



First Steps towards a New Vulnerability Index

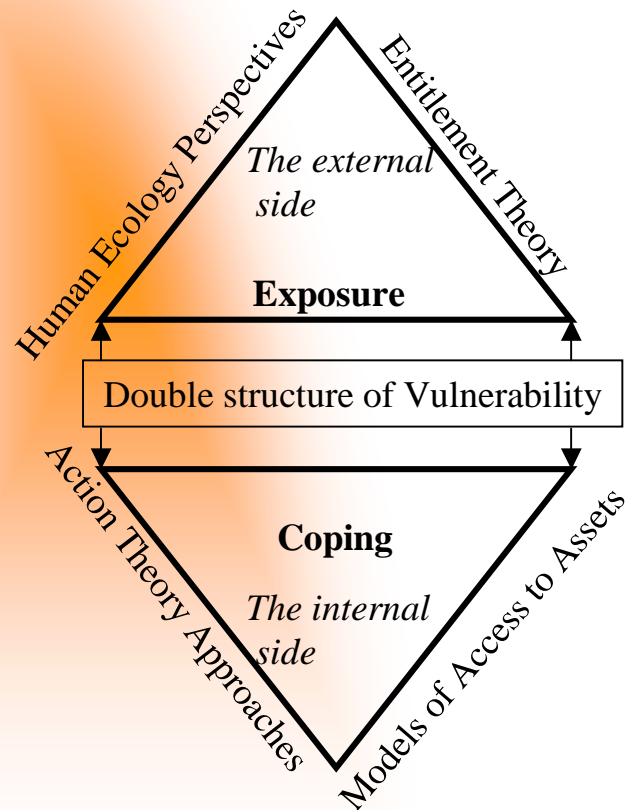
Center for Environmental Systems Research,
University of Kassel, Germany

Dörthe Krömker

Current Vulnerability Approaches

Bohle, Watts & Downing, 1994,
1996,2001

- Focus on food related issues



Lonergan, Gustavson & Carte 1998, 2000

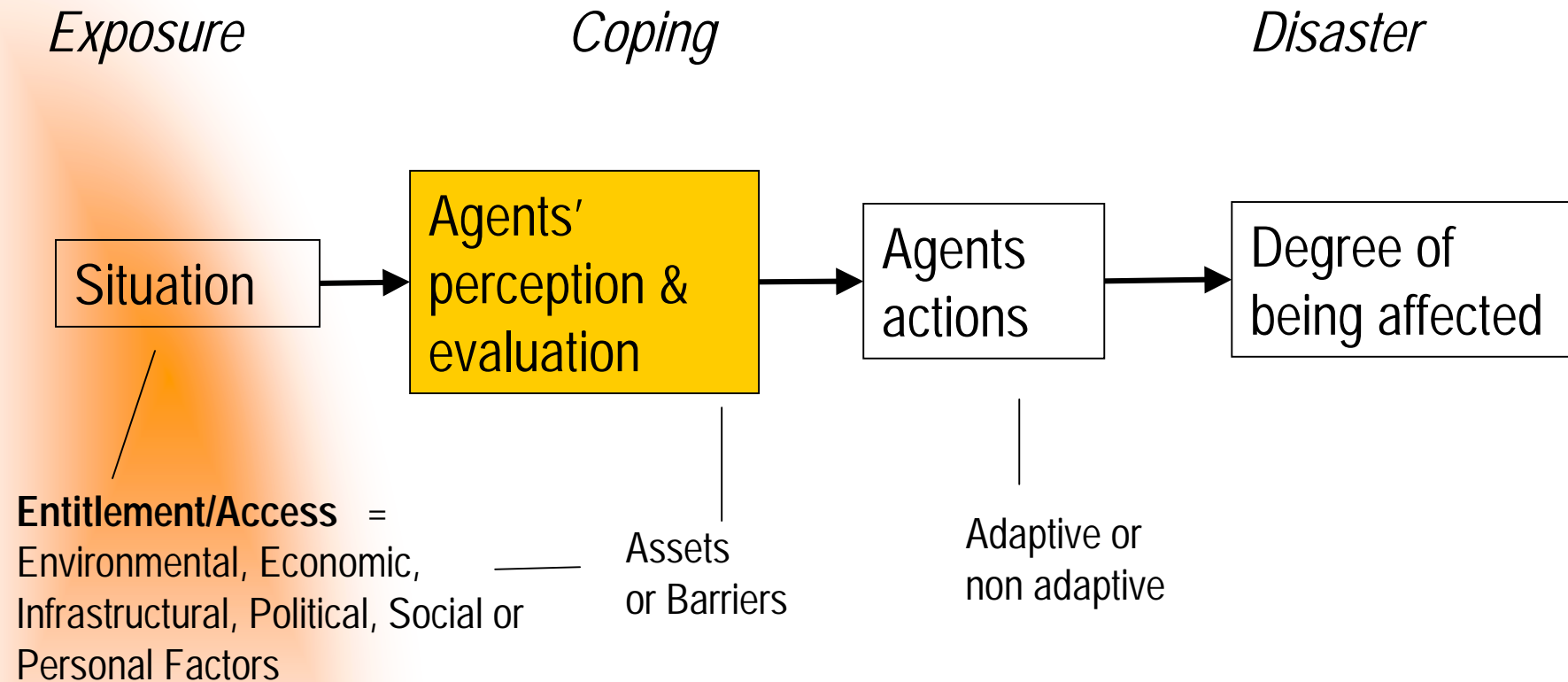
- Focus on “security” issues

- Threats
- Capacity/Freedoms
- Participation

as well:

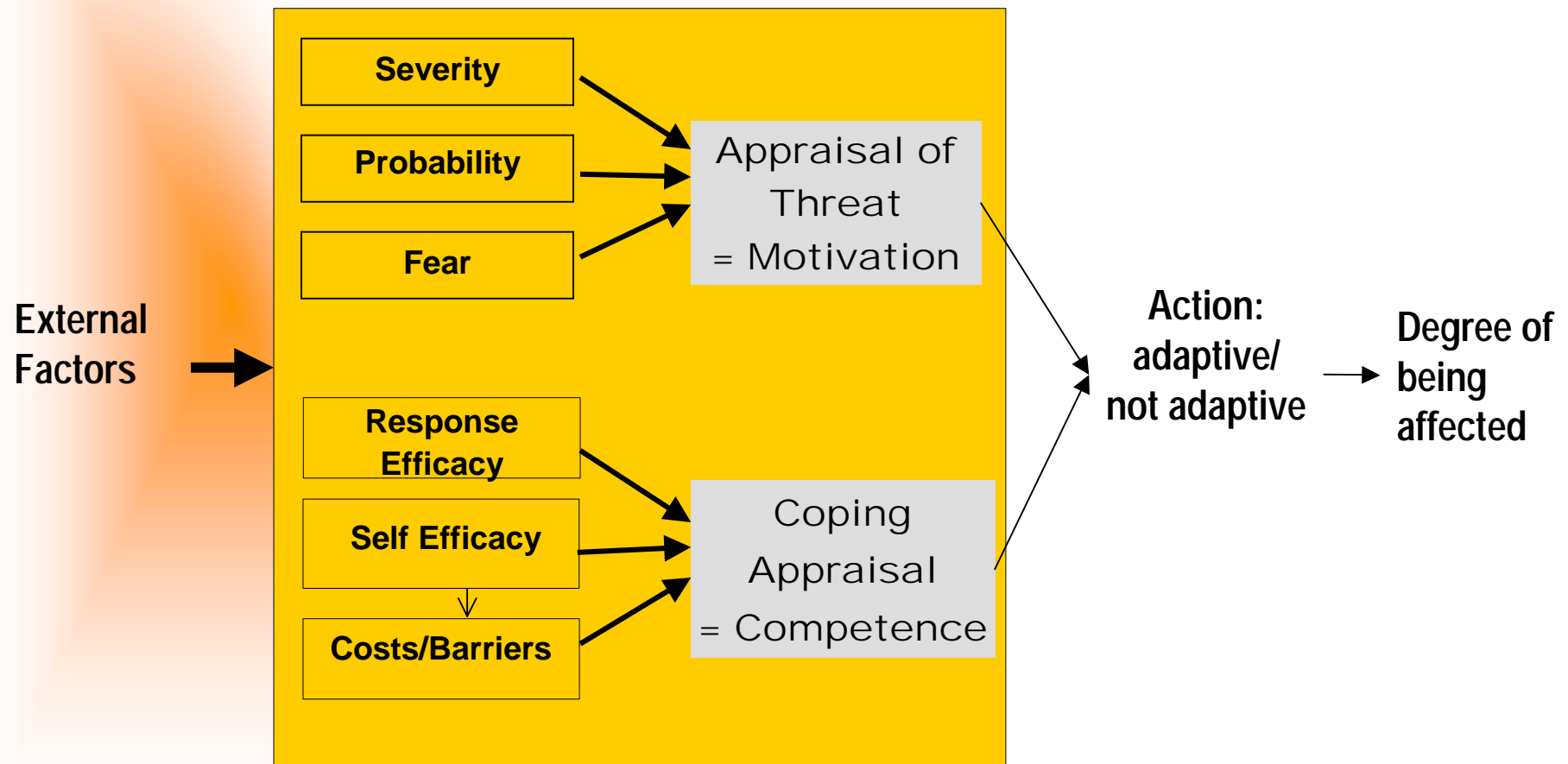
- Environment
- Economy
- Society
- Institutions

Agent Based Approaches: Action Theory

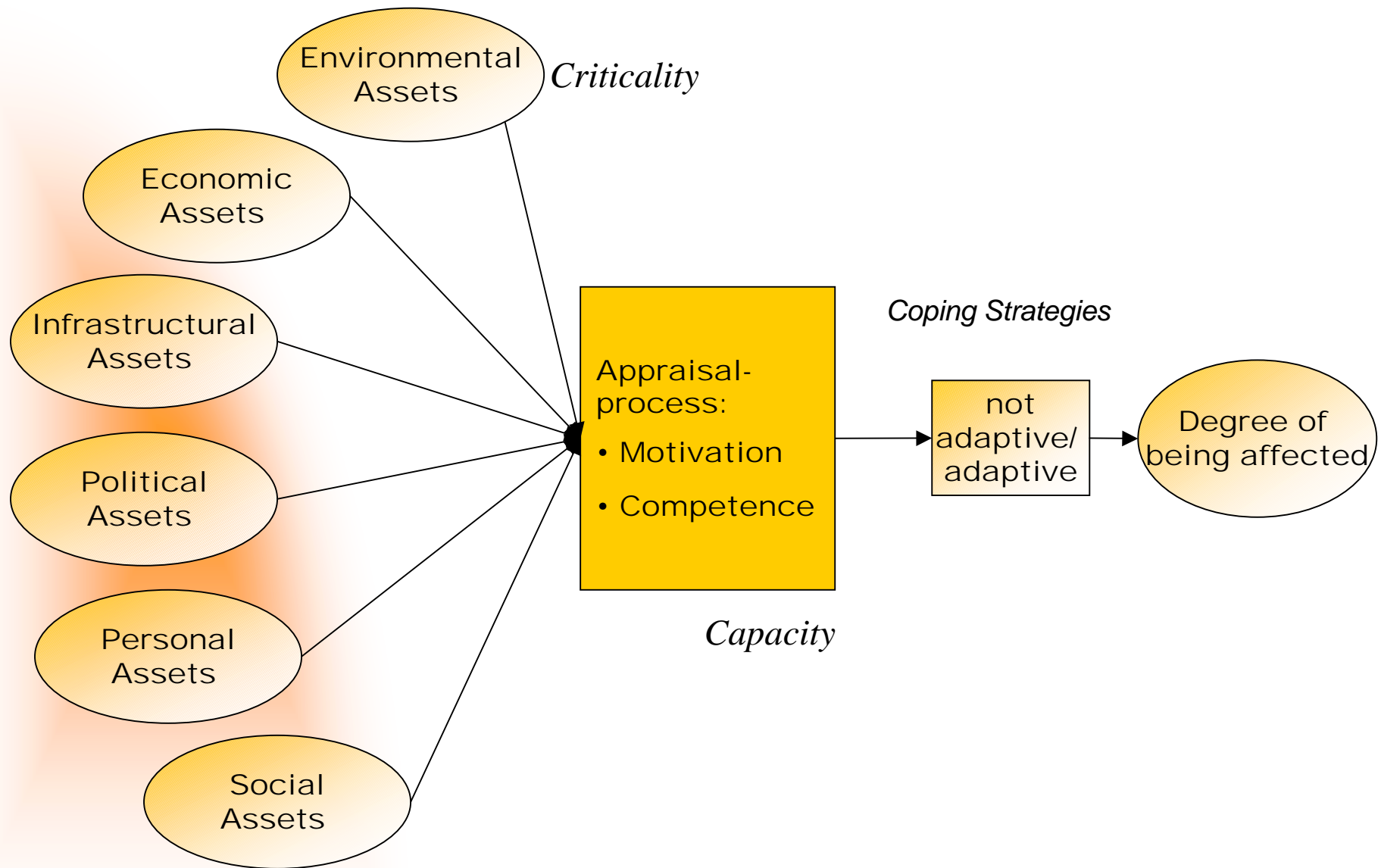


Action Theory: "Protection Motivation"

Perception based appraisal process



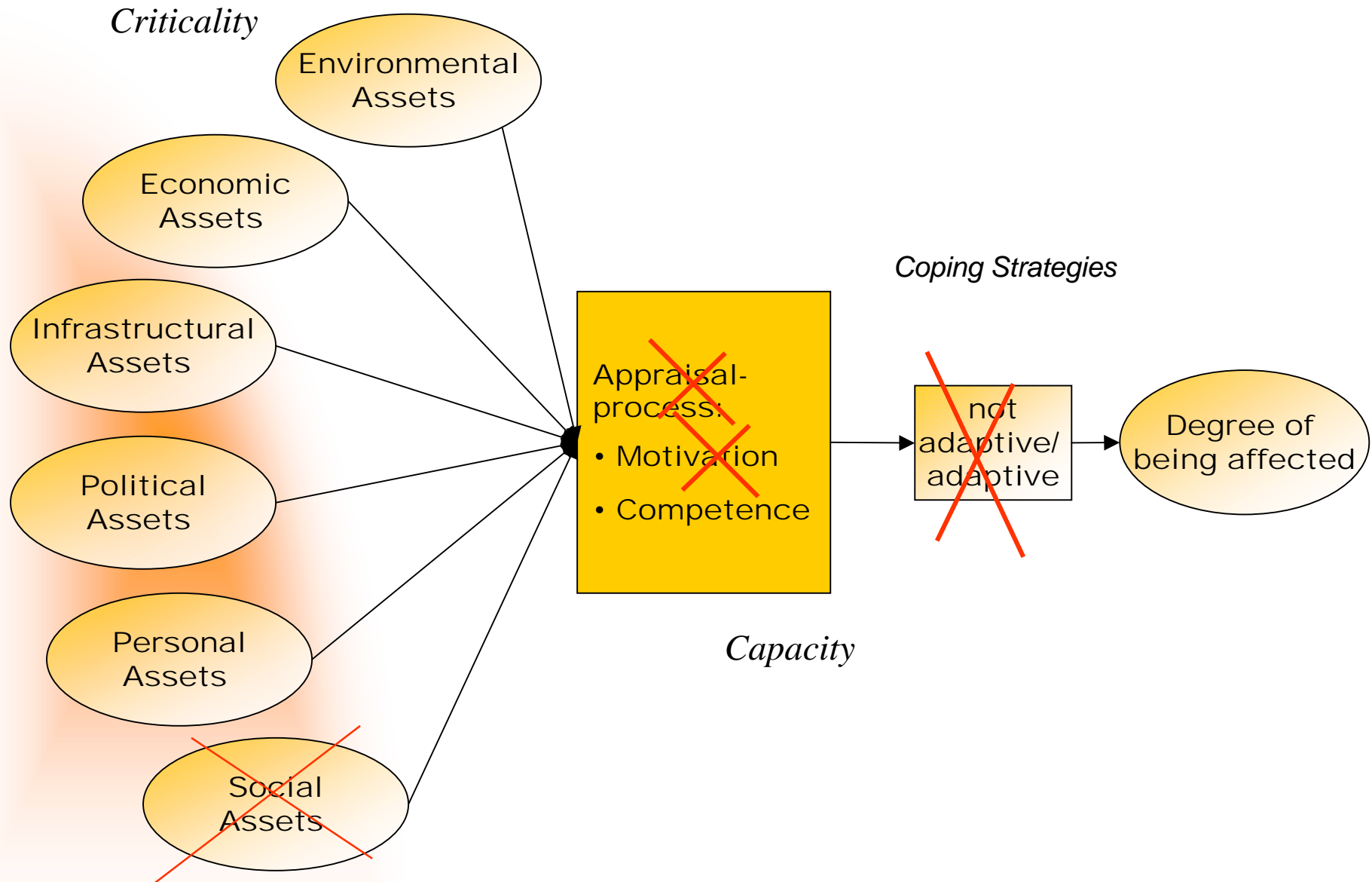
Action Theory



Hypothesis

- The higher the Capacity, the more likely no disasters occur
- Capacity consists of Motivation and Competence
- A high Motivation is given, if agents perceive a situation as threatening, as challenging or if they feel responsible for potential damage
- A high Competence is given if no situational or person related barriers take effect on agents

Data and Action Theory



Operationalisation of the Models' Factors

- Vulnerability towards Droughts
- Construction of a measure for people being affected by drought related disasters
(criteria, dependend variable)
- Construction of measures for situation and person related barriers

Measure for Situation and Person related Barriers

Available:

- Socio-economic
- Water Stress

data on national scale

Sources:

- HDR, WB, WRI

- Theoretical Based Selection
- High Intercorrelation: Reduction of Dimensions: Factor Analysis

Operationalisation of the Models' Factors

Indicators:

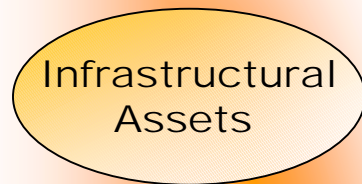
New Factors:



- Computer, Internet, Fax, TV, Telefon per 1.000 people
- GDP power purchase parity
- Gini-Coefficient

Wired

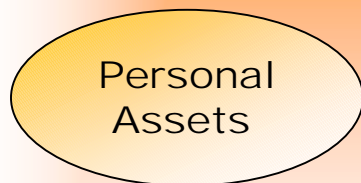
Inequality



- Services as % of GDP
- Agricultural and Service based value added per worker, Agricultural machinery per hectare of arable land , Tax revenue (% of GDP)
- Population without access to Health Services, Sanitation, Safe water (%), One-yea-olds fully immunized against tubercolsis (%), Doctors (per 100.000 people)

Service

Productivity



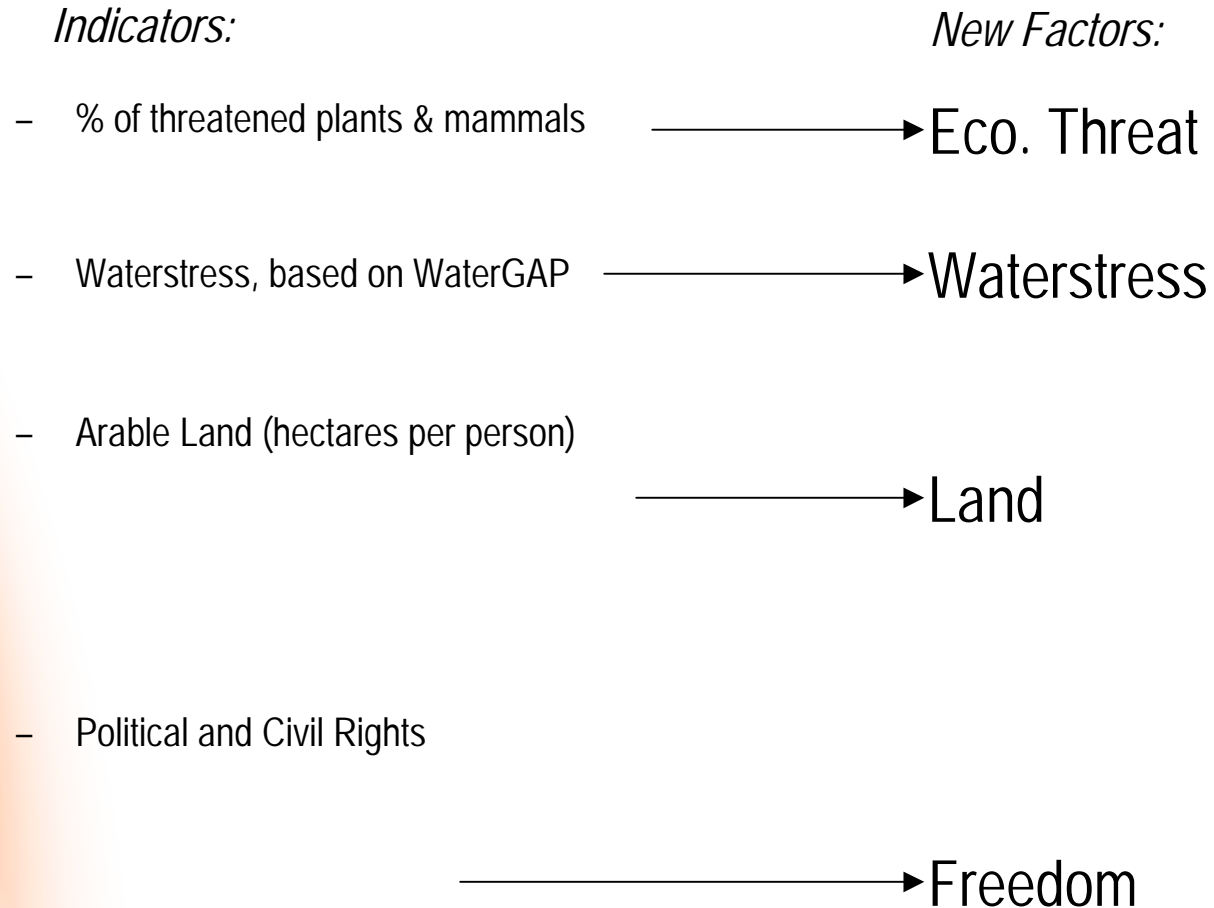
- Education Index (based on school enrolment), Adult literacy rate (%)
- Life expectancy at birth (year), People not expected to survive to age 60 (as % of total population), Infant mortality rate (per 1.000 live births), Under 5 mortality rate, Maternal mortality rate (per 100.000 live birth), Infant with low birth weigth (%)
- Aids, Tuberculosis, cases per 100.000 people

Welfare

Aids

Operationalisation of the Models' Factors

Environmental Assets



Political Assets

Measure for Being Affected by Droughts

Source: Emergency Database

Information on national scale:

- Number of people affected

Affected People:

People requiring immediate assistance during a period of emergency: basic survival needs such as food, water, shelter, sanitation, immediate medical assistance

Furthermore:

- financial damage
- casualties

Measure for Being Affected by Droughts

Number of people affected?

- **Dis_absolut**

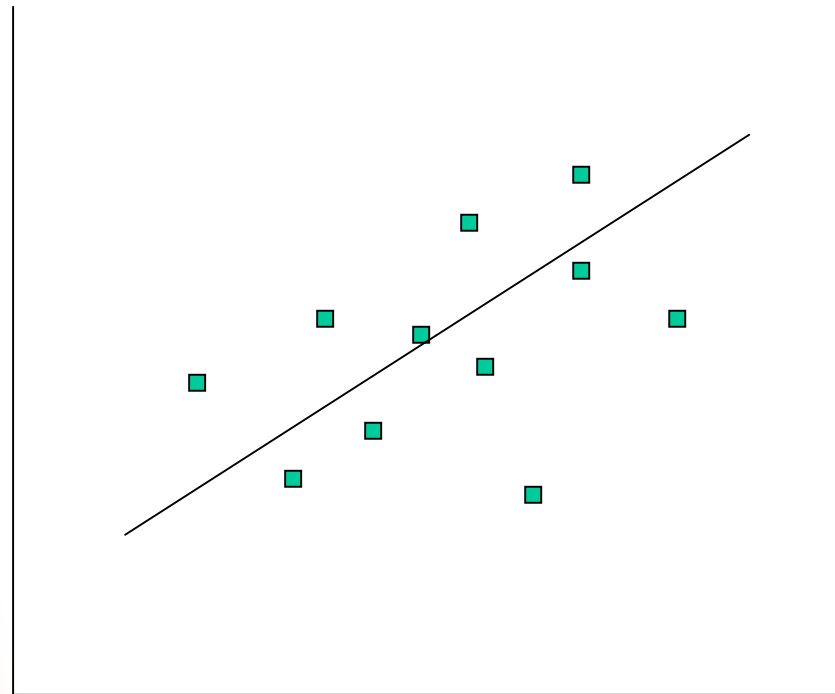
- 0= no Disaster reported
- 1= financial damage only
- 2= up to 100.000 people affected
- 3= up to 500.000 people affected
- 4= up to 1 Mio people affected
- 5= up to 5 Mio people affected
- 6= more than 5 Mio

Percentage of population affected?

- **Dis_percent**

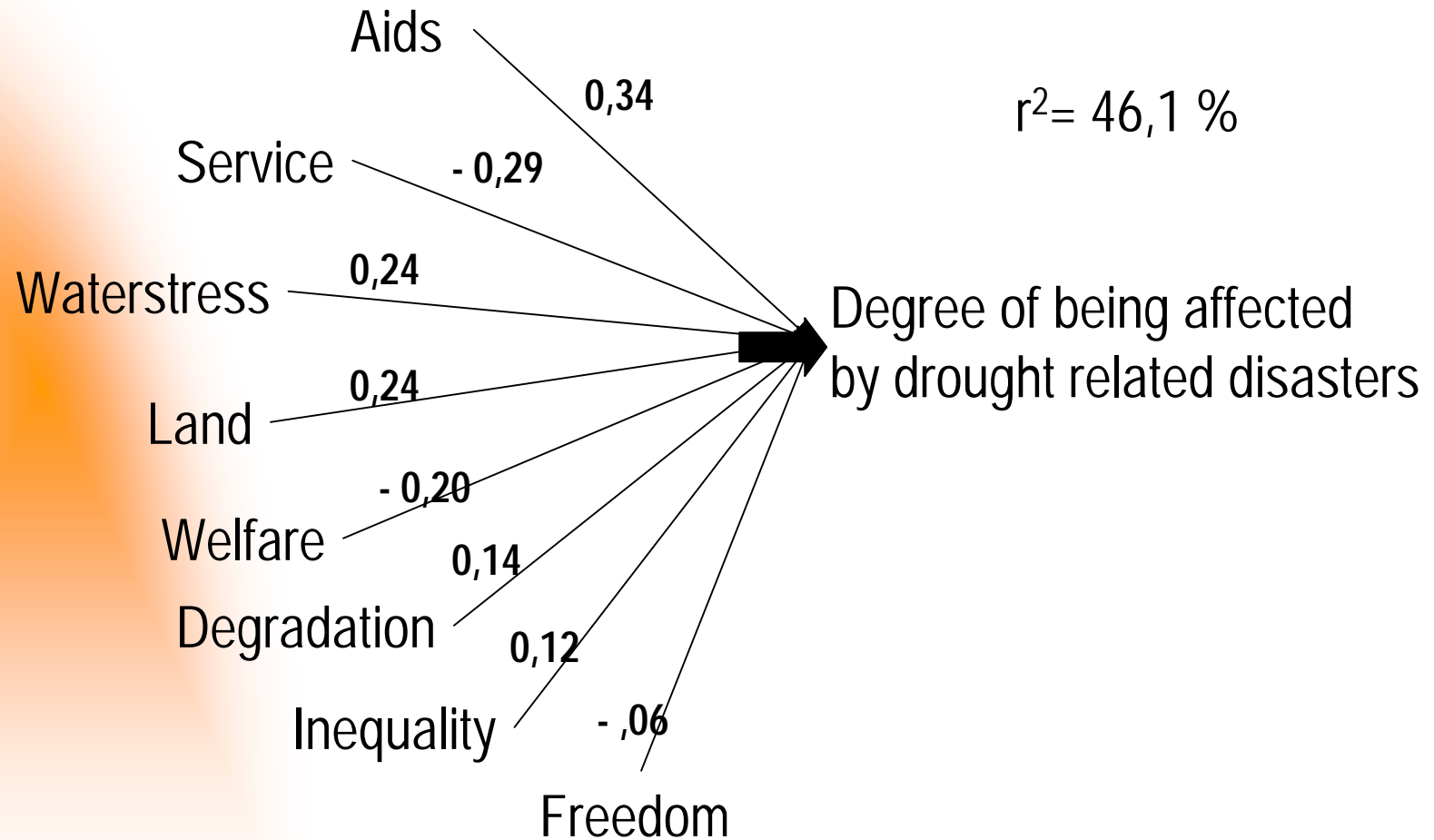
- 0= no Disaster reported
- 1= financial damage only
- 2= up to 1% of population affected
- 3= up to 10% of population affected
- 4= up to 20% of population affected
- 5= up to 30% of population affected
- 6= more than 30% of population affected

Multiple Correlation (Regression Analysis)

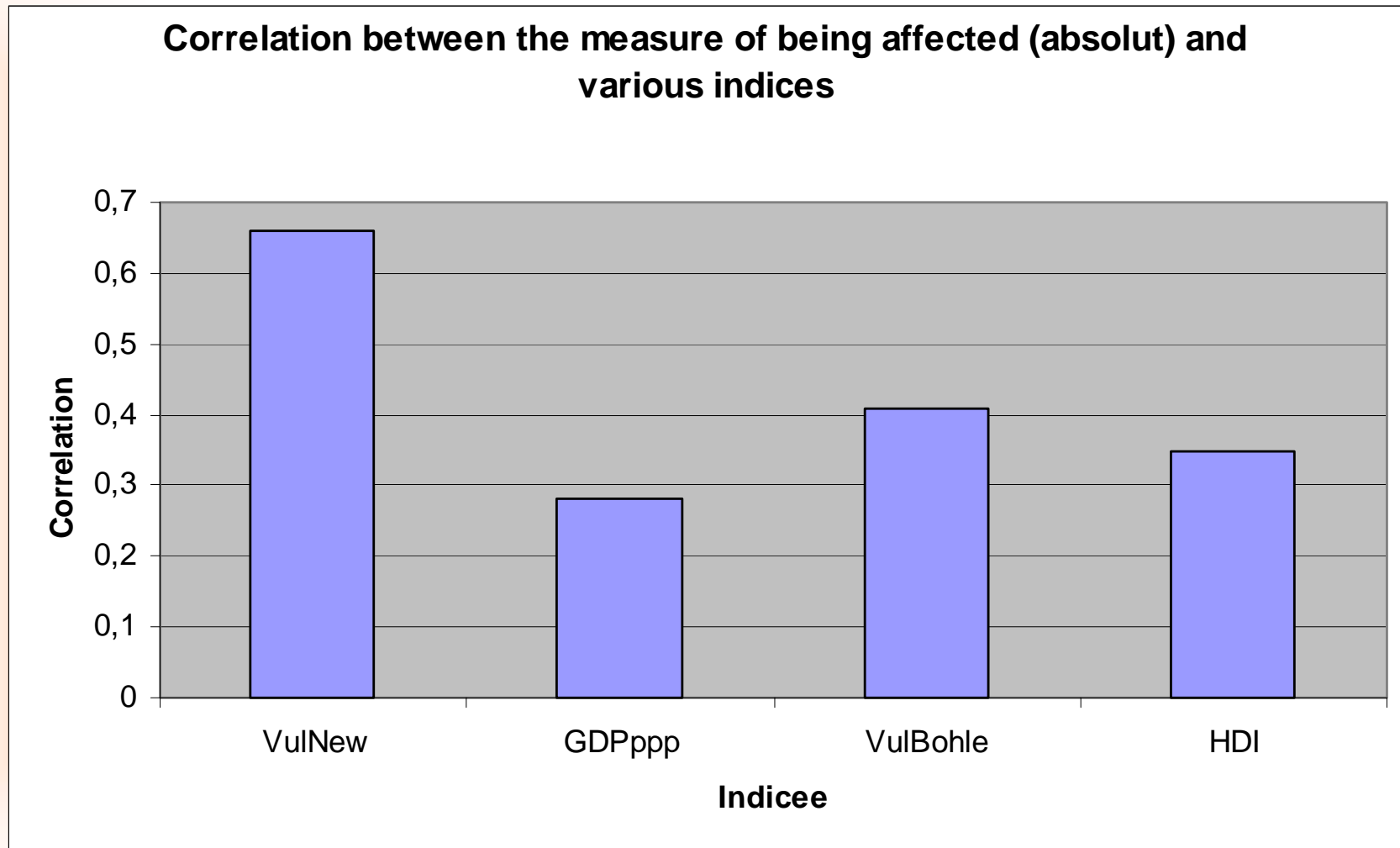


r^2 : measure of fit between the influencing variables and the phenomenon to be explained

Multiple Correlation Model



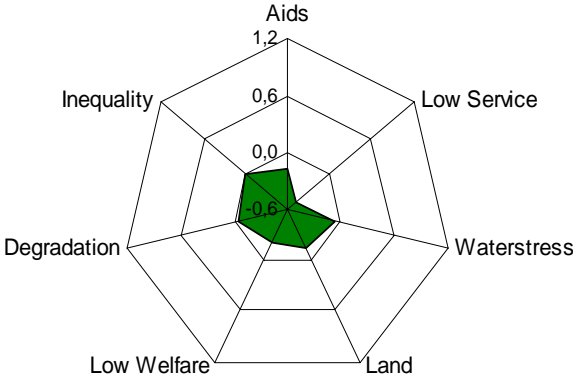
Comparison of Different Indices



Weighed Components of the Vulnerability Index in Selected Countries

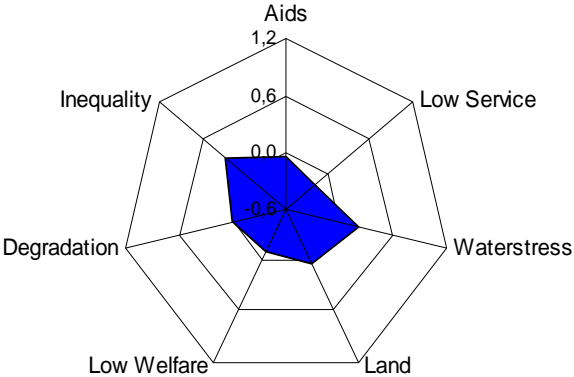
Netherlands

(Vulnerability-Index = Low)



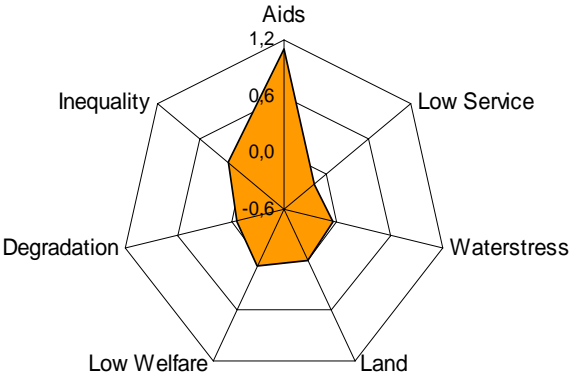
Brazil

(Vulnerability-Index = Medium)



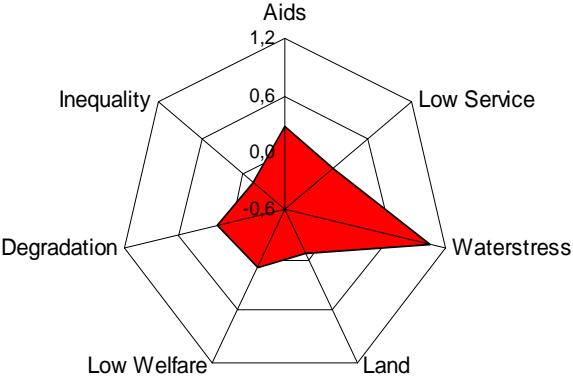
Zimbabwe

(Vulnerability-Index = High)



India

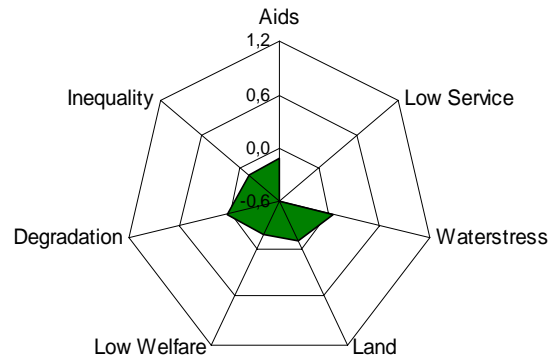
(Vulnerability-Index = High)



Weighed Components of the Vulnerability Index in Selected Countries

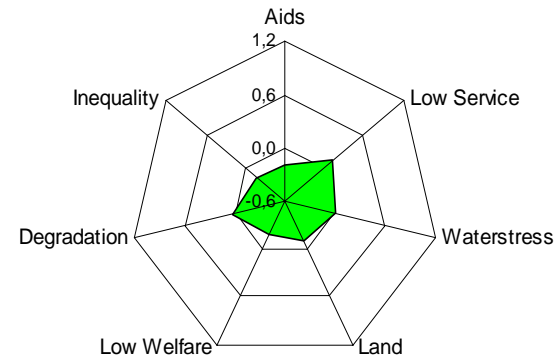
Italy

(Vulnerability-Index = Low)



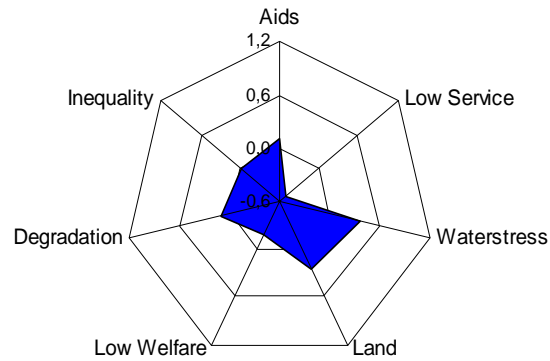
Germany

(Vulnerability-Index = Low)



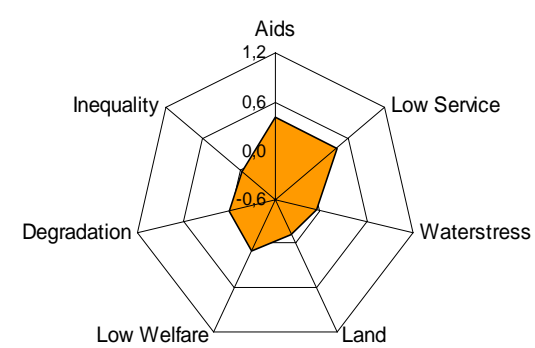
United States

(Vulnerability-Index = Medium)



Tanzania

(Vulnerability-Index = High)



Conclusions

- Theoretical basement helps to choose indicators
- An external criteria for the validity of the index is necessary and possible
- No causal structure
- Far away from peoples' reality
- Certain amount of arbitrariness