

Natural Disaster Risk Management in Germany

TH Köln - University of
Technology, Arts &
Sciences

Prof. Dr. Alexander Fekete



Photo: Pirna 2006, Fekete



Germany

Population: 83 million

4 Cities with more than 1 million

City of Cologne

Population: 1 million

Universities: 11

90.000 students

Significant Disasters In Germany

Table 2

Top 10 (natural and technological) disaster events in Germany from 1917 to 2017.

Source: EM-DAT: The Emergency Events Database - Universite catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium.

Created on: February 02, 2018.

Disaster no	Type	Date	Totals deaths
2003-0391	Extreme temperature	00-08-2003	9355
1997-0005	Extreme temperature	04.01.97	30
2002-0467	Flood	11.08.02	27
1990-0723	Storm	28.02.90	24
1999-0571	Storm	24.12.99	15
1990-0722	Storm	25.02.90	15
2009-0571	Extreme temperature	18.12.09	14
2002-0674	Storm	26.10.02	11
2007-0019	Storm	18.01.07	11
1990-0721	Storm	13.02.90	10

Paper:



Significant Disasters In Germany

Deaths:
1. Heat Wave
2. Storms

Affected People:
1. Floods
2. Storms

Damage:
1. Floods
2. Storms
3. Heat Wave

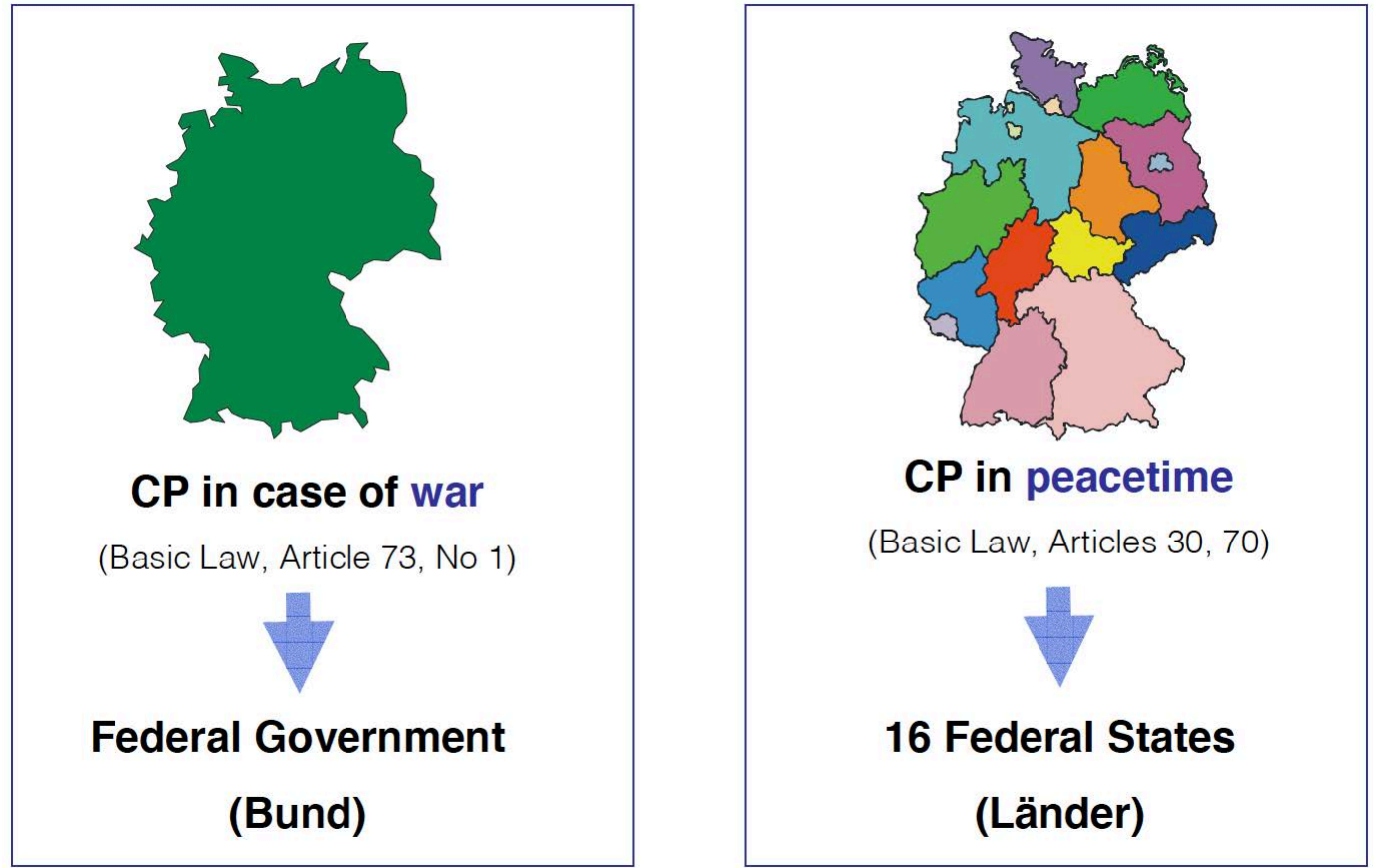
Table 4

Summary of (natural and technological) disaster damage in Germany from 1917 to 2017.

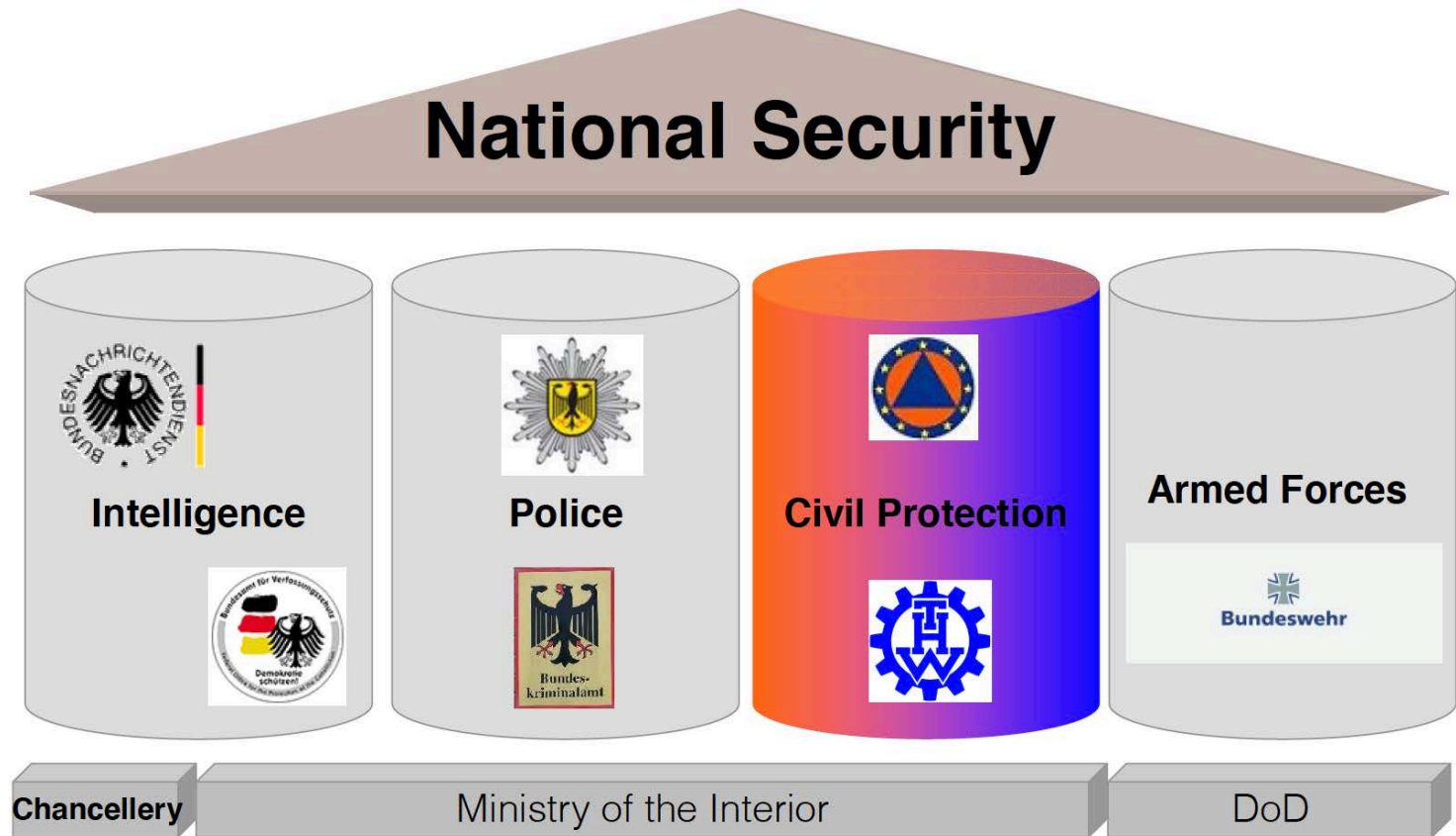
Source: EM-DAT: The Emergency Events Database - Universite catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium. Created on: February 02, 2018.

Disaster type	Disaster subtype	Events count	Total deaths	Total affected	Total damage ('000 US\$)
Earthquake	Ground movement	2	1	1675	62,000
Epidemic	Viral disease	2	0	609	0
Extreme temperature	Cold wave	7	53	165	300,000
Extreme temperature	Heat wave	2	9357	0	1,650,000
Extreme temperature	Severe winter conditions	1	10	0	0
Flood	-	3	34	330,108	13,630,100
Flood	Flash flood	1	3	0	0
Flood	Riverine flood	13	24	213,600	14,923,500
Landslide	Avalanche	1	5	0	6230
Storm	-	16	107	30,234	6,075,000
Storm	Convective storm	13	41	101	7,934,800
Storm	Extra-tropical storm	10	63	134	11,820,000
Storm	Tropical cyclone	1	0	0	500

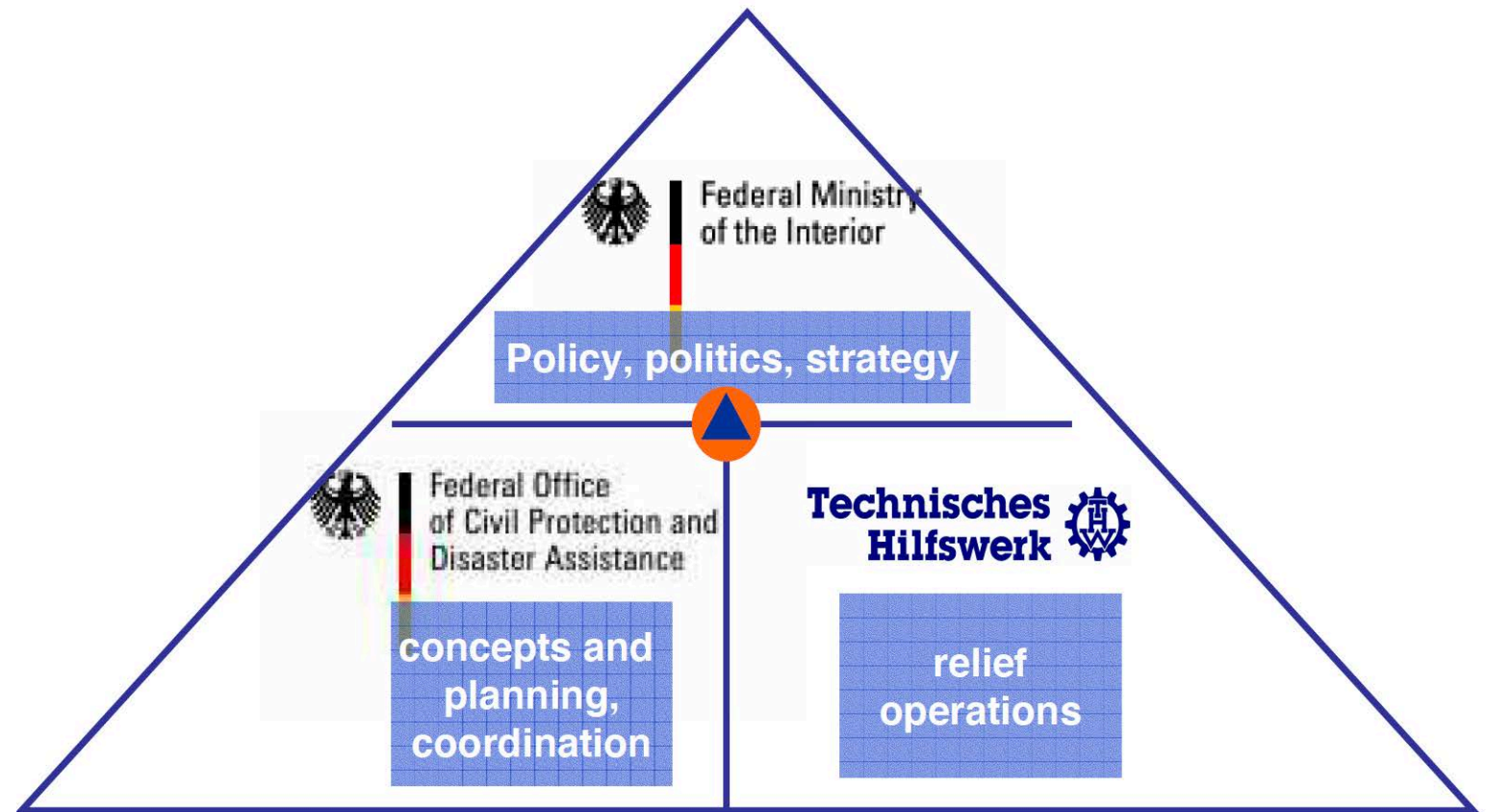
Civil Protection



Civil Protection at National Level



Civil Protection – Distribution of Tasks at National Level



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Risk and Crisis Management
Institute of Rescue Engineering and Civil Protection

Technology
Arts Sciences
TH Köln

Figure; adopted from Federal Office of Civil Protection and Disaster Assistance, 2009

Civil Protection Organisations

Firefighters

33.000 professional Firefighters

1,7 million Volunteers
Voluntary Firefighters,
Relief Organizations, THW



The collage features several images and logos. At the top left is a red fire truck at night. Below it is a blue THW truck stuck in mud. At the bottom left is a white DLRG boat on a lake. To the right of these images are logos for the Bundesanstalt Technisches Hilfswerk (THW), the Deutsches Rotes Kreuz (German Red Cross), Johanniter-Unfall-Hilfe, Malteser, and ASB (Arbeiter-Samariter-Bund).

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Figure; adopted from Federal Office of Civil Protection and Disaster Assistance, 2009

Technical Relief Agency – THW Operational Disaster Management

1800 employees
80.000 trained volunteers



...search **...rescue** **...clearing** **...command**

...repair **...pumping** **...support** **illumination**

**Ready for rapid inter-
national deployment :**

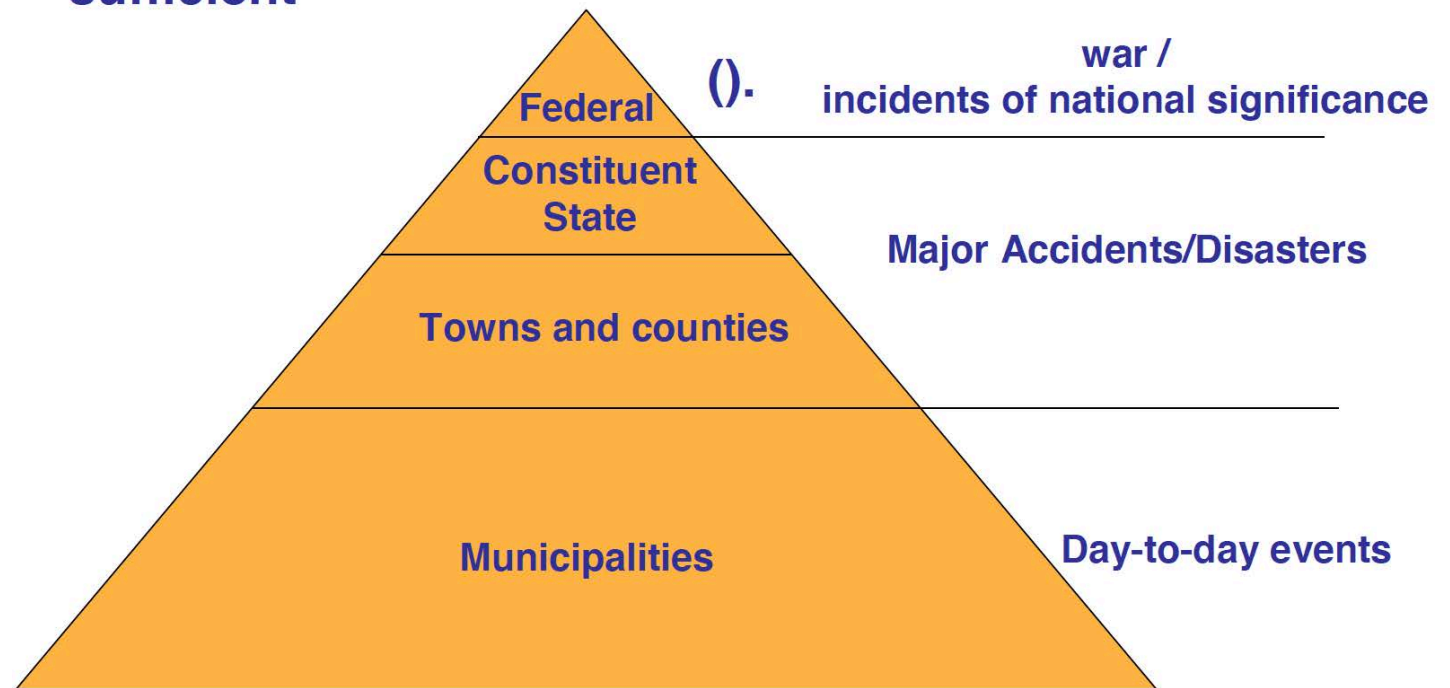
SEEBA **SEEWA**

THW Capacities. Figure adopted from THW 2020

Civil Protection – Structure of Levels of Responsibility

Principle of subsidiarity:

Support by the next level, if resources are not sufficient



Natural Hazards in Germany after World War II

World War II 1939-1945:
up to 80 million killed in over
25 countries

1946-47 Cold Spell (North sea
area), extreme winter



Bundesarchiv Bild 183-B0527-0001-753, Krefeld, Hungerwinter, Demonstration.jpg
File source: Wikipedia commons, CC

Natural Disaster (Risk) Management in Germany - Driven by Events



Storm Surge
Hamburg, Bremen, etc.

1962



Sturmflut 1962 in Wilhelmsburg
File:Hamburg Sturmflut 005.jpg. Gerhard Pietsch, Wikipedia, CC

Storm Surge 1962 in Hamburg, Bremen, Bremerhaven, Weser, Ems, etc.

Impacts

- Tide plus storm
- Dyke overtopping and breaches
- 340 dead

Management problems

- Responsibilities in Hamburg unclear
- Late reaction
- Army called in
- Dykes not up to standards

Reactions: dyke standards



Sturmflut 1962 in Wilhelmsburg
File:Hamburg Sturmflut 005.jpg. Gerhard Pietsch, Wikipedia, CC

Natural Disaster (Risk) Management in Germany - Driven by Events



Recent topic :
forest fires in
2018-2020



Forest Fire
Lüneburger Heide

1975

Waldbrand Lüneburger Heide
File:WaldbrandLünebgHeideA.jpg. Hildegard Markmann, Wikipedia, CC

Forest Fire 1975 in Lüneburger Heide, Wendland

Impacts

- Hot summer, 1972 storm: dead wood
- 7 dead (5 firemen, 2 helpers)
- 13.000 ha forest, moor and heathland

Management problems

- Late reaction
- „This is our fire“
- Long distance to water bodies

Reactions: water bodies



Waldbrand Lüneburger Heide

File:WaldbrandLünebgHeideA.jpg. Hildegard Markmann, Wikipedia, CC

Natural Disaster (Risk) Management in Germany - Driven by Events



Social and Infrastructure Flood Vulnerability Index (SIFI)

Sources: BBR 2007; BfG 2007; Drexler 2006; DLG/DFV 2007; K&H 2001; M&S Bayern 2007; LfWV Bayern April 2007; Colour intervals in 0.1 steps; Value ranges from 0 to 1.1

Recent topic :
pluvial floods in
2018-2020



Hochwasser, Schlottwitz

File:Schlottwitz Hochwasser 113-1368 IMG.JPG. Harald Weber, Wikipedia, CC

River Floods

Rivers Danube, Elbe, Oder, Rhine, etc.

1993/95

1997

2002

2013

Paper:



River Floods 2002 in several Bundesländer and Europe

Impacts

- >100mm rain per day
- 21 dead
- > 1 billion€ damage at rail, >420 mio. agriculture, etc.

Management problems

- Awareness
- Warning

Reactions: >700 billion investment into damage protection (50% by EU)



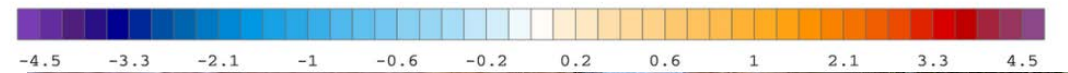
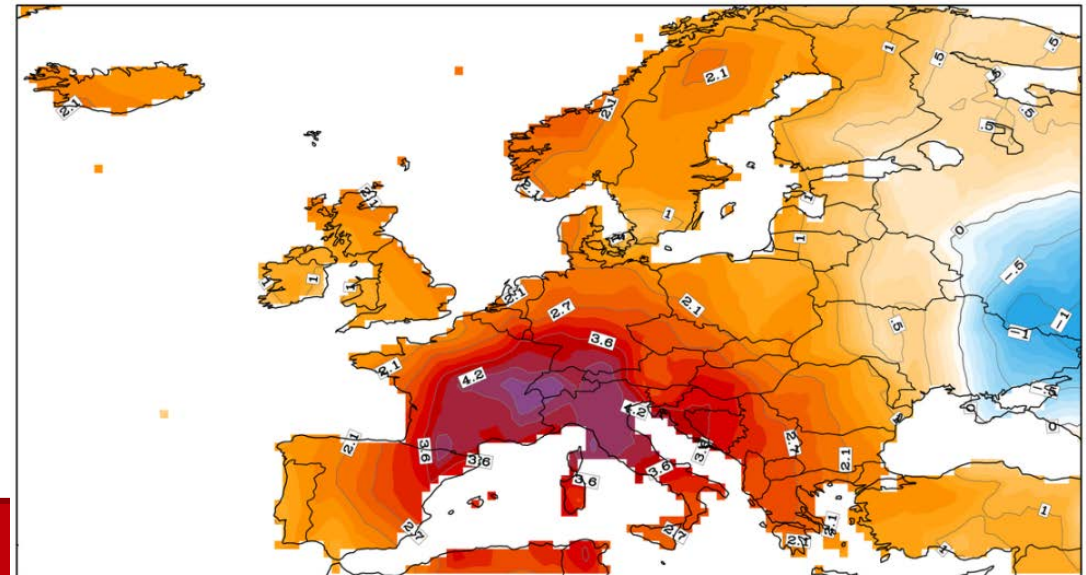
Hochwasser, Schlottwitz

File:Schlottwitz Hochwasser 113-1368 IMG.JPG. Harald Weber, Wikipedia, CC

Natural Disaster (Risk) Management in Germany - Driven by Events

Heat Wave
Europe

2003



[2003 europe](#) summer temperature anomaly with respect to 1971-2000 climatology. Data source: CRU TS3 File: [Giorgiopp2](#), Wikipedia, CC

Heat Wave 2003 in Europe

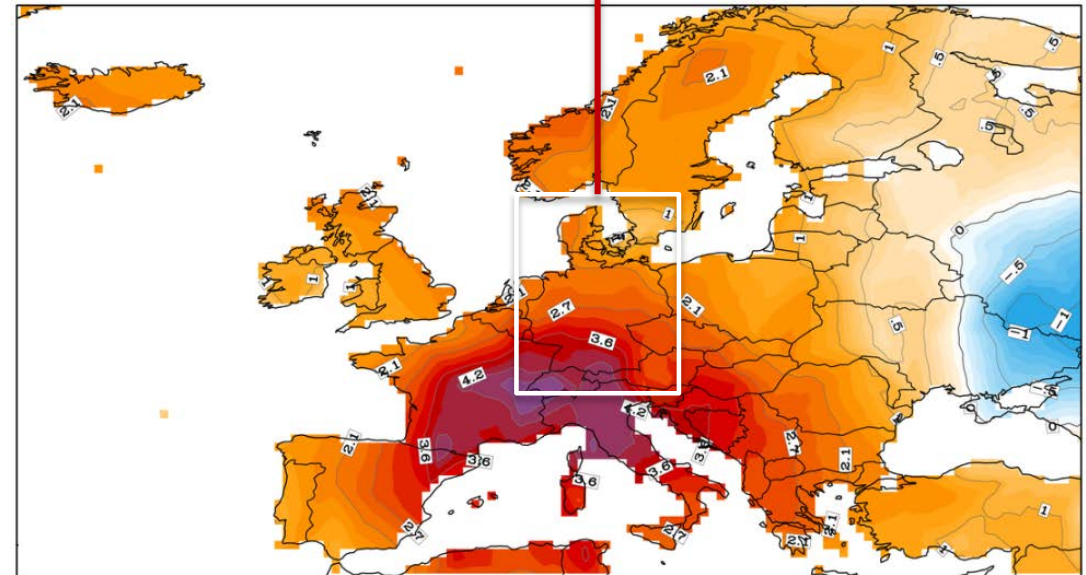
Impacts

- $>40^{\circ}\text{C}$
- >3000 dead
- Deaths to lung problems

Management problems

- Awareness
- Warning

Germany



[2003 europe](#) summer temperature anomaly with respect to 1971-2000 climatology. Data source: CRU TS3 File:[Giorgiopp2](#), Wikipedia, CC

Early Warning Systems

Most known for multiple hazards:

- National Weather Service (DWD)
- Joint Information Center (GMLZ)

End-user applications

- Radio/TV
- Internet/Media
- Sirens
- Social Media Apps (NINA, KatWarn, BiWapp, EWOB etc)

Challenges

- Sirens deinstalled
- Digital Radio Broadcasting
- Local communities
- Nowcasting
- Acceptance by people

Interest in learning from Iran

Based on research projects:

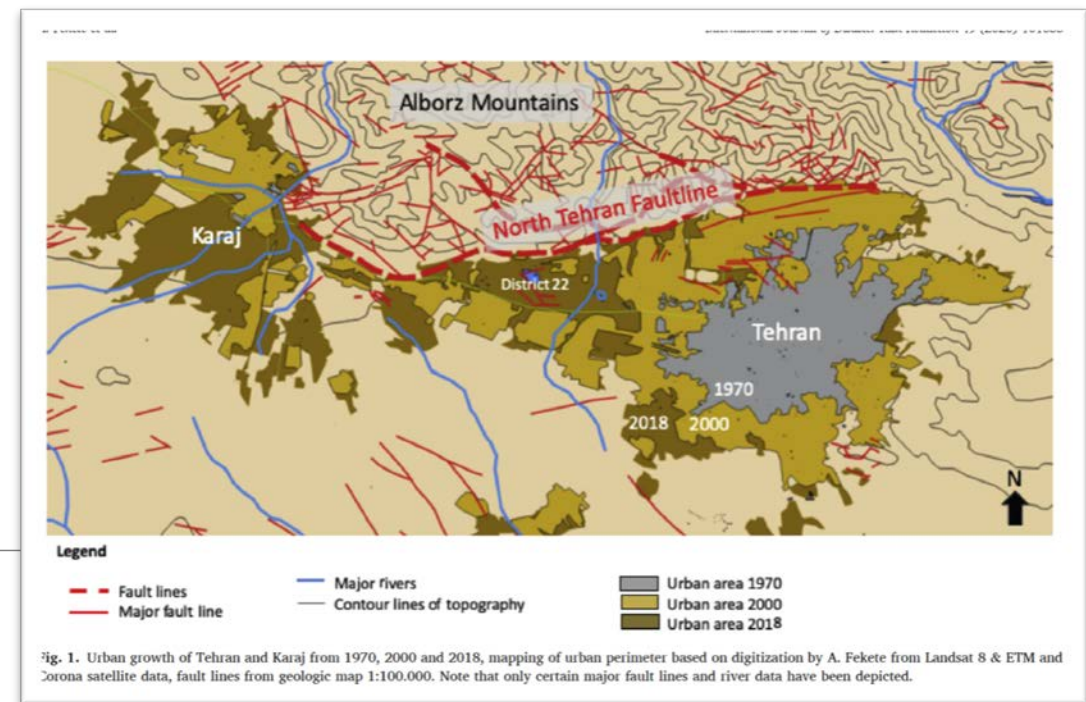
DRYSATMAP (dryland satellite mapping). Funding: BMBF (2002-2004)

INCOR: Basic Infrastructures and Services for Enhancing Inclusive Community Disaster Resilience in Iran. Funding: BMBF (2018)

Paper:



- Early Warning
- Multi-hazard risk assessment
- Urban growth
- Vulnerability and Resilience



riskncrisis

Risk, Crisis and Disaster – Research and Education

Website:



Publications:



Thank you

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Prof. Dr. Alexander Fekete

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