

Thematic Mapping for Disaster Risk Assessment in Case of Earthquake

Silvia MARINOVA, Temenoujka BANDROVA,
Mihaela KOUTEVA-GUENTCHEVA, Stefan BONCHEV
*University of Architecture, Civil Engineering and Geodesy
BULGARIA*



Introduction

Earthquakes cause major damages and casualties among all natural disasters.

About 360 fatalities due to earthquakes are reported in Bulgaria since 1901 until now.



FIG Working Week 17-21 may, Sofia, Bulgaria

Cartography and Disaster Management

Disaster Management activities

- **assessment, preparedness and prevention**, including hazard analysis, risk assessment, scenarios, monitoring, planning the emergency activities;
- **protection**, including early warning, rescue planning, organizing rescue operations, evacuation and **coordination** of the operations of the Integrated Rescue System;
- **recovery**, including human help, economic support, rehabilitation, reconstruction, strategic development.

FIG Working Week 17-21 may, Sofia, Bulgaria

Cartography and Disaster Management

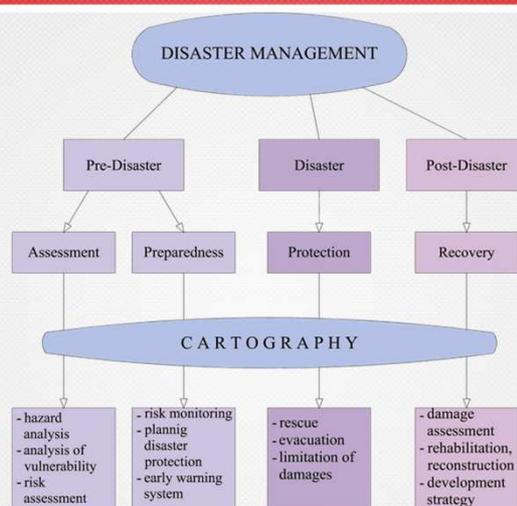
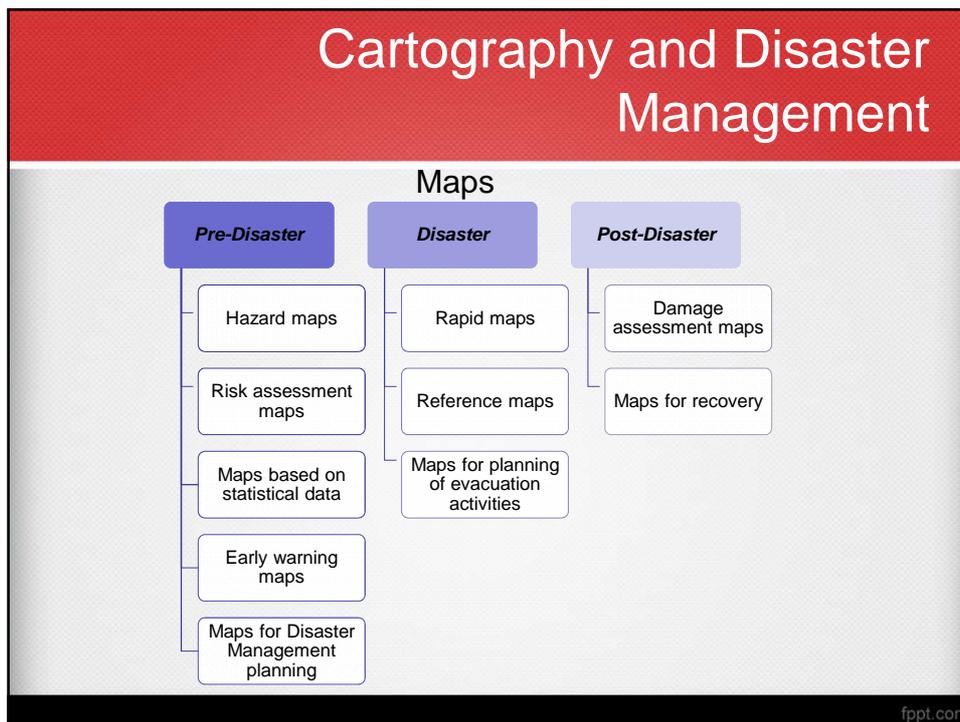


FIG Working Week 17-21 may, Sofia, Bulgaria



fppt.com

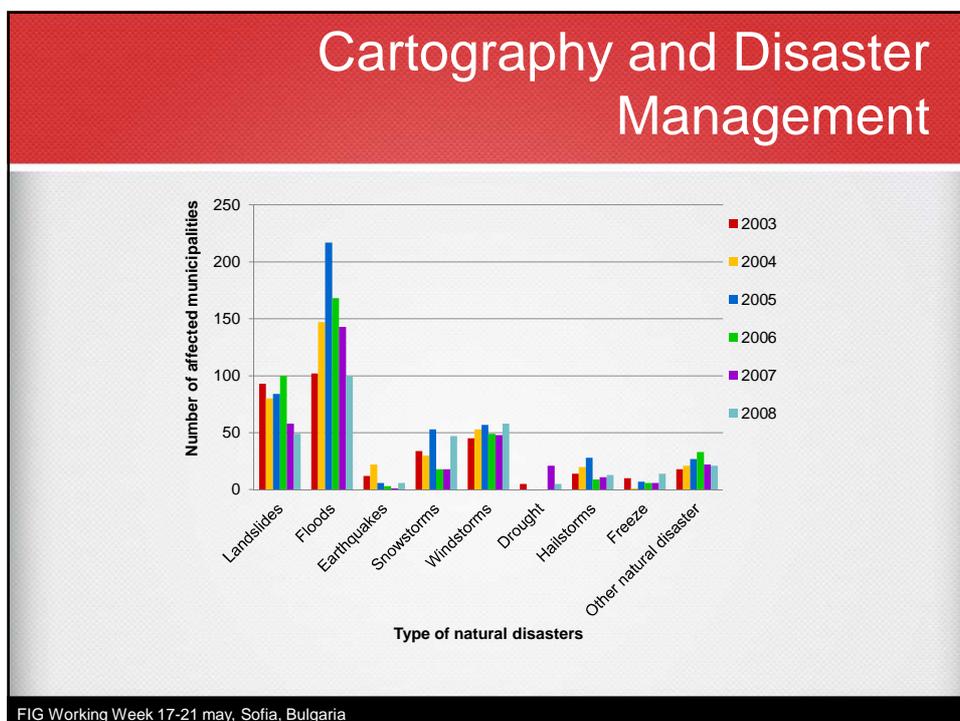


FIG Working Week 17-21 may, Sofia, Bulgaria

Cartography and Disaster Management

Research Project for Earthquake Risk Assessment at University of Architecture, Civil Engineering and Geodesy

- Conceptual model for information system for expert express assessment of the earthquake risk over the Bulgarian territory.

FIG Working Week 17-21 may, Sofia, Bulgaria

Cartography and Disaster Management

Research Project for Expert Earthquake Risk Assessment

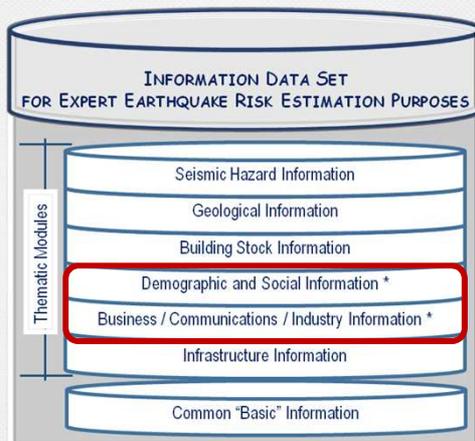


FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Research Project for Expert Earthquake Risk Assessment

Disaster management requires accurate information.

Participants in activities for disaster management need special geographic information.

Main source of such information are thematic maps.

FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Research Project for Expert Earthquake Risk Assessment

Considering the importance of the **demographic and social information** combined with **business / communications / industry information** several maps were produced.

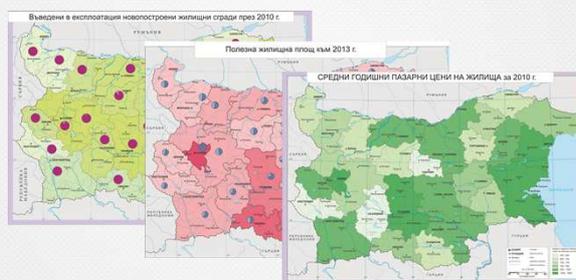


FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Research Project for Expert Earthquake Risk Assessment

Maps representing:

- short-term statistics on residential buildings;
- housing fund - useful living area;
- business statistics - number of building permits;
- business statistics - sectorial statistics - average annual prices;
- information society - household access to the Internet;
- demographic statistics - population density;
- demographic and social statistics – urbanization;
- health sector - number of hospital beds.

FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Research Project for Expert Earthquake Risk Assessment

Maps for the Information Data Set for Seismic Risk Evaluation:

- Urbanization process;
- Transport infrastructure- der regional network;
- Mining and quarrying;
- Electricity network;
- Chemical industry;
- Others.



FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Mapping Demographic and Social Information



Map of newly built housing constructions for 2010

FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Mapping Demographic and Social Information



Map of newly built housing constructions for 2013

FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Mapping Demographic and Social Information



Map of useful living area for 2013

FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Mapping Demographic and Social Information



Map of the building permits number for 2013

FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Mapping Demographic and Social Information



Map of average annual prices for housing for 2010

FIG Working Week 17-21 may, Sofia, Bulgaria

Thematic mapping for expert evaluations of seismic risk assessment

Mapping Business Communication and Industry Information



A map presenting household access to the Internet for 2013

FIG Working Week 17-21 may, Sofia, Bulgaria

Data Harmonization

Combination of international, national and regional data.

Usage of heterogeneous data provided by various services, agencies and organizations.



ekatte	name	region	document abc
04279	Благоевград	BG41	1483 1
07079	Бургас	BG34	1483 2
10135	Варна	BG33	1483 3
10447	Велико Търново	BG32	1483 4
10971	Видин	BG31	1483 5
12269	Враца	BG31	1483 6
14218	Габрово	BG32	1483 7
22524	Добрич	BG33	1483 8
40909	Кърджали	BG42	1483 9
41112	Костандил	BG41	1483 10
43952	Ловеч	BG31	1483 11
49489	Монтана	BG31	1483 12
55155	Пазарджик	BG42	1483 13
PER	Перник	BG41	1483 14

FIG Working Week 17-21 may, Sofia, Bulgaria

Data Harmonization

Main aspects of data harmonization

Georeferencing the information into a geographical reference system

Standardizing the attribute structure

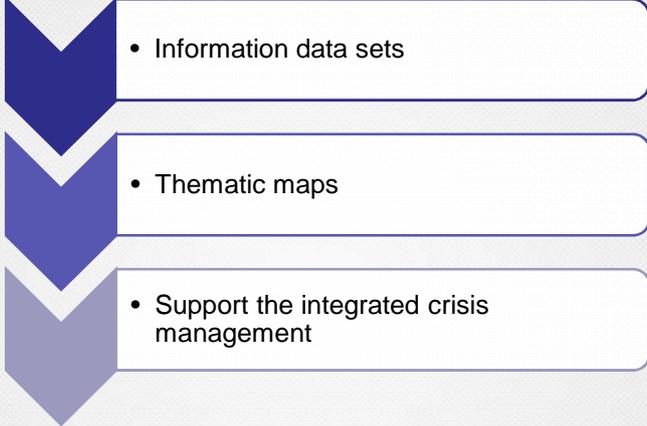
Standardizing the object classification

Standardizing the level of detail of the information

Unifying the cartographic visualization

FIG Working Week 17-21 may, Sofia, Bulgaria

Conclusion



- Information data sets
- Thematic maps
- Support the integrated crisis management

FIG Working Week 17-21 may, Sofia, Bulgaria

Thank you for your attention!

Dr. Eng. Silvia Marinova
University of Architecture, Civil Engineering and Geodesy
Bulgarian Cartographic Association
1, Chr. Smirnenki Blvd.
1046 Sofia, BULGARIA
Email: silveto_marinova@yahoo.com
Web site: www.cartography-gis.com

FIG Working Week 17-21 may, Sofia, Bulgaria