People and the planet

Summary and recommendations
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People and the planet
Executive summary
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Cover image: *Earth's city lights* shows how human-made lights highlight particularly developed or populated areas of the Earth's surface. The brightest areas of the Earth are the most urbanized, but not necessarily the most populated. (Compare western Europe with China and India.) Cities tend to grow along coastlines and transportation networks. Even without an underlying map, the outlines of many continents are still visible. The United States interstate highway system appears as a lattice connecting the brighter dots of city centers. In Russia, the Trans-Siberian railroad is a thin line stretching from Moscow through the center of Asia to Vladivostok. The Nile River, from the Aswan Dam to the Mediterranean Sea, is another bright thread through an otherwise dark region.Data courtesy Marc Imhoff of NASA GSFC and Christopher Elvidge of NOAA NGDC. Image by Craig Mayhew and Robert Simmon, NASA GSFC. Original version available at visibleearth.nasa.gov

President's Foreword
Sir Paul Nurse FRS

Rapid and widespread changes in the world's human population, coupled with unprecedented levels of consumption present profound challenges to human health and wellbeing, and the natural environment.

The combination of these factors is likely to have far reaching and long-lasting consequences for our finite planet and will impact on future generations as well as our own. These impacts raise serious concerns and challenge us to consider the relationship between people and the planet. It is not surprising then, that debates about population have tended to inspire controversy.

This report is offered, not as a definitive statement on these complex topics, but as an overview of the impacts of human population and consumption on the planet. It raises questions about how best to seize the opportunities that changes in population could bring – and how to avoid the most harmful impacts.

We hope this report, the Royal Society's first substantive offering on this topic, will be a springboard for further discussion and action by national and international Governments, scientific bodies, non-governmental organisations, the media and many others.

I would like to thank Sir John Sulston FRS, the Working Group and the Society's staff for making sense of such a complex set of topics. I would also like to thank the many people who contributed throughout the project, including Council's Review Panel, who have all helped to bring clarity to these enduringly important issues.

Paul Nurse

Paul Nurse
President of the Royal Society

Summary

The 21st century is a critical period for people and the planet. The global population reached 7 billion during 2011 and the United Nations projections indicate that it will reach between 8 and 11 billion by 2050. Human impact on the Earth raises serious concerns, and in the richest parts of the world per capita material consumption is far above the level that can be sustained for everyone in a population of 7 billion or more. This is in stark contrast to the world's 1.3 billion poorest people, who need to consume more in order to be raised out of extreme poverty.

The highest fertility rates are now seen primarily in the least developed countries while the lowest fertility rates are seen in the more developed countries, and increasingly in Asia and Latin America. Despite a decline in fertility almost everywhere, global population is still growing at about 80 million per year, because of the demographic momentum inherent in a large cohort of young people. The global rate of population growth is already declining, but the poorest countries are neither experiencing, nor benefiting from, this decline.

Population and consumption are both important: the combination of increasing global population and increasing overall material consumption has implications for a finite planet. As both continue to rise, signs of unwanted impacts and feedback (eg climate change reducing crop yields in some areas) and of irreversible changes (eg the increased rate of species extinction) are growing alarmingly. The relationship between population, consumption and the environment is not straightforward, as the natural environment and human socioeconomic systems are complex in their own right. The Earth's capacity to meet human needs is finite, but how the limits are approached depends on lifestyle choices and associated consumption; these depend on what is used, and how, and what is regarded as essential for human wellbeing.

Demographic change is driven by economic development, social and cultural factors as well as environmental change. A transition from high to low birth and death rates has occurred in various cultures, in widely different socio-economic settings, and at different rates. Countries such as Iran and South Korea have moved through the phases of this transition much more rapidly than Europe or North America. This has brought with it challenges different from those that were experienced by the more developed countries as they reached the late stages of the transition.

Population is not only about the growing numbers of people: changes in age structure, migration, urbanisation and population decline present both opportunities and challenges to human health, wellbeing and the environment. Migrants often provide benefits to their countries of origin, through remittances, and to their host countries by helping to offset a workforce gap in ageing populations. Current and future migration will be affected by environmental change, although lack of resources may mean that the most vulnerable to these changes are the least able to migrate. Policy makers should prepare for international migration and its consequences, for integration of migrants and for protection of their human rights.

Developing countries will be building the equivalent of a city of a million people every five days from now to 2050. The continuing and rapid growth of the urban population is having a marked bearing on lifestyle and behaviour: how and what they consume, how many children they have, the type of employment they undertake. Urban planning is essential to avoid the spread of slums, which are highly deleterious to the welfare of individuals and societies.

The demographic changes and consumption patterns described above lead to three pressing challenges.

First, the world's 1.3 billion poorest people need to be raised out of extreme poverty. This is critical to reducing global inequality, and to ensuring the wellbeing of all people. It will require increased per capita consumption for this group, allowing improved nutrition and healthcare, and reduction in family size in countries with high fertility rates.

Second, in the most developed and the emerging economies unsustainable consumption must be urgently reduced. This will entail scaling back or radical transformation of damaging material consumption and emissions and the adoption of sustainable technologies, and is critical to ensuring a sustainable future for all. At present, consumption is closely linked to economic models based on growth. Improving the wellbeing of individuals so that humanity flourishes rather than survives requires moving from current economic measures to fully valuing natural capital. Decoupling economic activity from material and environmental throughputs is needed urgently for example by reusing equipment and recycling materials, reducing waste, obtaining energy from renewable sources, and by consumers paying for the wider costs of their consumption. Changes to the current socio-economic model and institutions are needed to allow both people and the planet to flourish by collaboration as well as competition during this and subsequent centuries. This requires farsighted political leadership concentrating on long term goals.

Third, global population growth needs to be slowed and stabilised, but this should by no means be coercive. A large unmet need for contraception remains in both developing and developed countries. Voluntary family planning is a key part of continuing the downward trajectory in fertility rates, which brings benefits to the individual wellbeing of men and women around the world. In the long term a stabilised population is an essential prerequisite for individuals to flourish. Education will play an important role: well educated people tend to live longer healthier lives, are more able to choose the number of children they have and are more resilient to, and capable of, change. Education goals have been repeatedly agreed by the international community, but implementation is poor.

Science and technology have a crucial role to play in meeting these three challenges by improving the understanding of causes and effects (such as stratospheric ozone depletion), and in developing ways to limit the most damaging trends (such as enhancing agricultural production with reduced environmental impact). However, attention must be paid to the socio-economic dimensions of technological deployment, as barriers will not be overcome solely by technology but in combination with changes in usage and governance.

Demographic changes and their associated environmental impacts will vary across the globe, meaning that regional and national policy makers will need to adopt their own range of solutions to deal with their specific issues. At an international level, this year's Rio+20 Conference on Sustainable Development, the discussions at the UN General Assembly revisiting the International Conference on Population and Development (ICPD+20) scheduled for 2014/2015 and the review of the Millennium Development Goals in 2015 present opportunities to reframe the relationship between people and the planet. Successfully reframing this relationship will open up a prosperous and flourishing future, for present and future generations.

Recommendations

Recommendation 1

The international community must bring the 1.3 billion people living on less than $1.25 per day out of absolute poverty, and reduce the inequality that persists in the world today. This will require focused efforts in key policy areas including economic development, education, family planning and health.

Recommendation 2

The most developed and the emerging economies must stabilise and then reduce material consumption levels through: dramatic improvements in resource use efficiency, including: reducing waste; investment in sustainable resources, technologies and infrastructures; and systematically decoupling economic activity from environmental impact.

Recommendation 3

Reproductive health and voluntary family planning programmes urgently require political leadership and financial commitment, both nationally and internationally. This is needed to continue the downward trajectory of fertility rates, especially in countries where the unmet need for contraception is high.

Recommendation 4

Population and the environment should not be considered as two separate issues. Demographic changes, and the influences on them, should be factored into economic and environmental debate and planning at international meetings, such as the Rio+20 Conference on Sustainable Development and subsequent meetings.

Recommendation 5

Governments should realise the potential of urbanisation to reduce material consumption and environmental impact through efficiency measures. The well planned provision of water supply, waste disposal, power and other services will avoid slum conditions and increase the welfare of inhabitants.

Recommendation 6

In order to meet previously agreed goals for universal education, policy makers in countries with low school attendance need to work with international funders and organisations, such as UNESCO, UNFPA, UNICEF, IMF, World Bank and Education for All. **Financial and non-financial barriers must be overcome to achieve high-quality primary and secondary education for all the world's young, ensuring equal opportunities for girls and boys.**

Recommendation 7

Natural and social scientists need to increase their **research efforts on the interactions between consumption, demographic change and environmental impact.** They have a unique and vital role in developing a fuller picture of the problems, the uncertainties found in all such analyses, the efficacy of potential solutions, and providing an open, trusted source of information for policy makers and the public.

Recommendation 8

National Governments should accelerate the development of comprehensive wealth measures. This should include reforms to the system of national accounts, and improvement in natural asset accounting.

Recommendation 9

Collaboration between National Governments is needed to **develop socio-economic systems and institutions that are not dependent on continued material consumption growth.** This will inform the development and implementation of policies that allow both people and the planet to flourish.

The Royal Society

The Royal Society is a self-governing Fellowship of many of the world's most distinguished scientists drawn from all areas of science, engineering, and medicine. The Society's fundamental purpose, as it has been since its foundation in 1660, is to recognise, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity.

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- Fostering international and global cooperation
- Education and public engagement

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