Disasters:
what we know and
what we should know

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DKKV
Distribution of people reported affected by natural disasters:

World 1974 – 2003; n ~ 5 000 000 000

~1/3 of the world population is affected by a natural disaster in a decade, with ~95% weather induced!

www.em-dat.net, CRED 2005
Increase (1987-2006):
--yellow ~12%/a
--red ~ -2%/a

Figure 13 – Natural disasters categorized by amount of damages (in 2006 US$ million) as a percentage of GDP – numbers and linear trends

CRED 2008
Uncertainty of rare natural events!

Gumbel plot for the 100 observed annual maximum Rhine discharges at Lobith (1900-2000) (blue) and for the 1569 annual maxima as derived from the ECMWF data via Eq. 4 (red). Also shown are the extrapolated GEV fits to 1250-year return periods and the 95%-confidence intervals to the observations and to the ECMWF data (van den Brink et al. 2004).

Uncertainty of disaster data

Increase (linear) from 1987 to 2006:
~10%/a; MunicRe 2007

Increase (linear) from 1987 to 2006:
~2.3%/a (resp. ~1.4%/a); CRED 2008
**Damage function**: non-linear and complex!
This particularly applies to „protected“ systems (building codes, dikes, warning systems,...)

![Graph showing the relationship between average temperature and number of insurance claims for different years (1991-1995). The graph illustrates a non-linear trend, with a significant increase in claims as the average temperature rises.]
Increase of urban population 1987-2006. Urban population grows at twice the rate of the total population.

In any urban setting population and material goods are concentrated, resulting in increased vulnerability because of the loss of self-sufficiency and of complex supply systems.

World Bank 2008
IPCC 2007

Global Mean Temperature

Estimated actual global mean temperatures (°C)

Difference (°C) from 1961 - 1990

Period
Years
25
50
100
150
Rate
°C per decade
0.177±0.052
0.128±0.026
0.074±0.018
0.045±0.012

Increase in mean

Probability of occurrence

Cold
Average
Hot

Previous climate

Less cold weather

New climate

More hot weather

More record hot weather

IPCC 2007
Global Trends: Disasters are NOT natural

Natural and human-induced hazards
Increased intensity and frequency of extreme climatic events

Increasing vulnerability:
Socio-economic: poverty, unplanned urban growth, lack of awareness and institutional capacities...

Physical: insufficient land use planning, housing, infrastructure located in hazard-prone areas...

Environmental degradation: unsustainable management of ecosystem services, coasts, watersheds, marshlands...

ISDR 2006
What is the acceptable risk and how can it be agreed upon? Straightforward economical optimisation cannot give the answer (cost-benefit-analysis).

**HFA : Governance!**

Source: VROM (the Netherlands Ministry of Housing, Spatial Planning and the Environment)
What do we need to know better:

--disasters of the past (IRDR),
   as examples and basis for understanding processes

--extreme events AND vulnerabilities,
   areal coverage

--extrapolations into the future of extremes and vulnerabilities

--disaster prevention strategies implemented into
   concrete measures and planning
Thank you!