Demographic Aspects of Climate Change Mitigation and Adaptation: Micro- and Macro-Perspectives

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Need for new paradigms in the social sciences and humanities

• In the European science system the humanities and social sciences seem to be losing ground. In ERC 83% of funding goes to natural sciences.
• The “crisis” of SSH can only be resolved with new attractive paradigms.
• **Identity Sciences**: Who am I, where do I come from? Largely humanities
• **Intervention Sciences**: How does the system of the real world work and what interventions (or lack of interventions) will have what consequences? Largely quantitative social sciences. Systems analysis.
Global Climate Change

- GHG emissions
- Consumption
- Technology
- Innovation

Regional effects on:
- temperature
- humidity
- extreme events (storms)
- sea-level rise

Differential vulnerability

Livelihood

Health/Mortality

Migration

Human Population

By age, sex, level of education, place of residence, and household structure

Closing the full circle of population and climate change
Source: O’Neill et al., *Global demographic trends and future carbon emissions*, PNAS 2010
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Scenarios used for IPCC related analyses

- **SRES-Scenarios** (2000 – group led by IIASA)
  Only socio-economic variables used: Total population size and GDP. Pop serves as denominator.

- **SSPs (Shared Socio-economic Pathways) 2013**
  Scenarios with the “human core” by age, sex and level of education (plus urban/rural and consistent GDP scenarios).

**Education seen as single most important source of observable population heterogeneity** next to age and sex. Good, stable and consistent indicator of empowerment and social status.
SSP Logic

SSP 1: (Low Challenges) Sustainability
Conventional Development

SSP 2: (Intermediate Challenges) Fragmentation
Middle of the Road

SSP 3: (High Challenges) Inequality

SSP 4: (Adapt. Challenges Dominate) Conventional Development

SSP 5: (Mit. Challenges Dominate) Sustainability

Socio-economic challenges for mitigation

Socio-economic challenges for adaptation
What is the education effect?

Chapter in new OUP book: We have good reasons to assume “functional causality” from education to health. Education is not just a proxy for SES.

- Every learning experience builds new synapses in our brains and makes us “physiologically different” (Eric Kandell)
- Enhancement of cognitive skills
  - change risky behavior
  - extend personal planning horizon
  - learn from past damage
- Empowerment and reduced inequality
- Better access to relevant information
- Improvement of health and physical well-being
- Higher income at the individual and household level
Education and Deaths from Natural Disaster

All countries available
Countries with more than 30 disasters

Log (Total Deaths/Initial Population)

Female 20-39 Sec+ Edu

Multivariate Analysis

**Data:** We use floods, droughts, storms, extreme temperature events, and landslides since 1980 for all countries with data.
WIC Data on educational attainment by age, sex, and education (1970 – 2050)

Seven different model specifications.
Dependent variable: Number of deaths due to natural disasters per Million population
Controlling for: Frequency of disasters, population density, OPEC, coastline.

**Income:** Consistently not significant when education is included in equation

**Education:** strong and consistently negative significant effect.
   Best indicator: Proportion of women aged 20-39 with secondary or higher education.
Projecting Future Disaster Vulnerability in Sub-Saharan Africa

Predicted Number of Deaths (in 1000's)

- Constant Hazard
- Climate Change

Scenario:
- CER
- GET
- FT
Micro-level Evidence

• Education can play an important role in reducing the negative impacts of extreme climate events on human mortality
• Special issue of “Ecology and Society” on differential vulnerability (even within households) by age, gender and level of education.
• Individual level studies from Asian tsunami, flooding in Nepal and Bangladesh, hurricanes and cyclones etc.
• Consistently persons of all ages, men and women alike, are better prepared, less affected and recover faster if they are better educated – clearly more important than income/wealth.
Education as the best investment in enhancing adaptive capacity

• Global adaptation fund for developing countries.
  20 Billion US$ pledged per year. What is done with the money? Should it all go to engineers?

• Forthcoming Seminar of IUSSP Committee on Population and Climate Change:
  on Demographic Differentials in Vulnerability to natural Disasters and environmental Change
  Khao Lak (Thailand) – Sponsored by IIASA and College of Population Studies (Chulalongkorn)
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Consumption

Technology

Innovation

Closing the full circle of population and climate change

By age, sex, level of education, place of residence, and household structure
Education effects on income, consumption and innovation

The key “problem” is that education enhances economic growth and hence consumption.

ECONOMICS

The Demography of Educational Attainment and Economic Growth

Wolfgang Lutz,1* Jesús Crespo Cuaresma,2 Warren Sanderson3

Forthcoming in Demography:
Is the Demographic Dividend an Education Dividend?
Emissions by Category of Education of Household Head, US 2002

Source: Ethan Sharygin, *The carbon cost of an educated future*
Carbon Footprint by Level of Education

Source: Ethan Sharygin, *The carbon cost of an educated future*
Energy Type by Education of Household Head

![Bar chart showing energy types by education level and country.](chart.png)
(1) Recognize that the numbers, characteristics, and behaviors of people are at the heart of sustainable development challenges and of their solutions.

(2) Identify subpopulations that contribute most to environmental degradation and those that are most vulnerable to its consequences.

(3) Devise policies to treat these subpopulations differently according to their demographic and behavioral characteristics.

(4) Facilitate the inevitable trend of increasing urbanization in ways that ensure that vulnerabilities are under control.

(5) Invest in human capital—people’s education and health, including reproductive health—to slow population growth, accelerate the transition to green technologies, and improve people’s adaptive capacity to environmental change.
Sola schola et sanitate

Sola schola et sanitate: human capital as the root cause and priority for international development?
Wolfgang Lutz

Forthcoming statement by Leopoldina, Royal Society, Science Academies of France, Sweden, Poland and Austria (draft):

“European policies in times of massive demographic change ... should find ways to reduce material consumption and at the same time to grow in quality and extent of education, health and living conditions”.