

Space for nature

How much of the planet should we leave for other forms of life? This is a question humanity must now grapple with. The global human population is 7.6 billion and anticipated to increase to around 10 billion by the middle of the century. Consumption is also projected to increase, with demands for food and water more than doubling by 2050. Simply put, there is finite space and energy on the planet, and we must decide how much of it we're willing to share. This question requires deep consideration as it will determine the fate of millions of species and the health and well-being of future generations.

About 20% of the world's vertebrates and plants are threatened with extinction, mostly because humans have degraded or converted more than half of the terrestrial natural habitat. Moreover, we are harnessing biomass from other forms of life and converting it into crops and animals that are more useful to us. Livestock now constitute 60% of the mammalian biomass and humans another 36%. Only 4% remains for the more than 5000 species of wild mammals. This ratio is not surprising: Wild vertebrate populations have declined by more than 50% since 1970. Both from an ethical and a utilitarian viewpoint, this depletion of natural ecosystems is extremely troubling.

Most scientific estimates of the amount of space needed to safeguard biodiversity and preserve ecosystem benefits suggest that 25 to 75% of regions or major ecosystems must be protected. But estimating how much space is required to protect current levels of biodiversity and secure existing ecosystem benefits is challenging because of limited knowledge of the number of species on this planet, poor understanding of how ecosystems function or the benefits they provide, and growing threats such as climate change. Thus, spatial targets will be associated with great uncertainty. However, targets set too low could have major negative implications for future generations and all life. Any estimate must therefore err on the side of caution.

Current levels of protection do not even come close to the required levels. Just less than half of Earth's surface remains relatively intact, but this land tends to be much less productive. Only 3.6% of the oceans and 14.7% of land are formally protected. Many of these protected areas are "paper parks," meaning they are not effectively managed, and one-third of the terrestrial protected lands are under intense human pressure.

At the 2010 Nagoya Conference of the Convention on Biological Diversity, the world's governments convened to agree on an ambitious "strategic plan for biodiversity" and adopted 20 Biodiversity Targets, widely referred to as the Aichi Targets. The 11th Target states that by 2020, at least 17% of the terrestrial and inland water, and 10% of coastal and marine areas, should be conserved. Target 12 advocates for preventing extinction of known species, and Target 14 advocates for the safeguarding of ecosystems that provide essential services. These goals beg the question: Would achieving Target 11 be sufficient to allow the achievement of Target 12 or 14? Current scientific evidence suggests that it would be woefully inadequate for the task.

If we truly want to protect biodiversity and secure critical ecosystem benefits, the world's governments must set a much more ambitious protected area agenda and ensure it is resourced. In 2020, the world's governments will meet at the Convention on Biological Diversity in Beijing, China, to set biodiversity targets for the future. Given the evidence to date and the implications of an underestimate, we encourage governments to set minimum targets of 30% of the oceans and land protected by 2030, with a focus on areas of high biodiversity and/or productivity, and to aim to secure 50% by 2050. This will be extremely challenging, but it is possible, and anything less will likely result in a major extinction crisis and jeopardize the health and well-being of future generations.

—Jonathan Baillie and Ya-Ping Zhang



Spix's macaw, native to Brazil, is critically endangered.

“Current levels of protection do not even come close to the required levels.”



Jonathan Baillie
is executive vice president and chief scientist at the National Geographic Society, Washington, DC, USA. jbaillie@ngs.org



Ya-Ping Zhang
is a biologist at the Kunming Institute of Zoology, Chinese Academy of Sciences, Beijing, China. zhangyp@mail.kiz.ac.cn



TOMORROW'S EARTH
Read more articles online at scim.ag/TomorrowsEarth

Science

Space for nature

Jonathan Baillie and Ya-Ping Zhang

Science **361** (6407), 1051.
DOI: 10.1126/science.aau1397

ARTICLE TOOLS	http://science.sciencemag.org/content/361/6407/1051
RELATED CONTENT	http://science.sciencemag.org/content/sci/361/6407/1066.full http://science.sciencemag.org/content/sci/361/6407/1079.full file:/content
PERMISSIONS	http://www.sciencemag.org/help/reprints-and-permissions

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.