10

COLOMBIA
Stories in the history of science communication

Sandra Daza-Caicedo, Luisa Barbosa-Gómez,
Tania Arboleda-Castrillón and Marcela Lozano-Borda

This chapter describes some of the main events of science communication during the last 60 years in Colombia. According to some authors, this history can be traced back to the mid-19th century. However, much research and archival work is needed to confirm this earlier point of origin. We have chosen the 1960s as a starting point for two reasons. First, it was the beginning of the institutionalisation of scientific policy in the country and consequently of government support to science communication activities. Second, this period has been widely studied by several authors and its activities have been documented (Fog, 2004; Lozano, 2005; Daza-Caicedo and Arboleda, 2007; Hermelin, 2011; Daza-Caicedo and Lozano-Borda, 2013).

We have reviewed official documents (scientific policy, public office for science communication files, official websites, etc.), as well as consulting books and papers on this topic. We have considered previous research including interviews and archive reviews. The history told here relies on the most visible and central actions and those that have had support from the government: actions of the Administrative Department of Science, Technology and Innovation (Colciencias),[1] which was created in 1968 and commissioned in 1969 to design and execute the country's scientific policy as well as to promote and finance the development of science, technology and innovation in Colombia.

---

1   In 2009, this institute changed its name to Administrative Department of Science, Technology and Innovation. However, since its creation in 1968 it has always been recognised as Colciencias, which is the term we will use in this chapter.

Our story has many gaps. For instance, we do not consider science communication activities carried out by the universities, the main producers of scientific knowledge in the country. This overlooks some radio and television stations, magazines and activities that researchers carry out in co-production with communities. Nor have we accounted for activities of community organisations, non-government organisations and other socially based organisations. We offer just a piece of 'the whole' history, some stories in the history of science communication.

The play on words we make between *History* and *stories* looks to emphasise not just the partial character of History, but the fact that science communication is part of a socioeconomic context, with social actors and their conflicts, political processes and different comprehensions about what science and technology mean. In other words, while great events occur—such as the creation of institutions, science festivals and museums, TV programs, awards, academic training—there are tensions, excluded actors and negotiations between stakeholders about the purposes and practices of science communication. In Colombia there has been a thoughtful debate on this topic for the last 20 years. As a result, some sectors refer to 'social appropriation of science and technology' (ASCyT for its acronym in Spanish) instead of science communication.

The meaning of ASCyT has changed over the years. Initially it intended to differentiate itself from deficit models, but it has been changing as researchers from different fields (critical studies of communication, social studies of science and technology, communication for development) conduct research on the practices, actors and objectives of science communication activities. Although there is still no agreement on its definition, the academic and political debate on ASCyT has allowed a critical reflection on its activities and objectives.

This chapter is composed of three sections. The first one is devoted to a *history of events*. We use a set of periods suggested by previous works to give an account of the changes in public policies as well as in the terminology used to address science communication. We will go through five different periods that can be differentiated by the way science communication has been done and what it has been called. As we cover more than a half century, the narrative can sometimes get 'overcrowded': too many names, institutions, activities and projects. We encourage the reader to let themselves dig quickly into this history of events. The second section deals with the *stories* of science communication, centred in the debate around the local concept of social appropriation of science and technology. Finally, we offer some conclusions that try to summarise the trends of the many diverse actions done in the field of science communication in Colombia in the last decades.

1. The history of events

1.1. From newspapers to informal education

In the second half of the 20th century, after World War II, science and technology (S&T) arose as a promise of development. Latin America witnessed the emergence of S&T programs intended to 'modernise' countries. Development agencies such as the United Nations, the Organisation of American States (OEA) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) offered financial and conceptual support in the areas of education, science and technology. These agencies and some intellectuals of the region started promoting the objective of 'closing the gap' between the underdeveloped Latin American countries and the developed world by the means of science and technology. This gave birth during the 1960s and 1970s to the National Councils and Ministries of Science and Technology in various countries, including Colombia (Franco-Avellaneda and von Linsingen, 2011). The new panorama required the implementation of technology and knowledge transfer processes accompanied by communication strategies in the fields of health and agriculture, among others, with the promise of 'modernisation'. Such promises set the conditions and interests for the communication of S&T through the media.

In this context, during the 1960s an enthusiasm and an institutionalisation of science and technology emerged, including science communication activities. A series of courses and workshops were held in Chile, Ecuador and Argentina between 1962 and 1965. In 1967, Ibero-American leaders agreed on a regional program in which education and scientific and technological dissemination stood out among the priority objectives (Declaración de Punta del Este, 1967; Calvo Hernando, 1999).

In Colombia, the first science communication activities in the 1960s were in the form of science education. The program Scientific Activities for Youth was funded by the MIT–Harvard Club of Colombia, the Bank of the Republic and the Ford Foundation (Posada et al., 1995); and focused on supporting science teaching and promoting scientific vocations (Fog, 1995).

In 1968, Colciencias was founded as the government organisation in charge of leading the policy and the development of science, technology and innovation activities in the country. Two years after that, the Colombian Association for the Advancement of Science (ACAC) emerged, a non-profit private organisation whose mission was to create consciousness of the importance of science, technology and innovation (STI) to society. These two

events constituted a breakthrough in the history of science communication in Colombia, as they created the central institutions that have determined the policies and the dynamics of the field in the country.

Colciencias stated for the first time in an official document (Colciencias, 1971) the necessity to 'create consciousness on the important social role of science and technology in the mind of every Colombian'. However, for a long time the actions to achieve this goal remained focused on science education for Colombian youth and the program had a very limited budget.

In 1969 another milestone occurred in this history: a round table in the capital city Bogotá about the value of education, science and culture for national progress. The event was convened by the Ministry of Education and the OEA (Massarani et al., 2012). As a result, the Inter-American Centre for the Production of Educational and Scientific Material for the Press (CIMPEC) was created. This institution had the important task of producing scientific and technological material for the media in Colombia and all other member countries (Fog, 2004). That same year, the first National Congress of Science Journalism was held in the city of Medellín, which motivated the first ideas for the subsequent creation of the Ibero-American Association of Science Journalism (Massarani et al., 2012).

During this period and until 1976, a weekly scientific supplement appeared in *El Tiempo*, the largest-circulation national newspaper. In addition, the national radio station had a half-hour program on Saturdays dedicated to scientific dissemination (Muñoz Quevedo, 1986). The first science TV show *Naturalia* was broadcast in 1974, presenting documentaries of explorers and adventurers such as Jacques Cousteau and David Attenborough (Cortés-Fonnegra, 2014). Within this context of enthusiasm for the development of science and technology, in 1976 the Colombian Association of Science Journalism (ACPC)[2] was created.

In this early phase of science communication in Colombia, multilateral organisations played a crucial role. For instance, the Inter-American Bank (IDB) lent money to Colciencias in 1982 to promote science and technology and, by doing so, settled the line of action around these topics. The activities relating to science communication were shaped according to what was occurring in the Anglo-Saxon countries: magazines and TV shows promoting scientific activity were created. The discourse was also affected when Colombia adopted the term 'science popularisation' instead of 'dissemination' (Daza-Caicedo and Lozano-Borda, 2013).

---

2   See acpc.com.co/acpc-asociacion-colombiana-periodismo-cientifico/.

With the IDB loan, a new Science and Technology Policy was launched by Colciencias (1983). The policy stated three areas of action for the strengthening of science popularisation in the country: science journalism, the scientific activities for young people and the use of mass communication media. By including mass media and science journalism, the activities of that period reached several publics from different ages and regions instead of just the young.

The first written publications completely devoted to science communication were established with the newsletter *Letter from Colciencias* and the magazine *Colombia, Science and Technology* in 1982. The first science TV show was launched with the name *Diffusion and Scientific-technological Formation* in 1984. It was co-produced by Colciencias and the Colombian Institute for the Promotion of Higher Education (ICFES) and showed the advances Colombia had made in S&T, as well as introducing the leading professionals in the field to the public.

By this time, science popularisation was perceived as an effort arising from institutions, the media and individuals related to science teaching and information, as well as researchers who actively participated in outreach of their research. With the involvement of the mass media—first cinema and radio and then TV—a new era of professionalisation arose.

In 1986, the Executive Secretariat of the Andrés Bello Agreement[3] and the Konrad Adenauer Foundation developed a program to promote the specialisation of journalists in science and technology; as a result, two books were published in Bogotá in 1986 and 1988. They contributed to the scarce bibliography in the Spanish language available on science topics (Calvo Hernando, 2002).

In 1987, following the line of informal science education for youth, the national program Cuclí Cuclí started. Supported by the National Ministry of Education and the National University, the program promoted science by linking it with primary and secondary educational curricula. This program was active until 1997 and laid the foundations for other initiatives such as Nautilius (1995–96), the Pléyade project (1997–98), Cuclí-Pléyade (1998–2001) and Ondas. All these programs aimed at promoting scientific vocations and interesting children and young persons in science and technology (Lozano-Borda, 2013).

---

3   The Andrés Bello Agreement is an inter-governmental organisation for educational, scientific, technological and cultural integration in Ibero-America. It was created in order to contribute to the equitable, sustainable and democratic development of the member states through a treaty signed in Bogotá on 31 January 1970. Members are: Bolivia, Chile, Colombia, Cuba, Ecuador, Spain, México, Panamá, Paraguay, Perú, the Dominican Republic and Venezuela.

That same year, the first S&T fair Expociencia was organised by the ACAC with the support of Colciencias. This fair is still organised annually, although there have been gap years.

In 1990, the Network of Popularisation of Science and Technology for Latin America and the Caribbean (RedPOP) was established. Colciencias played a major role in the creation of the network, and its objective was to contribute to the enhancement, exchange and active cooperation between the teams, programs and institutions devoted to the popularisation of S&T in the region (Massarani, 2015; Pabón, 2017).

In 1991, the second loan from the IDB allowed the restructuring of Colciencias and its transformation into a division fully dedicated to the organisation of activities targeting a non-scientific public. The newly created department elaborated a proposal for a National Plan for the Popularisation of Science and Technology, a first attempt to develop a policy on this topic— although it was not officially accepted.

2. The boom of interactive museums, science journalism courses and more

Another milestone in the history of science communication in Colombia was the creation of the Mission of Science, Education and Development in 1993. The mission was a group of academics commissioned by the president, and they worked together to elaborate a set of recommendations on the future course of science, education and development in the country. The mission wrote the report *Colombia, at the edge of opportunity* (Posada et al., 1995) and used for the first time the term 'social appropriation of science and technology' in an official document with political intention. The report did not evolve into a policy but constituted an important step towards an S&T system with cultural, ethical and democratic basis.

Even though a new term was proposed in the document, the aims and activities described did not differentiate from the traditional ideas of mass popularisation. This could be in part due to the fact that 'appropriation' was proposed as a means of raising awareness of the importance of promoting science in culture, without having fully developed a research-based conceptual framework around its meaning. As a result, the term often got merged with others used in public policy, such as 'popularisation', 'dissemination', 'science journalism' and 'science education'.

During this decade, Colciencias supported initiatives aimed at boosting science communication through the media, and public universities played an important role. For instance, in 1993 the Universidad de Valle created the first news agency for science and technology in Colombia. The University Agency of Science Journalism (AUPEC) gave rise in 1994 to the first science journalism award, which received entries from 86 journalistic works from newspapers, TV and radio. This university also produced the TV show *Eureka* (1996), and the National University of Colombia followed with *Mente Nueva* [New Mind] in 2000. Colciencias promoted other television shows in these years, many of which faced big problems of funding and acceptance by the private mass media, such as the series *Universes* (1997) and *For Science* (2003).

The Museo de la Ciencia y el Juego [Museum of Science and Play] founded in 1984 was one of the pioneers in the country, using interactive, playful and itinerant activities to explore scientific concepts. The network of Small Interactive Museums of Science (Liliput) in Colombia and Ecuador was consolidated during these years. Another initiative promoted by the museum was Maletas viajeras [Scientific Suitcases] that inspired the concept of itinerant museums and allowed many Colombian towns to access science communication activities.

In 1998, and promoted by ACAC, the interactive museum Maloka was founded with funding from a third loan of the IDB. Maloka was the first cultural and educational megaproject focused on science and technology, using much of the economic resources devoted by Colciencias to science communication. Since its creation, Maloka has a cultural program that offers many entertaining activities, hosts activities such as science cafés and works with teachers to explore the pedagogical possibilities of the centre and to collect opinions and suggestions.

With the new century, a new program of Scientific Activities for Youth started. Ondas [Waves] was launched in 2001 thanks to the collaboration between Colciencias and the Foundation for Education and Social Development (FES). It became the longest-lasting science communication initiative for children in Colombia. The program carries out research projects based on the interest and curiosity of the children, designed and developed by the children together with their teachers.

In 2002, the Colombian Association of Science Journalism set its focus on three projects: training of science journalists around the country, research on the work of science and technology communicators, and setting up a S&T news agency (NotiCyT). Even though the agency was not a pioneer in the field, it did have an impact on local media as well as Latin American newspapers (Vélez Lopera, 2013). Despite this, it only lasted five years.

Other institutions also initiated efforts to offer training in science communication. In 2002 and then 2004, the ACPC organised a series of seminars in different regions of Colombia (Daza-Caicedo et al., 2006). Some years later, the ACAC together with the Javeriana University offered training courses on the social appropriation of sciences.

During this period one 'innovative' activity called *regional encounters* took place. It was developed by Colciencias with the support of the ACAC. The encounters were events that, for the first time, created spaces for direct dialogue between researchers, industry and journalists all over the country. Their objective was to socialise the results of the activities promoted by Colciencias among several actors of the different regions.

In 2003, theatre came into play. The National Theatre Company's Theatre of Science attempted to promote science and technology through artistic language. Two plays resulted from this, and were presented in big events in Bogotá, like the Book Fair and Expociencia.

Institutions started recognising the value of dialogue around the course of science communication. In 2004, Maloka organised the first academic forum Conciencia abierta.[4] It gathered together communicators, academics and researchers from different Latin American countries to reflect upon the process of appropriation of S&T in the region. The organisation of the forum was supported by Colciencias and the Andrés Bello Agreement.

3. Appropriation becomes a policy

In Colombia, the National Council of Socio-Economic Policy (CONPES) is the highest planning authority. It advises the national government in all aspects of socioeconomic development by coordinating and monitoring the study and approval of public documents that describe different policies to be applied in the country. In 2005, CONPES approved the *National Policy for the Social Appropriation of Science, Technology and Innovation* (ASCTeI) (Colciencias, 2005).

---

4   The literal translation is 'Open consciousness'. In Spanish, the name is a play on words that also means 'open with science'.

This sought to better define the terminology involved, using an extensive theoretical and epistemological approach, as well as describing a strategy for implementation. It constituted an inflection point by considering the population as active participants with decision-making capacity. Therefore, it challenged the deficit model that had been implemented until that time.

One year after the CONPES, the Colombian Science and Technology Observatory (OCyT) published a report on the assessment of activities for the public communication of S&T. With this report, Colciencias manifested the need to migrate towards a more democratic model 'in which the publics are not conceived as mere receptors of scientific information' and are instead recognised as active participants in the process of knowledge production (Daza-Caicedo et al., 2006).

For the first time, authorities, institutions and actors in the national system of S&T were urged to 'democratise' scientific knowledge. 'New' strategies came into play, and they took into consideration citizen participation, public opinion and the interests and needs of society. Some activities focused on participation rather than mass media, promoting forums, open debates and the creation of networks.

Following that line of thought, the National Science and Technology Week was founded in 2006. This initiative created a space for the different sectors of society to engage in the process of scientific knowledge production. With National Science Week another important goal was achieved: to decentralise the activities that mostly occurred in Bogotá. Science Week was organised biennially until 2014. Colciencias supported it financially and technically, and this initiative has presence in 25 (out of 33) territorial entities of the country (32 departments plus the capital district). Science Week helped shift activities away from conferences and talks, and towards more participatory events with the integration of different actors, including universities, research centres, companies, students, community agents of different kinds and indigenous and Afro-descendant communities.

In 2008, 10 years after the opening of Maloka, the second science centre Parque Explora opened in Medellin. From the start, this centre developed a participatory approach much in line with the idea of appropriation. In 2010, Maloka published the book *Relocating the Social Appropriation of Science and Technology* (Pérez-Bustos and Tafur Sequera, 2010) aimed at recognising the effort of actors in different regions of the country acting in favour of the social appropriation of knowledge.

Figure 10.1: Parque Explora, Medellin.
Source: Guía de Viajes Oficial de Medellín.

The public policy of this period shows a misalignment between the goals and the strategies of ASCTeI in Colombia. Although the theory is clear about the importance of the relationship between science, technology and society, a great part of the actions still focused on a vision of science, technology and innovation that is external and independent from their cultural and social contexts.

4. The appropriation policy gets a strategy

The National Strategy of ASCTeI was launched in 2010 as a complement to the National Policy of 2005 (Colciencias, 2010). It led to one of the most important changes at the organisational level: the design and realisation of national open calls instead of financing projects evaluated one by one. This allowed a greater control in the execution of the policy as well as opening up and introducing a greater democratisation of the resources, as the regions and types of organisations diversified.

The strategy differentiates from previous public policy by recognising several types of actors, not just scientists, involved in the processes of the generation and use of knowledge. It distances itself from the assumption of a gap between 'producers' of knowledge and 'receptors–users', on the basis that science is a social construction. As the civil society's agency is recognised, the development of initiatives acquires a democratic and participatory perspective.

The strategy consists of four lines of action:

- Promote citizen participation in the construction of public policy in STI.
- Communicate S&T from the perspective of society, to favour the development of reflective and contextualised communication projects for the understanding, dialogue and opinion formation on the relations of STI and society.
- Exchange and transfer knowledge, to stimulate initiatives with an effective integration into specific local and social contexts that contribute to development.
- Develop training and measurement mechanisms to generate knowledge about the different ways in which scientific and technological knowledge is appropriated in Colombian society.

These lines of action are expressed to a greater or lesser degree in the programs and initiatives financed by Colciencias between 2010 and 2018.

In 2011 the Science, Technology and Innovation Fund was created to increase scientific and technological capacities, as well as the innovation and competitiveness of Colombian regions. It was financed by royalties from natural-resource extraction (Article 29, Law 1530, 2012 ; Official Journal of the Republic of Colombia, 2012). Within five years (2013–18), around 50 ASCTeI projects were financed with these resources. More than half of these belonged to the Ondas program, and the rest was attributed to ASCTeI, science centres and scientific and technological vocations. Some ASCTeI projects were aimed at strengthening the citizens' culture in STI through, for example, research projects to promote the capacities, skills and attitudes towards science and technology research in children and young people linked to primary and secondary education in the Caribbean island of San Andrés. Another aimed at reaching the Buen Vivir [Good Living] and the territorialisation of peace in the ecoregion of Perijá.

'Territorialisation of peace' means to develop peace-building processes in diverse Colombian territories. Even though the administrative division in Colombia is the department (there are 33, including the capital district of Bogotá), the concept of 'territory' is related to the identity of various groups whose life and permanence in these lands are constantly threatened. Groups affected by this include peasants, indigenous people and the Afro-Colombian people, a result of the colonial legacy and inequity in land distribution that is concentrated in very few rich families. The underlying tension since the 'discovery' of the continent and the transfer by force of the African people to these lands and subsequent enslavement of them and the indigenous people were the main reason for 60 years of warfare.

There are difficulties with the ASCTeI projects, and many actors report it is impossible to spend the money because of the logistics and paperwork, ending with an absurd budget in which 'two of every five pesos in the fund went unspent' (Bajak, 2018).

In 2011 the first public forum, Replantémonos, was held in the Congress, aimed at promoting an effective forest policy that responded to a social, economic and ecological crisis. In 2012, a National Water Meeting held regional workshops to collect and systematise experiences on water as a factor of economic and social development, as a basic human need and as a risk in the face of droughts, floods and pollution. And finally, in 2014, the National Forum on Social Appropriation of Science and Technology elaborated recommendations to the strategy (Aguirre et al., 2011). Unfortunately, a change in the director of Colciencias that year did not give continuity to the forums, as the new director did not agree to accept these recommendations.

In 2012, the OCyT organised the Survey on the Public Perception of Science and Technology. Its results revealed the general public's lack of knowledge of local science and scientists, and the influence of the media on the stereotypical misrepresentation of S&T among Colombians. For instance, it was evidenced that people thought science was confined to natural and basic science; that it was all about discoveries and technology and that it was done by men who were above average intelligence (Daza-Caicedo et al., 2014). This was the third official survey of its kind carried out in the country. The first survey was published in 1995 by Colciencias and the ACAC (Misión de Ciencia, Educación y Desarrollo, 1995) and the second one was published in 2005 (Aguirre, 2005), carried out by Colciencias and the National Consulting Centre.

Between 2011 and 2013, more than 20 communication projects were funded to produce content for mass media broadcasts (including radio and virtual channels) and to develop strategies to contextualise science, technology and innovation in a critical perspective. Some of these projects were developed in local communities with the active participation of members of the communities, research groups and organisations that promote ASCTeI processes.

With the purpose of encouraging collaborative work among science, technology and innovation experts and communities or social organisations, in 2012 the program Ideas for Change was launched.[5] In the first phase, poor communities postulated needs that could be addressed through scientific-technological knowledge. Then, universities and other organisations put forward possible solutions. After technical evaluation and prioritisation, solutions are then implemented by negotiation, exchange and knowledge transfer between experts and communities. So far, the program has made four biennial calls (2012–18). 'Water and poverty' was the theme of the first call, and it was to address water problems in the communities of three territorial entities. Ten innovative scientific-technological solutions for access to drinkable water were proposed. In 2014, the call Pacific Pure Energy addressed energy solutions for clean and renewable sources and, as a result, 14 collaborative solutions to supply energy in community spaces such as schools and health centres were implemented. In 2016, the third call sought to promote the preservation and conservation of the environment through the design and application of clean technologies contributing to the sustainable use of natural resources; 14 solutions were proposed. The fourth called 'Science and ICT for Peace' is under development. It aims to support processes of social appropriation

5   See minciencias.gov.co/cultura-en-ctei/ideas-para-el-cambio.

of science, technology and ICT in collaborative construction with surviving communities from the armed conflict in Colombia, contributing to human and sustainable development in a post-conflict context.

A Ciencia Cierta[6] is another initiative developed during this period. It takes the form of a contest that invites communities to share experiences in which they have applied scientific and technological knowledge. Those with the greatest impact and relevance in the social field then participate in learning processes and knowledge exchange in sessions involving scientists, technologists and communities. Up to now, three versions have been developed (2013, 2015, 2017), supporting 36 experiences regarding the agricultural sector, food security and micro-enterprises for the use of biodiversity. A more recent call (2018) has been developed around community projects for the conservation of ecosystems.

In 2014, Colciencias implemented Virtualia,[7] an online training program with support of the United Nations Development Program (UNDP) Virtual School, to provide tools for the ASCTeI to assist strategic actors and institutions. The program aimed at strengthening capacities and processes and boosting social practices with a focus on human development. The training included the development of written projects based on proposals for solving local problems. Courses were run for community leaders of local organisations interested in the development of participatory processes involving the ASCTeI—namely professionals working in public libraries and museums (science museums, botanic gardens, planetariums, zoos, aquariums).

From 2014, a change in the chief executive officer of Colciencias also changed the approach of the ASCTeI as proposed in the strategy: the key priority became to strengthen the development of museums and science centres. With this turn, Colciencias provided guidelines and supported the creation, recognition and strengthening of science centres and promoted the National Network of Science Centres[8] (Colciencias, 2015). Likewise, a general model of good sustainability practices in science centres was developed to respond to the need for these organisations 'to remain valid in times of uncertainty and thrive under changing economic, legislative, cultural and environmental conditions' (Colciencias, 2016).

---

6   See www.acienciacierta.gov.co.
7   See www.colciencias.gov.co/cultura-en-ctei/apropiacion-social/virtualia.
8   See www.colciencias.gov.co/cultura-en-ctei/apropiacion-social/centros-ciencia/por-que-los-centros-ciencia.

Parallel to the National Strategy of ASCTeI, Colciencias currently supports a strategy called Todo es Ciencia [All is science]. It mainly follows the deficit model of science communication through the production and issue of web series, news, opinion articles and documentaries 'in order to show a diverse panorama to inspire people to appropriate science as an engine of a better world'.[9]

Furthermore, local processes are developing in regions of Colombia like Antioquia where the book *Social Appropriation of Knowledge, the Role of Communication* (Aguirre et al., 2013) gathered some support with critical views on the topic and proposing a more regional approach. In the Caribbean coast, the University Jorge Tadeo Lozano has organised living laboratories and researched on the appropriation carried out in universities (Hernández et al., 2016). In the Coffee Region, the Quindío University developed the Centre for Scientific Culture and risk management programs.

5. From science communication to social appropriation of science of technology

In the field of science communication, it is very important to tell a story listing milestones, main characters and the consolidation of institutions and policies. This history allows for comparisons and lets readers analyse the creation and strengthening of this field. However, to the 'history of events' one should add a 'social history'. Therefore, one must consider the tensions, the power games, the different conceptions about communication, the silent actors and so on.

We do not intend to write down the complete story in these few pages. However, we would like to emphasise that S&T communication in Colombia has been a dynamic field, always involved in conceptual disputes—sometimes enriching, sometimes not. A first element in this complex dynamic is set out in the previous section: there is a close link between science communication, public policy and transnational agencies and their agendas. Very few activities have been done without the financial support of Colciencias. This is probably due to the scarce resources devoted to S&T in the country, but also because the first visible activities in the 20th century occurred thanks to IBD loans and with the support of other transnational institutions like UNESCO, OEA and the Andrés Bells Agreement. This limited the type of actions that could be conceived and executed (Daza-Caicedo et al., 2006).

---

9   See www.todoesciencia.gov.co/todo_es_ciencia/presentes-en-docmontevideo-uruguay-2017.

The IDB loan allowed the growth and development of some activities, like the museums and interactive science centres, but was not flexible enough to encourage activities of 'alternative communication' or local initiatives that did not follow international models. Moreover, the lack of continuity in the availability of resources translated into the quick death and disappearance of many activities.

So the relationship between communication for development—carried out through public health campaigns, agricultural transfer, alphabetisation campaigns[10]—and science communication is yet to be pointed out. We left out of the analysis to what extent the development agenda favoured or hindered local processes of scientific production and communication and how the ideals of development biased ways of understanding the science–society relationship.[11]

Between the 1980s and 1990s, many academics started pointing out the need of society to appropriate science. By the beginning of the 21st century—and after some ground-breaking actors and communication activities—an academic debate started around the dominant communication model. The discussion was inspired by the debates from Roqueplo (1983), Raichvarg and Jaques (1991), Durant (1993), Lewenstein (2003), Irwin and Michael (2003), Michael (2002) and Felt (2003) about the 'deficit' and 'democratic' models in the public communication of science. The core of the discussion orbited around four questions: Why communicate science? From whom? To whom? And how?

Those debates stimulated the consolidation and use of the concept 'social appropriation of science and technology' (ASCyT) and a new idea to get away from the deficit model of communication. The new approach fostered dialogue between techno-scientific knowledge and local perspectives, promoting a scientific practice concentrating on the solution of local problems and with the inclusion of civil society. Such debate was encouraged by social and human sciences researchers, most of them focused on the social studies of science and technology. Due to their backgrounds, they insisted on considering science as a social construct (Woolgar, 1988; Latour, 1992, 2007; Hess, 1997; Bloor, 2003).

---

10   Campaigns to teach adults to read and write.
11   Some of these issues have been addressed by Escobar (1996), Gómez-Morales (2005), Pérez-Bustos (2009) and Franco-Avellaneda and von Linsingen (2011).

The term 'social appropriation of science and technology' was quickly embraced by politics and actors in the field of science communication, but its meaning has not been stable. Some use it as synonym of words as 'popularisation', 'dissemination', 'outreach' and 'communication'. Others try to fill it with sense, as in the definition by Franco-Avellaneda and Pérez-Bustos (2010):

> An intentional social process in which diverse actors in a reflexive manner articulate to exchange, combine, negotiate and dialogue knowledge, motivated by their needs and interests to use, apply and enrich such knowledge in their contexts and concrete realities. We understand that this intentional social process happens through mediations of recognition, information, teaching-learning, circulation, transfer, transformation and production of knowledge, among others, of which science and technology are its main object.

In the ASCyT policy the concept is defined as (Colciencias, 2010):

> A process of understanding and intervention of the relationships between techno science and society, built upon active participation of the various social groups that create knowledge.

These two definitions seek to account for the complexity and diversity of mediation devices that comprise ASCyT, emphasising the need to think of it as a critical, context-dependent activity that involves the participation of different actors. This conception considers communication as a process that must be understood 'in the context of historical, social, geographical, political, cultural conditions' (Huergo, 2001). In that sense, there is no ASCyT strategy that always applies uniformly to all cultures.

Why is there no consensus on the meaning of appropriation? There are multiple interests that range from stakeholders looking for scarce resources and maintaining the management of activities, to promoting certain imaginaries about science and technology or specific ways of giving continuity to policies. On the other hand, because science communication and appropriation remain as secondary areas in the macro policies of science and technology, they have not obtained important resources or clear instruments for their implementation.

Finally, there are voices that still have very little participation and power: communities could use techno-scientific knowledge to negotiate with their own traditional knowledge (indigenous, Afro-Colombian, rural, etc.) to solve contextual problems. The questions that arose in the 1990s are still open: what kind of science and for whom?

6. Conclusions

The history of science communication in Colombia shows a slow development of the field in at least five sorts of activities: science journalism and communication through mass media; scientific activities for youth; museums and science centres; citizen participation; and research on social appropriation of knowledge.

We have documented a significant number of mass media productions made in Colombia, mainly focused on children. In most cases, they have been short-term strategies with weak alliances that have not facilitated co-production with public channels. Science journalism has lost the momentum of the late 1960s and it has been difficult to keep active the Colombian Association of Science Journalism. As an important stakeholder, the institution should have been centrally placed to position and mobilise the issue in the country. The association has been boosted recently by a new generation of young science journalists and communicators with interesting projects.[12] On the other hand, we evidence the low prestige of science journalism in the Colombian mass media: in TV news, science and technology has a very low key presence compared to Latin American countries like Brazil. Even when these topics are covered, there is little contextualisation and use of scientific sources, with a bias for presenting science in a positive way and rarely mentioning scientific controversies that limit public debate (Arboleda Castrillón et al., 2015; Ramalho, Arboleda and Hermelin, 2017). This situation is intertwined with the limited professional training on offer for mediators and scientific journalists.

Many science communication experiences in the country target children and young people in schools—this was particularly so until 2005. They aim at motivating future generations for science. Slowly, the regionalisation of this topic allows the appearance of new actors, and options to communicate science and opportunities to build more dialogical initiatives. This means we require not only scientific journalists, but other types of 'mediators'.

Another important group of initiatives are the S&T museums and interactive centres. In Colombia they arose through the initiative of scientific communities interested in developing effective translation exercises that show science as relevant and 'fun' to diverse audiences, with the aim of achieving

---

12   Some of these new science communication projects are Shots de Ciencia (soundcloud.com/shots-de-ciencia), cientificamente.net (www.facebook.com/pg/Cientificamente.net/about/?ref=page_internal), or Ciencia Café Pa' Sumercé (cienciacafesumerce.wordpress.com, www.youtube.com/watch?v=w1lkk5CqAuQ).

a greater appreciation of their practices and implications. These strategies to seduce the public gained great relevance in the allocation of Colciencias' budget and other national public entities. However, the museums' offerings tend to quickly fall short in front of a population eager for novelty and expecting to find new wonders at each visit. Their renewal and maintenance are expensive and difficult to sustain over time, especially when only a few interactive centres in the country have significant support from private companies. Because of this, and because national goals are prioritised, public investment in S&T interactive museums and centres has been very variable, going from periods of great support to periods of almost none.

Despite the above, interactive museums are significant in Colombia and they have become a reference point in public communication of S&T. Likewise, they have been laboratories of new types of experiences, which seek in an innovative manner to impact the field of informal education and the social integration with the environment in which they are located.

As an alternative to the traditional models of communication of science, citizen participation initiatives have emerged. These initiatives have been strongly promoted in the last few years and emerge from the need to have dialogical models to contribute to the social appropriation of knowledge. Hence, forums and public debates about controversial issues of local interest are organised and new calls encourage co-production of knowledge and knowledge-sharing. Although it has not been possible to fully consolidate this, it shows an interest for constructing strategies that break the mould of deficit models of communication. It is noteworthy that the constant change of direction in Colciencias during the last period has had an impact on its strategic approach, going vertiginously from participatory to deficit models and ending abruptly with ongoing proposals.

In the last 20 years, there is growing interest for evaluating strategies related to the identification, differentiation and understanding of audiences. This idea is motivating research and evaluation in Colombians' perceptions of science. The discussion has also been framed theoretically, encouraging an academic community beginning to engage with this interest, feeding a reflective and critical view on ASCyT processes and creating evaluation systems. The ASCyT is gradually consolidating not only as a field of practice but also as a relevant field of studies.

Universities have been an important player in Latin American scientific and technological development and are considered the centre of knowledge production in the region (Albornoz, Barrere and Sokil, 2017). Thus, it is necessary to identify the role that Colombian universities have in the

communication and appropriation of S&T. They should open the debate on how the knowledge science produces is useful to society, to its environment and to local communities. In brief, their role in ASCyT should go beyond training future mediators. Universities can encourage processes of encounter, communication, negotiation and exchange for new forms and places of knowledge production that enable the resolution of social problems. But this requires researchers to work on local research agendas, carry out processes of dialogue with communities and turn their interests not only to the production of papers in indexed journals but to other forms and formats of communication. It is urgent to recognise the work of researchers who devote time and effort to these activities and try to connect scientific production with local necessities and agendas.

For years we thought that the mission of science communication was to conquer citizen's hearts, but decades of activities have taught us that we also need to conquer the heart of researchers and policymakers. First, because we need more resources, both economic and human, for science communication to develop new and innovative activities. Second, because it is still necessary to understand that citizens can be involved in science and technology activities and policy design. Colombia has made a great effort in elaborating a discourse that recognises the citizens' right to participate, but the materialisation of it is still a work in progress.

References

Aguirre, C., Arboleda Castrillón, T., Cassiani, S., Daza-Caicedo, S., Guivant, J., Hermelin Bravo, D., Hilgartner, S., Jasanoff, S., Lozano-Borda, M., Lozano Hincapié, M., Maldonado Castañeda, O. J., Metcalfe, J., Olive, L., Raigoso, C., Sutz, J. and Tafur Sequera, M. (2011). *Ciencia, Tecnología y Democracia: Reflexiones en torno a la apropiación social del conocimiento*. M. Lozano-Borda and T. Pérez-Bustos (eds). Medellín: Universidad Eafit / Colciencias.

Aguirre, C., Dominguez, E., Echeverry, J., Castaño, M., Raichvarg, D., Trelles, I., Jaillier, E. Velez, N., Jaramillo, F., Acevedo, C., Marin, B., Marquez, J., Domínguez, E., Echeverry, J. and Castaño, M. (2013). *Apropiación social del conocimiento, el papel de la comunicación*. E. Domínguez, J. Echeverry and M. Castaño (eds). Medellín: Universidad de Antioquia.

Aguirre, J. (ed.) (2005). *La percepción que tienen los Colombianos sobre la Ciencia y la Tecnología*. Bogotá, Colombia: Colciencias.

Albornoz, M., Barrere, R. and Sokil, J. (2017). 2.1. Las Universidades lideran la I+D en América Latina. In RICYT, *El estado de la Ciencia*. Retrieved from www.ricyt.org/wp-content/uploads/2017/10/files_Estado-de-la-Ciencia-2017_E_2017_2_1_Las_Universidades_lideran_id.pdf.

Arboleda Castrillón, T., Hermelin, D., Massarani, L. and Reznik, G. (2015). Ciencia y Tecnología en los telediarios colombianos: sobre lo que se cubre y lo que no se cubre. *Revista Ensaio*, *17*(1), 208–29. doi.org/10.1590/1983-211720175170110.

Bajak, A. (2018). Science in Colombia on the cusp of change. *Nature, 562,* 7728. doi.org/10.1038/d41586-018-07113-6.

Bloor, D. (2003). *Conocimiento e imaginario social*. Barcelona: Gedisa Editorial.

Calvo Hernando, M. (1999). *El nuevo periodismo de la ciencia*. Quito, Ecuador: Ediciones CIESPAL.

Calvo Hernando, M. (2002). La divulgación de la ciencia: ambiciones y objetivos. El periodismo científico -PC-, no contribuye a satisfacer las necesidades básicas de América Latina en este campo. *Colombia Ciencia y Tecnología*, *20*(1), 10–17.

Colciencias. (1971). Política científica y tecnológica: consideraciones preliminares. Documento de trabajo. Santa Fé de Bogotá: Colciencias. Retrieved from repositorio.colciencias.gov.co/bitstream/handle/11146/1269/1987-V11-N3-4-Articulos-Art%203-4.4.pdf?sequence=1&isAllowed=y.

Colciencias. (1983). Plan de Concertación Nacional en Ciencia y Tecnología. Santa Fé de Bogotá: Colciencias. Retrieved from repositorio.colciencias.gov.co/bitstream/handle/11146/1398/1983-V1-N4-Articulos-Art%204.3.pdf?sequence=1&isAllowed=y.

Colciencias. (1998). *Colciencias 30 años: Memorias de un compromiso*. Santa Fé de Bogotá: Colciencias.

Colciencias. (2005). *Política de apropiación social de la ciencia, la tecnología y la innovación*. Bogotá. Retrieved from www.colciencias.gov.co/sncyt/ley29.html.

Colciencias. (2010). *Estrategia nacional de apropiación social de la ciencia, la tecnología y la innovación*. Bogotá: Colciencias.

Colciencias. (2015). *Lineamientos para el reconocimiento de centros de ciencia en Colombia.* Bogotá, Colombia. Retrieved from colciencias.gov.co/sites/default/files/ckeditor_files/lineamientos_centrosdeciencia.pdf.

Colciencias. (2016). *Modelo general de buenas prácticas de sostenibilidad en centros de ciencia.* Bogotá, Colombia. Retrieved from colciencias.gov.co/sites/default/files/ckeditor_files/modelo-buenas-practicas.pdf.

Cortés-Fonnegra, L. M. (2014). Naturalia: una huella en la historia de la divulgación científica en Colombia. *Desde la Biblioteca*, *48*, 25–33.

Daza-Caicedo, S., Arboleda, T., Rivera, A., Bucheli, V. and Alzate, J. (2006). *Evaluación de las actividades de comunicación pública de la ciencia y la tecnología en el Sistema Nacional de Ciencia y Tecnología Colombiano. 1990–2004*. Report. Bogotá DC: Observatorio Colombiano de Ciencia y Tecnología.

Daza-Caicedo, S. and Arboleda, T. (2007). Comunicación pública de la ciencia y la tecnología en Colombia: ¿políticas para la democratisación del conocimiento? *Signo y pensamiento*, *26*(50), 100–25.

Daza-Caicedo, S. and Lozano-Borda, M. (2013). Actividades hacia 'otros públicos'. Entre la difusión, la apropiación y la gobernanza de la ciencia y la tecnología. In M. Salazar (ed.), *Colciencias cuarenta años. Entre la legitimidad, la normatividad y la práctica* (pp. 280–353). Bogotá DC: Observatorio Colombiano de Ciencia y Tecnología.

Daza-Caicedo, S., Lozano-Borda, M., Bueno Castellanos, E., Gómez-Morales, Y. J., Salazar Acosta, M., Jaime, A., Aguirre, J., Rueda Ortíz, R., Franco-Avellaneda, M., Rincón, O., Pérez-Bustos, T., Farias, D., Suárez, R. and Osorio, C. (2014). *Percepciones de las ciencias y las tecnologías en Colombia*. S. Daza-Caicedo and M. Lozano-Borda (eds). Bogotá DC: Observatorio Colombiano de Ciencia y Tecnología.

Declaración de Punta del Este (1967). Declaración de los Presidentes de América, 12 al 14 de abril de 1967. Punta del Este, Uruguay.

Durant, J. (1993). What is scientific literacy? In J. Durant and J. Gregory (eds), *Science and Culture in Europe* (pp. 129–37). London: Science Museum.

Escobar, A. (1996). *La invención del Tercer Mundo Construcción y deconstrucción del desarrollo*. Santa Fé de Bogotá: Editorial Norma. Retrieved from cronicon.net/ paginas/Documentos/No.10.pdf.

Felt, U. (2003). *Optimising Public Understanding of Science and Technology*. Vienna.

Fog, L. (1995). *La A.C.A.C., 25 años creando futuro*. ACAC. Retrieved from catalogo. cenda.edu.co/cgi-bin/koha/opac-detail.pl?biblionumber=1898.

Fog, L. (2004). El Periodismo científico en Colombia un lento despegue. *Quark*, *34*, 59–65.

Franco-Avellaneda, M. and von Linsingen, I. (2011). Popularisaciones de la ciencia y la tecnología en América Latina: mirando la política científica en clave educativa. *Revista mexicana de investigación educativa*. Consejo Mexicano de Investigación Educativa A.C., *16*(51), 1253–72.

Franco-Avellaneda, M. and Pérez-Bustos, T. (2010). Tensiones y convergencias en torno a la apropiación social de la ciencia y la tecnología en Colombia. In CyT, C. de I. para la A. S. de la (ed.), *Deslocalizando la apropiación social de la ciencia y la tecnología en Colombia. Aportes desde prácticas diversas*. Bogotá: Maloka-Colciencias.

Gómez-Morales, Y. J. (2005). Política científica colombiana y bibliometría: usos. *Nómadas*, *22*, 241–54.

Hermelin, D. (2011). Un contexto para la comunicación pública en Colombia: de las herencias eurocéntricas a los medios para la acción. *Co-herencia. Revista de Humanidades*, *14*(8), 231–60.

Hernández, Y., Puello, K., Perafán, A. and Martínez-Dueñas, W. (2016). Aproximación a las relaciones entre Ciencia, Tecnología, y Sociedad en la Dinámica Investigativa de la Universidad del Magdalena. *Diálogos en Mercosur – Rede Acadêmica Série Diálogos en Red – Nuestra América, 2*, 7–23.

Hess, D. (1997). *Science studies. An advanced introduction*. New York and London: New York University Press.

Huergo, J. (2001). La popularización de la ciencia y la tecnología: interpretaciones desde la comunicación. *Seminario Latinoamericano Red-POP-Cono Sur, 14 al 17 de mayo de 2001*. La Plata.

Irwin, A. and Michael, M. (2003). *Science, Social Theory and Public Knowledge*. Maidenhead, Philadelphia: Open University Press.

Latour, B. (1992). *Ciencia en acción*. Barcelona: Editorial Labor.

Latour, B. (2007). *Nunca fuimos modernos. Ensayo de antropología simétrica*. Siglo XXI editores.

Lewenstein, B. (2003). *Models of Public Communication of Science & Technology*. Ithaca. Retrieved from edisciplinas.usp.br/pluginfile.php/43775/mod_resource/content/1/Texto/Lewenstein2003.

Lozano, M. (2005). *Programas y experiencias en popularisación de la ciencia y la tecnología: panorámica desde los países del Convenio Andrés Bello*. Bogotá DC: Convenio Andrés Bello.

Lozano-Borda, M. (2013). Una mirada hacia la medición de la apropiación social de la ciencia y la tecnología a la luz del programa Ondas. In J. Lucio (ed.), *Observando el Sistema Colombiano de Ciencia, Tecnología e Innovación: sus actores y sus productos* (pp. 311–43). Bogotá DC: Observatorio Colombiano de Ciencia y Tecnología.

Massarani, L., Amorm, L., Bauer, M. and Montes de Oca, A. (2012). Periodismo científico: reflexiones sobre la práctica en América Latina. Chasqui. *Revista Latinoamericana de Comunicación, 120*, 73–77.

Massarani, L. (2015). *RedPOP: 25 años de popularisación de la ciencia en América Latina*. Rio de Janeiro: Museu da Vida/ Casa de Oswaldo Cruz / Fiocruz / Unesco.

Michael, M. (2002). Comprehension, Apprehension, Prehension: Heterogeneity and the Public Understanding of Science. *Science, Technology & Human Values*, *27*(3), 357–78. doi.org/10.1177/016224390202700302.

Misión de Ciencia, Educación y Desarrollo (1995). *Colombia: Al filo de la oportunidad*. Colección documentos de la Misión, Tomo 1. Bogotá: Presidencia de la República-Colciencias.

Muñoz Quevedo, J. (1986). El estado actual del periodismo científico en Colombia. *Periodismo científico en los países del Convenio Andres Bello*, pp. 51–72. Bogotá, Colombia: Secretaría del Convenio Andrés Bello.

Official Journal of the Republic of Colombia. (2012). Article 29, Law 1530. Bogotá, DC, Colombia. Retrieved from svrpubindc.imprenta.gov.co/diario/index.xhtml.

Pabón, R. (2017). Apropiación social del conocimiento: una aproximación teórica y perspectivas para Colombia. *Educación y Humanismo*, *20*(34), 116–39. doi.org/10.17081/eduhum.20.34.2629.

Pérez-Bustos, T. (2009). Tan lejostan cerca. Articulaciones entre la popularisación de la ciencia y la tecnología y los sistemas educativos en Colombia. *Interciencia*, *34*(11). doi.org/10.1097/AJP.0b013e3182290d90.

Pérez-Bustos, T. and Tafur Sequera, M. (2010). *Deslocalizando la Apropiación Social de la Ciencia y la Tecnología*. Aportes desde Prácticas Diversas, Bogotá, Maloka-Colciencias.

Posada, E., Hoyos, N., Pantoja, A., Carvajal, C. and Marín, M. (1995). Apropiación social de la ciencia y la tecnología. In Z. Periodismo (ed.), *Ciencia y Educación para el Desarrollo, Informe de Comisionados III* (pp. 9–224). Bogotá DC: Imprenta Nacional.

Raichvarg, D. and Jacques, J. (1991). *Savants et ignorants : Une histoire de la vulgarisation des sciences*. Paris: Seuil.

Ramalho, M., Arboleda, T. and Hermelin, D. (2017). A cobertura de ciência em telejornais do Brasil e da Colômbia. *História, Ciências, Saúde – Manguinhos*, *24*(1), 223–42. doi.org/10.1590/s0104-59702016005000019.

Roqueplo, P. (1983). *El reparto del saber*. Gedisa. Retrieved from www.casadellibro.com/libro-el-reparto-del-saber/9788474321807/33327.

Vélez Lopera, N. (2013). Vida y obra de Lisbeth Fog : entender la ciencia para divulgarla. *Desde la Biblioteca*, *46*, 15–21.

Woolgar, S. (1988). *Ciencia: abriendo la caja negra*. Barcelona: Anthropos Ltd.

Timeline

Event	Name	Date	Comment
First interactive science centre established.	Museo de la Ciencia y el Juego – Universidad Nacional de Colombia	1984	
First national (or large regional) science festival.	Science fairs	1970s	Organised by the National Education Ministry of Colombia
An association of science writers or journalists or communicators established.	Asociación Colombiana de Periodismo Científico (ACPC) [Colombian Association of Science Journalism]	1976	
First university courses to train science communicators.	Science journalism course at the University Corporation Minuto de Dios	2000s	Taught by members of the Colombian Association of Science Journalism.
First master's students in science communication graduate.	There is no specific master's degree in science communication	No	2003: Master's at the National University of Colombia, but in appropriation and communication of science
First national conference in science communication.	Roundtable 'Creation of a public awareness of education, science and culture', Bogota	1969	1969: National Congress of Science Journalism took place in Medellín 1969: Creation of the Ibero-American Association of Science Journalism
National government program to support science communication established.	This was enunciated in the policy for Colciencias called *Plan for National Consensus on Science and Technology*	1983	It was based on five working areas, one of which was the popularisation of science
First significant initiative or report on science communication.	*Scientific Activities for Youth*	1965	
National Science Week founded.	National Science Week	2006	10 regions joined this initiative
A journal completely or substantially devoted to science communication established.	*Science, Technology and Development Journal*	1977	
First significant radio programs on science.	National radio program on Saturdays dedicated to scientific dissemination	1976	

Event	Name	Date	Comment
First significant TV programs on science.	*Dissemination and scientific-technological training*	1984	A co-production of Colciencias and ICFES on research projects, technological development
First awards for scientists or journalists or others for science communication.	National Award for Scientific Merit	1989	Organised by the Colombian Association for the Advancement of Science and Technology
Other significant events.	The term 'social appropriation of science and technology' first used in science policy	1995	
	National policy for social appropriation of science, technology and innovation	2005	
	National Strategy of Social Appropriation of Science and Technology	2010	

Contributors

Dr Sandra Daza-Caicedo leads research in the social appropriation of science and technology. She was co-editor of the Colombian science and technology indicators yearbook and was in charge of the national surveys on public understanding of science and technology.

Luisa Barbosa-Gómez is a researcher at the Studies Centre on Science, Communication and Society at Universitat Pompeu Fabra (CCS-UPF) in Barcelona and the academic coordinator of the master's degree in scientific, medical and environmental communication at UPF – Barcelona School of Management.

Dr Tania Arboleda-Castrillón is an independent consultant and researcher on the social appropriation of science and technology. She recently worked as a consultant for the National Administrative Department of Science and Technology in Colombia.

Marcela Lozano-Borda is a professor of the Department of Communication of the Pontificia Universidad Javeriana in Bogotá. She coordinated the Colciencias (National Department of Science and Technology) social appropriation of science area, where she led the design and formulation of the national strategy.