmergency: A collaborative system for emergency managemen...	Qin, Y. and Liu, J. and Wu, C. and Shi, Y.	2012	Accepted	Unclassified	Low	5
8	2093	Automatic identification of crisis-related sub-events using clust...	Pohl, D. and Bouchachia, A. and Hellwagner, H.	2012	Accepted	Unclassified	Low	0
8	2095	Discovering topic transition about the east japan great earthq...	Hashimoto, T. and Kuboyama, T. and Chakrab...	2012	Accepted	Unclassified	Low	5
8	2097	Discovering emerging topic about the East Japan Great Earthq...	Hashimoto, T. and Kuboyama, T. and Chakrab...	2012	Accepted	Unclassified	Low	0
8	2098	Robust Decision Engineering: Collaborative Big Data and its ap...	Chan, S. and Rhodes, W. and Atencio, C. and...	2012	Accepted	Unclassified	High	0
8	2108	Real-time information driven decision support system for evacu...	Gottumukkala, R. and Zachary, J. and Kearfo...	2012	Accepted	Unclassified	High	10
8	2109	Automatic sub-event detection in emergency management usin...	Pohl, D. and Bouchachia, A. and Hellwagner, H.	2012	Accepted	Unclassified	Low	10
8	2110	Lessons learned in using social media for disaster relief - ASU c...	Abbasi, M.-A. and Kumar, S. and Filho, J.A.A. ...	2012	Accepted	Unclassified	High	5
8	2112	Crowdsourcing, citizen sensing and sensor web technologies fo...	Kamel Boulos, M.N. and Resch, B. and Crowle...	2011	Accepted	Unclassified	High	10
8	2113	A collective intelligence resource management dynamic approa...	Asimakopoulou, E. and Bessis, N. and Sotiriadi...	2011	Accepted	Unclassified	Low	10
8	2122	Harnessing the crowdsourcing power of social media for disast...	Gao, H. and Barbier, G. and Goolsby, R.	2011	Accepted	Unclassified	Low	10
10	2134	Simulating the effects of social networks on a population's hurri...	Widener, Michael J. and Horner, Mark W. and ...	2013	Accepted	Unclassified	Low	9
10	2135	"SimDelta" - Inquiry into an Internet-Based Interactive Model f...	Rijkten, Ties and Stijnen, Jan and Slootjes, Na...	2012	Accepted	Unclassified	Low	6
10	2139	Emergency knowledge management and social media technolo...	Yates, Dave and Paquette, Scott	2011	Accepted	Unclassified	Low	20
10	2140	Rumor Analysis Framework in Social Media	Hashimoto, Takako and Kuboyama, Tetsuji an...	2011	Accepted	Unclassified	High	29
11	2157	Before and after disaster strikes: A relief supply chain decision ...	Sameer Kumar and Thomas Havey	2013	Accepted	Unclassified	Low	7
11	2158	Emergency knowledge management and social media technolo...	Dave Yates and Scott Paquette	2011	Accepted	Unclassified	High	9
12	2145	Spatial Computing and Social Media in the Context of Disaster ...	Adam, N.R. and Shafiq, B. and Staffin, R.	2012	Accepted	Unclassified	High	28
8	2088	Topic detection about the east japan great earthquake based ...	Hashimoto, T. and Kuboyama, T. and Hirota, Y.	2013	Accepted	Unclassified	Low	0

Paper successfully saved

Initial Conduction



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Thank You!

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