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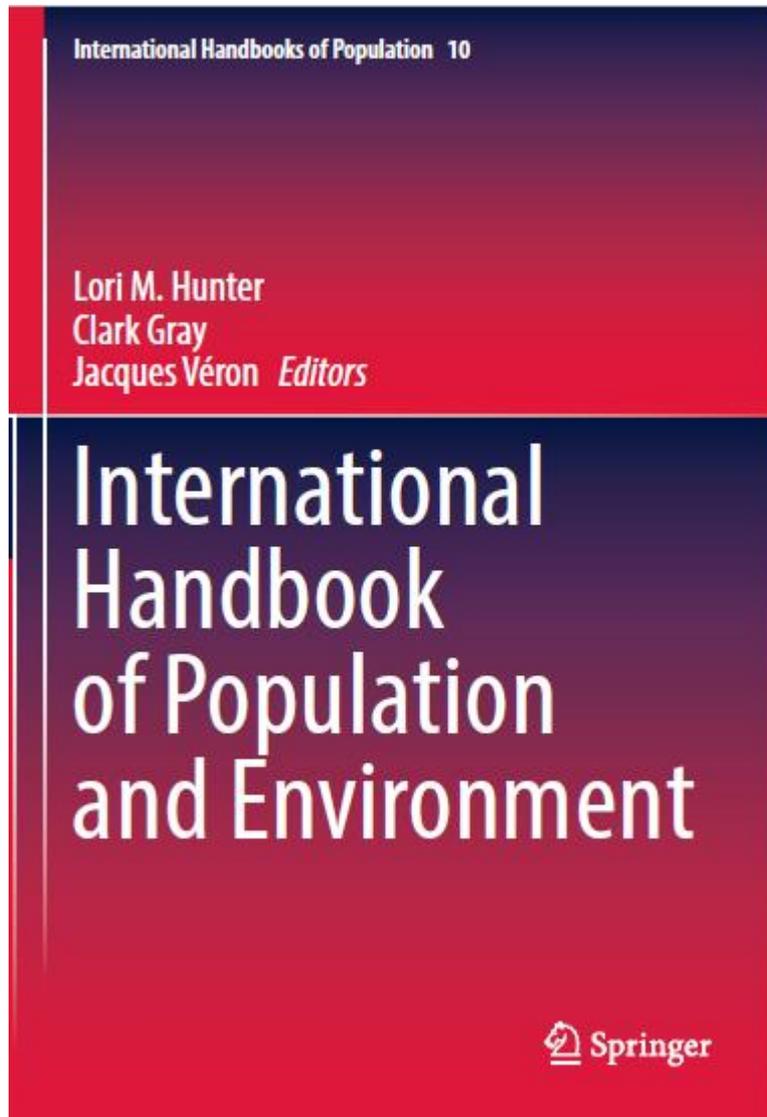
Population and Environment: where do we stand?

Jacques Véron

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WORKSHOP INED
POPULATION-ENVIRONMENT-HEALTH: CONNECTING PIXELS
6 JULY 2022

The state of the art



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A little flashback: the 1998 PAA presidential address

DEMOGRAPHY AND THE ENVIRONMENT*

ANNE R. PEBLEY

Demographers' interest in the environment has generally been enmeshed in broader issues of population growth and economic development. Empirical research by demographers on environmental issues other than natural-resource constraints is limited. In this paper, I briefly review past demographic thinking about population and the environment and suggest reasons for the limited scope of demographic research in this area. Next, I describe more recent demographic research on the environment and suggest several newer areas for demographic research. Finally, I consider the future of research on the environment in the field of demography.

Source: Demography, Vol. 35, No. 4 (Nov., 1998), pp. 377-389

Major human impacts on ecological systems: what is the role of population as such?

- “ Today, demographers’ engagement with environmental topics becomes all the more imperative as we move further into the Anthropocene – an era characterized by major human impacts on ecological systems. ”
- The Population-Environment Research Network (PERN) launched in 2001. Since 2003, the Network has been supported by a number of sponsors, primarily the IUSSP.
- PAA 1998 annual meeting: one session “Population growth and environmental change”
PAA 2021 annual meeting: eight core sessions with topics ranging from natural disasters to methods and measurement to environmental migration.

A theme that has grown in importance: the environmental dimensions of Migration

- A great public concern about “Climate Refugees”
- “ The **specter of climate change’s** potential to intensify population movements brought an unfamiliar public and policy spotlight to migration research. The research community responded.”
- **Need to go beyond a mechanistic vision:**
It appears that “environmental pressures do not act in isolation but, instead, interact with economic, social and political factors to ultimately shape migration decision-making. Social capital in the form of migration networks has proven to be particularly key in impacting the likelihood of migration in the face of environmental stress ”.

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Lori M. Hunter, Clark Gray, and Jacques Véron

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2. Population and Environment Interactions: Macro Perspectives

Jacques Véron

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Sara R. Curran

4. Vulnerability to Climate Change and Adaptive Capacity from a Demographic Perspective

Raya Muttarak

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Brian C. Thiede

6. Spatial Data and Analytical Approaches

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Brantley Liddle and Gregory Casey

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22. Socio-demographic Inequalities in Environmental Exposures

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23. Reflections on the Past, Present, and Future of Population-Environment Research

Barbara Entwisle

24. Environmental Migration Scholarship and Policy: Recent Progress, Future Challenges

Robert McLeman

What do we mean by “population ” and what do we mean by “environment ”?

“Population ”

- . A number of people in a given territory (world, region, country, etc.),
- . The age or sex structure, or to the spatial distribution.
- . Different ratios, as the proportion of people under 15 years or aged 65+;
- . Growth rates applied to the world population, to the urban population, etc.
- . Demographic phenomena: fertility, mortality, and mobility.

“Environment ”

- . Wild life
- . Air and water quality
- . Natural resources
- . Land use,
- . Consumption and production patterns
- . Climate change,
- Etc.

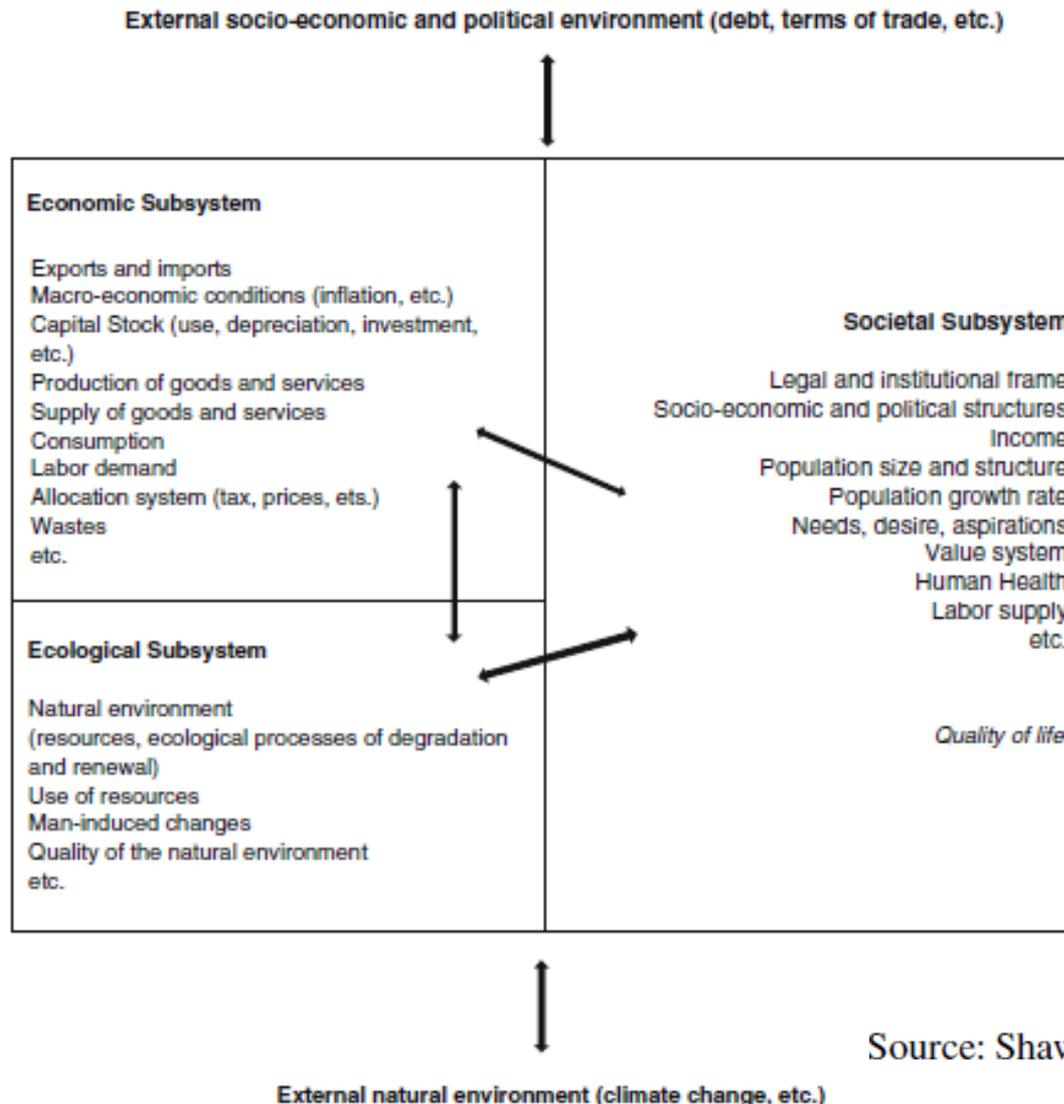
Complexity in a Simple Equation: The Development of IPAT

- From Ehrlich & Holdren, 1972 and Commoner, 1972 to the “Kaya identity” (Kaya, 1990)

$$I = P \times A \times T \qquad C = P \times \frac{\text{GDP}}{P} \times \frac{E}{\text{GDP}} \times \frac{C}{E}$$

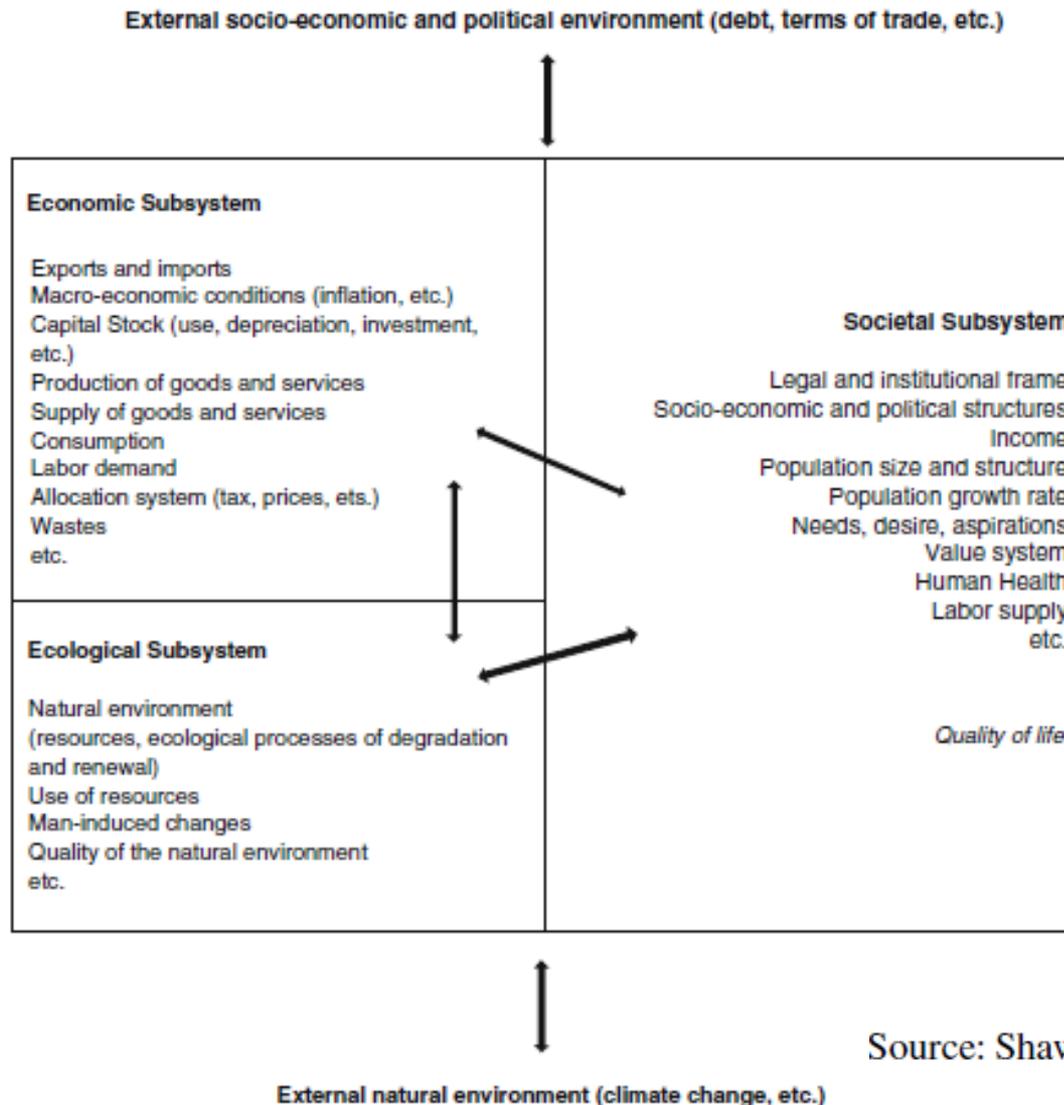
- A main critique** (O’Neill & Chen, 2002):
“although as an **identity** it is always true by definition, when it is used as an **explanatory model** it implicitly assumes that there are only three relevant variables [. . .] all related in a simple linear fashion.”
- They return to the distinction introduced by Shaw (1989) between **“proximate factors”** (i.e. direct causes) of environmental impact and **“ultimate factors”** (such as income distribution or attitudes and preferences).
 - . Among proximate causes: population density or population growth;
 - . Among ultimate causes: polluting technologies or affluence-related wastes.

Systems modelling of Population-Environment Interactions



Source: Shaw et al., 1992 (simplified diagram)

Systems modelling of Population-Environment Interactions



Source: Shaw et al., 1992 (simplified diagram)

Population and Climate change

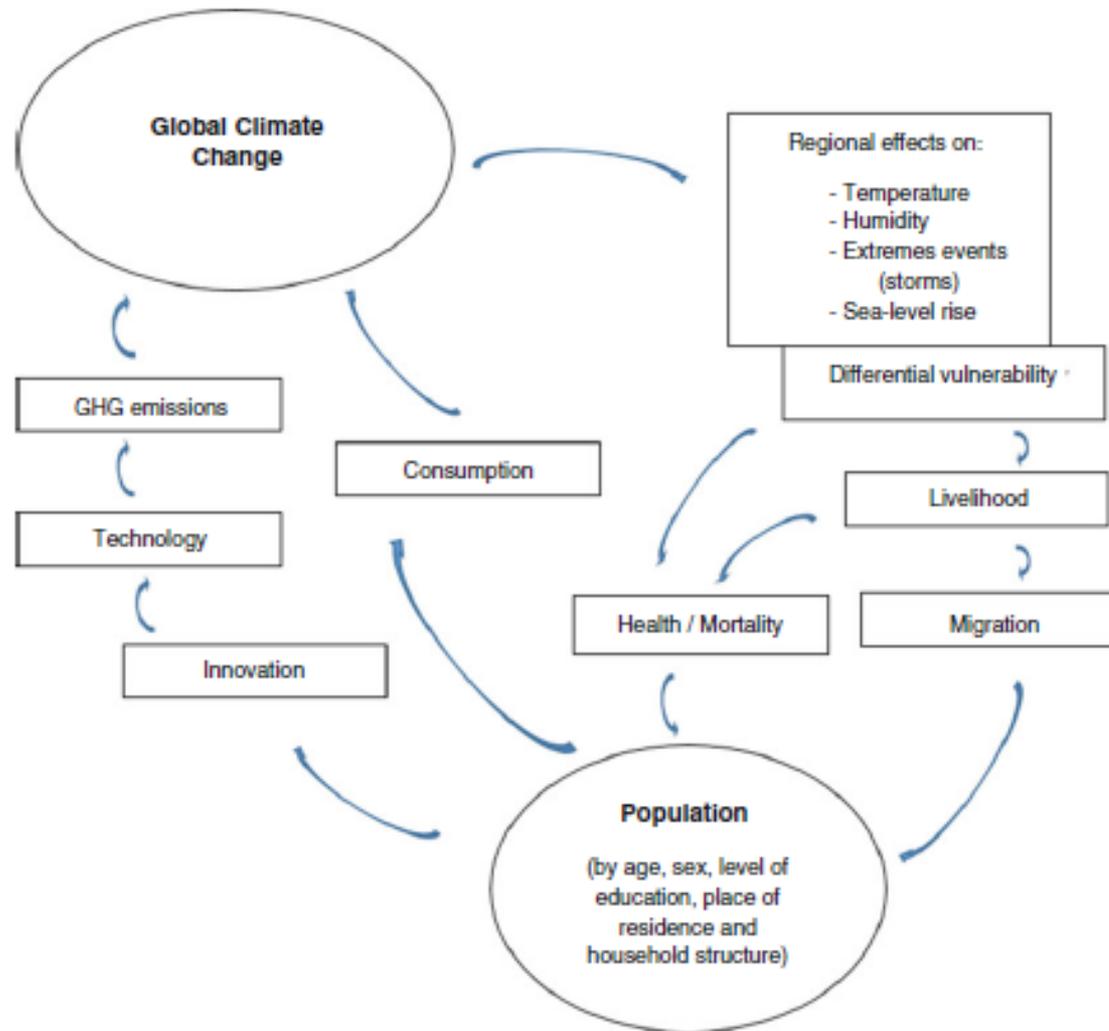


Fig. 2.5 The cycle of climate change and population relationships. (Source: Lutz, 2009)

Micro Perspectives: Population, Environment and Livelihoods Strategies

In her chapter Sara Curran considers 5 micro level perspectives:

1. Demographic behaviors and outcomes as a response to environmental endowments;
2. General demographic impacts on environmental endowments (including discussions about *intensification* and *extensification* in the *production* activities associated with family livelihoods).
3. Human migration impacts on the environment which have pointed to *extensification* explanations, as well as *diversification* behavior and activities.
4. Demographic responses to environmental hazards or environmental shocks.
5. Role of *consumption* behavior and preferences as a conceptual domain mediating the relationship between population and environment.

Population, Environment and Livelihoods Strategies (continued)

- These studies often employ a migration as **diversification**
- Introduction of **vulnerabilities** and **resiliencies** at the individual and household level, as well as at the macro level.
- Possibility to explain **heterogeneity** of individual and household responses in demographic behaviors and outcomes.

Mitigation and Adaptation to Climate Change

- Raya Muttark's chapter

Human population → Global Climate

Mitigation

(technology, consumption)

Human population ← Global Climate

Adaptation

(health, livelihood and migration)

- Raya Muttarak concludes that “changing **population composition** such as by age, gender and education – a source of population heterogeneity relevant to vulnerability – implies different levels of vulnerability and adaptive capacity in the future”.

Types of micro-level data employed (Brian Thiede)

Table 5.1 Examples of micro-level datasets used in population-environment research

Category	Dataset	Select uses of data
Large-scale, multi-national surveys	National population censuses	Bohra-Mishra et al. (2017), Nawrotzki et al. (2013) and Watmough et al. (2016)
	Demographic and Health Surveys	Behrman and Weitzman (2016), Galway et al. (2018) and Grace et al. (2015)
	Living Standards Measurement Study	Asfaw and Maggio (2018) and Mueller et al. (2020)
	Multiple Indicator Cluster Survey	Clifford et al. (2010) and Mason et al. (2005)
	Young Lives	Bahru et al. (2019)
	American Time Use Survey	Graff Zivin and Neidell (2014)
Large-scale, single-country surveys	China Health and Nutrition Survey	Mueller and Gray (2018)
	Chitwan Valley Family Study	Massey et al. (2010) and Williams and Gray (2020)
	Ethiopian Rural Household Survey	Gray and Mueller (2012) and Randell and Gray (2016)
	India Human Development Survey	Sedova and Kalkuhl (2020)
	Indonesian Family Life Survey	Bohra-Mishra et al. (2014), Sellers and Gray (2019) and Thiede and Gray (2017)
	Malawi Longitudinal Study of Families and Health	Anglewicz and Myroniuk (2018)
	Mexican Migration Project	Nawrotzki et al. (2015)
	Nang Rong Projects	Entwisle et al. (1998, 2016)
	Pakistan Panel Survey	Mueller et al. (2014)
	Panel Study of Income Dynamics	Elliott and Howell (2017)
	U.S. Current Population Survey	Cahoon (2006) and Groen and Polivka (2010)

Types of micro-level data employed (continued)

Small-scale surveys	Bangladesh Environment and Migration Survey Carrico and Donato (2019)
	Displaced New Orleans Residents Survey Sastry (2009)
	Resilience in Survivors of Waters Katrina (2016)
	Study of the Tsunami Aftermath and Recovery Frankenberg et al. (2008), Gray et al. (2014) and Nobles et al. (2015)
Demographic surveillance systems	Agincourt Health and Demographic Surveillance System Hunter et al. (2011, 2014) and Leyk et al. (2012)
	Matlab Health and Demographic Surveillance System Call et al. (2017) and Islam et al. (2009)
Administrative records and vital statistics	Bangladesh Sample Vital Registration System Chen and Mueller (2018)
	U.S. Internal Revenue Service tax returns Deryugina et al. (2018)
	U.S. Centers for Medicare and Medicaid Services Di et al. (2017)

In the part Data & Methods: two more chapters

- **Spatial Data and Analytical Approaches**

Rachel A. Rosenfeld and Katherine J. Curtis give an overview of how spatial data and analyses are used in research at the population- environment nexus and identifies how spatial data and analytic strategies might advance our theoretical knowledge of today's most significant environmental issues.

- **Qualitative Data and Approaches to Population–Environment Inquiry**

Sabine Henry, Sebastien Dujardin, Elisabeth Henriet, and Sofia Costa Santos Baltazar

After a brief of a variety of qualitative methods (in-depth interview, focus groups, participant observation, ethnography, and drawing) three concrete examples of population–environment research aimed at illustrating the selection and application of appropriate tools to build qualitative knowledge.

Migration and Environment

- **Africa** *Valerie Mueller*

Scarcity of wage employment opportunities, poor transportation infrastructure, and weak endowments in financial capital pose **strong barriers to use of migration as an adaptation strategy** in Africa.

- **Asia (Water Stress and Migration)** David J. Wrathall and Jamon Van Den Hoek
Link between surface temperature variation, physical water scarcity, agricultural change, and migration.

- **North America** *Elizabeth Fussell and Brianna Castro*

A review of the research on three types of environmental migration in North America: amenity migration, natural hazards-related migration, and anthropogenic hazards-related migration.

- **Air Pollution** *Melissa LoPalo and Dean Spears*

The authors point out that although most of the literature has focused on **richer countries**, where environmental and demographic data are more likely to be available, exposure levels to air pollution can be much greater in the **developing world**.

- **Population and Water Issues** *Stéphanie Dos Santos, Bénédicte Gastineau, and Valérie Golaz*

The authors encourage not to be satisfied with reasoning in quantitative terms (scarcity or not) but to broaden the vision, considering for example **inequity in access to and the use of water**.

- **Extreme Heat** *Heather Randell*

Overview of some of the direct and indirect health impacts of extreme heat including its effects on mortality, birth outcomes, nutrition and food security, and infectious disease transmission.

Health and mortality (continued)

- **Land Use and Land Cover Change**

William K. Pan and Gabrielle Bonnet

Research has focused on *infectious diseases*, particularly vectorborne and zoonotic diseases (role of high density). What about the connection between LULC and non-communicable diseases, accidents/unintentional injuries, or non-zoonotic infectious diseases?

The authors examine the role played by Agricultural Extensification and Deforestation, agricultural intensification (pesticides and fertilizers), infrastructure (road and injuries), city expansion (non-communicable Diseases and change in dietary behaviors)

- **Natural Disasters**

Mark VanLandingham, Bonnie Bui, David Abramson, Sarah Friedman, and Rhae Cisneros

The impacts of disasters on health and mortality are large, widely distributed, and unevenly distributed; and often spread out over a long period of time.

Demographic Dynamics and Environment

- **Cities and Their Environments**

Mark R. Montgomery, Jessie Pinchoff, and Erica K. Chuang

Air pollution, Urban Heat Islands, Water Stress, Flooding, etc.

- **Agricultural Change**

Richard E. Bilborrow

Review of land extensification and intensification on different continents in relation to population dynamics.

- **Energy Consumption/Carbon Emissions:**

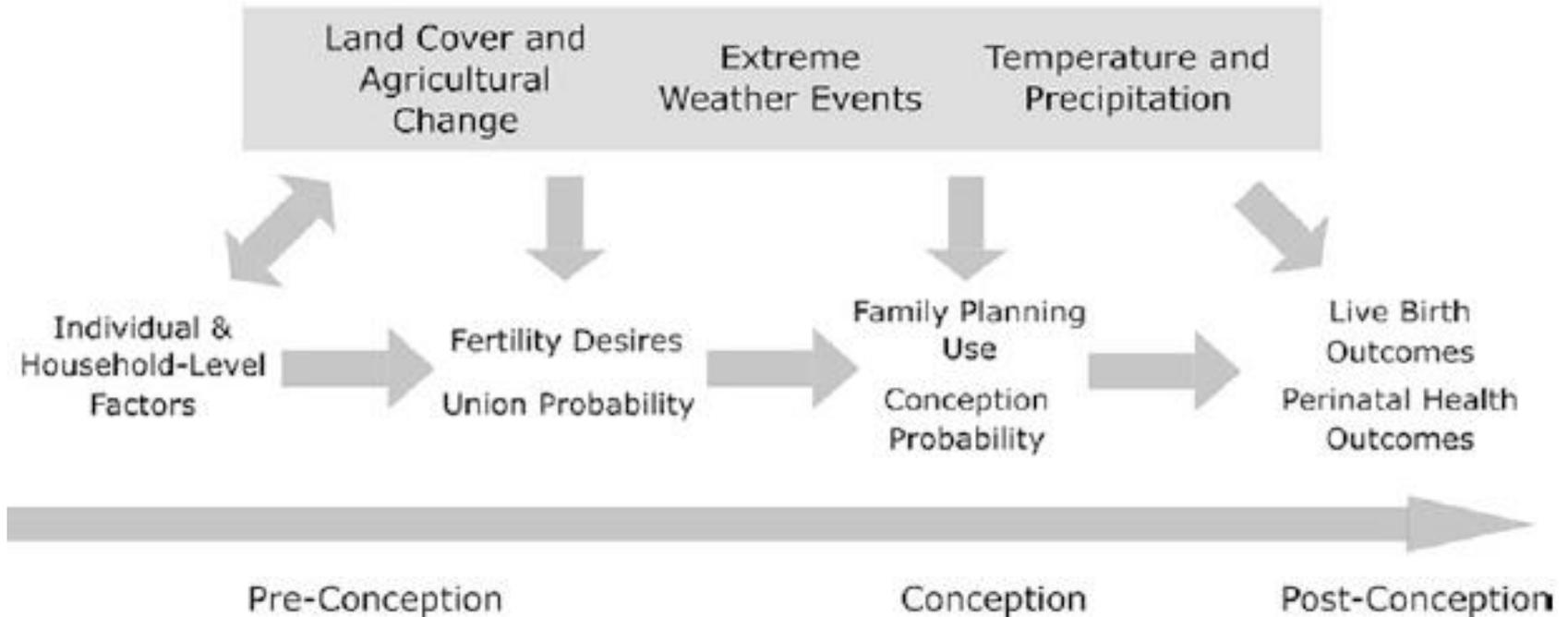
Brantley Liddle and Gregory Casey

Demographic patterns (age structure, household composition, household size and population density) as important drivers energy use and, thus, carbon emissions. Importance of life-cycle and cohort effects (millennials tend to consume less fuel from driving, etc.)

Other arenas

Fertility *Sam Sellers*

Environmental Variability



Other arenas (continued)

- **Gender** *Jessica Marter-Kenyon, Sam Sellers, and Maia Call*

Gender as an intervening factor in four key areas of inquiry: perception of environmental change and risk; human impacts on the environment; adaptation to environmental change; and well-being outcomes following environmental stress.

- **Socio-demographic Inequalities** *James R. Elliott and Kevin T. Smiley*

Unequal socio-demographic **access and exposure** to different types of transformed nature.

The review traced increasing scale, scope, and harm of new environmental threats produced by the march of **affluent societies**. With each new advance, we see how socially **marginalized groups** disproportionately bear the brunt of those threats.

Conclusive remarks

- **Barbara Entwisle** discusses promising directions for future research. Among them: develop a **more holistic** account of population-environment interrelations, build **bridges** between the literature on climate change and the literature on pollution and other hazards, incorporate **social, economic, and cultural domains** into a multidimensional conceptualization of the natural and social environment; utilize a **comparative perspective** to better understand how and why population-environment interrelations vary from place to place.

- **Robert McLeman**
Conclusion on the evolution of environmental migration research
According to McLeman particular attention should be given to linkages between climate adaptation and labour migration flows, and identification of **thresholds** at which adaptation switches from in situ options to migration.