ENV-613

Human population dynamics: social & environmental

Benettin Paolo, Invited lecturers (see below), Meibom Anders

Cursus	Sem.	Type
Architecture and Sciences of the City		Opt.
Civil & Environmental Engineering		Opt.

Language of teaching	English
Credits	1
Session	
Exam	Project report
Workload	30h
Hours	**22**
Lecture	12
Exercises	2
Project	8
Number of positions	

Frequency

Only this year

Remark

A one-time only course by invited lecture Stephen Warren (University of Washington, Seattle, USA). March 28th - April 8th

Summary

Continuing growth of the human population (80 million/year for each of the past 50 years) is often cited as responsible for many environmental and social problems. We will examine the dynamics of population growth and decline, their causes and consequences, and relations to policies and cultures.

Content

Schedule. During the two weeks March 28 â## April 8, there will be six class meetings for lecture, discussion, and group exercises, MWF 12:00-14:00.

Lecture 1. Plenary overview of population and environment. Links of population to both causes and effects of environmental problems; the example of global warming. Growth of human populations, globally and in some key countries; shrinking populations in east Asia. Why is world population growing, and why is the answer not obvious?

Lecture 2. Population dynamics and links to environment. Mathematics of population dynamics: measures of fertility, exponential growth and decay, population momentum, replacement-level fertility, the â##renegade effectâ##. Links to environmental problems: global warming, pollution, deforestation, biodiversity. â##Planetary boundariesâ##. Population in IPCC scenarios. I=PAT: where this equation is useful and where it is not.

Lecture 3. Forecasts and feedbacks. Methods of forecasting future populations, and the acrimonious debates among them (UN Population Division, US Census Bureau, IIASA, IHME). Earth-system modeling involving feedbacks: Meadowsâ## Limits to Growth, Kalnayâ##s HANDY model, Ehrlichsâ## Ghastly Future, Gottâ##s Copernican Principle.

Lecture 4. Agriculture and human biology. Natural human fertility, frontier-effect. Causes of fertility decline. Were advances in agriculture responsible for population growth? Net primary productivity (NPP), appropriation of land for agriculture. Past and future increases of agricultural yield. Future decreases of yield: heat stress, water shortages, pollution, soil degradation. Limits to population from crop failures or disruption of trade.

Lecture 5. Politics of population. History of thinking on population (Malthus and Darwin in 1800s; eugenicists in 1920s-1930s). UN conferences and feminism. Foreign aid for birth control. Migration. Can reduced fertility promote development? â##Why the silence?â##

Lecture 6. The astronomical connection.Â Does the failure of SETI indicate that technological civilizations inevitably have short lifetimes? The audacious â##Silurian Hypothesisâ## for prior mass extinctions. Also, oral reports from

students on their reviews.

Assessment. One credit will be awarded to each student who participates in the discussions and writes a report. The report will be a critical review of a published paper or a series of papers. A brief oral presentation of the report will be given during the final class meeting on April 8.

Keywords

population, environment

Learning Outcomes

By the end of the course, the student must be able to:

- to assess environmental and social causes and effects of population change, and the history and likely futures of population in key countries, and to criticize population projections.

Resources

Bibliography

http://onlinelibrary.wiley.com/doi/10.1002/2014EF000275/pdf
https://atmos.uw.edu/~sgw/Population/2018_Debates.pdf