Coastal management case study:

Integrated coastal flood risk management - Timmendorf

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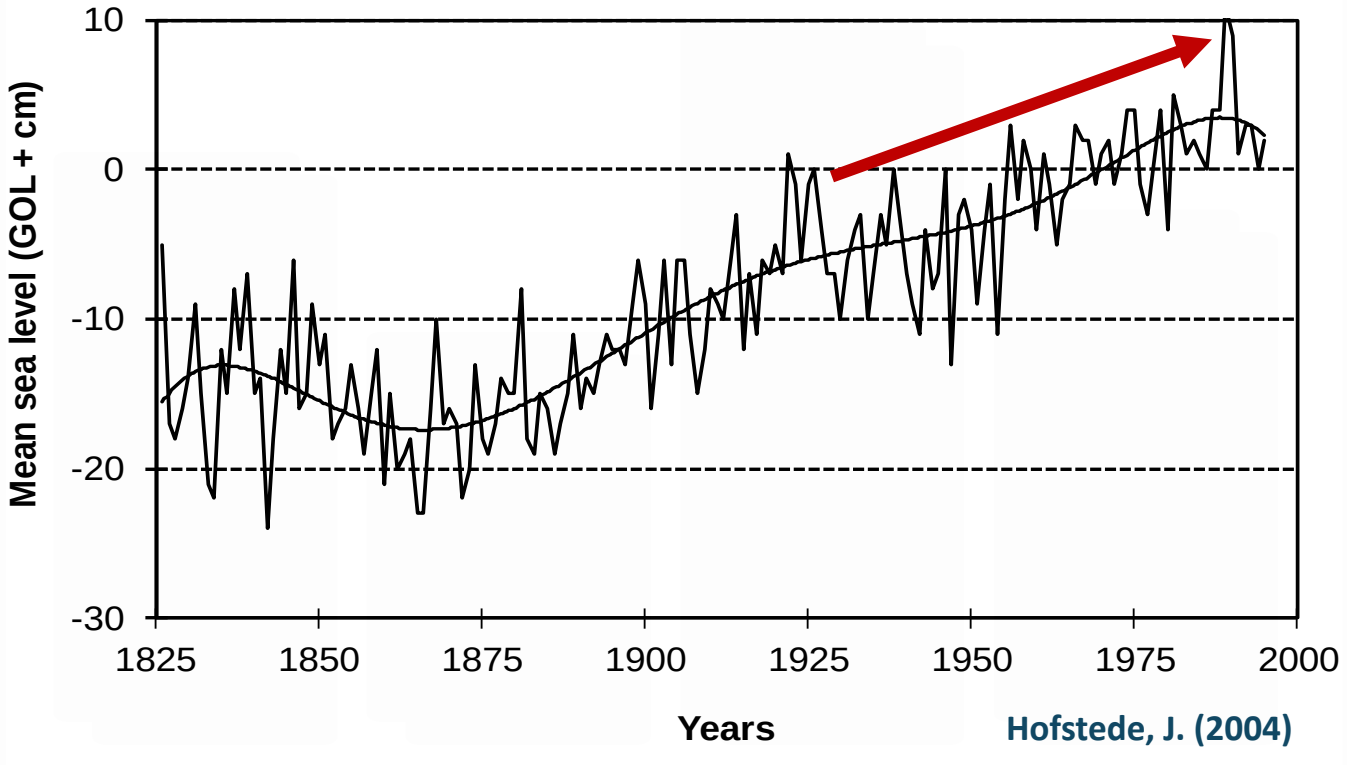
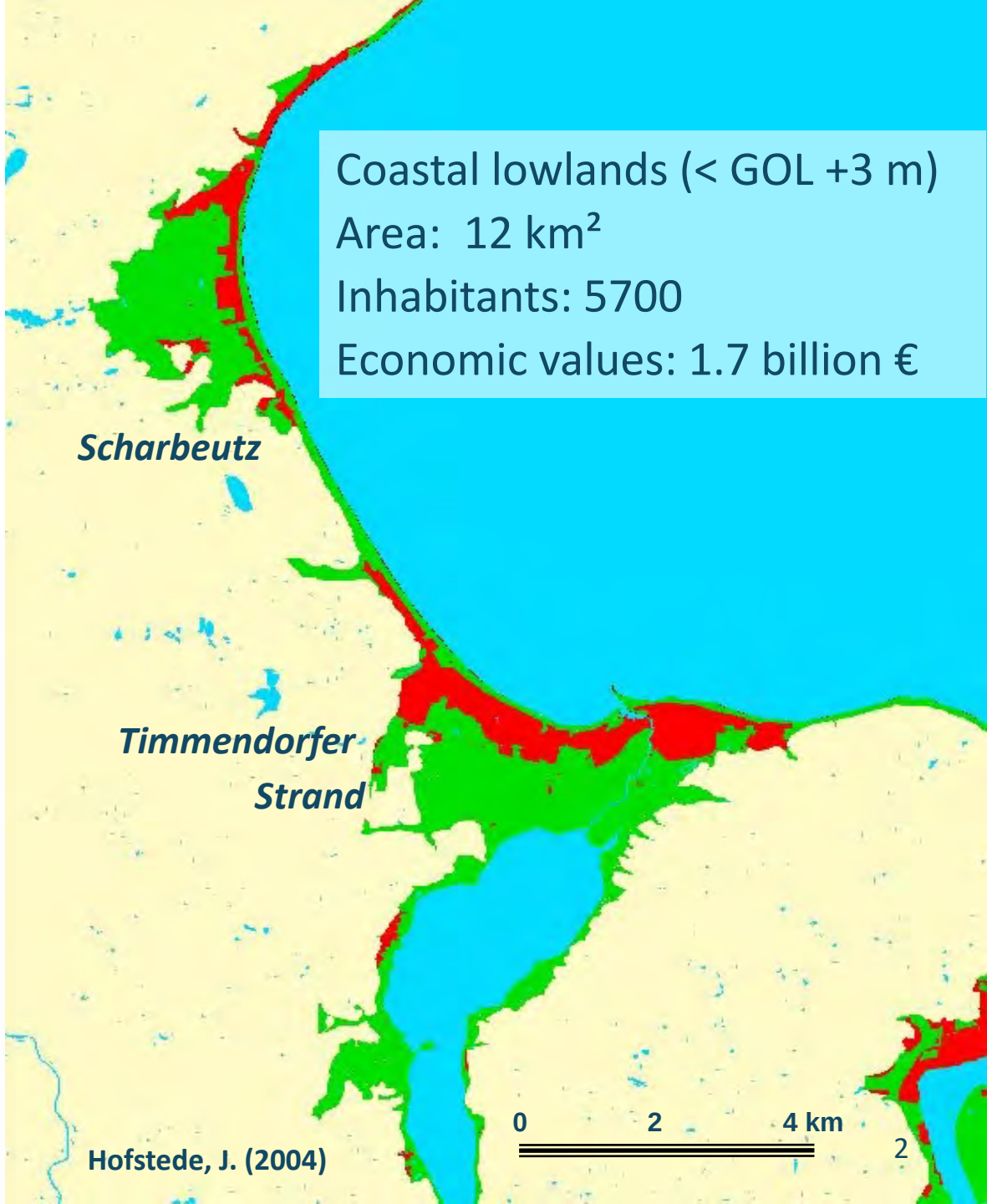
Timmendorf-Scharbeutz: Location and problem



Coastal lowlands (< GOL +3 m)
Area: 12 km²
Inhabitants: 5700
Economic values: 1.7 billion €



Background conditions in summer 1999

- The coastal flood defence (beach wall ca. MSL +2.2 m) was deficient.
- Responsible for coastal flood defence are the municipalities (State administration gives technical and financial assistance).
- The local population is very sceptic towards coastal flood defence (negative impact on tourism).
- Locals demanded that the State funds measures against coastal erosion (beach nourishment, groins).
- The State responded that a pre-requisite for funding is an integrated concept for the entire lowland (coastal protection and flood defence).
- Locals agreed, but demanded an active involvement in the establishment of such a concept.

After a stakeholder mapping, 65 persons were invited to a first public meeting organized by the ministry and a consultant company.

After Hofstede, J. (2004)

Process and approach

In 2000, seven local stakeholder meetings (max 25 participants) took place, moderated by an external consultant.
In these meetings, the stepwise Sensitivity Model of Prof. Vester© was applied:

- Characterisation of the region with variables (e.g. economic power, quality of life),
- definition of the effects (strength and direction) of the variables on each other, i.e. establishment of a model,
- extraction of a sub-model on coastal defence and flooding,
- development five coastal defence measure scenarios, and
- model simulations on the future regional situation for each scenario.

After Hofstede, J. (2004)

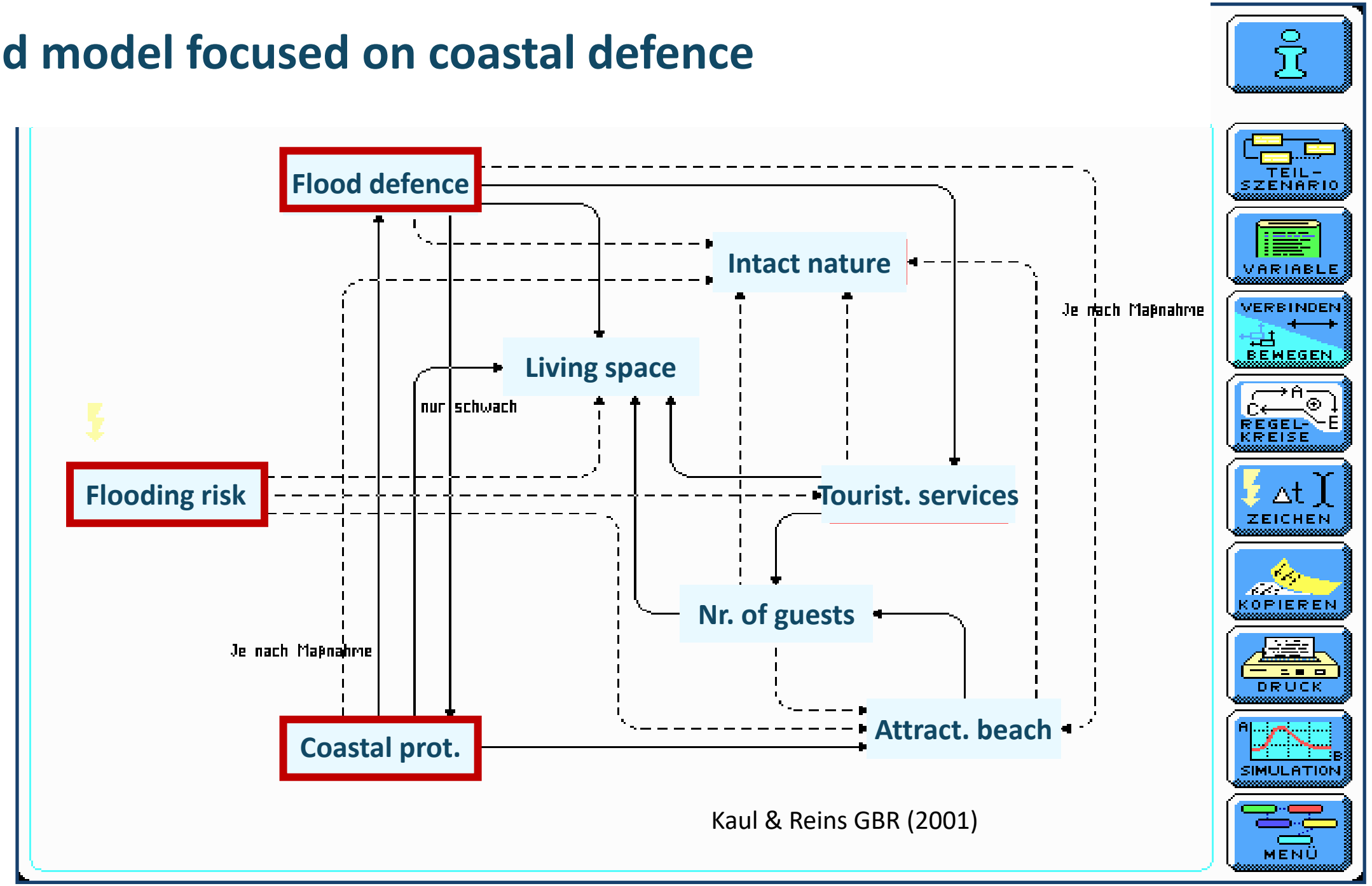
Characterisation of the region: Variables & dependencies

Scores:
1: Weak
2: Medium
3: Strong

Effect of ↓ on →		1 Economic power	2 Tourist services	3 Degree of employment	4 Nr. of inhabitants	5 Nr. of guests	6 Attractivity beach	7 Coastal protection	8 Quality of living	9 Security of people	10 Recreational services	11 Intactness of landscape	12 Intactness of seascape	13 Effective infrastrucutre	14 Budget municipality	15 Future policy	16 Image of the municipality	17 Traffic development
1	Economic power		3	3	0	0	0	0	0	0	1	1	0	0	2	2	0	2
2	Tourist services	2		3	0	3	2	0	1	0	2	2	1	2	2	0	3	2
3	Degree of employment	1	0		2	0	0	0	2	0	1	0	0	0	3	0	0	0
4	Nr. of inhabitants	2	0	0		0	0	1	2	1	1	1	1	0	3	1	0	2
5	Nr. of guests	3	1	2	0		2	0	0	1	0	1	1	0	3	1	0	2
6	Attractiveness beach	1	3	2	1	3		1	3	0	1	1	0	1	2	0	3	0
7	Coastal protection	1	0	0	1	1	2		3	3	0	0	0	1	1	0	1	0
8	Quality of living	1	0	0	3	2	0	0		0	0	0	0	0	0	1	2	0
9	Security of people	0	0	0	3	1	0	0	2		0	0	0	0	0	0	2	0
10	Recreational services	2	3	1	2	3	1	0	3	0		1	1	0	2	0	2	2
11	Intactness of landscape	1	2	1	2	3	1	1	3	0	1		2	0	0	0	2	0
12	Intactness of seascape	2	3	2	2	3	3	0	2	1	1	1		0	0	0	2	0
13	Effective infrastrucutre	3	2	2	2	3	1	1	3	0	1	2	0		0	0	1	1
14	Budget municipality	1	2	1	0	0	1	2	1	1	2	0	0	3		2	0	2
15	Future policy	1	2	1	2	1	2	2	2	1	1	1	0	2	2		0	1
16	Image of the municipality	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0		0
17	Traffic development	2	1	0	0	1	0	0	2	1	1	1	0	3	2	1	1	

Kaul & Reins (2001)

Simplified model focused on coastal defence



Kaul & Reins GBR (2001)

Coastal defence scenarios

1. No coastal defence
2. Only coastal erosion protection measures
3. Only local measures to reduce flooding
4. Combination of 2 and 3
5. Dike on the beach (optimal protection)

Simulation of flood risk and damage for every scenario

Source: Kaul & Reins GBR (2001)

Variablenbeschreibung

Risk of flooding:

describes the frequency of flooding and the potential damages.

Skalenbeschriftung

Funktionsbeschreibung

Drucken

Annehmen | Abbrechen

Scale for risk of flooding

Internal function

30 one flooding per year

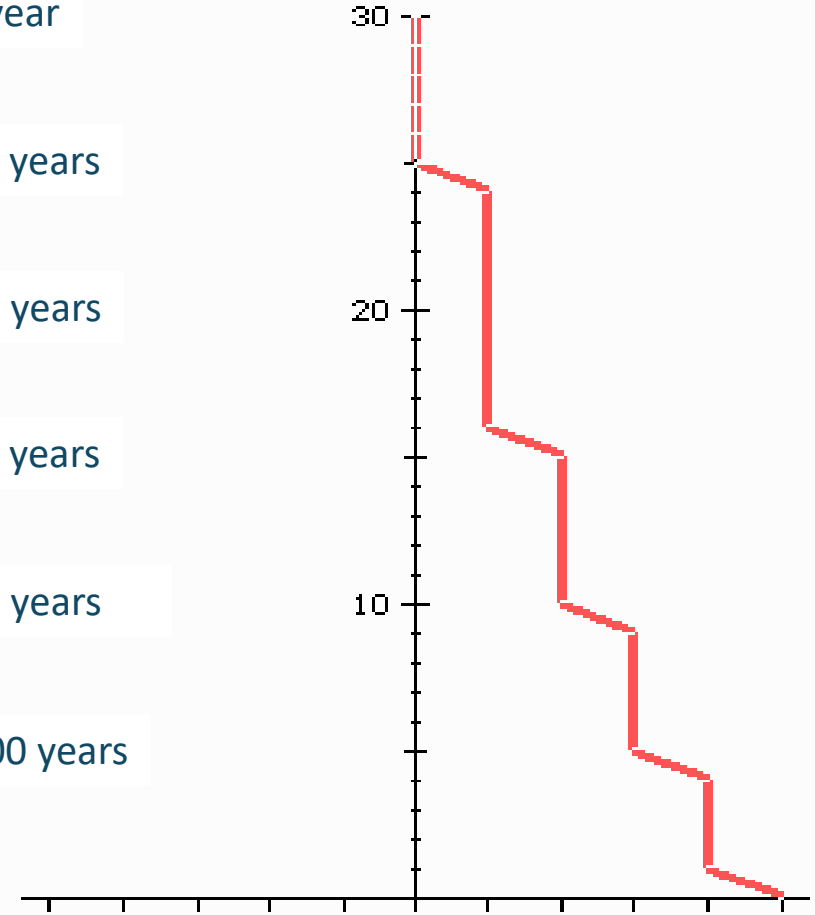
20 one flooding in 40 years

one flooding in 60 years

10 one flooding in 80 years

one flooding in 100 years

0 no flooding



dynamisch ☒
statisch ☐

TEIL-SZENARIO

sim ABLAUF

sim START

sim KURVEN

sim ENDE

SICHTBAR

DRUCK

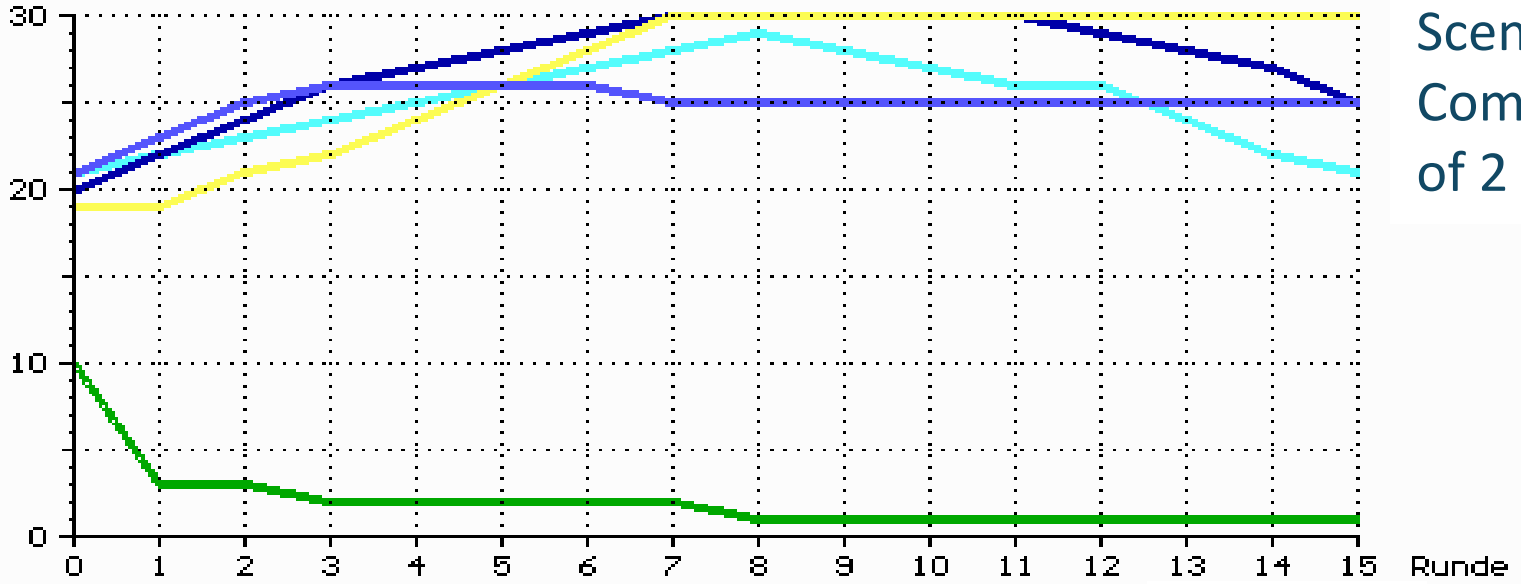
ZURÜCK

MENÜ

Simulation of the consequences of every scenario

on major variables taking into account the specific flood risks

Development of variables with time



Scenario 4:
Combination
of 2 and 3

Time steps of 5 years

- tourist services
- quality of living space
- intact nature
- number of guests
- attractive beach

Only qualitative trends !
No scientific validation !

Source: Kaul & Reins GBR (2001)

zurück | vor | Bildschirmausdruck | Ende

TEIL-SZENARIO
sim ABLAUF
sim RUNDE
KURVEN
sim ENDE
UNSICHTBAR
DRUCK
ZURÜCK
MENÜ

Decision making process

Presentation and discussion of the results on a public meeting:

- the group unanimously supports the results of the sensitivity analysis, especially those of the simulations with the coastal defence model,
- the group recommends a combination of coastal protection and flood defence measures (that fits into the landscape) to be implemented, and
- the group demands further active participation in the process as a technically qualified interest group.

From the perspective of the state coastal defence administration, the model based systems approach as a guiding process worked very well and a solution was obtained !

Implementation (2007-2009)

12 km renewed coastal protection caused investment costs of 30 million Euros !

Source: umweltbundesamt.de

Present situation (2015)

Permanent walls protect the city

Implementation (2007-2011)

Mobile gates enable beach access

Source: ThyssenKrupp Bautechnik GmbH

Present situation (2015)

Individual schemes protect existing buildings near the beach.

Present situation (2015)

The majority of protection measures is hidden in and under artificial dunes.

Evaluation: SWOT-analysis

Strength

- active involvement of the affected
- systematic approach
- transparency of the results

Weaknesses

- low number of participants (compared to the affected)
- tiresome and time-consuming procedure
- depending upon volunteers

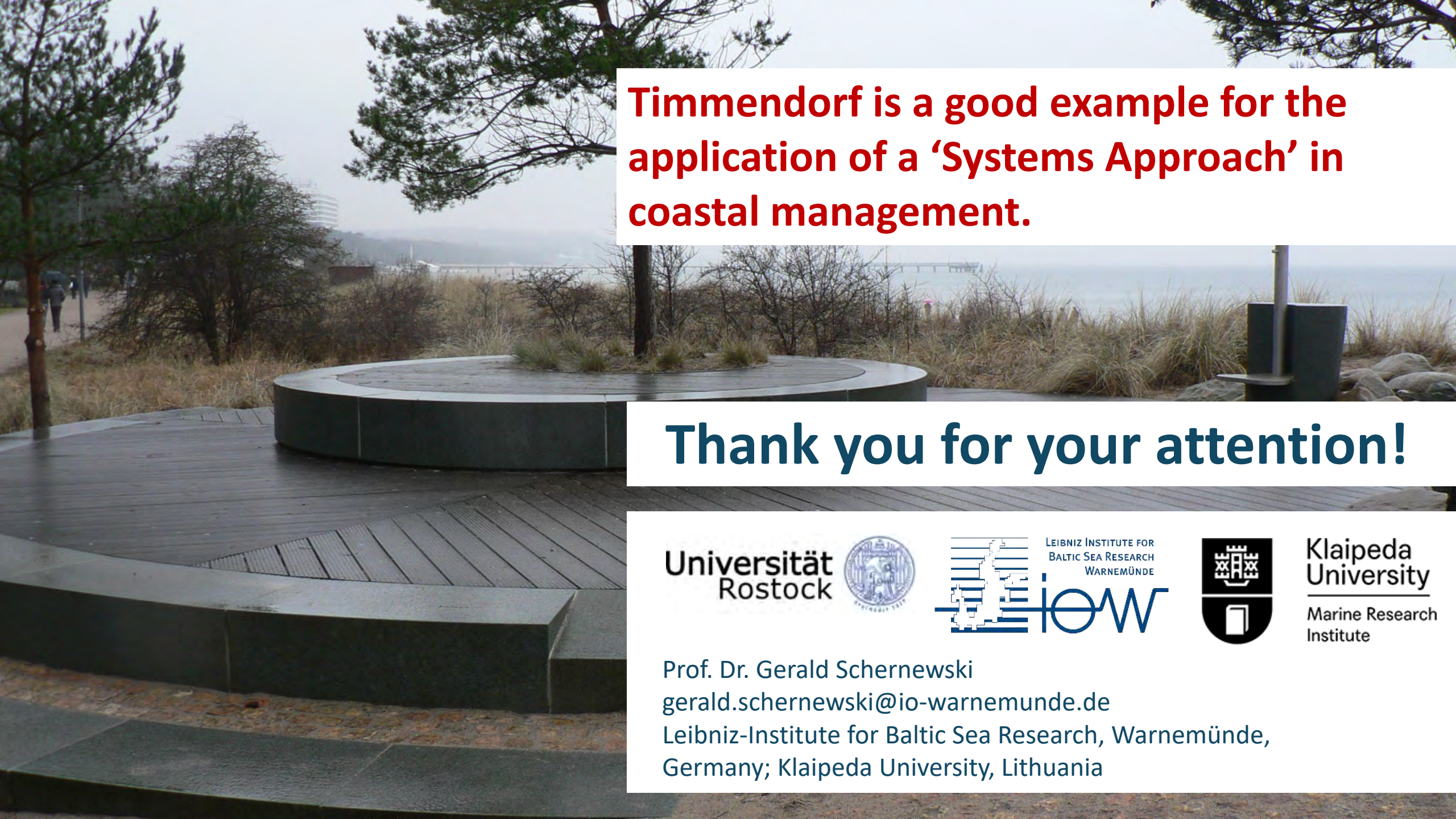
Opportunities

- recognition of the problems
- awareness of the responsibilities
- acceptance of possible solutions

Threats

- results may not in agreement with contractors expectations
- loss of interest during humdrum meetings
- not enough participants
- slow implementation

After Hofstede, J. (2004)



Timmendorf is a good example for the application of a ‘Systems Approach’ in coastal management.

Thank you for your attention!

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