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Intergovernmental Scientific Networks in Latin America: Supporting Broader Regional Relationships and Integration

Marga Gual Soler

INTERNATIONAL science cooperation networks are increasingly contributing to improving relationships among countries and to the integration of world regions.¹ Latin American countries have a long tradition of bilateral, regional, and global scientific cooperation as an essential tool to strengthen and complement national capacities for research, technological development, and innovation.² However, despite numerous multilateral initiatives, the region has not fully leveraged the opportunities and additional benefits that scientific collaboration offers to facilitate international relations, address shared transnational challenges, and achieve common development goals. The multiplicity of forums at the political level, budgetary problems, political instability, and the gap between science and policy have limited the effectiveness and relevance of multilateral scientific initiatives on broader political and societal decisions.³ The accelerated growth of Latin America in the last decade represents an opportunity to build scientific and technological capacity while contributing to strengthening the relationships among its countries in the twenty-first century.

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To provide insights on how such relationships could be established or strengthened, this paper analyzes how two regional science cooperation initiatives, the Ibero-American Programme for Science, Technology and Development (CYTED) and the Inter-American Institute for Global Change Research (IAI), contributed directly or indirectly to Latin American regional integration over the past decades. Both networks operated initially as North-to-South initiatives driven institutionally and financially by Northern countries but evolved into more horizontal, South-to-South cooperation networks partly because of the emergence of politically stable and economically growing middle-income countries in Latin America. The analysis provides an understanding of the motivations, attributes, and practices behind the two networks and suggests recommendations for strengthening the value of science as a vehicle for regional cohesion and improved international relations. Identifying the networks' differences and similarities, their level of political relevance, and their autonomy from governments may inform future national, regional, and global efforts in developing science diplomacy instruments and strategies in the region.

The Ibero-American Programme for Science, Technology and Development

Origins

The Ibero-American Programme for Science, Technology and Development (CYTED) was established by a group of researchers and administrators from Spain and Latin America who, in the early 1980s, discussed the possibility of creating a formal structure for fostering scientific cooperation among Spain, Portugal, and Latin America. The program would provide sustainability to existing collaborations and a framework for many more collaborations in the future. What made this proposal distinctive was that it envisaged the establishment of a mechanism that would not only enable collaboration between Spanish and Latin American researchers, but that would also create a new model for South-to-South cooperation among Latin American countries with little experience in scientific exchange among themselves.⁴ The initiative was coordinated in Spain and received initial support and financing from the Spanish Ministry of Education and Science—led by Federico Mayor Zaragoza, a renowned scientist, politician, and diplomat who would go on to become a director-general of the United Nations Educational, Scientific and Cultural Organization (UNESCO). Mayor Zaragoza had forged ties with the founding researchers of CYTED during his scientific career, which gave the scientists the political support needed to start an international program from the bottom-up.

The newly formed network began organizing international meetings and research exchanges and soon recognized the potential of the initiative and the need for more formal support to scale it up. In 1984, nineteen national science and technology agencies in Latin America, Spain, and Portugal signed a basic framework agreement in Madrid, Spain. The United Nations Economic Commission for Latin

America and the Caribbean (ECLAC), the Organization of American States, and UNESCO were also included as observer bodies.⁵

The main goal of CYTED was to promote cooperation through activities aimed at establishing and strengthening collaborative networks between Spain, Portugal, and Latin American countries to advance science and technology for economic and social development. However, no less important was the medium- and long-term objective of achieving regional integration and cohesion of an Ibero-American community through the transfer of knowledge and technology between researchers, institutions, and countries. In the early 1990s, the dissolving of the East-West bipolarity with the end of the Cold War made the gap between North and South more explicit, and in this context, the Ibero-American political space arose as a forum for consultation and dialogue endowed with its own characteristics.⁶ The Spanish government sought to change the narrative about the relationship between Spain and Latin America, which had been largely based on a conservative and unilateral vision. Instead, Spain wanted to leverage the historical and cultural ties that linked Spanish- and Portuguese-speaking states, transcending ideological and economic battles, through an instrument of unity and development based on dialogue, cooperation, and solidarity operating as a “common knowledge market,” officially known as the Ibero-American Space.⁷

At that time, CYTED was the only multilateral instrument that encompassed all Ibero-American countries. In 1989, Jesús Sebastián, deputy director-general of the Institute for Ibero-American Cooperation at the Spanish Agency for International Development Cooperation, led the transformation of CYTED into the flagship development cooperation mechanism between Spain, Portugal, and Latin America. CYTED expanded and gained considerable political weight among member states, culminating with a resolution of the Ibero-American Conference of Heads of State and Governments (later known as the Ibero-American Summit) that formally incorporated CYTED as an instrument for regional integration in 1992.⁸ In the program’s first decade, its budget grew considerably, from US\$300,000 a year to US\$3.5 million,⁹ mostly coming from Spain. The CYTED General Assembly became the prime forum of science policy discussions in Latin America and the first instance in which the dialogue about the regional integration of Latin America included the themes of science, technology, and innovation.

Organization

CYTED was built around an innovative dual organizational framework combining institutional and functional structures to give the program the flexibility and freedom to maneuver. The institutional body consisted of the signatory agencies of participant countries (generally the bodies responsible for science policy) that constituted the CYTED General Assembly and were responsible for making decisions on the strategy, content, and financial contributions of each country to the program. The functional structure was defined by subprograms

divided by scientific fields. Each subprogram had an international coordinator appointed by the CYTED General Assembly based on proposals from the signatory agencies. The coordinators were given the freedom to identify the best researchers in their scientific area across the twenty-one member states and to propose thematic networks and activities. Networks were required to include at least six participating countries with a balance of more and less developed countries.

The overall coordination, management, and representation of the program were the responsibility of the secretariat in Spain, and, until 2012, all elected secretary-generals were Spanish. Importantly, CYTED was initially envisioned not as a research funding instrument, but as a research cooperation program. The basic framework agreement stated that members were responsible for financing costs associated with the research activities of their own national groups and in-kind donations, while all costs of research exchanges, training courses, publication costs, and coordination meetings would be met by the Spanish government.¹⁰

As the program consolidated and began to prove its value and visibility as an important instrument for science cooperation, changes in management led to a revision in the organizational framework in the 2000s, replacing the coordinator-led networks with annual competitive open calls for proposals to ensure transparency and fairness.

Achievements and Challenges

CYTED has significantly contributed to developing scientific capacity in Latin America during its thirty years of existence. Up to 2013, 441 thematic research networks and 680 innovation projects had been funded with the participation of more than 8,400 research groups from all Ibero-American countries, with the direct involvement of more than 28,800 scientists from the twenty-one CYTED countries.¹¹

Direct results of CYTED include the production of scientific knowledge such as large-scale genome sequencing projects or coordinated networks to detect emergent virosis in the region that would have been difficult or impossible to obtain by separate groups. CYTED also was responsible for an increase in the number of collaborative publications and scientific output in many Latin American countries, particularly smaller ones. For some countries in Central America and the Caribbean, CYTED proved to be instrumental in developing their national science and technology systems. A remarkable example can be found in Panama, where participation in the CYTED Medicinal Chemistry Subprogramme alone increased Panama's scientific productivity by 700 percent between 1991 and 1998, as measured in the number of collaborative publications that resulted.¹²

The number of participating researchers per country has varied greatly from about one hundred a year for Central America and Caribbean countries to more than a thousand a year in Argentina, Brazil, Colombia, Mexico, and Spain.¹³ Countries that were less developed in science and technology experienced

more difficulties in joining group research projects. This was due to a variety of causes, including inadequate dissemination of information about the funding calls by signatory agencies, lack of research groups capable of participating in international projects, and, as CYTED did not directly fund research, insufficient national funding to support these groups. In the later period, CYTED required all proposals to include researchers from less developed countries to contribute to building capacity in their national science institutions.

In 2009, CYTED introduced strategic projects in priority areas identified as relevant for the socioeconomic challenges of Latin America. Their designation helped mobilize supplementary resources from national science agencies and governments to promote research that could have a direct impact on regional development. The most successful example was the sequencing of the genome of the common bean.¹⁴ The project, which was led by Mexico with participation from Argentina, Brazil, and Spain, had a twofold objective: to advance knowledge and technological improvement of the most important agricultural crop in the region and to build capacity in genome sequencing in scientifically less developed countries.

Despite being an intergovernmental agreement, CYTED was never given legal status in any country. Instead, in those early years, it was always hosted by different Spanish academic or governmental institutions. This dependence on Spain turned into one of the organization's biggest weaknesses. This was manifest in a lack of member state annual contributions and how the organization's finances were subject to changes in the Spanish political and economic landscape, as happened after the global financial crisis of the late 2000s.

The Inter-American Institute for Global Change Research

Origins

At its creation in 1992, the Inter-American Institute for Global Change Research (IAI) was envisaged as an instrument for scientists and decision makers of countries in the Western Hemisphere to jointly frame, understand, and tackle critical cross-border and regional issues associated with global change and their socioeconomic implications. The nineteen member countries in the Americas that formed the intergovernmental organization would fund collaborative research, training, and policy-relevant communication.

IAI traces its origins back to 1990, when U.S. President George H. W. Bush convened leaders from seventy countries to a White House Conference on Science and Economics Related to Global Change.¹⁵ He called for the establishment of sustained multilateral cooperation agreements for global change research throughout the world—not just in industrialized countries—to guarantee open access and exchange of worldwide scientific talent, data, resources, and facilities. In

order to maintain U.S. leadership on issues associated with the profound economic and social implications of responding to global environmental change, the U.S. National Science Foundation (NSF) promoted the creation of a series of regional institutes and networks of hemispheric scale: one in the Americas, one in Europe-Africa, and one in Asia-Pacific.¹⁶ The international conditions were favorable after the liberalization of Europe and the Soviet Union, as countries could now openly acknowledge their severe environmental problems and seek international assistance to solve them. In particular, tropical Latin American countries such as Mexico and Brazil began to admit their serious urban pollution problems, biodiversity loss, and ecosystem destruction.¹⁷

After a series of follow-up meetings, IAI was established in May 1992 in Montevideo, Uruguay. The initial agreement was signed by Argentina, Bolivia, Brazil, Chile, Costa Rica, the Dominican Republic, Mexico, Panama, Peru, the United States, and Uruguay, joined within a few months by Canada, Cuba, Ecuador, and Paraguay. Subsequently, Colombia, Guatemala, Jamaica, and Venezuela signed the agreement to bring the membership to nineteen countries. The establishment of IAI reflected both the vision of the scientific community and the political will of the states of the region to achieve the best possible international coordination of natural and social scientific research on the extent, causes, and consequences of global change in the Americas and to serve as an effective interface between the research and policy processes.

Organization

The first IAI Secretariat was hosted by NSF from 1994 to 1996. Afterwards, IAI became fully operational at the IAI Directorate in Brazil. To promote broader representation in the region, in June 2010 IAI distributed its headquarters among Uruguay, Argentina, and Brazil, with the directorate based in Montevideo and the Office for Science-Policy Liaison in Buenos Aires, while São José dos Campos in Brazil continued to host the Office for Science Development.

IAI consists of four major institutional organs to implement its mission. The Conference of the Parties (CoP) is the principal policy-making organ of the institute, which includes representatives from signatory agencies of each of the member countries. The IAI Executive Council serves as the executive organ of the institute, comprising a subset of elected representatives of the CoP. The IAI Scientific Advisory Committee was established as the scientific advisory organ of the institute, appointed by the CoP. The recently established IAI Science-Policy Advisory Committee has been charged with improving and broadening the links between the scientific work of IAI and the policy-making community.

IAI funds collaborative research through a merit-based, competitive peer-review process. Projects must involve at least four countries in the Americas and focus on global change issues of regional importance based on the IAI Science Agenda. Research focuses on regions with ecosystems and large populations that

are vulnerable to various impacts of global environmental change, such as climate change, biodiversity, agriculture, oceans, and socioeconomic systems, but that lack the scientific capacity, financial resources, or political will of individual governments to engage in science-based planning. The multinational and interdisciplinary nature of the projects funded by IAI fosters research that no country can undertake on its own, but the outcomes benefit each of the participating countries and the region as a whole.

Priority-setting has been based on input from a broad cross-section of the science community in member countries, from the IAI governing bodies, and from interactions with other international programs and conventions. IAI formulates its research agenda through a combination of top-down and bottom-up approaches in order to harness both the national science programs of member states and the creativity of the region's science communities.

Achievements and Challenges

IAI has sought to produce research that provides policy-relevant information to decision makers in the private, governmental, and legal sectors. The innovative approach used by IAI in research funding and capacity building promotes collaboration and mutual understanding among different stakeholders and scientific disciplines that would not normally interact. In particular, IAI requires the results of the research to be written in a language accessible to diverse audiences. Furthermore, all funding proposals must include at least two countries and two different disciplines, including social sciences and economics, to enhance the human dimensions of global change research. However, there is disproportionate participation of researchers from big countries, especially Argentina, Brazil, Chile, and Mexico.

According to a 2007 external review,¹⁸ IAI's biggest contribution has been in the area of capacity building. IAI conducts intensive training institutes linking social and natural scientists, practitioners, decision makers, and industry leaders from all countries in the Americas with the goal of establishing interdisciplinary dialogues to identify policy-relevant research. The training institutes are conducted in small countries that do not have a strong science system in an effort to level the playing field. Another important contribution has been strengthening capacities in research areas traditionally underrepresented in the region. For example, as a result of IAI-funded research, the field of regional oceanography has made more progress in Latin America in the last ten years than in the previous fifty.¹⁹

Nonetheless, the same report concluded that IAI research outputs had not been adequately translated into policy-relevant discourse and action. Participants of IAI programs interviewed by the author cited a lack of information concerning policy makers' needs, inadequate dissemination of IAI activities, insufficient consideration of the social aspects of global change research to make them policy-relevant, and the lack of formal opportunities for engagement between scientists

and policy makers.²⁰ Since the release of the external report, IAI has worked well to raise awareness about its programs and to increase its influence among policy makers. Specifically, several of its research outputs have been used to inform various laws and climate change adaptation and mitigation strategies.

An example of policy-relevant IAI research to the region as a whole is a study of air pollution on urban emissions that was a source of consultation for transportation authorities in Argentina and Colombia in the design of their municipal emission control programs and later became a South American integrated monitoring network working closely with governments.²¹ Another successful case is the Tropi-Dry research network comprising researchers from Brazil, Canada, Costa Rica, Mexico, the United States, and Venezuela, from such diverse disciplines as conservation biology, ecology, sociology, anthropology, forestry, and policy analysis. Data from this project led to overturning a Brazilian law to protect more than 16,000 square kilometers of dry forests and their indigenous populations in Minas Gerais, Brazil.²²

Similar to CYTED, one of the biggest challenges IAI has faced throughout its history is a shortfall in member state contributions and the dependence on NSF for program funds. This was due to a combination of factors including lack of institutional continuity of designated representatives, lack of political will, and lack of visibility of the networks in national governments and research agencies. There were even bureaucratic barriers to making international money transfers to the secretariat. In addition, the bureaucracy of many Latin American governments caused delays and problems for the secretariat in obtaining contributions. There were also substantial difficulties in distributing grants to successful proposals because of variations in financial institutions, government rules, and academic systems across the hemisphere, particularly between Northern institutions and Latin America, which led to delays in the start of several projects for months or even years. Another significant barrier IAI faced was that most activities were conducted in English. Although the IAI newsletter is also published in Spanish, the dominance of English for communication limited the involvement of some members of committees and placed some proposals at a disadvantage.

From North-to-South to South-to-South Cooperation

As CYTED and IAI matured, and as the political, economic, and scientific environments changed in the Northern and Southern member countries of the organizations, one feature that has emerged is the strengthening of South-to-South cooperation. This is apparent in the funding flows and shifting of participation and leadership in both CYTED and IAI.

The voluntary nature of financial contributions has historically been a recurrent problem of both organizations, reflecting the strong financial dependence on Northern countries and absence of commitment from certain Latin American

member states, particularly smaller ones. In the late 2000s, a combination of management and financial problems forced the decline of Spanish leadership in CYTED. Spain's financial contribution to the organization had been increasing annually until the country's economy was hit by the global financial crisis. CYTED's budget dropped from €7 million (€4 million of which was provided by Spain) until 2011 to €2.6 million in 2013.²³ During that period, significant changes were made in the institutional and functional structures that resulted in the loss of the independence between the two "wheels" of the program.

Given the decline in Spanish leadership, Argentina spearheaded a proposal for Latin American countries to take ownership of the program. It quickly gained traction. The Spanish government, undermined by the financial crisis, had drastically reduced its financial contribution and did not propose a candidate for secretary-general in the next election. In 2012, the CYTED General Assembly for the first time voted to install a Latin American, Alberto Majó from Uruguay, in the position. The new Latin American leadership brought changes in the direction and strategy of CYTED, injecting new ideas and momentum to the program.

A parallel situation occurred in IAI. NSF, on behalf of the U.S. government, funded a disproportionate percentage of IAI costs (approximately 87 percent of core operational and research costs until 2003), a much larger share than the 25 percent initially envisaged.²⁴ In recent years, many member states have made in-kind contributions, and IAI researchers have been extremely successful in securing additional money by leveraging IAI funding. For instance, for the Second Collaborative Research Network (CRNII 2006–2012), the United States provided US\$10.4 million, while the projects were able to raise US\$22.5 million in complementary funding.²⁵

Collaboration on the North-to-South axis was especially strong in the early stages of CYTED and IAI when most principal investigators were from the North. Over time, principal investigators from the South grew in number, in step with the enhancement of regional research capacity of Latin America, and both networks became practically South-to-South cooperation instruments. For example, in IAI the majority of proposals submitted and funded shifted from the United States and Canada (twenty-one of twenty-six initial grants) to Argentina, Brazil, Mexico, and other southern countries (twenty-five of the thirty-eight grants in the 2002–2006 period). Of the twelve projects under CRNII, eight were under Latin American leadership.²⁶

From Regional Integration to Global Engagement

CYTED had long aimed at serving as the biregional bridge between the European Union (EU) and Latin America, but negotiations within the EU had been difficult because such an arrangement could potentially favor Spain and Portugal over the other EU member states.²⁷ Nevertheless, in 2014 the European Commission

selected CYTED as the secretariat for a new EU-Latin America research cooperation program called ERANet-LAC, adding a strategic dimension to the current and future relevance of CYTED. ERANet-LAC is aimed at fostering the involvement of national and international research and innovation funding organizations from Europe, Latin America, and the Caribbean.

IAI has conducted regional assessments and provided input to international global change frameworks, conventions, and multilateral bodies, such as the Intergovernmental Panel on Climate Change, the United Nations Framework Convention on Climate Change, ECLAC, the World Bank Global Environmental Facility, and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.²⁸ Most recently, IAI has been selected as the leading institution for the Latin American node of Future Earth. The mission of the new ten-year international research initiative is to develop the knowledge for responding effectively to the risks and opportunities of global environmental change and for supporting the transformation toward global sustainability.²⁹ IAI will develop support structures and science development initiatives for Future Earth under a new partnership with the International Council for Science (ICSU) and UNESCO.³⁰ IAI is also a founding partner of the new UNESCO–Avina Foundation Regional Centre for Climate Change and Decision Making established in Montevideo, Uruguay, to train managers and decision makers from the public and private sectors of Argentina, Brazil, Chile, Paraguay, and Uruguay. Finally, IAI is planning to engage in biregional science cooperation schemes with the EU. Recently the directorate has begun participating in science cooperation planning meetings between Latin America and Europe to identify common areas of research interest under the new EU Framework Programme Horizon 2020.³¹

Facilitating Diplomacy

The signing and ratification of intergovernmental agreements by most Latin American countries is the first measure of success for CYTED and IAI, especially since the agreements included a commitment to the free and open exchange of data and to financial contributions to a core office. Both organizations created opportunities for their researchers, projects, and parties to make connections at all levels and created spaces for the incorporation of science into policy, decision making, and governance in Latin America.

CYTED was key in the development of a new governance model for Panama's biodiversity hot spots. In 2007, CYTED put forward a proposal to build an international Meso-American Scientific Research Station in the Coiba archipelago to protect an area with great scientific value from the impact of tourism. Researchers from Panama and Spain initiated a process of interdisciplinary dialogue involving the government of Panama, the CYTED leadership, the Spanish Agency for International Development Cooperation (AECID), conservation authorities, local

fishermen, and indigenous peoples in what became the first intersectoral decision-making committee in the country.³² Researchers secured investment from AECID, which was used to persuade the government of Panama to complete the project, and Coiba was declared first a national park and later a UNESCO World Heritage Site. The presence of CYTED at the discussion table from the start was a landmark in intersectoral discussions in Panama and a clear example of how international collaboration brought scientific input into national government decisions before a legal or institutional framework for scientific advice was established.

For IAI, the commitment to standardization and exchange of data sought to break down some of the longstanding traditions of guarding geophysical, ecological, satellite, and meteorological data in the name of national security. It also sought to encourage some countries to contribute more to key observational networks, sometimes in nontraditional ways such as using their military and other resources to gather the data. A remarkable example was the joint effort between IAI-funded scientists and the Argentine, Brazilian, and Uruguayan navies and air forces to carry out observations in jurisdictional waters of the three countries.³³ This kind of collaboration had never happened before, and it resulted in the most relevant data set for the region. After the success, the goodwill among the three countries' navies has continued and several other projects are being conducted cooperatively.

Overall, IAI has been successful in building scientific capacity, networking across regions and political boundaries, and positioning Latin America as a key actor in global change discussions. The IAI director, Holm Tiessen, points out that "it's extremely difficult to combine so many nations, cultures, development histories etc., with clear political action. Therefore the strength of IAI is bringing together countries such as the U.S. and Bolivia."³⁴ Mutual respect and collaboration across disciplines, countries, and cultures have contributed to knowledge generation applicable in different settings and to equity in science institutions across the continent. IAI has helped shape the research community more like a network than the pyramidal model in the past.³⁵

IAI has helped create research networks that transcend political divides, help build bridges, and reduce mistrust among nations with previously limited joint environmental research and policy. For example, perhaps the greatest difficulty arose in connection with Cuba. The country is a full member of IAI and submitted good proposals, but NSF funds could not be used to fund Cuban participation because of longstanding U.S. government sanctions on Cuba. Lacking support from other countries, the IAI Directorate had to stretch its own budget to help keep Cuba involved.³⁶ Consequently (the very limited) non-U.S. source funding was used to support any Cuban projects or project components.

IAI has increased its outreach efforts in recent years, making the organization much more visible among policy makers including ministries of foreign affairs and diplomatic personnel. As a result, Mexico, Argentina, and other countries are

starting to use IAI as an instrument for diplomacy. For example, a joint reception of diplomatic representatives from the embassies of all IAI member countries and IAI researchers was organized by the Argentine Ministry of Science, Technology and Productive Innovation in Buenos Aires in 2011 to showcase how IAI research benefits Argentina, Latin American researchers, and the region as a whole. Another example was the use of remote sensing data and satellite imagery generated by IAI as a legal basis for land-use decisions during a dispute resolution in the border between Costa Rica and Nicaragua.³⁷

Lessons and Future Directions

IAI and CYTED have achieved remarkable success according to their own objectives as international intergovernmental organizations for scientific cooperation. Both have proven to be valuable instruments for regional integration in Latin America through science and technology cooperation, undergoing a process of transformation from North-to-South networks to South-to-South cooperation models. Their research agendas are increasingly driven largely by Latin American researchers, contributing to reducing the external technological dependency of the region by strengthening endogenous science and technology systems. While supporting South-to-South cooperation is important, both IAI and CYTED illustrate the importance of maintaining the North-to-South dimension of the research networks to encompass important sources of scientific innovation and access to know-how and advanced technologies, such as satellite imagery and genome sequencing.

However, while these changes reflected the positive transitions of some Latin American countries to middle-income nations, they also reinforced the asymmetries in scientific capacity between countries, as the least developed countries were often left behind, unable to financially support their own researchers.

The experience of both networks has shown that over-reliance on a single country as a funding source left them vulnerable at several points in their history. In an increasingly multipolar world, diversification of funding sources will be essential for the networks to be less vulnerable to financial and political instability of member states. IAI has taken these steps by signing an agreement with science funding agencies from ten countries to establish a co-funding mechanism to support research and capacity-building initiatives.³⁸ If implemented, this new funding strategy, modeled after the Belmont Forum, has the potential to address several of IAI's weaknesses: overcome the heterogeneity of scientific systems that often translates into disparities in the political level in member states; improve funding commitments; leverage political weight and national visibility; and align the national research priorities of member states with regional development goals and foreign policy priorities.

Both networks have realized that integrating natural and social sciences is essential for policy impact. IAI has taken steps toward achieving this goal. CYTED should, in light of the changing geopolitical landscape of Latin America vs. Ibero-America, continue to design more inclusive cooperation modalities to bridge asymmetries between countries to tackle issues critical to the development and social inclusion in the region.

As a bottom-up instrument for regional integration through science cooperation, CYTED has been the biggest contributor to establishing an Ibero-American “space” or community of knowledge. It has also promoted greater regional cohesion and homogeneity in science policy mechanisms by providing a unique dialogue space between those responsible for science and technology policy in member states. It is important to note that preserving the independence between the political and scientific bodies of international research networks can give immunity to political and institutional changes in times of political instability and fragile governments, as illustrated by CYTED. The downside of too much independence from the government is that it can have the opposite effect and leave the organization operating in a vacuum. This was the case of IAI in some countries, as dialogue with decision makers had been shaped largely by chance and opportunity until recent years. More structured and strategic arrangements are necessary for the producers and users of science to come together in a more effective way.

In the case of CYTED, a bottom-up, informal, and trust-based approach based on preexisting connections between scientists and policy makers proved to be essential. It guaranteed top quality of the research networks at the initial stages, and it ensured high-level political weight (especially since many senior scientists in Latin America achieve prominent political positions), although it sacrificed transparency and objectivity in the selection of participants and allocation of resources. Once a critical mass of high-level scientists across all member states had been achieved to give enough visibility and prestige to the program, a competitive, open-call based strategy was adopted to guarantee excellency, transparency, and fairness.

The networks developed by researchers lasted beyond the duration of the specific projects. This enabled Latin American teams to leverage their relationships to secure external grants. In particular, CYTED provided Latin American scientists with access to European funding via their Spanish and Portuguese counterparts.³⁹ CYTED estimates that research networks have returned twenty to fifty times the initial investment.⁴⁰

CYTED and IAI have had crucial roles as points of anchorage to leverage external funding and enable the participation of Latin American institutions, researchers, early career scientists, and policy makers in biregional and global forums in which they would not have been able to participate in individual capacity. Moreover, the successful participation of countries with difficult political relations, such as the United States and Cuba, in international scientific networks

illustrates how the benefits of a multilateral organization surpass the capabilities of bilateral partnerships.

CYTED and IAI have enhanced South-to-South scientific cooperation in Latin America by linking thousands of scientists, training human resources in new methodologies, and establishing research groups in most countries even in periods of political and institutional instability. The collaborative relationships initially formed through participation in CYTED and IAI activities have developed into genuine integration of the international teams, involving mutual respect and harmonization of different scientific cultures and know-how. Especially during its early period, CYTED put special emphasis in avoiding the traditional Northern dominance, or “scientific colonialism.” By conducting societally relevant research and building capacity, CYTED and IAI have been able to build trust between scientists and policy makers across the region and bridge very different research cultures in a more informal, decentralized, and horizontal structure that researchers felt was much more cooperative and egalitarian than traditional, more hierarchical, and competition-oriented schemes.⁴¹ Acknowledging the differences in research cultures between Northern and Southern countries is essential for fruitful collaboration, and the increase in southern leadership of networks has resulted in greater attention to equity issues in global change research.

Intergovernmental research networks such as IAI and CYTED are uniquely positioned to play a dual role in building scientific capacity in Latin America in the twenty-first century. First, they can help countries strengthen their national scientific systems and coordinate their science policy instruments to leverage the scientific potential of the region. Second, they can serve as a point of anchorage for the Latin American region as a whole to engage in other regional and global partnerships, such as the EU-LAC Joint Initiative for Research and Innovation and Future Earth, in order to achieve full representation in the global consortia that will shape the role of science in development and sustainability. **SD**

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