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FOR DEMOGRAPHY AND GLOBAL HUMAN CAPITAL

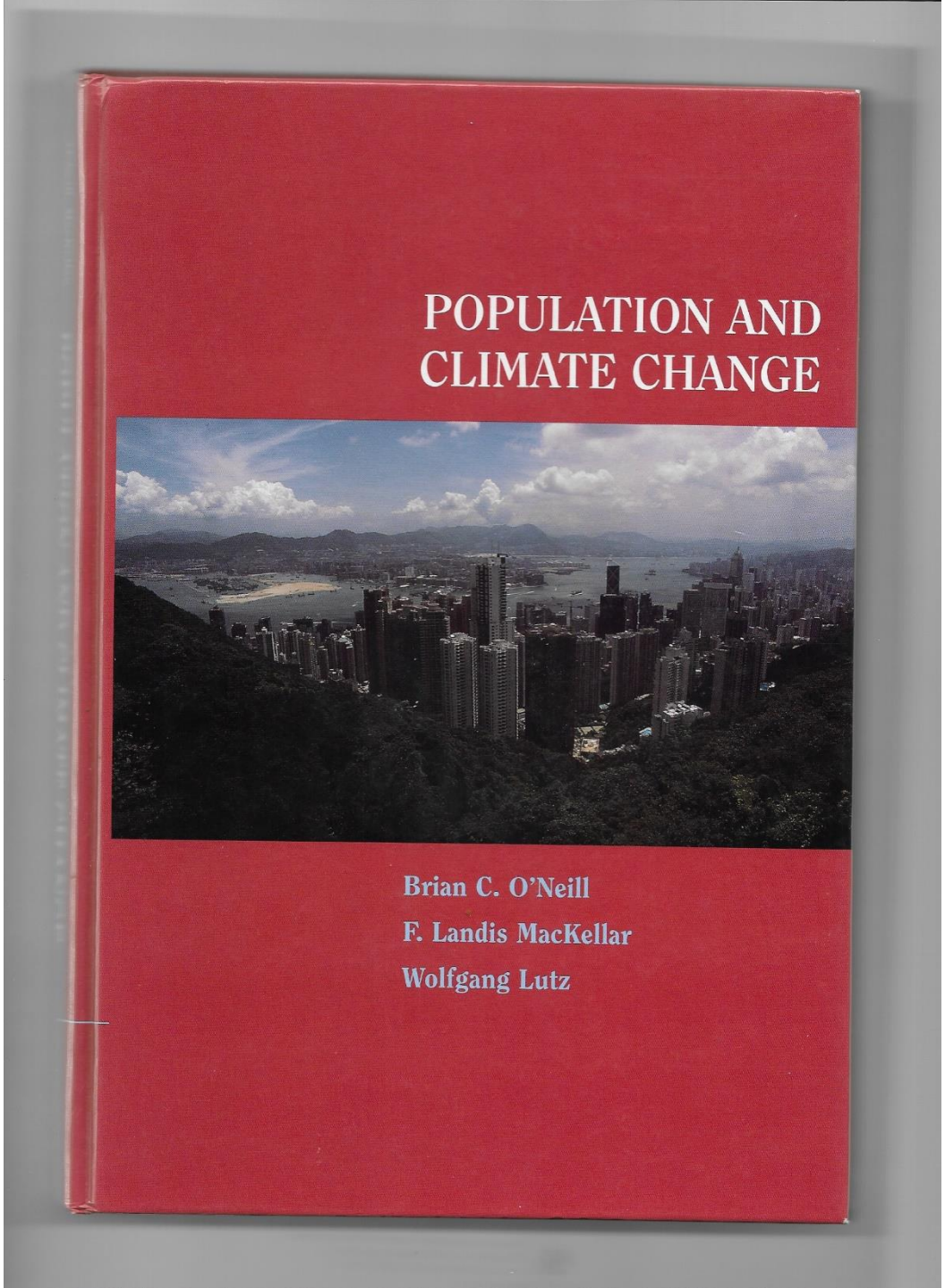
Population and Climate Change

Wolfgang Lutz

PERN-IUSSP, Sept 16, 2021

International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

universität wien



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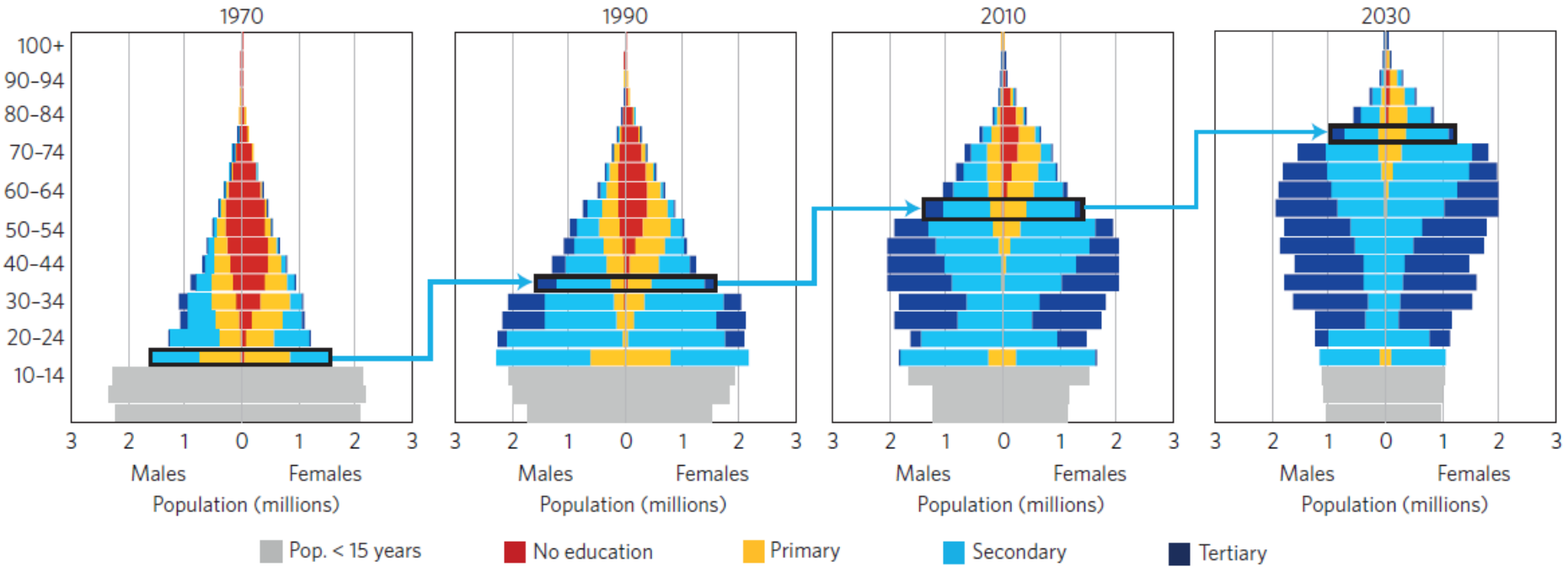
2001 Book

Basic facts and forecasts have hardly changed since then,
but public awareness has changed dramatically

Multi-dimensional population dynamics by age, sex and education for the Republic of Korea



Source: Lutz & Muttarak (2017) *Nature Climate Change.*

World population trends by level of education according to the three scenarios SSP1 (rapid social development), SSP2 (middle of the road) and SSP3 (stalled development).

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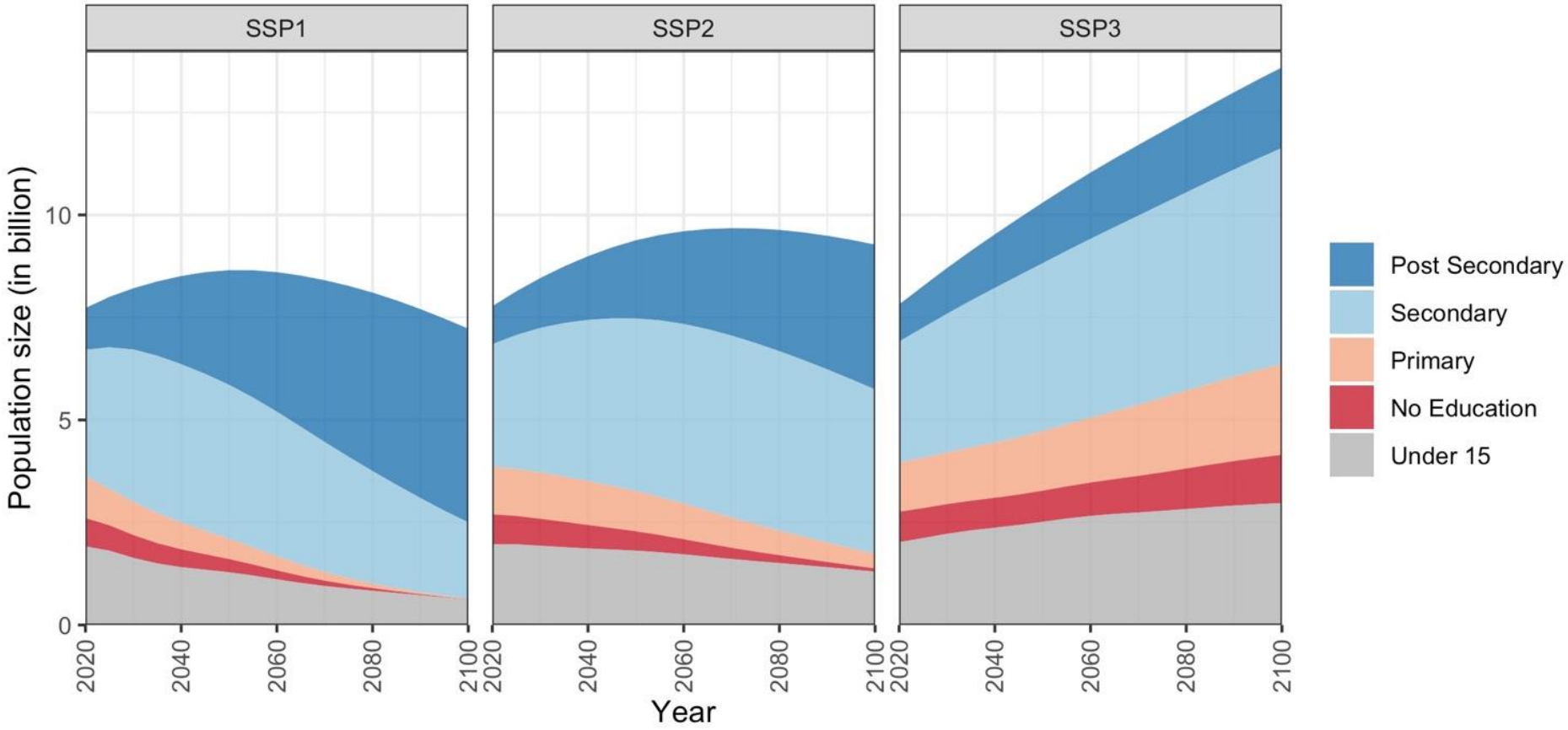

Population scenarios by age, sex and level of education as the "human core" of the SSPs (Shared Socioeconomic Pathways) for climate change mitigation and adaptation

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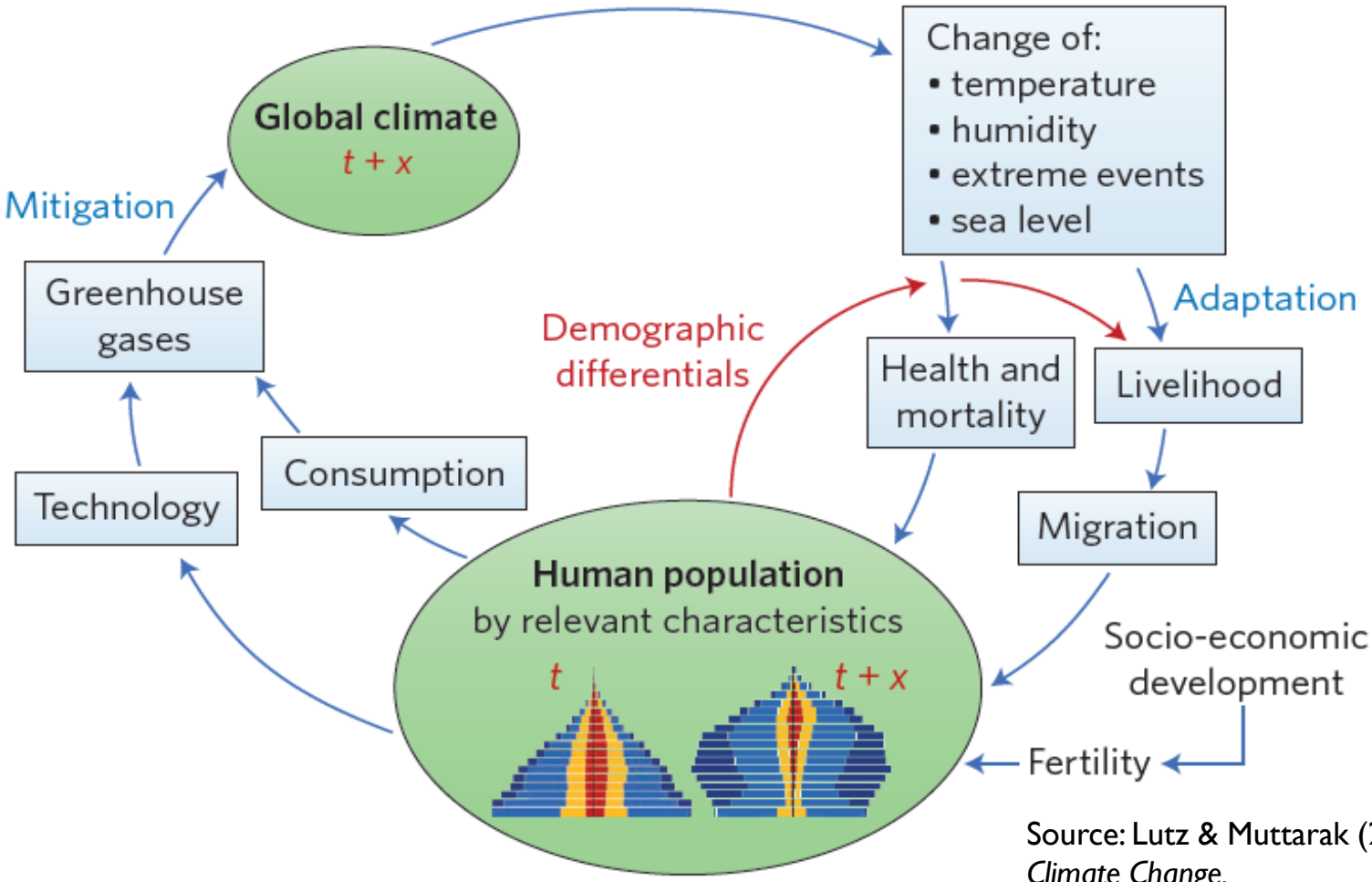

Source: Lutz & Muttarak (2017) *Nature Climate Change*.

The climate of the future will affect the population of the future (not that of today)

Vulnerability to climate change differs by SSPs

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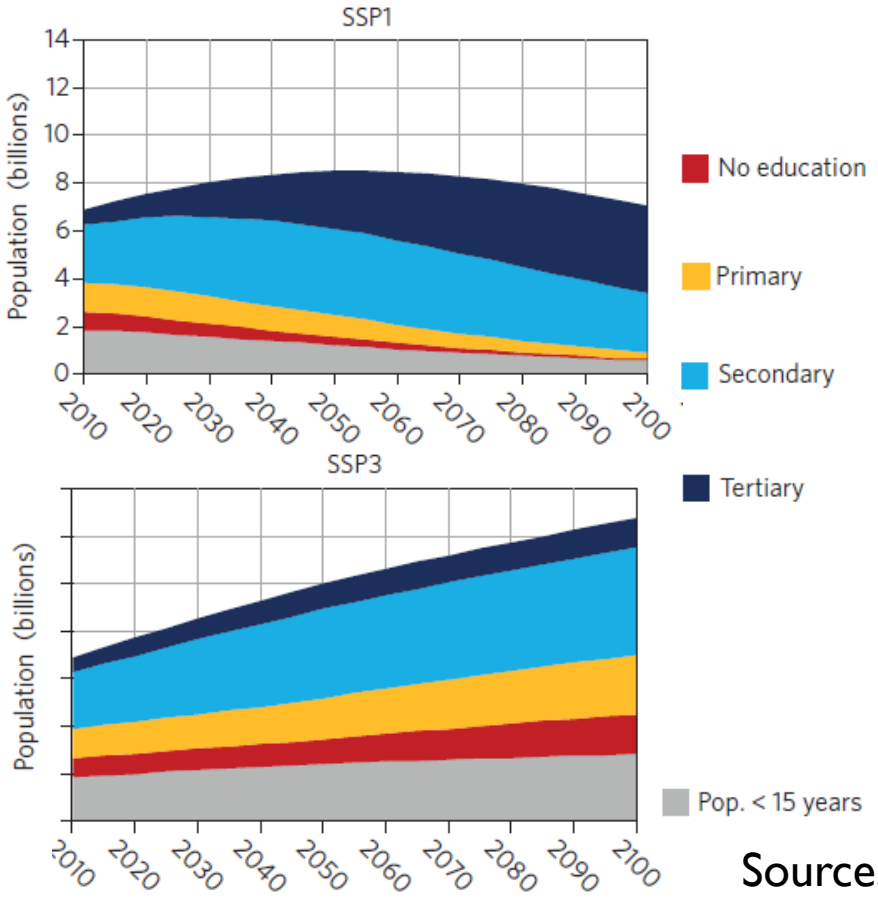

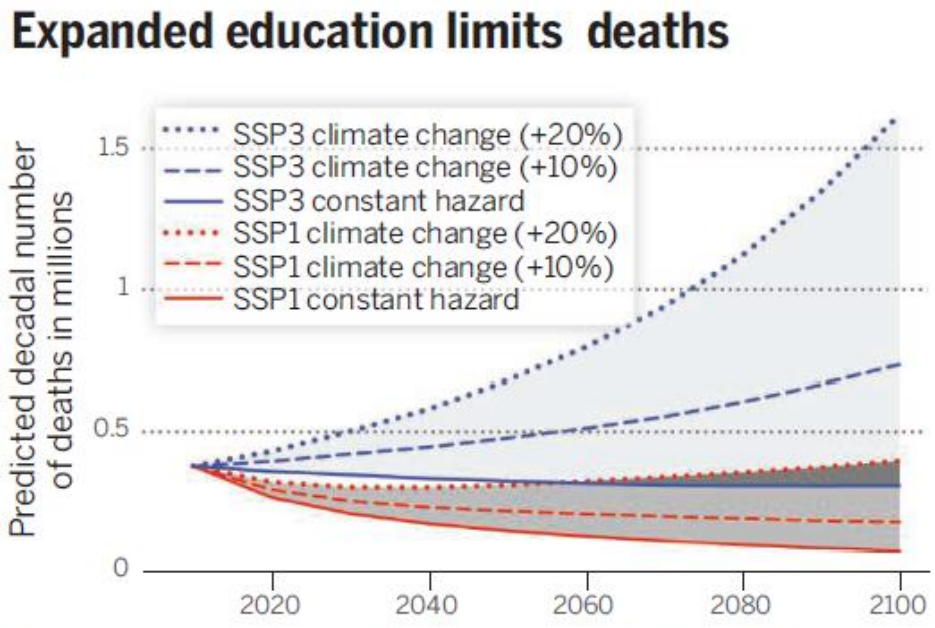

Predicted decadal number of disaster deaths (in millions). Difference in deaths resulting from estimated education and population effects according to the contrasting scenarios SSP1 and SSP3 to 2100. See SM for details.

Source: Lutz, W. & Muttarak, R. & Striessnig (2014) *Science*.

Let Data or Experts Speak: A spectrum of approaches

1. **(Blind) statistical extrapolation.** Only past data and simple linear model (Randers 2012, Club of Rome).
2. **(Sophisticated) statistical extrapolation.** Past data plus complex model (incl. expert-based assumptions). No country-specific or other knowledge from outside the model (UN since 2012, IHME 2019).
3. **Structural models**. Future fertility and mortality trends made dependent on non-demographic trends (Meadows 1972).
4. **Blending** statistical extrapolation with country-specific expert knowledge and expert assessment of arguments (Lutz et al 2014).
5. **Expert argument-based assumptions**. Expert define assumptions and explicitly justify them (previous IIASA).
6. **Expert opinions** without justification (most Delphi studies).

UN up to 2010?
Between 5 and 6

SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Meeting the Sustainable Development Goals leads to lower world population growth

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Contributed by Wolfgang Lutz, October 25, 2016 (sent for review July 12, 2016; reviewed by Joel E. Cohen and Hans-Peter Kohler)

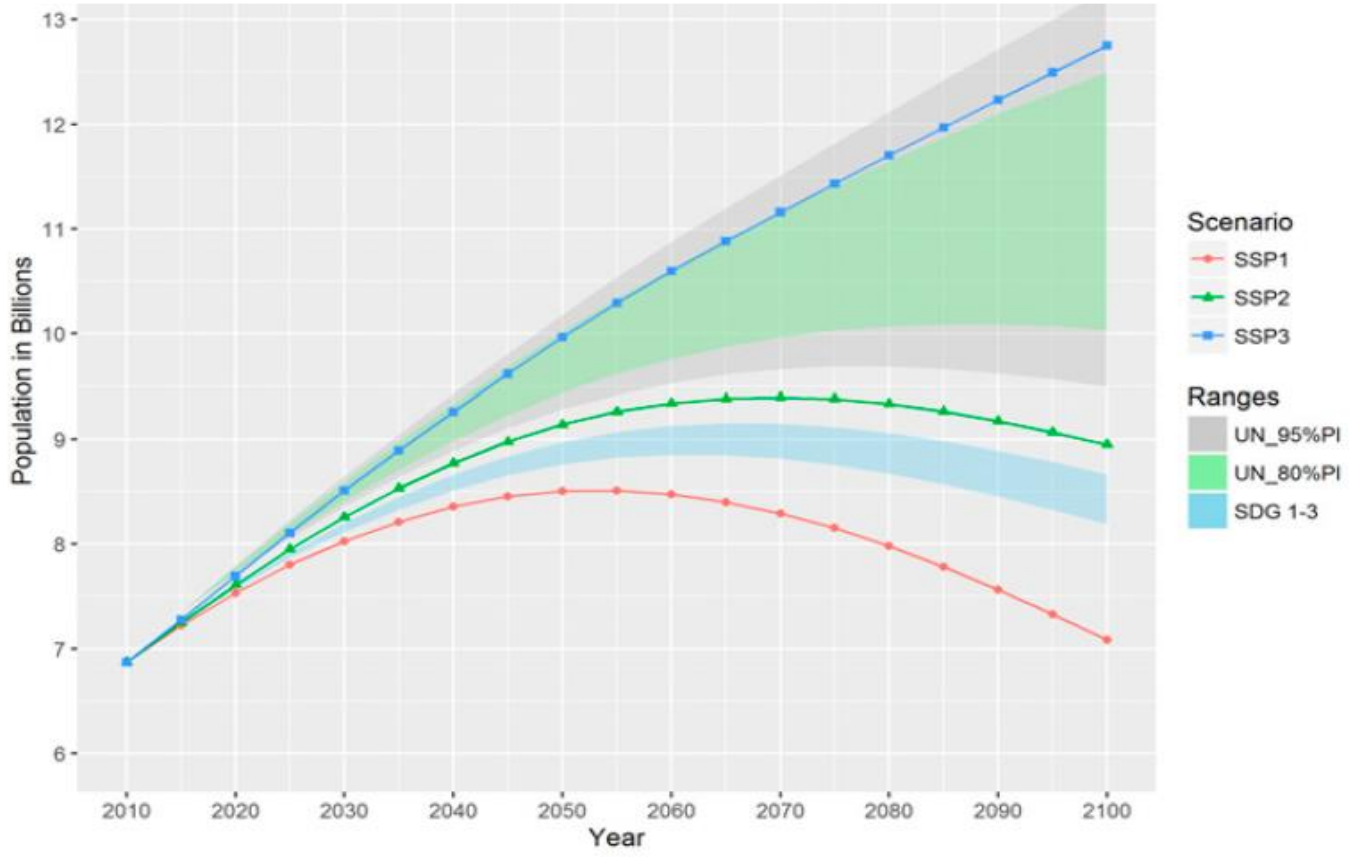


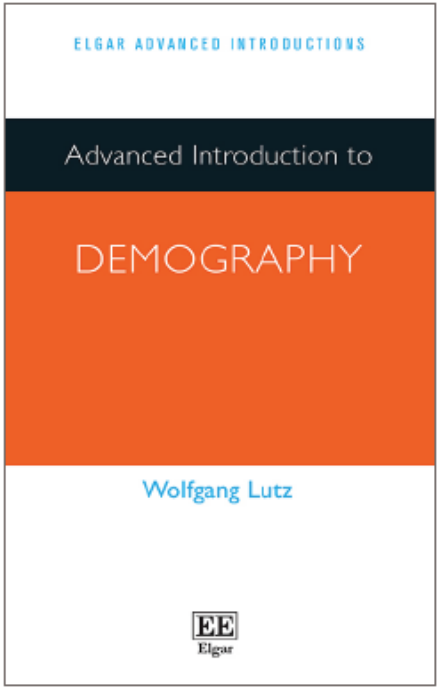
Fig. 1. Future world population growth as projected according to the three SSP scenarios, the range of SDG scenarios presented here, and the probabilistic ranges given by the UN population projections.

THE FUTURE
IS NOW
SCIENCE FOR ACHIEVING
SUSTAINABLE DEVELOPMENT
GLOBAL SUSTAINABLE
DEVELOPMENT REPORT
2019

TEXTBOOK

ADVANCED INTRODUCTION TO DEMOGRAPHY

Wolfgang Lutz, University of Vienna, Austria



September 2021

'Wolfgang Lutz secured his place among the handful of the world's most influential demographers by decades of pioneering empirical research, theoretical exploration, and institutional leadership. This succinct book is a capstone to his contributions. Lutz envisions multi-dimensional demography (including age, sex and other attributes like education) as the foundation for a theory that integrates demographic metabolism (cohort replacement), the demographic transition, and the demographic dividend. Demographers, social scientists, and policy makers need to read this important book.'

– Joel E. Cohen, The Rockefeller University and Columbia University, US

Elgar Advanced Introductions are stimulating and thoughtful introductions to major fields in the social sciences, business and law, expertly written by the world's leading scholars. Designed to be accessible yet rigorous, they offer concise and lucid surveys of the substantive and policy issues associated with discrete subject areas.

Highlighting the power of multi-dimensional demography, this Advanced Introduction addresses the most consequential changes in our societies and economies using quantitative approaches. It defines three demographic theories with predictive power – demographic metabolism, transition and dividend – and repositions the discipline at the heart of social science.