UNU-EHS
Institute for Environment and Human Security

Fabrice Renaud, Head of Section
Mission and Vision

Mission:
Advancing human security through knowledge-based approaches to reducing vulnerability and environmental risks

Vision:
That by 2015 our ability to integrate multidisciplinary research and postgraduate education will have secured us the position of a world-class leader in policy-relevant science with specific thematic focus on

- Vulnerability assessment, resilience analysis, risk management and adaptation strategies within linked human-environment systems
- Internal displacement and trans-boundary migration due to environmental push factors
Human security can be described as protection of individuals or communities from threats and disruption as well as protection of their rights and basic needs (Kaldor, 2007; Human Security Network, 2010; UNDP, 1994) and is closely related to concepts such as human well-being.

UNDP definition: Human security can be said to have two main aspects. It means, first, safety from such chronic threats as hunger, disease and repression. And second, it means protection from sudden and hurtful disruptions in the patterns of daily life – whether in homes, in jobs or in communities. (UNDP, 1994a: 23)
Human Security

TRADITIONAL
Sovereign states, national and political dimensions, military, peace, etc.

EMERGING
Key Dimensions of human security:
- Political
- Environmental
- Economic
- Food
- Health
- Personal
- Community
- Cultural

Freedom from fear
Freedom from want
Sustainable Development
Program structure

- **EMSVA**: Environmental Migration, Social Vulnerability & Adaptation
  Lead: Koko Warner, scientific staff: 11

- **VARMAP**: Vulnerability Assessment, Risk Management & Adaptive Planning
  Lead: Joern Birkmann, scientific staff: 11

- **EVES**: Environmental Vulnerability & Ecosystem Services
  Lead: Fabrice Renaud, scientific staff: 14

- **EGECHS**: Enhancing Graduate Educational Capacities for Human Security
  Lead: Jörg Szarzynski, scientific staff: 2
PhD students (currently): 13
Graduated in reporting period: 4

Research projects: 15 (most of them including more than one programme)

Publications (mid 2010/11):
• 33 peer reviewed articles
• 10 conference proceedings
• 6 policy / research briefs
• 16 book chapters
• 11 Articles in magazines
Selection of Projects
WASCAL

- Addresses climate change and land use in West Africa
- Large-scale research-focused program

**Aim:**
- Enhance the resilience of human and environmental systems to climate change and increased variability

**Objectives:**
- Strengthening the research infrastructure and capacity in West Africa related to climate change
- Creating attractive scientific “on place” working environment in West Africa
- Pooling the expertise of ten West African countries and Germany

**Funded by BMBF, coordinated by Center for Development Research (ZEF, Bonn University), with a network of German and African universities**
Lead workpackage 5.1 on Risk Assessment:
- Collaboration with German Aerospace Centre, ZEF & UNU-INRA; Collaboration between EVES and VARMAP sections of EHS
- Multi-hazard vulnerability and risk assessment
- Research carried out in watersheds in Burkina Faso, Ghana and Bénin

Official “German” counterpart in the Graduate Research Programme “Climate Change and Human Security”
- MSc programme led by Université de Lomé in Togo
- Support in curriculum development
- Support in teaching (vulnerability and risk assessment; social-ecological systems, ecosystem services)
Vulnerability of Coupled Systems: a Proxy for Human Security

Drivers/Causes

Variability & change in social conditions

Variability & change in ecological conditions

Perturbations, stresses (exogenous, endogenous)

Place Vulnerability

Exposure

• Assets
• People
• Ecosystems

Consequences

Ecological Influences outside the Place
State of biosphere, State of Nature, Global Environmental Changes

Social Influences outside the Place
Macro political economy, institutions, global trends and transitions

System operates at multiple spatial, functional and temporal scales

Impact responses

Adjustment & adaptation responses

Ecosystem Resilience

Coping Capacities

Adaptive Capacities

Resilience

Place Vulnerability

Sensitivities

• Condition of social system
• Condition of ecological system
### Use of SUST for Specific Sectors

#### Agricultural Sector

**Exposure (E)**
- % farmland ($e_1$)
- % employees ($e_2$)

**Sensitivity (S)**
- Unemployment rate of district ($sh$)
- Contamination potential ($se_1$)
- Erosion potential ($se_2$)
- Water quality index ($se_3$)

**Resilience (R)**
- Water storage capacity ($er_1$)
- Filter/buffer capacity ($er_2$)
- % perm. grasslands ($er_3$)
- GDP per capita district ($c_1$)
- GDP per capita FS ($c_2$)
- Side business income ($c_3$)
- % organic farms ($a_1$)
- % protected areas ($a_2$)

#### Forest Sector

**Exposure (E)**
- % forested area ($e_1$)
- % employees ($e_2$)

**Sensitivity (S)**
- Unemployment rate of district ($sh$)
- % pre-damaged forest ($se_1$)
- Water quality index ($se_2$)

**Resilience (R)**
- Forest size ($er_1$)
- Forest type ($er_2$)
- Forest fragmentation ($er_3$)
- GDP per capita FS ($c_1$)
- GDP per capita district ($c_2$)
- Mean annual income of households ($c_3$)
- Forest growth rate ($a_1$)
- Protected areas ($a_2$)

Source: PhD research of Marion Damm (UNU-EHS) – DISFLOOD Project
World Risk Index

Risk and Vulnerability Index

Exposure
Exposure to natural hazards

Susceptibility
Likelihood to suffer damage in an emergency

Coping Capacity
Capacity to reduce negative impacts in case of emergency

Adaptive Capacity
Capacity for long-term adaptation and change

--- Core components of vulnerability ---

NATURAL HAZARDS SPHERE

SOCIETAL SPHERE

Global Index / Indicators with national scale resolution

Local Indicators and criteria with sub-national, local and household scale resolution
### Indicators selected

#### 1. Exposure

**Exposed Population in REGARD TO**

- A) Earthquakes
- B) Cyclones
- C) Floods
- D) Droughts
- E) Sea level rise

#### 2. Susceptibility

**Nutrition**
- A) Percentage of undernourished population
**Public Infrastructure**
- B) Population without access to improved sanitation
- C) Population without access to clean water

**Housing Conditions**
- Proportion of population in slums;
- Proportion of semi-solid and fragile houses
  - limited data availability

**Poverty and Dependencies**
- D) Dependency ratio (proportion of under 15 – and above 65-year-olds in relation to the working population)
- E) Extreme poverty (population living on less than 1.25 USD (live PPPs) per day)

**Economic Capacity and Income**
- F) Gross Domestic Product per capita (Purchasing Power Parity)
- G) Gini-Index

#### 3. Coping Capacity

**Government and Authorities**
- A) Corruption Perception Index
- B) Failed States Index

**Disaster Preparedness and Early Warning**
- National disaster risk management policy according to the report of UN / ISDR

**Medical Services**
- C) Number of physicians per 10,000 population
- D) The number of hospital beds per 10,000 population

**Social Networks: Neighborhood, Family and Self-Help**
- No data available

**Economic Coverage**
- E) Insurance (except life insurance)

#### 4. Adaptive Capacity

**Education and Research**
- A) Adult literacy rate
- B) Combined gross school enrolment (rate of school-aged children in primary, secondary and tertiary educational institutions)

**Gender Equity**
- C) Gender parity in education (in primary, secondary and tertiary educational institutions)
- D) Percentage of female representatives in the National Parliament

**Environmental Status / Ecosystem Protection**
- E) Water resources
- F) Protection of biodiversity and habitats
- G) Forest Management
- H) Agricultural Management

**Adaptation Strategies**
- Volume of National Adaptation Programmes of Action to Climate Change, Climate Change Convention (available for 45 of the least developed countries)

**Financing**
- I) Life expectancy at birth
- J) Private health expenditure
- K) Public health expenditure
Hazard Exposure
(annual pop. exposed)

Exposure
Exposure of the population to the natural hazards earthquakes, storms, floods, droughts and sea level rise.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Exposure Range</th>
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<tbody>
<tr>
<td>very low</td>
<td>0.05 - 0.71</td>
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<tr>
<td>low</td>
<td>0.72 - 1.82</td>
</tr>
<tr>
<td>medium</td>
<td>1.83 - 4.28</td>
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<tr>
<td>high</td>
<td>4.29 - 8.85</td>
</tr>
<tr>
<td>very high</td>
<td>8.86 - 56.33</td>
</tr>
<tr>
<td>no data available</td>
<td></td>
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</tbody>
</table>

Max. exposure: 100%
Classification according to the quantile method
Vulnerability

Vulnerability of society as the sum of susceptibility, lack of coping capacities and lack of adaptive capacities

- **Very low**: 24.57 - 35.63
- **Low**: 35.64 - 45.03
- **Medium**: 45.04 - 53.50
- **High**: 53.51 - 63.32
- **Very high**: 63.33 - 76.10

Max. vulnerability = 100%
Classification according to the quantile method
World Risk Index

World Risk Index as the result of exposure and vulnerability.

- **very low**: 0.00 - 3.56
- **low**: 3.57 - 5.80
- **medium**: 5.81 - 7.71
- **high**: 7.72 - 11.13
- **very high**: 11.14 - 32.00
- **no data available**

Max. risk = 100%,
Classification according to the quantile method.
System Shifts and Thresholds

I
New State
linked to anticipation of potential changes

II
State “Now”

III
Alternate State
Often unfavourable for the system studied

1a)
External shock

1b)

2a)
Regime Shift

2b)
Potential change or impact

Geography of Environmental Risks and Human Security

- Core partner: Department of Geography, University of Bonn
- Type: Two-year consecutive research Master’s degree programme with 120 credit points (ECTS)
- Degree: Master of Science (M.Sc.)
# Education Programs: Joint Master

<table>
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<tr>
<th>Year 1</th>
<th>Year 2</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td><strong>Spring</strong></td>
</tr>
<tr>
<td>14 CP</td>
<td>24 CP</td>
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<tr>
<td>18 CP</td>
<td>6 CP</td>
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<td>18 CP</td>
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<td>6. Internship</td>
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<td>10 CP</td>
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THANK YOU!

UNITED NATIONS UNIVERSITY

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