

Stanford biologists call for humanity to 'scale itself back'

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Biology Professors Gretchen Daily and Paul Ehrlich. Credit: L.A. Cicero

(Phys.org) -- "In biophysical terms, humanity has never been moving faster nor further from sustainability than it is now."

It's a dire message, but that's the point. The quote comes from a paper by Stanford biology Professors Paul Ehrlich and Gretchen Daily, with the Nature Conservancy's Peter Kareiva, published in *Nature*'s new Rio+20 issue.

The successor to the United Nations' 1992 Conference on Environment and Development in <u>Rio de Janeiro</u>, Rio+20 begins on June 20. With it comes a major opportunity for the world's nations to take stock of where we are in our collective headlong rush toward global bust.



And what does the science say?

The cultural changes necessary to reduce <u>birth rates</u> have begun to take hold, but the world's population is still projected to reach 9.5 billion by 2050. Very little progress has been made in reducing <u>consumption</u>, and the developed world's <u>lifestyle</u> in particular will need to be drastically scaled back. Loss of biodiversity threatens to worsen the situation for <u>ecosystems</u> and <u>human societies</u> alike. And translating these findings into policy may be the greatest challenge researchers face.

"Just telling the people what the science says hasn't brought about the changes we need," Ehrlich said.

Population pressure

Humans are already above the planet's carrying capacity – the population size Earth can sustainably support. The scene in 40 years is, predictably, even grimmer.

"Even with people going hungry and living in ways that Americans aren't used to, we'd need another half an Earth to maintain just today's population indefinitely," according to Ehrlich.

There are, however, encouraging increases in gender equity, particularly in access of girls and women to education, jobs, credit, health care and family planning. Through these social changes, average fertility rates in developing countries have fallen from six to three births per woman over the past 40 years.

"Intimate personal decisions and cultural traditions have changed at the speed of light," said Daily.



Addressing the existing unmet demand for contraception among women in the developing world remains a promising way to reduce fertility rates. Estimates suggest that simply making contraception available could prevent over 20 million births annually, while also reducing maternal mortality and the need for unsafe abortions.

Educating women in the developing world could bring about an even greater change. The authors point to a paper in Science that predicted a global education effort would reduce the Earth's 2050 population by 1 billion.

Such a campaign would also further improve gender equity – an issue with a special relationship to <u>sustainability</u>. Growing evidence suggests women in the developing world are disproportionately affected by environmental degradation (e.g., of water and fuel supplies, and of land productivity), and that women worldwide are more invested in environmental causes. Controlling for other factors, the political status of women in a country is directly correlated to its success in reducing dangerous emissions.

The consumption bomb

The question of consumption has proven a much more intractable, and more urgent, issue.

"If we don't get off the fossil fuel standard," said Ehrlich, "it hardly matters how many people there are."

Although the developing world contains approximately 80 percent of the world's population, the developed world's environmental impact is much larger. Based on energy consumption, the average impact of an inhabitant of a developed country is 2 to 14 times that of a person in the developing world.



This global inequity is itself cause for concern, the authors say. Unequal wealth distribution may create "flashpoints for ecological and human disaster" – developing nations that will have the fewest resources to deal with climate stress and other environmental pressures.

Global life support

Although biodiversity is often thought of as merely an indicator of ecosystem health, it's also a critical component of an ecosystem's ability to support human well-being. In a second paper in this issue of *Nature* – a consensus statement by a large number of prominent environmental scientists – Daily points out that biodiversity loss may be as important a driver of ecological change as global warming.

Economic prosperity is dependent on what Daily calls "natural capital." Earth's lands, water and biodiversity provide a host of life-support benefits: "Food and energy, water and climate security, jobs, recreation and inspiration."

Some governments now acknowledge the economic value of these ecosystem services. China is implementing a new system of reserves, to span 25 percent of its land area, in which the government will invest in conservation efforts such as reforestation. In return, the reserves will improve flood and sandstorm control, hydropower production efficiency, water quality for irrigation and drinking supply, and climate stability.

In Latin America, water funds have become a popular way to invest in natural capital. Downstream water users – hydropower and bottling companies, agribusinesses and urban residents – pay upstream communities to secure water supplies.

"This involves shifting farming practices, restoring forests and forgoing



some types of development in order to improve water quality, dry-season flow and security from flooding," said Daily.

The Natural Capital Project, an international partnership with a research engine at Stanford, is supporting these policies. With a software system called InVEST, users in China and Latin America can identify which conservation actions in which places will yield the highest return-oninvestment for society.

More "boundary institutions," which translate environmental science into policy, are also beginning to form. April saw the founding of the Intergovernmental Platform on Biodiversity and Ecosystem Services – an agency that applies ecological findings on an international level. But the researchers say the field's profile is still too low for comfort.

"We need to scale back destructive human impacts – but in terms of good ideas and models of success, we need to scale up," said Daily.

"And it's not incremental over the next 40 years," added Ehrlich. "It's right now that we need to move."

More information: <u>www.nature.com/nature/journal/ ...</u> <u>ull/nature11148.html</u>

Provided by Stanford University

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