



## Perspectives in ecology and conservation

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### Policy Forums

## Science and democracy must orientate Brazil's path to sustainability

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### ABSTRACT

In the search for solutions to social and environmental challenges, all world nations have contributions to give. Brazil is no exception. On the contrary, as a megadiverse country and emerging economic power, it has a central role in this process. Between 1995 and 2014 the country made important improvements in terms of human development, including higher education and environmental protection. However, the current economic and political crisis threatens such advances. By reducing science funding and sidelining scientific advice in strategic environmental decisions, Brazil has veered off its path to sustainability, and several positive trends have already been reversed. If Brazil is to contribute to solving the challenges of improving human well-being and conserving biodiversity, it must renew its commitment to science, education and democracy.

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Finding pathways to sustainability is a global work in progress, and each nation should contribute. In developing these contributions, critical components will be the application of scientific knowledge to improve human well-being and protect biodiversity, and increased participation of a well-educated and well-informed public. In the past two decades, Brazil has pursued such a path, but a more recent U-turn toward an anti-science political agenda threatens the future of the world's most biodiversity-rich country. What is happening in Brazil mirrors recent shifts in the political agenda of other countries, including the superpowers United States and United Kingdom and our developing neighbors Colombia and Argentina, with perverse consequences for people and nature. Here, we explore how science, environmental protection, and human rights have been deeply undermined in Brazil, when they should instead have been fostered to overcome crises and resume the pathway to human well-being and biodiversity conservation. We highlight the importance of a scientifically literate and engaged society to foster in-country political decisions for greater invest-

ment in biodiversity research programs and to support effective environmental policymaking.

Between 1995 and 2014 was the longest period of Brazilian democracy – defined here humbly, as when the president and representatives are elected by vote and complete their mandate. During that period, the country fought some of its historical problems of poverty, environmental destruction, and science and education shortfalls (Fig. 1; data and sources are available as online Supporting Information). Economic development occurred, considering increase in GDP growth, positive results in central government fiscal balance and minimum wage tripling (Fig. 1A–C). Environmental issues started being addressed as represented by creation of protected areas, the decline of deforestation rates in the Amazon and Atlantic Forest (Fig. 1G–I). Science funding increased (Fig. 1E) and more students entered higher education, with a five-fold increase in the annual number of graduate degrees (from  $10.5 \times 10^3$  to  $50.2 \times 10^3$  and  $2.9 \times 10^3$  to  $16.7 \times 10^3$  of masters and PhDs, respectively; CGEE, 2016).

However, 2014 represented a turning point in Brazilian route (Table S1). The first deficit in public accounts was observed in the last 20 years (Fig. 1B), driven by a decrease in revenue. This decrease is mostly attributed to reductions in economic activity, lower prices

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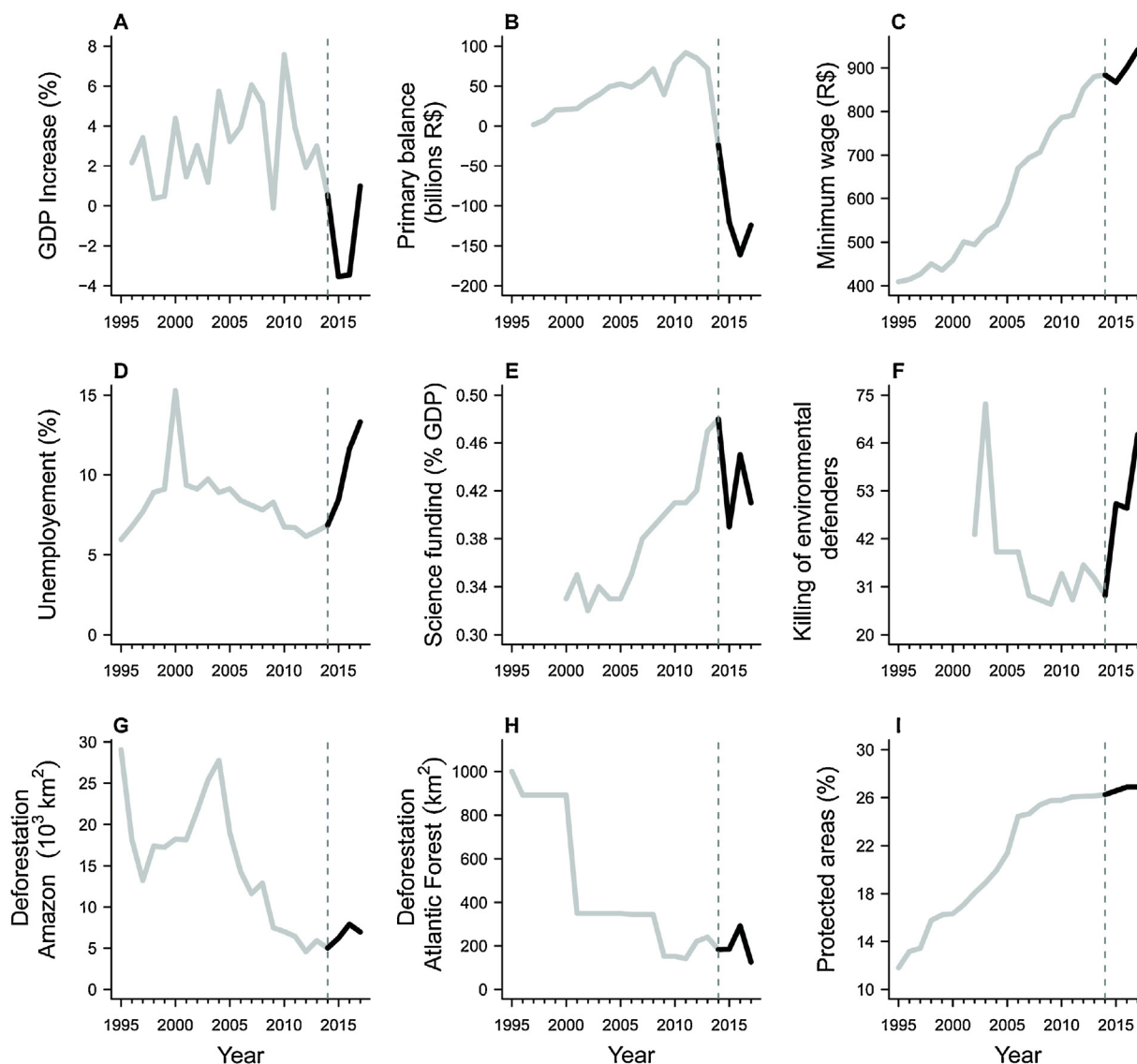
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of Brazil's commodities and exports, resulting in the first deficit since 2000, rises in public expenditures to rescue the energy sector after water collapse (Dobrovolski and Rattis, 2015), and tax cuts in response to the 2008 world economic crisis (IFI, 2017). This economic scenario added to accusations of using public bank loans to mask the real economic situation and corruption scandals involving the giant semi-public (e.g. Petrobras) and private (e.g. J.B.S. S.A.) companies, set the opportunity for Congress to impeach the president, Dilma Rousseff in August 2016. She was succeeded by her vice-president, Michel Temer (Watts, 2016). Brazil went through its worst economic crisis since 1931, including GDP contraction in 12 successive quarters (Fig. 1A) and a tripling in the unemployment index affecting 13 million people (Fig. 1D). According to World Bank estimates, 2.5–3.6 million Brazilians were expected to fall back below the poverty line between 2016 and 2017, after 28.6 million had moved above it between 2004 and 2014 (Pregaman et al., 2017).

In 2017, Mr. Temer was involved in two scandals – accused of corruption, obstruction of justice and criminal organization leadership – that required the Congress to approve continuation of

legal processes against him. Despite his 3% approval rate (the lowest of any president since 1985), Mr. Temer retained his post by persuading the congressmen with R\$ 6.4 billion in parliamentary amendments and R\$ 2.4 billion in tribute discharge. In addition, the “ruralist” lobby, representing the agricultural and extractive industries, convinced the government to abolish a protected area in Amazon and to issue a decree weakening the legal definition of slavery (Londoño, 2017). Both acts were revoked only after widespread protests.

The way these opprobrious decrees were exchanged for votes has much to say about how science, the environment and human rights have been managed in Brazil: instead of being considered as a patrimony to be protected and fostered for overcoming crisis and building a future of sustainable development, they are considered as expenses that should be cut. The new government fused the Ministry of Science, Technology and Innovation with the Ministry of Communications, minimizing the political importance of the former and reducing its overall budget. Since the onset of the crisis, the science budget suffered several cuts, being particularly affected (Fig. 1E). These recent cuts represent the newest signs of



**Fig. 1.** Socioeconomic and environmental indicators of Brazil's performance. The years before and after the 2014 are shown as gray and black lines, respectively. (A) Annual increase in gross domestic product (GDP). (B) Annual Brazilian Central Government Primary Balance. (C) Minimum wage value, corrected for inflation. (D) Unemployment rate. (E) Investment in science and technology, in relation to GDP. (F) Annual number of land and environmental defenders killed. (G) Annual deforestation of Amazon, in square kilometers. (H) Idem G, for Atlantic Forest. (I) Percentage of Brazilian territory under legal protection.

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