



# PREPARATORY MEETINGS

2013 World Science Forum

## Science for Global Sustainable Development: Brazil's Contribution

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EXECUTIVE SUMMARY

# National Executive Committee of the 2013 World Science Forum

ABC – Brazilian Academy of Sciences

ANDIFES – National Association of Directors of Federal Institutions of Higher Education

CGEE – Center for Strategic Studies and Management

CONFAP – National Council of State Foundations for Research Support

CONSECTI – National Council of State Secretariats for Science, Technology and Innovation

CNPq – National Council for Scientific and Technological Development

FINEP – Brazilian Agency for Innovation

MCTI – Ministry of Science, Technology and Innovation

MEC/CAPES – Coordination for the Improvement of Higher Education Personnel

MRE – Ministry of External Relations

SBPC – Brazilian Society for Scientific Development

UNESCO Office in Brazil

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# Science for global sustainable development: Brazil's contribution

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Executive Summary

## Presentation

In 2009, the Ministry of Science, Technology and Innovation (MCTI), the Brazilian Academy of Sciences (ABC), the Brazilian Society for Scientific Development (SBPC) and UNESCO, in collaboration with major Brazilian scientific and technological institutions and Governments of Latin America and the Caribbean, initiated a series of meetings focused on planning a regional Science, Technology and Innovation strategy for the following decades. The main achievement of these meetings was the formalization of a Regional Declaration concerning the issue, which was presented at the World Science Forum's 10th anniversary (2009), in Budapest, Hungary. The focus of the declaration is on the establishment of a regional strategic plan geared toward solving common problems affecting these countries and on the need for incorporating the social inclusion theme into Brazilian ST&I policies.



Because of this initiative, the city of Rio de Janeiro was selected to host the 2013 World Science Forum, whose central theme will be "Science for Global Sustainable Development."

In 2011, National Executive Committee of the 2013 World Science Forum was established with the participation of a group of players that make up the Brazilian ST&I system. Its role involves the participation of the Brazilian Government in the preparation, theme programing and institutional coordination of the forum's sixth edition. The Commission brings together representatives from 12 organizations and institutions (MCTI, ABC, SBPC, MRE, MEC-CAPES, FINEP, CNPq, CGEE, ANDIFES, CONSECTI, CONFAP and UNESCO's Brazil Office).

Due to the importance of the event, these entities approved seven Preparatory Meetings in various Brazilian capitals (São Paulo, Belo Horizonte, Manaus, Salvador, Recife, Porto Alegre and Brasília) prior to the main event. At each of these meetings, the themes discussed relate to 21st-century science's major challenges within national and international contexts. At all seven meetings, four crosscutting themes were highlighted: (1) science education; (2) dissemination of, and access to, knowledge of social interest; (3) ethics in science; and (4) science for sustainable, inclusive development.

This important national-level debate concerning the role of science in global development led to a publication that will be released officially during the 2013 World Science Forum, comprehending a consolidation of the proposals and conclusions of the discussions.

This executive summary presents a synthesis of the major highlights of the debates.

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# Science for global sustainable development: Brazil's contribution

Holding the VI World Science Forum in Rio de Janeiro offers a unique opportunity to analyze science's worldwide situation and, especially, to discuss processes aimed at globally expanding the production and assimilation of scientific knowledge, which is currently concentrated in developed countries. Consequently, such concentration contributes to increasing the technological and socio-economic gap between developing and developed countries, to the detriment of the progress of science, human welfare and world peace.

A global vision of scientific progress must necessarily consider regional peculiarities. In particular, the science-and-technology field in Brazil and in several countries of Latin America and the Caribbean exhibits similarities, such as meager business innovations; flaws in the educational system, especially in elementary schools, combined with a lack of emphasis on science education for the general public; strong technological dependence on highly developed countries; and an export agenda that is still relatively dominated by products of little technological content. Add to that a framework of social inequality that, up until now, recent major advances have been unable to solve.

Science academies and their regional counterparts have frequently declared that increased regional cooperation is needed; that progress in ST&I requires state policies capable of transcending all governments and all politico-economic structures, policies expressly incorporated into development strategies; and that social inclusion is an ethical and strategic obligation of science, technology and innovation.

Between 2012 and 2013 in Brazil, the VI World Science Forum promoted seven regional meetings (in the cities of São Paulo, Belo Horizonte, Manaus, Salvador, Recife, Porto Alegre and Brasília) coordinated by the Brazilian Science Academy (ABC) and the Brazilian Society for Scientific Progress (SBPC) and encouraged federal and state government participation. Aiming at nationwide and regional campaigns and deliberations concerning the issues to be discussed at the 2013 World Science Forum, these meetings brought together ST&I researchers, students and administrators. This document summarizes the main findings of global reach of seven preparatory meetings, with the goal of contributing to the enrichment of the discussions at the 6th Edition of the WSF 2013.

## The 21<sup>st</sup> Century poses great challenges for science

In line with humanity's current stage of development, the main challenges of science in the 21st Century include population growth and urbanization; regional and global environmental changes; food, water, energy and cyber security; the preservation of biodiversity and ecosystems; the emergence of new diseases and recurrence of obsolete ones; the management of natural disasters; and the need to reduce social inequalities and eliminate poverty and hunger through both improvements in the



planetary living conditions of population and fulfillment of the Millennium Goals of the United Nations Organization. Addressing these challenges within the context of accelerated environmental change requires breaking away from disciplinary limitations and establishing science-and-technology policies that stimulate international collaboration and promote the defragmentation and sharing of knowledge.

In this sense, it is imperative to adopt concrete measures in at least three dimensions:

### Recommendations

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- (i) *By way of international organizations and bi-national and multinational agreements, encourage the creation of multidisciplinary international networks for scientific collaboration to address challenges common to many of the planet's regions.*
- (ii) *In addition to encouraging scientific activity focused on these major challenges, promote innovations in the economy and in public administration, geared toward social inclusion, and advocate a peace culture aimed at reducing violence.*
- (iii) *Although it does not produce immediately obvious applications, frontier research, the fruit of human curiosity, should be strengthened and expanded globally: science history demonstrates that this type of research leads to scientific and technological revolutions.*

## Investments in science, technology and innovation are a priority in times of economic crisis

In recent decades, countries that have achieved better results via their scientific and technological policies did not subordinate them to economic cycles and market surges. Instead, they opted for ensuring ST&I investments in response to the crises themselves. These countries guarantee an infrastructure and environment appropriate to innovation, which is increasingly driven by startup companies.

### Recommendations

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- (iv) *Essential to the sustainable development of nations, ST&I investments should be encouraged as the best response to economic crises..*



## The educational system is essential for scientific and technological development and social inclusion

The educational system is the foundation of the entire scientific and technological development process and a powerful factor contributing to social inclusion, together with other essential factors, such as sanitation, health, housing conditions, employment and income, mobility, and access to culture and leisure. In many countries, it is necessary to expand the coverage of education and improve its processes and results.

### Recommendations

- (v) *Upgrading elementary-school education requires recognizing the importance of teachers and offering them incentives for self-improvement, combined with an appropriate infrastructure, especially in the public sector.*
- (vi) *Science education should be upgraded at all levels. In order to do this, it is important to share successful experiences nationally and internationally.*
- (vii) *The modernization of university education through the expansion of ST&I activities requires improvements in the planning of budgetary and staff resource allocations and revisions in the management procedures of the various institutions involved.*
- (viii) *The diversification of institutions of higher education should be encouraged along with the modernization of university programs – which are often supported by obsolete departmental structures that hamper inter- and trans-disciplinary methods – and various courses of instruction.*

## Science education contributes to democracy and the political agenda of the nations

The production of knowledge is as important as its transmission through both formal education and the popularization of science is. The more widespread the knowledge is, the greater the possibility of its democratic use and the greater the chance of themes of social interest actually being included in scientific and political agendas of the nations.

If science, technology and innovation are crucial tools for sustainable development, then it is even more reasonable to assign science education (and the dissemination of research results) the mission of equipping people with tools that enable them to maintain a critical spirit in relation to scientific advances.



## Recommendations

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- (ix) *It is necessary to encourage both science education for the people and the popularization of science by way of increasing exposure on media channels and encouraging scientists to participate in this process.*
- (x) *To this end, new information technologies should be made available globally, with support to initiatives that contribute to "education beyond school."*

## Sustainable natural-resource use is critical to water and food security

At least two billion people on the planet lack basic sanitation services and water supplies, which is particularly serious in the cities and semiarid regions. The rising cost of water for irrigation and other uses threatens increased food production, which involves the use of large amounts of surface and groundwater.

The scientific and academic community's responsibility is quite clear in this particular context. It is not only responsible for gathering knowledge, but also for translating it so that people can influence both decision making and the prioritization of public policies and legislation related to sharing natural resources.

The burden placed on ocean systems by fishing, pollution and global environmental changes threatens the functioning of ecosystems that are essential for the biosphere and human welfare. About 40% of the human population lives in coastal areas. Scientific development and technological progress have been making it possible to unravel the mysteries of the oceans and discover the biological diversity, biotechnological and energy potential, and mineral resources in the seabed. However, the sustainable exploitation of these resources is still an important objective to be pursued by the international scientific community.

Increased food production and improved distribution, which have been constant needs throughout human history, are now critical issues. Science and technology play a key role in food security, for they contribute to increased production efficiency and quality. Successful experiments in several countries have resulted in increasingly efficient soil and water use in food production. Additionally, international collaboration has been important in the development of new technologies appropriate to specific environmental contexts, and it has contributed to eradicating poverty and to reducing inequalities between countries.





## Recommendations

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- (xi) *It is the government and scientific community's responsibility to promote research and development to ensure basic water supplies and sanitation conditions for the world's people.*
- (xii) *Development of technologies that increase the efficiency of water use and consumption should be encouraged, thus expanding sustainable food production in the various regions of the planet.*
- (xiii) *Analysis of the impacts of water use in the production of fossil fuels, bioenergy, food and drinking water supplies should be encouraged.*
- (xiv) *The protection and sustainable use of the ocean's natural resources should be a priority on scientific and political agendas, thus ensuring the health and integrity of these ecosystems.*
- (xv) *Dissemination of knowledge and international collaboration should be encouraged, since they are essential to ensure food security of humankind.*

## Action by governments and science is urgently needed to face climate change

Global climate change represents a challenge that can only be tackled within the framework of an international effort. In particular, climate change is forcing societies throughout the world to explore new forms of development. New approaches to land use in strict compliance with natural-resource conservation are crucial to initiatives to mitigate and adapt to climate change.

Less developed countries are systematically more vulnerable to climate-change impacts on their people's lives. For example, large populations, especially in Latin American, Caribbean and African nations, are periodically subjected to drought, which tends to get worse with global warming. It is necessary to establish and develop national policies related to living with droughts and increasing the resilience of human and natural systems.

Science should contribute to reducing social and environmental vulnerabilities by identifying and exploiting local capacities to deal with the adverse effects of climate change.



## Recommendations

- (xvi) *Climate change threatens the planet and demands immediate action by society and governments on policies that are needed to both mitigate the causes and adapt to the effects of these changes.*
- (xvii) *Science should contribute to reducing underdeveloped countries' vulnerability to climate-change impacts on their people's lives by identifying and exploiting local capacities to deal with adverse climate-change effects.*
- (xviii) *Ensuring energy security without aggravating climate change is a challenge that requires innovation, investments in infrastructure and planning that is consistent with lower greenhouse gas emissions.*
- (xvix) *Environmental sustainability should be encouraged, particularly with respect to decreasing the use of "fossil fuels" and increasing the amount of "cleaner," "renewable" energy sources.*

## Establishing a scientific and technological basis for the sustainable use of tropical forests

Interactions between local and global environmental change pose new challenges to the protection of tropical systems. Of the 17 countries that exhibit mega-biodiversity, whose territories together contain over two-thirds of the planet's biological wealth, six are located in Latin America and the Caribbean. This region possesses large savanna zones, unique mountain systems and the world's largest area of endless tropical forests.

With an area of 7 million square kilometers, 25,000 kilometers of navigable rivers, around 40 million people in nine countries, and territories of immense cultural and biological diversity, the Amazon Basin plays an extremely important role in the global climate scenario and presents enormous challenges to science. The forest possesses immense carbon reserves. Its future is open to the prospect of increasingly valued environmental services with respect to the climate and biodiversity.

Although the Andes represent only 13% of the Amazon Basin, they are the predominant source of sediments and mineral nutrients for most of the river, exerting strong control over the ecological characteristics of adjacent rivers and downstream floodplains. Consequently, the mission of all Amazon countries (Andean and non-Andean) is to identify and take advantage of convergences that will enable them to replace the conventional economic exploitation of forest resources with modern processes, which should encourage social inclusion, income generation and the preservation of biodiversity. Although they define public policies, cartographic borders do not overcome the similarities that unite the entire region with respect to environmental issues and their convergence with health, education, communication and transportation policies. In this sense, the Amazon Cooperation Treaty Organization (OTCA) could play a major role.



## Recommendations

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- (xx) *Regional cooperation, both scientific and political, should be encouraged in the Amazon nations in order to replace conventional, financially based forest-exploitation practices with innovative methods that promote social inclusion, income generation and ecosystem sustainability.*

## Health inequality remains a challenge for science and public policies

Inequality between the various regions of the planet with respect to the exploitation of innovations arising from scientific discoveries is especially striking in the area of health.

The potential for discovering medicines that are effective against diseases afflicting underdeveloped countries and regions is lower mainly due to the high cost of related processes. Malaria, yellow fever, dengue and leishmaniasis are a few examples. The most lethal infectious disease of the world still is tuberculosis, but its geographical distribution (mainly in poverty-stricken countries) discourages the search for new drugs capable of overcoming the ineffectiveness of current medicines.

In the debate over the so-called neglected diseases, the opinion is surfacing that it is not the diseases that are neglected, but rather the populations that are affected by them. These diseases afflict the poorest communities that enjoy the least national and international exposure. Controlling these diseases involves not only the administration of medications, but also the improvement of employment and housing conditions and of the quality of water supplies, sanitation and health services. Moreover, global intellectual-property legislation often creates significant obstacles to health policies in developing countries due to the high price of essential medications for controlling endemic diseases and epidemics.

Population aging is a worldwide trend, a characteristic of both developed and developing countries. In terms of health, it entails a greater incidence of chronic degenerative diseases, senile dementia, diabetes, strokes and other problems, increasingly involving complex, high-cost technologies.

Cancer is another global public health problem. Data from the World Health Organization (WHO) indicates that in 2030 there will be roughly 27 million recorded cases of cancer, 17 million deaths from cancer and 75 million people living with cancer every year. Once again, this will require complex, costly technologies for diagnosis and treatment, thus severely affecting middle-class and low-income populations.

Additionally, one cannot ignore other relevant worldwide diseases such as those caused by environmental (air, water and soil) pollution and those related to food safety, obesity and drug abuse.



In relation to health, we must also consider the growing need to search for new molecules aimed at treating various diseases, new diagnostic and treatment technologies, and the development of regenerative methods, including those involving cellular therapy. The sciences and technologies involved in these diverse processes are costly and could thus increase the imbalance between nations.

### Recommendations

- (xxi) *Research into medications for treating diseases afflicting the planet's underprivileged populations/regions must be encouraged.*
- (xxii) *It is up to the scientific community to enlighten society and governments as to the fact that the control of these diseases depends not only on medicines, but also on education, labor conditions, housing, drinking water supplies and sanitation.*

## Accelerated urbanization challenges traditional models of governance

Changes in the demographic structure of the planet are occurring with increasing speed. It is estimated that, in 2050, 75% of the world's population will be living in cities, in comparison with the current figure of 50%. The current global process of accelerated urbanization is producing immense metropolitan areas and new forms of spatial organization that challenge traditional governance models, thus resulting in greater disparity between the established powers and the people. Within this context, problems such as violence, sanitation, transportation, health and education acquire a new dimension. Understanding these processes and creating new paradigms requires collaboration between various fields of science, with social sciences taking the lead.

Increased urbanization also affects social, trade and labor relations in urban centers. It leads to a division of space that segregates various sectors of society and reflects social inequality, forcing institutions and the people to face the problem of informality. However, informality is often the expression of the possible lifestyles of people that have been abruptly displaced to major urban centers, including populations of migrant workers that have been poorly integrated into the metropolises of more affluent countries.

Mobility and urban violence are problems requiring a more integrated and interdisciplinary form of knowledge that is capable of supporting the establishment of long-term public policies and of emergency and remedial measures. Add to this the importance of training human resources, making social innovations and adopting new technologies related to public safety and urban mobility, among other aspects.



## Recommendations

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- (xxiii) *We recommend conducting multidisciplinary, international discussions concerning problems arising from the global process of accelerated urbanization in order to identify new paradigms of urban management and develop social innovations focused on the well-being of urban populations.*

## Ethics and integrity are unconditional presumptions of science

Although science unconditionally presumes the employment of ethics in research and in the communication of its results, individual and/or group integrity and responsible conduct are permanent challenges that must be faced by scientific and educational policies. This theme involves the reliability of the research data, plagiarism, the correctness of the academic literature, the notion of intellectual property guided by group interests, moral rights, and other issues.

Within the scope of scientific communication, an open database is a remarkable example of the possibilities of international collaboration, which is still in its infancy. It is necessary to deal with the flood of scientific data created by new technologies in order to preserve the principle of sharing and collectively exploiting new information, thus taking advantage of its potential for group use. Sharing is a necessity for all and for science itself, and it is determined by the demand to expand research possibilities for all humanity's benefit.

## Recommendations

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- (xxiv) *Scientific societies and research funding agencies should formulate codes of ethics that guide researchers and students to conduct reliable scientific and technological research.*
- (xxv) *The promotion of social inclusion is an ethical and strategic imperative of science, technology and innovation that should be encouraged at all levels of human training.*
- (xxvi) *Scientific data sharing must be encouraged because it is important to the globalization of scientific research and the advancement of human knowledge.*



## Science, interdisciplinary methods and public policies aimed at eradicating poverty and achieving sustainable development

Despite great recent advances, Brazil is the fourth most socially unequal country in Latin America, with 28% of its population living in precarious conditions and vulnerable to different types of violence. However, no country should be considered immune to the consequences of problems that often originate from other regions of the planet, whether these problems are wars, epidemics, crises in the banking system, economic stagnation, unemployment or other human disasters. This is an undeniable facet of the globalization of economic processes and volatile capital flows.

Science and technology are fundamental to the promotion of sustainable development, whether to provide tools for modifying current development patterns or to promote greater knowledge of the challenges and problems that affect society. International examples demonstrate that science can help eradicate poverty through contributions to food security and sanitation, the proper use of water resources, innovations in the area of energy, effective pharmaceutical products and the formulation of new paradigms of sustainability. A requirement arising from the increasingly complex nature of the challenges society faces is to practice interdisciplinary methods through an integrated approach, focusing on complementarities of the various domains of knowledge. In addition to the dialogue between subjects, dialogue with traditional knowledge and the pursuit of overcoming boundaries between cultures are essential to socially just, sustainable development..

### Recommendations

*(xxvii) The increasingly complex nature of the challenges society is facing requires the employment of interdisciplinary methods, the pursuit of dialogue with traditional knowledge and the overcoming of borders between cultures*

Insistence on current development standards will not promote inclusion or raise the life quality of the people, who today depend on markets and paradigmatic public policies. Hence, the importance of broadening the concept of innovation to also incorporate the social dimension, for every innovation process involves social, cultural and political issues, among others. Sustainable development goals are inseparable from human development goals. In particular, engagement of young people in the discussion process is crucial because their desires and aspirations defy conventional policies of education, employment and income generation.

Events such as the VI World Science Forum and its results are privileged instruments for raising the level of discussion to the highest ideals of human understanding and cooperation among peoples and nations.

# Preparatory Meetings



## 1<sup>st</sup> PREPARATORY MEETING

2013 World Science Forum

Education for Innovation: Building the Foundations of Active Citizenship and Sustainable Development

August 29-31, 2012 – São Paulo – SP



## 2<sup>nd</sup> PREPARATORY MEETING

2013 World Science Forum

Challenges to Scientific and Technological Development in the Tropics

October 29-30, 2012 – Belo Horizonte – MG



## 3<sup>rd</sup> PREPARATORY MEETING

2013 World Science Forum

Tropical Diversity and Science for Development

November 28-30, 2012 – Manaus - AM



## 4<sup>th</sup> PREPARATORY MEETING

2013 World Science Forum

Energy and Sustainability

December 5-7, 2012 – Salvador – BA



## 5<sup>th</sup> PREPARATORY MEETING

2013 World Science Forum

Oceans, Climate and Development

April 15-16, 2013 – Recife – PE

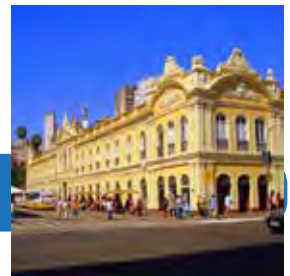


## 6<sup>th</sup> PREPARATORY MEETING

2013 World Science Forum

Climate, Health and Food: Challenges to Science in South America

May 13-14, 2013 – Porto Alegre – RS



## 7<sup>th</sup> PREPARATORY MEETING

2013 World Science Forum

Science for the Environment and Social Justice

August 21-22, 2013 – Brasília – DF

