

One and a half degrees. So what?

Um grau e meio. E daí?

Un grado y medio. ¿Y qué?

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The United Nations 21st Conference of the Parties on Climate Change (COP21), recently concluded in Paris (France), reached what many observers see as a historic agreement, signed by 195 countries after a lengthy series of prior conferences and parallel events. Added to this mobilization has been an intense debate in the scientific, news, and geopolitical arenas, with the exacerbation of conflicts of interest and views on the climate change issue.

The agreement consists of 29 articles, which can be summarized in 4 goals ¹:

- Hold the increase in the global average temperature to “well below” 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C;
- Achieve a balance between sources and sinks of greenhouse gases during the second half of this century;
- Review the terms of the agreement every five years;
- Mobilize jointly 100 billion dollars a year to address the needs of developing countries in the fight against climate change.

To hold the Earth's average temperature increase to 1.5°C requires a huge effort in curbing emissions, considering that at the current pace (“business as usual”) the average temperature could increase by 4°C to 7°C by the end of this century ². Some analysts believe that the 1.5°C target will mean the end of the so-called “petroleum civilization”, requiring a profound revision

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of current production and consumption models in order to achieve it.

The Earth's average temperature has increased about 1°C since the Industrial Revolution, already leading to manifest changes in the planet's climate such as melting of glaciers and part of the polar caps, rising sea levels, desertification, and increasing frequency and intensity of extreme climate events such as droughts and floods ². Several unwanted public health effects have included the expansion of transmission areas for vector-borne diseases, the collapse of urban water supply systems, the synergistic action of air pollution in periods of low relative humidity and burnings, as in the Brazilian Amazonia, or high emissions of pollutants by freight and passenger vehicles, especially in urban areas of large metropolises, in addition to the direct effects of climate extremes like heatwaves, floods, and hurricanes ³.

The strategy of setting temperature as a goal allows the negotiated targets to be monitored by simple measurements and accompanied by all citizens, as long as the latter have access to accurate and timely data. Yet the goal also poses risks for the agreement's interpretation and operationalization. Setting goals based on outcomes rather than on the processes that generate global warming may entail problems in their execution by not dealing objectively with limits on greenhouse gas emissions or fomenting mechanisms for carbon sequestration, i.e., policies for climate change mitigation. The agenda for the coming

years may not be legally binding, without planning to reducing emissions or metrics to control them. The idea is to allow each country and economic sector to decide how much effort it wants to see invested in reducing emissions, which can prove a daunting strategy, since the agreement's terms are expected to encounter resistance in some countries, for example approval by the United States Congress.

Interestingly, some of the major clashes before COP21 finally reached a deal hinged on verbs (decide, urge, request, encourage, recommend, invite) and their auxiliaries (would, should, shall) ⁴. In addition to the agreement's content, the force of expressions demonstrates the various options and constraints for governability of the commitments reached at the conference. Which institutions with international representativeness and legitimacy can assess the trends in order to allow periodically "revising the terms of the agreement"? How can the global goals be monitored, with which technical instruments and coercive mechanisms?

By setting average temperature as a goal, the parties to the agreement stated that this variable is central to global warming, summarizing its ("forcing") causes and possible consequences, besides assuming the existence of a univocal relationship between greenhouse gas levels and the response as accumulation of heat. This issue is still surrounded by uncertainties, according to an interview with Stephen Harrison of the University of Exeter (Exeter, United Kingdom) in *The Guardian* ⁵. On the one hand, uncertainties persist as to the Earth's climate system and the balance between radiation flows and the biogeochemical response to the increase in the atmospheric concentration of pollutants and greenhouse gases. In this case, the uncertainty lies in changes in natural variability and energy adjustment mechanisms like El Niño, as well as the system's external variability, caused by variations in solar radiation, the planet's orbit, and the Earth's axial tilt, among others. Meanwhile, technical and scientific uncertainty stems from the incapacity of mathematical models to simulate the complex interaction between various subsystems such as oceans, polar caps, and vegetation, and between these and the human subsystem, which encompasses the planet's social and economic development model in the 21st Century and its dependence on energy sources.

The terms of the agreement also assume that by maintaining average temperature within a certain threshold, population health will be better protected, or rather, that health risks will not be aggravated by climate changes. Health problems will obviously continue to exist, challenging

health systems and society's capacity to respond. What the agreement proposes is across-the-board reduction of risks and impacts, without considering social inequalities or, consequently, socio-environmental vulnerabilities. Yet every public health professional knows that health-disease processes do not have single causes. Even if we acknowledge the influence of climate factors on disease distribution, other mediating processes act between temperature and health risks. Climate events and cycles are intrinsically linked to land use patterns and the social appropriation of natural resources. The impacts of climate change differ enormously, depending on the vulnerability of population groups and their adaptive capacity and resilience ⁶. One of the most obvious strategies to protect the population against climate change is a public, universal, egalitarian, and comprehensive health system. To quote a professional from Brazilian Unified National Health System during a workshop of the Observatory on Climate and Health (*Vulnerabilidade e Efeitos das Mudanças Climáticas na Saúde Pública em Manaus*. http://www.climasaude.icict.fiocruz.br/docs/vulnerabilidade_manau_relafinal2_xedit.pdf), "*climate only regulates diseases where the health system is ineffective*".

A two-degree temperature rise may sound tiny in comparison to the variations we face daily: differences between night and day, city and countryside, summer and winter, indoors and outdoors, commuting and workplace. However, an average temperature increase of 1.5°C (according to the most optimistic scenario) will be distributed quite heterogeneously on the Earth's surface, affecting the Northern Hemisphere more intensely, areas with low plant cover, causing prolonged droughts in some regions and heavy rainfall in others. According to the recent IPCC (Intergovernmental Panel on Climate Change) report, Brazil was the world's tropical region with the largest temperature increase from 1901 to 2012 ⁷, with rising temperatures in all the biomes and changes in rainfall patterns. Concerted efforts are needed to build regional models that allow assessing the future distribution of risks and impacts from climate changes on the planet's different latitudes and landscapes.

Such complex interaction between natural and human and (global and local) forces will manifest itself differently in each place and in each socio-spatial group. Adaptation to this new context of the Earth's average temperature (even if controlled) demands adequate responses by institutions and civil society. The health sector needs to monitor the trends permanently, develop predictive models, and produce plans that consider resilience as strategy and solidarity as value.

Contributors

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