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How Science Policies Influence Ecological User-Engaged Research in Brazil and Peru?

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By

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Abstract

As a growing body of literature suggests, to resolve current complex socioenvironmental problems such as climate change, deforestation, and the health crises unraveled by Covid-19 pandemic, requires scientific engagement across disciplines and beyond academia. Through the analysis of written policy documents and 70 semi-structured interviews with researchers in Brazil and Peru, this thesis investigates the Brazilian and Peruvian S&T governance models and policies, looking specifically at academic publication rewards, incentives and requirements, how ecologists and environmental researchers interact with such policies and whether they impact researchers' ability to do engaged work.

While Peru has just started the process of accrediting its universities and creating requirements for individuals and institutions through the New University Law, Brazil has become the most academically productive country in Latin America, attributing its success, in parts, to the efforts of CAPES' (Coordination of Improvement of Higher Education Personnel) robust Graduate Program Triennial Evaluation System. Both the New University Law and CAPES' Triennial Evaluation rely heavily on international publication point systems to qualify what counts as "good science" with a series of implications to researchers and knowledge-production dynamics regionally, within each country, as well as in Latin America at large.

One of the main conclusions of this study is that the colonial and white supremacist legacy of academia is translated into National science policies that obsess over the written word and quantification methods. Such policies incentivize alienated production of papers – mostly written in English and often protected by paywals – which are predominantly read and filtered as "relevant" or "irrelevant" by the standards Global North academics and international publishing corporations, at the expense of local knowledge and scientific sovereignty. That dynamic also contributes to aggravating internal disparities within national boundaries, as researchers in both the Peruvian and Brazilian Amazon report to be seen as an object of science instead of political and scientific agents. This comparative study hopes to provide critical insights to help strengthen and develop more equitable knowledge production systems in Brazil and Peru that take into account regional idiosyncrasies as well as local knowledge systems and expertise.

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I am eternally grateful for the support, care, faith, inspiration and strength of my three main matriarchs: Wanda Maria de Oliveira, Maria Ines de Oliveira and Ivani de Oliveira, without the support of whom this thesis and my studies would've never been a possibility, not even in my wildest dreams. They fed me, nourished my curiosity about humans and the natural world, and educated me to stay in a path of humility, dignity and respect for others, before I even knew how to say my first words. Your dreams for me to learn, study and grow into someone who can see the complex picture of the world we live in, were part of my motivation and I hope I can have more space, time and resources to give back to you and our community now that I have finished this degree. I am also grateful for the vision, wisdom and protection I have received from the matriarchs and ancestors that came before these three, about whom I know so little but feel so much love for. Imagining that academic degrees and professional successes would have been your biggest dreams for me would be a dishonor to the sacrifices that you were forced into due to slavery, colonialism, wars, oppression and capitalism. As people who were physically, emotionally and materially exploited and forced to work nonstop, I hope that I can honor your legacy by living this present achievement with joy and working towards a future where leisure and pleasure are a part of our daily routine; and relationships, social dialogue and self-determination are valued above professional status or productivity.

I need to express my gratitude for CNPq-founded Program Ciencia Sem Fronteiras, created under Dilma Roussef's administration. The program has allowed me to meet, learn and work with amazing people from all over the world who are interested in a sustainable and socially just world. The program provided the material conditions that allowed me to continue my education in Brazil and the United States. I am particularly grateful for the 8 years of mentorship of Dr. Mark Neff who incessantly believed that I could finish this dissertation and gave me the opportunity to learn how to critically assess some of the discomfort that I encountered as an immigrant and working-class woman of color navigating academia. I am also grateful for the instructions, solidarity and provoking dialogues I've sustained with colleagues and mentors at WWU such as Dr. Rebekah Paci Green, Dr. Ricardo Lopez, Dr. Josh Ceretti, Samara Almonte, Juan Garcia and Aisha Mansour. In Brazil, I counted with the endless support, friendship and thoughtful contributions of Fabia Steyer, Raul do Carmo, Eduardo Ayres, Yuri Talacimon, Rosseline Tavares, and Dr. Marcelo Nivert. At home, my partner Ty Campbell, and friends, Makenzie Graham, Neah Monteiro, Kat Davis, Vicky Matey, Chelsea Thaw, Spencer Rodimir, Heather Haughland and Antonio Diaz made sure that I was fed and sane to carry my work in and out of academia.

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Main Acronyms' Key

Organizations Acronyms, and/or Platform's Names	Organization's Name (in Portuguese or Spanish)	English Translation	Description
CNPq	Conselho Nacional de Desenvolvimento Científico e Tecnológico	National Council for Scientific and Technological Development	Founded in 1951, CNPq is an organization of the Brazilian federal government under the Ministry of Science, Technology, Innovations & Communications, dedicated to the promotion of scientific and technological research and to the formation of human resources for research in the country. Its objective is to promote research and scientific development in the country. CNPq is responsible for making possible and integrating the advancement of academic research in Brazil. It hosts important academic networking platforms, such as the Lattes Curriculum platform, and provides scholarships for undergraduate, master's, doctoral, postdoctoral, visiting and senior research researchers.
CAPES	Coordenação de Aperfeiçoamento de Pessoal de Nível Superior	Coordination of Improvement of Higher Education Personnel	Founded in 1951, CAPES Foundation is a Brazilian federal government agency under the Ministry of Education, responsible for quality assurance in undergraduate and postgraduate institutions in Brazil Through a system called Triennial Evaluation created in the 70's, CAPES evaluates educational establishments periodically and grades them according to their productivity in Qualis journals. Scores range from 1 to 7, where 1 is the lowest — the maximum that an institution offering up to a master's degree will gain is 5, whereas an institution offering a doctorate will gain up to 7.

Qualis	-	-	National ranking system for Journals, which serves to inform the Triennial Evaluation of graduate programs in Brazil.
FAPESP	Fundação de Amparo à Pesquisa do Estado de São Paulo.	São Paulo Research Foundation	Founded in 1962, The São Paulo Research Foundation is a public foundation located in São Paulo, Brazil, with the aim of providing grants, funds and programs to support research, education and innovation of private and public institutions and companies in the state of São Paulo. According to the São Paulo State Constitution, FAPESP receives 1% of all state tax revenue. There are other regional "FAPs" in Brazil organized per state, none with as much revenue as FAPESP.
SciELO	-	Scientific Electronic Library Online	SciELO is an open access bibliographic database and digital library, created in 1997 through a partnership with several scientific agencies, in the context of challenges faced by researchers in Brazil and Latin America to deal with language barriers in addition to the difficulties to have access and make visible their scientific production. **History:** At the time, a very low percentage of Brazilian journals were indexed in international databases such as Web of Science (WoS) and SCOPUS, and a variety of those were still distributed in paper to few national institutions who could afford the subscription. In response to the rising demand to do, share, evaluate and publish peer-reviewed intellectual production of the Latin America, BIREME (Latin American and Caribbean Center on Health Sciences Information) in association with FAPESP and CNPq funded SciELO. The initiative later expanded across continents, including some African and European countries, such as South Africa, Portugal and Spain. SciELO became an important platform for researchers from luso-hispanic countries in the Global South to publish findings in their first languages and allowed for the creation of policies valuing locally-relevant knowledge

			production in a way that was accessible beyond internationalized institutions and academic centers. **Relevant research findings:** SciELO has, however, started to push for English language publication in a response to the organizational and international pressure to increase their "impact", measured by number of citations and other indirect quantitative bibliometrics. A prominent science policy researcher with whom we spoke in 2014, suggested that the recent boost in Brazilian productivity was swayed by an agreement between Thomson Reuters and CAPES, in which Brazil purchased access to their database for a variety of universities and received in exchange the incorporation of several Brazilian journals to the WoS database. For him, this justifies how the rising of scientific productivity with Brazilian authorship in indexed databases is still counterbalanced by the decrease in scientific impact (Interview Subject BR 25)
WoS (formerly owned by Thomsons Reuters Corporation, currently owned by Clarivate)	-	Web of Science	Web of Science subscriptions are an increasingly expensive and necessary product for research centers and universities across the world. They are the most trusted and powerful publisher and global citation database in the world. WoS works as a multidisciplinary virtual platform and library with regional, specialty, data and patent indexes. They're owned by Clarivate, a private company formed in 2016, following the acquisition of Thomson Reuters' Intellectual Property and Science Business by Onex Corporation and Baring Private Equity Asia. Clarivate stocks can be traded in the global trade market.
SCOPUS (Owned by ELSEVIER)	-	-	Scopus is the largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings.

CONCYTEC	Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica	National Council of Science, Technology and Technological Innovatio	Founded in 1981 CONCYTEC's purpose is to "regulate, direct, guide, encourage, coordinate, monitor and evaluate the actions of the State in the field of Science, Technology and Technological Innovation and to promote its development through concerted action and complementarity between the programs and projects of public institutions, academic, business social organizations and people who are members of SINACYT." And to also align those organizations with the "National Plan for Science and Technology and Innovation for Competitiveness and Human Development 2006-2021". One of the first and main scientific agencies in the country, CONCYTEC works, since 2008, as an executive agency along with other State institutions. More recently, in 2011, CONCYTEC has started to operate directly linked to the Presidency of the Council of Ministers setting S&T agenda and policies with a budget that rocketed from US$ 6.3 million to around US$ 43 million between 2012 and 2014, following a period of economic growth of 2.4% in 2014 Peru, led in part by mining and natural resources exploitation. CONCYTEC is also responsible for using and managing national funds such as the Fondo Nacional de Desarrollo Científico y Tecnológico - FONDECYT (National Fund for Scientific and Technological Development) and redistributing that money in the form of grants and scholarships, similarly to Brazil's CNPq
SUNEDU	Superintendencia Nacional de Educación Superior Universitaria	National Superintendence of Higher Education University	Created in 2015, SUNEDU has been given the responsibility to license higher education institutions, acting as a specialized technical public body attached to the Ministry of Education in Peru. SUNEDU has also been responsible for verifying compliance to basic quality conditions established by the government and monitoring whether public resources and benefits granted through the legal framework are being used for quality improvement and educational purposes. Preceding the creation of SUNEDU, a new law

			called "La Nueva Ley Universitaria N° 30220" published in 2014 instituted standards and guidelines for higher education that include concern with academic productivity and the intensification of research as an inherent part of bringing higher education's quality to the "highest level"
DINA	Directorio Nacional de Investigadores e Innovadores	National Directory of Researchers and Innovators	Recently renamed CTI Vitae, this platform works as a database that records self-reported qualifications and resumes of Peruvian professionals who carry out science, technology and innovation activities (CTI), both in the country and abroad. The Directorio Nacional de Investigadores e Innovadores was one of the first initiatives created in 2015 to quantify the number of researchers in the country and was created with the intention to give visibility to the work of the Peruvian researchers and innovators, as well as to link them with their peers, strengthening potential collaboration networks. Registration is voluntary, free and public access, and it's only requirement is for researchers to go through an online six hours training and questionnaire Certification of Responsible Conduct in Research. Yet, being registered in DINA is a requirement for applying to access to scholarships, grants and funds from CONCYTEC, as well as accessing virtual bibliographic databases, specialized networks and full-text scientific journals. DINA allows researchers to generate a standardized CV and is a preliminary step for those who want to be certified in the following, more restricted platform, REGINA.
REGINA	Registro Nacional de Investigadores en Ciencia y Tecnología	National Registry of Researchers in Science and Technology	REGINA (2015) has specific restrictions and benefits based on bibliographic academic production. Under the New University Law, researchers who qualify through REGINA could occupy a new position called "Researcher Professor" in their university and receive a 50% bonus to their salary. The process of assessment takes one month to be and the qualification lasts for two years. According to the 2017 regiment of SUNEDU,

			REGINA was created with the goal of establishing minimum standards in the National System of Science and Technology (SINACYT) for a person to be considered a researcher. REGINA is described as a registry of persons "who possess capacities, established according to a qualification, to perform scientific research and/or technological development". In order to access the platform to qualify as a researcher in REGINA, individuals need to have at least 1 publication in Scopus or Web of Science or at least 2 publications on SCIELO, although interview subjects have reported that SCOPUS was more respected.
RENACYT	Registro Nacional Científico, Tecnológico y de Innovación Tecnológica or	National Scientific, Technological and Technological Innovation Registry	RENACYT is a new platform created to replace the binary qualification system created through REGINA. Inspired by CAPES and other peer-countries, RENACYT will stratify researchers based on their indexed productivity. According to CONCYTEC's website, researcher's RENACYT levels will not affect their access to funds, and merit will be assessed based on the research proposals, but the new structures are meant to encourage "meritocracy" and motivate researchers to "level up" according to the Director of the of CONCYTEC's Evaluation and Management of Knowledge Direction. Although the impact of this new policy has not been encompassed by the interviews of this thesis, it is important to acknowledge that it confirms the trends in quantification of research observed in 2016 both in Brazil and Peru
IF	Fator de Impacto	Impact Factor	It is the most widely used bibliometric index. The impact factor (IF) is a measure of the frequency with which the average article in a journal has been cited in a year. It is often used to compare journals and evaluate the relative importance of a specific journal within the same scientific field. The metrics are, however flawed, and Garfield (2006) himself warned that IF was not to be used to evaluate researchers.

			IF Formula: $\frac{\#\ citations\ rec'd\ in\ year\ x\ for\ articles\ published\ in\ preceeding\ two\ y}{\#\ citable\ items\ published\ during\ those\ two\ years}$

Introduction

An emerging body of literature argues that in order to solve modern environmental problems, scientists need to collaborate with other stakeholders or potential knowledge-users throughout the process of investigation (i.e., research questions definition, project design, data collection and/or analysis). Such practices allow for continuous and reciprocal knowledge transfer, thus strengthening the connections between scientists and the broader society, while also promoting the diversification of research agendas and frameworks demanded by complex, multifaceted socioenvironmental problems (Cornell et al. 2013; Grove at al. 2015; McNie 2007; Etzkowitz 2006; Cash et al. 2003; Kates et al. 2001; Funtowicz and Ravetz 1993).

Several denominations and levels of engagement are cited in the literature, but for the purpose of this particular study, "user-engaged research" will be considered as an umbrella term that covers a variety of participatory approaches founded in the co-production of knowledge and social accountability model – as further explained in the following sections of this thesis. These approaches would be particularly beneficial for Latin American developing countries such as Brazil and Peru, which are more susceptible to environmental impacts due to their particular socio-environmental dynamic of extraordinary biodiversity, widespread poverty and high rates of inequality (UN 2005). Brazil and Peru together account for about 80% of the Amazonian territory and share a history of European colonization and exploitation as well as young and incipient trajectories in both science and democracy (Kapstein and Converse 2008; Ferreira et al 2006).

Whereas new approaches to knowledge production call for broader, more democratic, value-diverse and transparent forms of research review and evaluation, it is not clear to what extent such changes would be welcome in research institutes that rely heavily on formal

publication requirements, incentives and rewards systems for career progression and evaluation (Funtowicz and Ravetz 1993; Merton 1979; Merton 1979; Cornell et al. 2013; Whitmer et al 2010).

The present research looks more closely into Brazilian and Peruvian scientific publication policies – publication requirements, productivity rewards and incentives – in the national, state and institutional scales and to assess their compatibility with user-engaged research. Such policies seem to be both a form of representation and enforcement of social norms in academia directly related to researchers' ideas of what constitutes productive, good and important science. These expectations play a critical role in shaping research trajectories towards one way in detriment to others (Hessels and Lente 2008; Neff 2014; Miller and Neff 2013).

Through semi-structured interviews, document analysis, translation and transcription, this research attempts to elucidate the question of *how science policies may influence ecological user-engaged research?* We also ask if and how publication policies affect researchers' ability to work with local stakeholders in setting research agendas and addressing problems of social relevance happening on the ground. While academia has its own modes of knowledge production and evaluation, there are within Peru and Brazil regional wisdoms, needs, traditions and cultural knowledge systems that aren't always taken into account by S&T systems – traditional ecological knowledge, indigenous knowledge, farmworkers' knowledge, etc. This study can help us to understand bigger questions related to scientific imperialism, national sovereignty, and respect for local traditional ecological knowledge and wisdoms by explaining some of the tensions that exist between these knowledge systems and Western modes of knowledge production and validation. Investigating and comparing publication policies and researchers' experiences in the particular context of user-engaged ecological research can be key to promote

respect for the sovereignty of Brazilian and Peruvian nations, researchers, the Amazonian peoples and their traditional wisdom, as well as the protection of natural resources and biodiversity through the production and usage of knowledge that is relevant and co-produced. While working early on in the assessment and development of innovative scientific policies in these countries, public engagement and participation in science can be just the tools necessary to help ingrain democratic praxis and sustainability.

Literature Review

Participatory approaches to science: what do user-engaged research mean?

There has been a growing movement across different disciplines and fields of studies pushing towards more collaboration between researchers and society. A diverse range of participatory approaches to science has been proposed in the literature as alternative arrangements intended to bridge the gap between the academic Ivory Tower and the outside world. These approaches, which I call "user-engaged research" share the common goal of uniting scientists and non-academic knowledge users in a continual dialogue entrenched in collaboration and sparked by their common interest in conducting research that helps orienting decision-making and solving real-world problems.

Many participatory approaches to science were inspired by a number of Marxist, feminist and post-colonial thinkers, in particular by the work of the Brazilian popular educator and philosopher Paulo Freire (1971) and Peruvian Oscar Jara who advocated for critical consciousness, self-determination and social justice goals. His work gave basis to what is called the Southern tradition, in which studied communities are seen as more than mere objects of study, but instead as subjects of their own existence and inquiry. Academics and intellectuals are

seen by this approach as catalysts and supporters of change emanating from the community, rather than the experts responsible for providing advice in solving practical problems by planning, acting and investigating the results of action through research – the Northern approach (Minkler and Wallerstein 2003). Northern structures and organizations have been imprinted upon schools, universities and research centers throughout the world via colonization and globalization, and while this approach expects communities to be part of the process of learning and dissemination of knowledge, it doesn't hold as much emphasis on the long-term commitment of egalitarian power-sharing and co-learning process proposed by Freirians in Community Based Participatory Research, for example (Lamphere 2004; Minkler and Wallerstein 2003). After a long course of development, Northern institutions have also incorporated community input in defining research project agendas and collecting data in addition to disseminating the knowledge produced on what was called by Foote Whyte (1991) Participatory Action Research (PAR). While the former has been more prevalent in the Anglo-Saxon literature, both PAR and CBPR have sparked discussions in the global south and elsewhere calling for the legitimation of societal input in science and interdisciplinary collaboration, particularly in fields related to sustainability and environmental issues such as agroecology, ethnoecology and environmental justice. (Thiollent, 1985; Porto and Finamore, 2012; Brandão and Borges, 2007).

Despite the extensive discussion in the literature distinguishing PAR from CBPR along with many other designations, the present study agrees with Lamphere (2004) in recognizing such efforts as part of a greater endeavor that calls for an inclusive language rather than merely an academic struggle of defining boundaries (for a comprehensive review on these please refer to Schensul et al 2014). For that reason, I opt for the label "user-engaged research" as an umbrella term encompassing investigation practices that are embedded in the commitment with a) co-

production of knowledge (Jasanoff 2004; Sarewitz and Pielke 2007; Kates et al. 2001, Cash et al. 2003) or integrative research process (Cornell at al, 2013) and b) social accountability, or the or the concern with positive societal outcomes of knowledge production (Gibbons et al. 1994; Hessels and Van Lente 2008). In other words, user-engaged here describes research processes that a) includes non-academic stakeholders or knowledge-users as active members of the research teams in at least one or more core steps of its development (i.e., formulating research questions, design and hypothesis; data collection and analysis; results dissemination and implementation) and b) is done in the context of application and societal use and transformation. This definition admits the existence of different levels of engagement as initiatives with distinct strengths and potentials that are equally important to provide a comprehensive understanding of the advancement of research engagement initiatives in these countries and how current policies have affected them.

Untangling wicked problems: pluralism in the co-production of knowledge for sustainable science

Most of the complex environmental challenges faced by our society today – such as climate change, invasive species and food security – can be considered intractable or wicked problems. Rittel and Weber (1973) in their classical piece described wicked problems as those which have no stopping rule, meaning they cannot' be tackled by one simple solution, as they entangle other problems depending on how one frames them. They are ill defined and depend upon elusive political judgment for resolution. Such a challenging dynamic calls for investigation practices as well as management and planning strategies that encompass a variety of framing, values, experiences and world-views. Such an approach to research cannot' be

accomplished by the efforts of a sole scientist; according to the concept of human's Bounded Rationality, even when guided by science, one's ability to reason about things is limited by the fact that one does not value or know everything (Simon, 1991) – and never will. So the pursuit of knowledge needs to return to democratic expertise: expertise turned towards the service of democratic problem solving (Woodhouse and Nieusma 2001).

The present research is interested in the incorporation of diverse frameworks and types of expertise in the scientific field as a step into opening knowledge systems to different forms of evaluation and assessment that includes the input of broader society. According to Funtowicz and Ravetz "an extension of peer communities, with the corresponding extension of facts, is necessary for the effectiveness of science in meeting the new challenges of global environmental problems" (Funtowicz; Ravetz, 1993 p. 754-755). Cash et al 2003 and Cornell et al 2013 offer a wide range of related examples of initiatives between researchers and non-academic stakeholders – government authorities, NGO's, rural communities, fishermen, land managers and other decision makers – collaborating to create sustainable responses to environmental challenges.

Therefore, a process of democratization of knowledge production and uptake and incentives to create more pluralistic efforts needs to be developed to foster engagement, interactive problem framing, knowledge integration and real-world experimentation. Cornell et al 2013 also call for the consolidation of a *knowledge democracy* and argue: "(…) Using this term reflects our own stance in favor of democratic ideals in the production and use of knowledge: the quality and validity of knowledge systems for sustainability depend on ensuring plurality, transparency and independence; furthermore, sustainability scientists have a responsibility to collaborate openly in knowledge co-production and its translation to action with other social actors within knowledge systems" (Cornell et al 2013 p. 63).

Although several scientific agencies, particularly in Europe, have started to give more attention to participatory approaches to science by including values of diversification, engagement, communication and interdisciplinarity in their institutional policies (European Comission 2007; "Rome Declaration on Responsible Research and Innovation in Europe" 2014), those would be particularly beneficial to developing Latin American countries, which are disproportionately susceptible to environmental problems (Acselrad et al. 2009) and subject of very particular socio-environmental context of extraordinary biodiversity, widespread poverty and high rates of inequality (UN 2005).

Challenges for ecological user-engaged research in Latin America

Martins and Ferreira (2011) and Ferreira et al (2006) provide interesting insights about the intellectual production within interdisciplinary environmental fields in Latin America (LA). They point to the diversity of theoretical-methodological influences across disciplines and stress the particularities of working on environmental problems in LA Nations, which are impacted so deeply by poverty and social inequality. One of the ideas expressed in the LA literature analyzed by these studies is how the impacts of climate change are aggravated by its association with changes in land use and occupation. Economic pressures for development (i.e., agribusiness and large-scale infrastructure projects) are one of the leading causes of climate change problems, rather than greenhouse gas emissions due to fossil fuels burning per se - such as in the case of the USA, China and other nations. The complex interactions and feedback dynamics between ecosystems, population and economic factors have to be taken into consideration, they argue, in agreement with the different actors and scales involved in order for research to adequately inform decisions. That means, tending for public participation, multiple areas of intervention and

impacts of these decisions in the population and geographical areas (Martins and Ferreira 2011). But with such recent history of democratic and scientific structures (Ferreira et al 2006), creating spaces for this kind of interaction can be challenging, especially if policies and knowledge systems are not thoroughly thought and planned to reflect those demands.

Another important contribution of Martins and Ferreira (2011) is the acknowledgment of resource limitations amongst Latin American countries' scientific budgets and how interdisciplinary fields are the ones which often suffer the most as funding tends to be channeled towards natural sciences (Urich et al 2005). Skewedness of funding seems to be related to an outdated belief that environmental issues can be addressed separately from social issues. Such views are evidenced in the literature's efforts to demonstrate that political ecology and other disciplines are still rooted in hard biophysical sciences, as if those were a more "pure" science than the interdisciplinary and socially-focused sciences (Bryant 1997; Walker 2005).

The myth that ecological and biophysical sciences are the key to solve environmental problems is clearly dismantled when one recognizes that despite of a significant increase in the numbers of specialized professionals and journals in the ecological field over the last decades, those have not reduced the scale or number of most environmental problems (Castillo and Toledo 2000). The understanding that environmental problems are not entirely or even primarily scientific in their cause and in possible solutions leads developing countries' researchers to advocate for more communication between ecologists and community-based actors and for strengthening institutional links with these stakeholders. In "Applying ecology in the third world: the case of Mexico", Castillo and Toledo (2000) remind us that the generation of more scientific knowledge as an ultimate goal in itself is not necessarily helpful for improving human interactions with the natural world. In order for science to produce a significant impact in the

way human societies relate to ecosystems, it is necessary to think of institutional goals that fulfill the social accountability role of academia and to create arrangements that value not only the production of new scientific evidence, but also the exchange, use and dissemination of knowledge. That seems to be particularly true in the case of user-engaged research, where very often an opposing set of expectations has to be met in order to satisfy the interests of universities or research centers, community partners or stakeholders and funding agencies (Fletcher, Hammer, & Hibbert, 2014).

Conflicts between funders' demands for quantifiable results, institutional pressure for academic productivity standards, issues of academic validity and reliability and the long-term commitment to communicating with non-academic partners in a language that is ethical, effective and accessible are among some of the many challenges faced by user-engaged researchers (Travers et al 2013, Fletcher et al 2014). This narrative has been echoed by Martins and Ferreira (2011) who reiterate the fundamental role of scientific agencies' support, rewards and incentives in influencing research agendas and designs that are able to translate individual efforts into institutional values. These ideas were previously discussed in the literature by Merton (1979) and Busch and collaborators (1983) who reason that the decision for research problem choice and designs can be heavily influenced by the social demand for a specific kind of knowledge – the need for military technology, economics or technological fixes – and/or the likelihood that it would be publishable in a professional journal. Ziman (1987) goes further and challenges the concept of research problem choice, arguing that only a small group of privileged researchers are able to choose what they want to be studied while the rest follow their lead in the search for recognition and funding as a professional survival strategy.

Latour and Woolgar's (1986) classic book, "Laboratory Life", discusses, from an ethnographic perspective, the motivations behind scientists doing their work and uncovers what he called a "mixture of liberal political economics, social Darwinism, cybernetics, and endocrinology" (page 190). The complex calculus of personal satisfaction considerations among scientists was described as being based on one's sense of investment and achievement, positive feedback from peer scientists, numbers of papers published in academic journals and the number of opportunities for grants and faculty positions, as well as recognition that would all of these outcomes yield. Oversimplifying it, more papers and more recognition generate more opportunities and resources for research investment, creating a self-reinforcing cycle which Latour and Woolgar refers to as the cycle of rewards. Jackson (1968) notes the concentration of research recognition, resources and power around a few well-established research centers, a phenomenon he names the "Matthews effect," in a biblical reference - "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken even that which he hath" (Matthew 25:29).

In the particular case of Latin America, Malhado et al's (2014) map and assessment of Amazonian knowledge production illustrate some of these characteristics. Their findings sugegest the possibility that research agendas in the region are being shaped by Western (i.e., developed world) researchers and research institutions to the detriment of Amazonian-based researchers, in what they refer to as a culture of "scientific imperialism." In that instance, the authors stress the need to contribute to national research capacity and attribute the lack of local authorship from the Amazonian countries' researchers to a deficiency in resources and investments in capacity building within Latin American nations. Such dynamic appears to have strong ties with the conundrums created by Matthew's effect and the privilege of developed

countries' institutions and authors over L.A. not only in accessing, but also in setting up scientific structures, norms, and agendas.

Although the Amazon region is shared by nine developing countries – Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Venezuela and Suriname – only Brazil, followed by the U.S.A and U.K. was amongst the list of most represented countries publishing about the Amazon, with Brazil overtaking the U.S.A. as the most represented nation only after the 90's period. Curiously, though, the article also points to the fact that researchers from Brazilian institutions present a very strong pattern of increasing representation as first authors in low-cited articles (Malhado 2014). This data is consistent with Meneghini and his collaborators' 2008 study, which revealed that articles with Latin American affiliations tend to receive fewer citations than articles with developed countries' affiliations. It is key to note that both articles reviewed only Web of Science's (WoS) English-language papers, exposing the underlying dynamic that researchers feel the pressure to write, cite and publish in the "lingua franca" of science: English. This methodological choice could have left out of the analysis just the kind of research that is relevant to local knowledge-users and based upon participatory approaches. But it reaffirms the point that such work is undervalued and considered peripheral to the mainstream scientists – a crucial component to understand how and based on what science policies in Latin America are constructed.

Although neither Meneghini, Packer, & Nassi-Calò (2008) nor Malhado (2014) point with certainty to editorial and scientific prejudice practices, their work triggers questions that are of particular relevance to the context in which this thesis is being developed: who is responsible for setting global research agendas and which publications are considered of high-quality and high-relevance? How influential is the global agenda in developing countries? Does it

compromise the independence and sovereignty of national science? What role do bibliometric measures and research evaluation policies play in this dynamic? And how to guarantee the possibility for researchers from some of the most biodiverse regions in the planet to work with local knowledge-users in setting research agendas that address problems of national relevance happening in the ground?

Brazil, Peru and science in Latin America

While most science policy scholarship focus on research funding, the present study concentrates on *policies related to academic productivity and publication rewards, incentives and quality assessments, trying to understand how and if they represent a structural impediment for scientists interested in conducting ecological user-engaged research.* With that goal in mind, I refer to the work of Miller and Neff (2013) who argue that that in order to evaluate and construct effective policies that yield best societal results it is crucial to consider individual scientists and their communities, once they are active players in the social process of co-producing science policy and set research agendas. In that context, science policies are understood as formal and informal norms and disciplinary cultures that serve in shaping disciplinary research trajectories.

It is crucial to acknowledge that the intention of this work is not to quantify and/or to give a definitive answer of how much of user-engaged-research happens in Brazil or in Peru. This is, instead, an attempt to infer an answer to the question of the degree to which the approach is possible under the current structures. This question was framed under the assumption that time and resources for research are limited and dependable of both the social and cultural norms

translated into policies that define what should be a researcher's priorities and expectations of academic productivity and "good science".

Brazil and Peru are both South American developing countries, colonized by non-English language powers – Portugal and Spain, respectively. As with many other Latin American countries, they have young scientific cultures and traditions and a limited budget directed to Research and Development (R&D), when compared to most of the developed world. While the average of the percentage of GDP (Gross Domestic Product) invested in R&D in high-income countries is 2,31%, achieving 2,42% amongst OECD countries (Organization for Economic Co-operation and Development); Brazil and Peru respectively direct only 1.15% and 0.15% of their GDP to R&D (Gonzalez 2013; UNESCO, 2016). The Brazilian and Peruvian GDPs are also significantly lower than these OECD and high-income countries – while the purchasing-power-parity (PPP) of OECD countries and high-income economies in 2013 exceeded U$ 40,000 (Soete, Schneegans, Eröcal, Angathevar, & Rasiah, 2015) Brazil's GDP's PPP was a little bit over US$ 3,000 and the Peruvian's only US$ 350 (IMF, 2016). In addition to that, language barriers and social inequality are some of the challenges to be dealt with by scientists within these countries – countries that have an incredible potential for ecological investigation and conservation of the Amazon Forest (Hernández Asensio 2014; Delgado and Weidman 2012; Cruz, 2010; Meneghini and Packer 2007). This thesis takes the opportunity to assess the leanings of ecological sciences and related fields' knowledge production in these countries by identifying the main publication policies and evaluating their compatibility with user-engaged ecological research.

Brazil, in particular, has increased its international reputation in science lately through a process of intensification of scientific access and production, associated with research evaluation

and incentives programs (Prata, 2015). In fact, while Brazil produces about 60% of the Latin American WoS's indexed academic literature, the state of São Paulo alone produces more articles than any Latin American country, to the extent that a Peruvian report dedicated a chapter to the "Brazilianization of Latin America's science" (Hernández Asensio, 2014). National and State public agencies in Brazil have played an important role on that process, although these agencies have signalized an endorsement of the internationalization movement, along with the adoption of bibliometrics to indirectly asses scientific impact and quality (Prata, 2015). Whereas the increasing investment and contact with a globalized network of scientists can be beneficial to science in the general sense, it is important to attempt to the particularities and diversity of thoughts and relationships that can be neglected in a hegemonic scenario of scientific structures.

While most of the important actors in the scientific scenario in Brazil have been domestic public agencies and universities, Peru has relied heavily on external funding to produce ecological research, since a smaller portion of their already lower GDP is invested in science and technology activities (IMF 2016; Soete, Schneegans, Eröcal, Angathevar, & Rasiah, 2015). For that reason, international research institutes and conservation NGOs (Non-Governmental Organizations) can play an essential role in deciding what kinds of research are considered relevant or not. Being aware of that, the Peruvian federal government created a policy demanding from foreign research groups interested in studying the Amazon Forest to have at least one Peruvian researcher working and publishing with them, reinforcing international collaboration and guaranteeing the formal participation of local scientists through co-authorship (Malhado 2014). This thesis explores how such policies, including Peruvian's initial attempts in defining publication requirements as a form of legitimizing higher education centers impacts researchers and their work.

Theoretical Framework, hypothesis and research questions:

The Theoretical Framework of this study is based on the social construction of science and technology: the idea that science and technology, along with its prescribed and diffused cultural norms and expectations, are socially constructed, and therefore cannot be completely neutral or detached from values, priorities and/or judgments (Hacking 1999; Latour 1993; Jasanoff 2004). Science policies, as previously defined, tend to reflect the values, priorities and judgments of the academic community and to set the guidelines through which scientists should conduct their work. In this scenario, scientists are both actors and subjects to these policies and it is key to evaluate how they interact with each other and how this dynamic may affect researchers' ability to address modern environmental problems through the conduct of user-engaged research.

In the face of a relatively novel demand for including diverse frameworks and aligning knowledge production and use in ecological sciences, the questions that this research aims to explore focus on whether there is space for user-engaged research to operate among the existing scientific structures, defined and constrained by science policies in Brazil and Peru. To answer those questions, I aim to first identify:

A) Concerning academic publication, what are the main national policies in Brazil and Peru?

B) How do ecologists interact and interpret these policies in their day-to-day professional lives?

C) Do these policies address, disregard or value user-engaged research? Are they compatible with this approach?

D) Do they affect the researchers' ability to be more rewarded for choosing some research questions/designs in contrast to others?

For that purpose, I consider scientists from ecological and environmental-related fields that hold a professional position as researchers in scientific institutions in Brazil and Peru (universities, scientific enterprises and NGOs). It is important to note that this study is not particularly concerned in defining limits for what constitutes ecological sciences, as user-engaged research is inherently interdisciplinary (Hessels and Van Lente 2008; Cornell et al 2013; Kates et al. 2001; Ferreira and Martins 2009).

Exploratory and inductive research in the literature suggests that user-engaged research tends to be discredited or perceived to have less value by academia (Cornell et al. 2013) and this is the hypothesis through which I guided this study.

Methodological Approach

Data Collection

Background Literature

In a preliminary stage, I conducted a literature review tracing the R&D and S&T[1] (Science and Technology) policy landscape in Brazil and Peru. The priority in this phase was identifying the main scientific agencies – defined by those with more significant funds and prestige – most highly ranked research centers and universities according to international and local rankings and the principal funding sources in the country, as well as the current publication

[1] The author is fully aware of the differences between these two concepts, the second one (S&T) being broader than the activities included on the first one. They were treated as interchangeable though for the purpose of this thesis. For a complete definition of each one of these and the scope of their activities, please read UNESCO Recommendation Concerning the International Standardization of Statistics on Science and Technology, Paris, November, 1978.

requirements and incentives and leading critiques to the system. Key informants discovered in this initial phase helped gathering information and served as a support to identifying relevant elements and actors to be considered as well as interview subjects, universities and requirements.

Science Policies

When written policies from relevant universities and public agencies were available online, they were downloaded. In case they were not, they were solicited in writing from department heads, deans and/or individual researchers. It is important to point out that for the matters of this study, researchers' understanding of how a policy work are equally, and at times more valid, than what is registered in the actual documents analyzed, since it is their perception that reproduces the norms and cultures that have been currently put into place. Therefore, semi-structured interviews were conducted to address the aspect and hear how policies are understood and carried by researchers in these countries (see Data Analysis section). When written documents of these policies were incomplete and/or provide inadequate information, compared to what was reported by interview subjects, semi-structured interviews also serve to elicit the stated policies. Yet, both sources of information are be taken into consideration and triangulated to increase the validity of our findings.

Eventual translations from Portuguese and Spanish to English were required for policy documents and interviews. The author of this thesis and other two research assistants, who were suitably trained in both languages and certified by the IRB (Institutional Review Board), conducted the interviews, transcriptions and translations in collaboration with the PI of this project.

Semi Structured Interviews with Brazilian and Peruvian Researchers

Following a previous field trip to Brazil that happened in June 2014, we traveled to Brazil and Peru in August of 2016, completing 70 semi-structured interviews with 73 researchers across different regions of Brazil and Peru – 3 of those interviews were conducted with two interview subjects together at a time, following their request. Each interview lasted approximately 45 minutes. Twenty-eight (28) of the interview subjects were based in the Brazilian Southeast (in the cities of Rio de Janeiro, RJ; Sao Paulo SP, Campinas, SP; Sorocaba, SP), where most of the country's resources, researchers and publications are concentrated. Ten (10) of the interview subjects were based and conducted in the Brazilian Amazon (in the city of Manaus, AM), and one (1) researcher from the Centerwest of Brazil (Goias, GO) was interviewed earlier in 2013 by the PI of this study in the United States during an academic visit. It is also fair to notice that one (1) of the researchers interviewed in the State of Sao Paulo was born and raised in Peru - he was conducting his graduate studies at the State University of Campinas. From the thirty-four (34) researchers who we met and interviewed in Peru in 2016, fifteen (15) were based in the metropolis of Lima, eleven (11) in the Andean region of Cusco and eight (8) in the Peruvian Amazon (Iquitos City, Loreto) in accordance with the maps displayed bellow (Figure 1). Interview subject's names and identities were protected from disclosure in this thesis. However, you can find a list of locations, institutions and other descriptors in Appendix A.

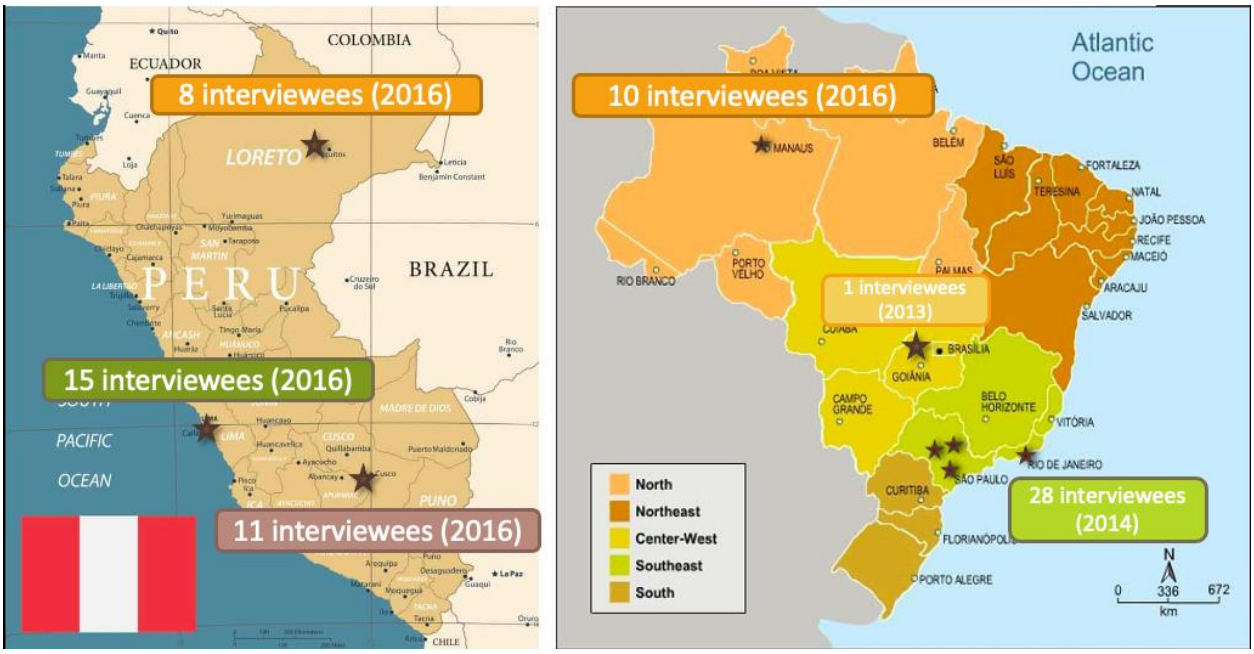


FIGURE 1: Number of interview subjects (interviewees) per region of Peru and Brazil followed by the year when interviews were conducted. Maps adapted from from Proyecto Mapa Mundi (2020) “Mapa político de los departamentos de Perú” and Mcgranahan, G. (2010) “Map of Brazil showing major regions, states and state capitals”.

We conducted interviews with the previously identified and contacted key-informants from ecology and related fields as well as interview subjects identified in loci by a mixed method of snowball approach and theoretical sampling. In lines with Grounded Theory, the form of analysis chosen by this study (See Data Analysis), theoretical sampling or purposive sampling allows for the adaptive selection of subjects that are particularly suitable to elucidate a specific theme, concept or phenomenon that is the focus of an iterative empirical inquiry (Robinson 2014; Glaser and Strauss 1967). This helps to assure that a diverse range of information sources and settings are consulted getting in-depth knowledge in a given topic. Key informants can be researchers with professional ties to the author of this thesis - who used to be an undergraduate student in Brazil - researchers who have published about science policies, publication policies

and/or societal engagement in their respective countries, as well as scientists from prestigious and underrepresented Universities that have research programs in the ecological field. The selection of "prestigious" Universities followed consultation to key-informants in combination with mainstream national and international rankings such as the "Shanghai ranking", Brazilian "Guia do Estudante", and the Peruvian "Estudiar.edu". Although the criterion behind such rankings are questionable and subjected to this study's critiques, they are also a direct representation of how academic success is perceived internationally and within these countries, and are thus important indicators of the scientific norms and performances recognized, expected, perpetuated and rewarded in Brazil and Peru.

It is key to note that for the purpose of this specific study I am not interested in defining the precise boundaries of what constitutes ecological research. Interview subjects could come from different backgrounds such as social sciences, environmental sciences and engineering, biology and ecology. The interview discusses researchers' experiences and perceptions on scientific policies in the national, state and institutional levels and focus mostly – but not exclusively – on productivity incentives and requirements in Brazil and Peru.

For a better understanding of the core of these semi-structured interviews and how they respond to the leading questions of this research listed as A, B, C and D in the item 2 of this chapter, please refer to Table 1 and see the example of generating and secondary questions used in the case of Brazil.

TABLE 1. Generating question and secondary lines of questions for the semi-structured interviews conducted in Brazil.

<table>
<tr><td colspan="4">Generating Question:</td></tr>
<tr><td colspan="4">"This study is part of a comparative study investigating if and how science policies, especially publication policies, can affect the kind of work that gets done in the ecological field. In Brazil, we are learning about Qualis, CAPES triennial evaluation, CNPq's productivity grant, etc. In your experience, how do you interact with these policies are they influential to your work?</td></tr>
<tr><td colspan="4">Secondary questions:</td></tr>
<tr><td>How much do these policies influence your research-topic choices – do they interfere at all?
In which ways are you satisfied or unsatisfied with the overall system of evaluation?</td><td>What (national, state and institutional) policies are the most influential to you?
How do they work?</td><td>Are you able to work with local-scale research and/or to interact with local users (decision makers, protected area managers, other scientists) if you want to?
Does that yield you any kind of rewards and recognition?</td><td>What is your intended audience when publishing?
What are the kinds of venues that you find appropriate for the kind of work and audiences that you target?
In your experience, are they properly valued by the national policy?</td></tr>
</table>

(Questions B and D)	(Questions A and B)	(Questions B, C and D)	(Questions B, C)

Interviews were audio recorded, stored and transcribed into the OneNote software, along with complementary information on interview subjects including their institutions' type, state and name, research department, and other information such as Curriculum links for further contextual examination. Most of these descriptors cannot be disclosed due to privacy concerns, but the general characterization of interview subjects can be provided upon request respecting IRB determinations. Interviews' full transcriptions are not attached to this thesis in order to protect participants' anonymity. Yet, those are referenced along the text with a numeration in accordance with the archived files stored on the OneNote software.

Data Analysis

Grounded theory is an approach for developing theory that is "grounded in data systematically gathered and analyzed" in contraposition to the positivist research that intends to prove that a pre-conceived theory applies or doesn't apply to the phenomenon studied. This approach allows for researcher to systematically build from nascent and tentative explanations to increasingly sophisticated and holistic ones (Strauss and Corbin 1994; Miles and Huberman 1994). Traditional objectivist versions of grounded theory assume the existence of a single reality that a passive, neutral observer discovers through value-free inquiry, while others argue that grounded theory is inherently social constructionist. Contrary to the earlier, in this study's analysis, I use a constructionist view for grounded theory, which, in lines with larger constructionist literature, accepts that researchers cannot be entirely free of prior knowledge, pre-conceived theories and understandings of research questions and data. It poses instead that the

research process, data and results are co-created as a result of socially shaped situations, structures and interactions between researcher and research participants. For that reason, this thesis takes a reflexive standpoint, acknowledging the researcher and research participants' positionality and biases without claiming for a universal "truth" to be imposed to other contexts, while also valuing of the lessons learned from such experiences (Charmaz 2008).

Due to the iterative nature of this analysis, interviews are subjected to constant comparison, that consists of the author moving in and out of the data collection and analysis as it attempts to answer the generating question of this research: how science policies influence ecological user-engaged research in Peru and Brazil? Interview field notes, transcriptions, and the policy documents were coded using descriptive tags that note, for example, "explicit editorial policy", "informal norm", etc. Each document was revisited several times adding subsequent interpretative tags, which document a nascent analysis, pattern tags in categories, capturing increasingly explanatory and interpretative qualitative analysis.

In summary, the examination consists in analytically reviewing each one of the interviews and documents content by adding descriptive tags that are then grouped into patterns, which give rise to new concepts and, in the ultimate instance, new theories. Those theories and concepts are validated by the previously mentioned consistent review and revisits of the data combined with saturation and triangulation among different interview subjects, field notes and the formal written policies' documents. The narrative of this thesis was be built upon this process and the concomitant assessment of policies compatibility with user-engaged research.

Author's Self-Reflection

This research is part of an overall five countries' comparative project supported by the National Science Foundation, NSF, under the Grant No. 1465279[2], which studies science policies across the Americas – U.SA., Canada, Brazil, Mexico and Peru and their influence in ecological user-engaged research. I was invited to collaborate in this project eight years ago by my current advisor and Committee Chair, the PI (Principal Investigator) and author of this grant, Dr. Mark Neff. The invitation happened during my first year abroad as an undergraduate Biology student in an American university entirely funded by a Brazilian government's scientific scholarship and policy called "Ciência Sem fronteiras" (CSF) translated as Science Without Borders (SWB). According to Science Without Borders' international mobility program website, it seeked "to strengthen and expand the initiatives of science and technology, innovation and competitiveness through international mobility of undergraduate and graduate students and researchers". The main goal of the program was "to qualify 100 thousand Brazilian students and researchers in top universities worldwide until 2014" in the so-called *fields of interest* – listed under priority areas mostly as STEM fields (Science, Technology, Engineering and Math), almost completely excluding the social sciences and humanities' fields from the program. It is key to note that despite of my own critiques to the Brazilian scientific policies, I am and forever will be grateful for the opportunity created by the Brazilian government to take me and many other young scientists into our first academic experiences abroad. For participants in SWB, the ability to be immersed in a new context – of which we were both critical of and inspired by - exposed us to so many new ideas, opportunities, technologies, teaching styles, and academic

[2] This material is based upon work supported by the National Science Foundation under Grant No. 1465279. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

resources. Those opportunities have awakened most SWB fellows to the contractions and disparities that we face in Brazil, while also triggering a desire to make sense of our roles as students and researchers navigating such different co-existing realities. It was with much grief that I felt the news of the media and parliamentary coup which took out of power the democratically elected president Dilma Rousseff – the female president of Brazil– along with many of the fundamental rights and policies that her administration has put in place, including Science Without Borders. This thesis touches briefly on how scientific advancements should be tied into democratic values. Not coincidently, one can point to the disconnect between these two as a leading factor to the political and scientific crises that Brazil, Peru, and the United States are currently facing.

It is ironic to acknowledge that initially, I was sent to the United States to learn how to produce "competitive science" in a "developed country's way". Ironically enough, I ended up in a prestigious small liberal arts college, taking interdisciplinary courses and conducting interdisciplinary "research about research in Latin America". My work challenges and enforces the core logic of my mission here. After all, one thing was right: in coming to the United States, I did learn so much more about the scientific structures of my field than I have ever imagined I would. Through my study, I do not mean to underestimate the value of the basic research from STEM and the so called "hard sciences" fields, yet I do see interdisciplinary engaged work as complementary forces and approaches where integration has to be considered and taken into account. Yet, I cannot deny that if it wasn't for my interest in both understanding and serving society through ecological knowledge, I would've never got my SWB scholarship, nor found myself pursuing a master's to continue studying how to make science more inclusive. These experiences have helped me to better understand some of the critiques, frustrations and questions

that I used to share with my colleague's students and professors in the halls of the Federal University of São Carlos – campus Sorocaba, in Brazil, where I got my Bachelors' degree in Biological Sciences. Our concerns included the following: Why are universities so disconnected from their social roles? How is it possible that the professors doing some of the most interesting collaborative research and extension programs in the department had some of the most underfunded laboratories? And also, how could some academics get so caught up in their bubble of specialization and academic productivity of the Ivory Tower, to the point of losing the ability to communicate with their own students and society at large?

My research did not bring me much comfort. It did not help me find sole villains to blame, nor a magical solution to these problems. However, the process of joining efforts to improve the academia through research and study has changed my mind about power and academia, giving me a much better understanding on how these structures have been raised and adapted over time.

Scientific policies are usually created with the best of intentions, to foster development, fairness, recognition and scientific accuracy in Brazil and elsewhere. But they end up having unintentional consequences and creating flawed systems entrenched in a complex cycle of power – one which is hard to acknowledge, let alone to govern – but which still allows for its constant reassessment and re-creation. And here is the hope, for the potential redefining what constitutes as good science in a way that incorporates the voices and empowerment of marginalized communities, different frameworks and knowledge-systems.

By incorporating the Brazilian Amazon and Peru to my discussion, I hoped to learn more about how different geographical, cultural and socioeconomically contexts shaped these experiences in my own country. Peru has shown to have its equal share of rich intellectual,

ecological, cultural and sociological assets beyond the overlap of the Amazon Forest. It has been a amazing journey to learn about how they chose to deal creative and optimistically with public righteous skepticism of "shelf-science" and the challenges and pressures in designing new policies and structures fostering engaged science under a context of competitive, globalized and hegemonic academic standards.

Ultimately, the immersion process and lessons learned after eight years working in this project, have forever changed and shaped my own understanding of my role as a scientist, communicator and social actor. These lessons apply beyond the scope of this thesis and academic work. They are embodied and ever evolving in my thoughts, teachings, actions and overall projects: in and out of academia. After all, this is, for me the reach of the kind of transformative impact of scientific knowledge that I believe in, and it will continue to advocate for - despite the career path I chose to pursue.

Science Policy Landscape & Background in Brazil and Peru

Background of Science Policies in Brazil

Main Scientific Agencies and Policies in Brazil

Before discussing our findings from the 2016 field work in the Brazilian and Peruvian Amazon, I would like to briefly cover the general lessons learned in the Southeast of Brazil, where a significant part of the recognized ecologists, research institutions and resources are concentrated. This initial chapter will help to understand the regional disparities that are further

explored in the secondary part of this research and following section, regarding science in the Amazon, and also work as a baseline for the contrast with Peru's S&T policies.

The background information in this section is not only important for a matter of comparison between regions and countries. It also allows us to introduce some essential actors and dynamics that are crucial for understanding the complex contexts in which the current structures of science and technology in Brazil came about. This is an updated, yet less comprehensive summary of the literature review and results compiled in my previous work and undergraduate thesis "How science policies influence user-engaged research in Brazil?"; most of the details not covered in this section are available for access in the full-text.

Brazilian science relies heavily on public funding: 60% of the PPP$ 31 billion[3] spent per year on research and development in the country comes from governmental sources (Brito Cruz, 2007; Unesco, 2016). In absolute terms, that is comparable to countries as the U.K., PPP$ 36 billion, and Canada, PPP$ 21 billion, but in reference to the GDP, 1.15% represents a much smaller share than the average of 2.4% devoted to R&D by countries in the OECD, the Organization for Economic Co-operation and Development. Nevertheless, in comparison to other countries in Latin America, the Brazilian investments in science are much higher than the regional average of 0.69%. About 60% of the federal government's expenditures in R&D in Brazil are directed towards public universities, which play an essential role in the scientific efforts in the country and are where we focused our efforts and interviews (Unesco, 2016).

Debates over the history of the beginning of a Brazilian scientific and educational system goes back to 1550 when, during colonial times, the establishment of the first Jesuit colleges in

[3] Gross domestic expenditure on Research and Development adjusted for Purchasing Power Parity, GERD PPP$ (UNESCO, 2016)

Bahia made it possible to obtain higher education degrees in a variety of fields such as arts, philosophy, mathematics, and of course, theology. Later, the first professionalizing courses of medicine (1808) and engineer (1810) were founded, respectively, in Bahia and Rio de Janeiro states. The first institution founded under the name of a university was actually the Federal University of Manaus – currently UFAM, Federal University of Amazonas – in 1909. The University was extinguished in just 17 years when, after a short period of prosperity from rubber exploitation, local funds became scarce again, and the university ceased to exist. Only their Faculty of Law survived and was later - in 1962 - incorporated to what is now known as the Federal University of Amazonas, where we had the chance to conduct part of our second round of interviews in 2016 (Cunha, 2000).

It is not uncommon to see the late appearance of the University of Sao Paulo, USP, funded by the Paulista[4] elites in 1930, described in the literature as a marker of the beginning of science in Brazil due to its international board of professors and pioneering role integrating of the academic career to research activities. With support from the Paulista elites, the media and other sympathizers, USP's scientists achieved the academic prestige and political power that allowed them to advocate in 1947 for the dedication of 0.5% of State revenue to fund research. A group of professors and researchers from the institution presented to the state deputy's a document called "Ciência e Pesquisa- Contribuição de Homens do Laboratório e da Cátedra à Magna Assembleia Constituinte de São Paulo" (*Science and Research – The Contribution of Men from the Laboratory and Scholarship to the Magna Constituent Assembly of Sao Paulo*). The document was inspired by the international Post-World War II rhetoric, regarding the duty of "dominant nations" (such as the United States, U.K. and Russia) and their governments' roles

[4] Referring to someone or something from São Paulo.

in boosting scientific expertise and development to guarantee war preparedness as well as economic development and social well-being. After approved by the Constituent Assembly, their petition originated article 123 of the São Paulo Constitution, establishing the following:

> Article 123 - The support for scientific research shall be provided by the State through a foundation organized in the manner established by law.
>
> Sole Paragraph - Every year the State shall attribute to this foundation, as special income of its own administration, an amount not less 0.5 of its total revenue." (Constituição do Estado de São Paulo, 1947)

The total amount was later raised to 1% and preceded the creation of the Foundation for Research Support of the State of São Paulo, FAPESP as we know now it – a project that was already under discussion since the 40's but was only officially institutionalized in 1962. FAPESP became one of the first local scientific agencies created in the country to comply and administer Sao Paulo's constitutional provision of directing 1% of the state's revenue to research, and the model was later followed by other States. Also following the Post World War II international trends of modernization and search for power and development through technology - a "knowledge economy", many other national and regional agencies started to come about during the same period around Brazil with the intention of organizing scientific efforts. Until this day, Sao Paulo still concentrates most of the national wealth (34% of the country's GDP) and dedicates a larger share of its GDP (1.64%) than the national average to R&D activities, contributing to the maintenance of its perceived status as one of the largest and most successful centers of science not only in Brazil but in Latin America as a whole (Motoyama et. al, 1999; Cunha, 2000; Schwartzman, 2006; Schwartzman, 1993, Prata, 2015).

Research and Development (R&D) activities in Brazil are coordinated primarily through the articulation of two Ministries, appointed by the federal government: Ministry of Education (MEC) and Ministry of Science, Technology, Innovation and Communication (MCTIC)[5] and their main agencies. These agencies play a central role in the organization of knowledge production and capacity building in Brazil, implementing policies related to research and education in the entire country. CAPES (Coordination of Improvement of Higher Education Personnel) and CNPq, (National Council for Scientific and Technological Development) are fundamental pieces of the S&T governance system, under MEC and MCTIC respectively.

Both CAPES and CNPq were created by law in the same year, 1951, and were later strengthened with the establishment and directing in 1999 of the sectoral funds and other revenue coming from exploitation of natural resources through FNDCT (National Fund for Scientific and Technological Development, 1969) and FINEP (Financing Agency for Studies and Projects, 1967), which is FNDCT's Executive Secretary ("O que sao Fundos Setoriais", n.d.). Both of the funds collect taxes revenue's that are then translated into efforts in S&T through grants, scientific initiation and graduate fellowships, funding for large research and development programs as well as the expansion and assessment of graduate programs. FINEP is a public company that helps manage these funds and connect them to the National Plan for R&D. For a detailed graphic illustration of the abovementioned policies and agencies, please review Figure 2 below in combination with the Main Acronyms Key (p. viii).

[5] Former MCTI, which was recently fused in 2016 with the Ministry of Telecommunications through an arbitrary decision of the interim President Michel Temer (after the 2016 coup that took democratically elected president Dilma Roussef from power), despite of a lot of protests from the scientific community (Angelo, 2016). Since then, Brazilian scientific policy and governance system have been unstable and funds for Science, Technology and Innovation were reduced in more than 40% after the election of right-wing politician Jair Bolsonaro in 2018. You can read more about that in Escobar, 2019 and

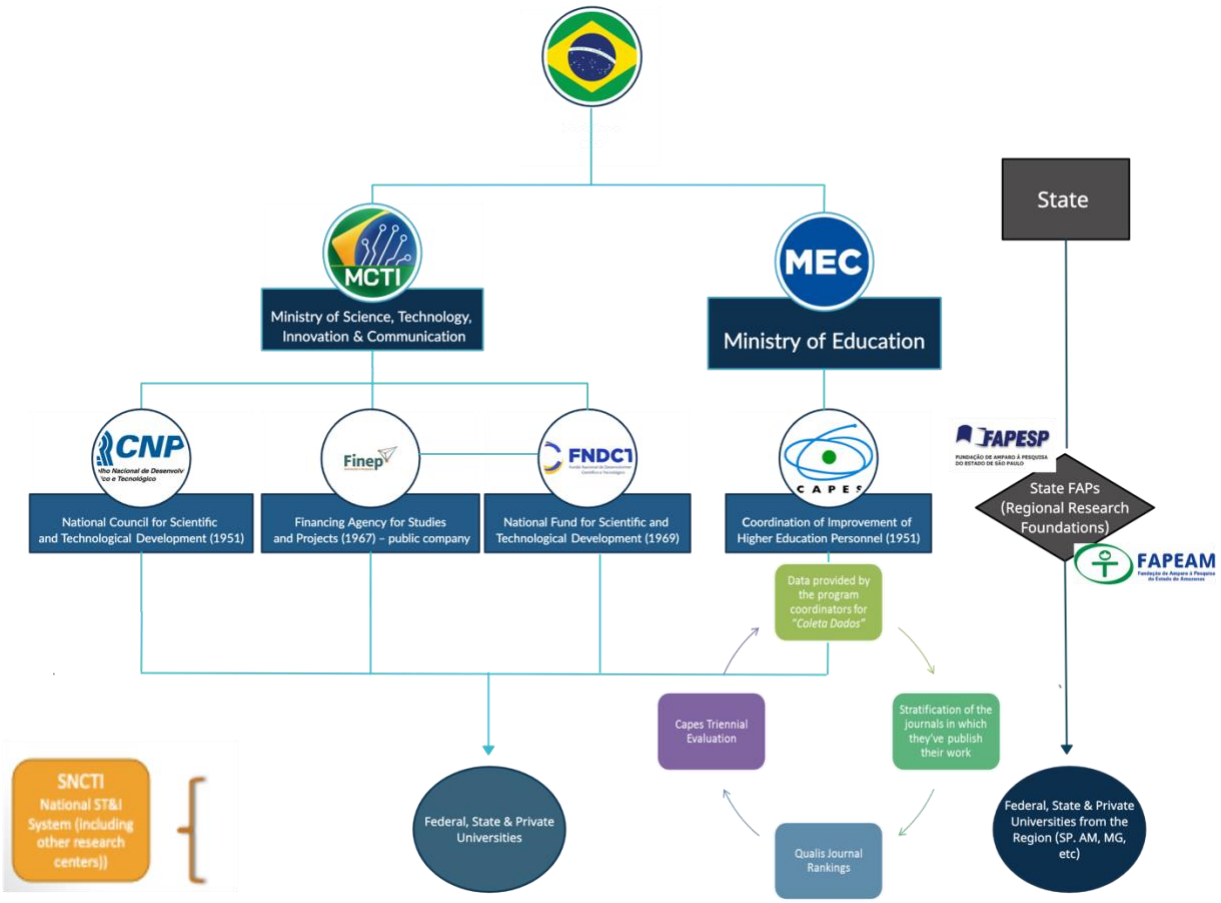


FIGURE 2: Simplified organizational flow chat of the main Brazilian scientific agencies and policies covered in this thesis.

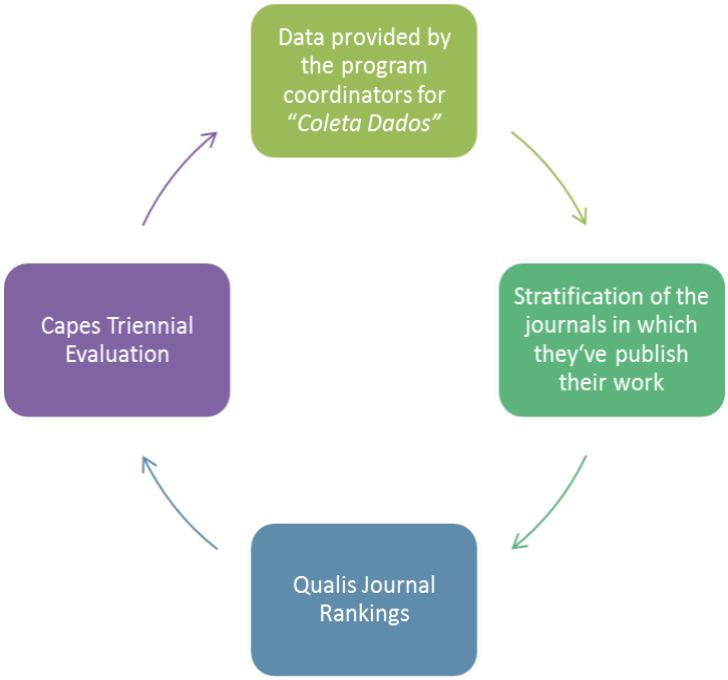
Whereas CNPq is one of the main funding sources for undergraduate, masters and doctoral researchers nation-wise, CAPES has been tasked with the responsibility of supporting the expansion and consolidation of graduate and post-graduate programs in the country. The establishment in 1998 of a Triennial Evaluation of graduate and post-graduate programs has been key in reaching those goals, and the evaluation was one of the most relevant policies mentioned throughout our interviews in Brazil, especially in the Southeast. This Evaluation system is an essential piece of this study, that was mentioned in all interviews across Brazil, as it is

responsible for the maintenance of quality standards and eventual mandates of closure of graduate programs due to low quality measured, primarily, by academic productivity. Amongst the attributes of CAPES Triennial Evaluation was the intention to consider and compensate for regional disparities in the National System of Graduate and Post-graduate studies (SNPG), a challenge that persists in the country and will be further addressed in the next section about the Brazilian Amazon ("Sobre a avaliacao", 2014; Prata, 2015)

Researcher's interactions with scientific policies in Brazil – Sao Paulo universities' perceived success and efforts for the internationalization of Brazilian science

CAPES Triennial Evaluation classifies graduate and post-graduate programs in a scale from 1-7 according to a variety of criteria such as the program's proposal adequacy; quality, quantity and ratio of faculty to students; number and speed of student's thesis and dissertations production; social impact and intellectual production of individuals that are part of each program. As academia is currently divided through disciplinary lines, the weight of each criterion varies across the 49 *Area Evaluation Committees* (i.e., Biodiversity, Environmental Sciences, Interdisciplinary, Anthropology, etc) and their respective *Area Documents* – where area committees provide a detailed description of what is evaluated and how. Yet, in the experience of research subjects, the most pressing measurements across committees were the number of articles published in highly regarded journals ranked in a national system called Qualis. That is a crucial piece of information since it defines where academics should spend most of their time and efforts in order to keep their programs functioning and competitive. Researchers also depend on their productivity levels according to Qualis to achieve progress in their careers, get access to grants, funds for their labs and scholarships for students.

The Triennial Evaluation[6] relies heavily on Qualis journal rankings to systematize and classify what counts as "qualified production". Qualis' scale varies from A1, A2, B1, B2, B3, B4, B5 and C, which is considered "non-qualified production" and therefore does not yield any points on the evaluation. Unlike many international journal rankings, Qualis is not founded exclusively on international bibliometric measurements such as the ISI and Scopus' Impact Factors (IF) and H-index. It is rather a field-specific ranking that takes into account some of those measurements in accordance with where researchers from each Area Committee reported to publish during the previous three years[6] (Figure 3).



[6] Since 2017, both CAPES Evaluation and Qualis have started operating in a Quaternal system, therefore analyzing indexed publications reported by graduate and post-graduate programs between 2013, 2014, 2015 and 2016. The change was announced in 2014 as a response to the demands made by programs considered of international excellence (grade 6 and 7) for longer periods of evaluation for productivity. Programs with grade 3-5 should continue to report triennially (by the year of 2015), being accompanied more closely through "Follow-up Seminars". Although CAPES suggests that the shorter evaluations will help programs to receive guidance on how to succeed, it is still unclear how these changes might disproportionately impact new programs with lower grades with higher pressure in comparison to those which are already well-established. For consistency purposes, this thesis will opt to continuous to refer to the evaluation as it was referred to us by interview subjects (Triennial Evalution) during the time of this research's field work (2014-2016), before such changes occurred ("Comunicado CAPES – Período de Avaliação do SNPG", 2014).

FIGURE 3: Flow Chart of how CAPES Triennial Evaluation and Qualis Journal rankings are connected. Graduate Program Coordinators from each Area Committee collect and report the information of academic production of professors and students triennially through a platform called “Coleta Dados” (in English: Data Collection). The Journals reported are then stratified from A1, A2, B1, B2, B3, B4, B5 to C according to Area Committee’s criterion, which often include but are not restricted to impact factor and other bibliometric indexes. Qualis Journal rankings points are then used to create a score for each graduate program across the country. The Triennial Evaluation scores scale from 1-7, programs that receive scores 1-2 are not recognized by CAPES or the Ministry of Education and have to be closed. Scores higher than 5 are only attributed to programs that have both PhD and master’s programs, which are considered the most competitive programs among prospect students. (Source: Extracted from Prata, 2015)

Qualis and the Triennial Evaluation attempt to respect field-specific dynamics and nationally set expectations through the moderation of high IF variances among different journals and areas of study. It also bolsters journals indexed in the SciELO library, ranking those as at least B2 or B3 – a recommendation, specially designed to value national open access journals, that has been followed across Area Committees. Those specifications represented important steps towards the emancipation of international rankings and indexes that are very unique to the Brazilian scientific evaluation system and experience.

SciELO is an open access digital library, created in 1997 through a partnership with several scientific agencies, in the context of huge challenges faced by researchers in Brazil and Latin America to deal with language barriers in addition to the difficulties to have access and make visible their scientific production. At the time, a very low percentage of Brazilian journals were indexed in international databases such as The Web of Science (WoS) – which at the time

belong to Thomson's Reuters – and SCOPUS, and a variety of those were still distributed in paper to few national institutions who could afford the subscription. In response to the rising demand of a possibility to do, share, evaluate and publish peer-reviewed intellectual production of the Latin America, BIREME (Latin American and Caribbean Center on Health Sciences Information) in association with FAPESP and CNPq funded SciELO. The initiative later expanded across continents, including some African and European countries, such as South Africa, Portugal and Spain. SciELO became an important platform for researchers from luso-hispanic countries in the Global South to publish findings in their first languages and allowed for the creation of policies valuing locally relevant knowledge production in a way that was accessible beyond internationalized institutions and academic centers. SciELO has, however, started to push for English language publication in a response to the organizational and international pressure to increase their "impact", measured by number of citations and other indirect quantitative bibliometrics.

CAPES' robust set of policies are accredited for the expansion and internationalization efforts that have made Brazilian science grow in the eyes of the broader scientific community. Over recent years, Brazil jumped from 18th to 14th position in the ranking of most academically productive countries in the world, achieving 2.9% of representation of the global share of indexed scientific production in Web of Science and Scopus. More than 90% of those articles come from universities (Agencia Fapesp, 2010; UNESCO, 2010; UNESCO, 2016). A prominent science policy researcher with whom we spoke in 2014, suggested that this boost in productivity was swayed by an agreement between Thomson Reuters and CAPES, in which Brazil purchased access to their database for a variety of universities and received in exchange the incorporation of several Brazilian journals to the WoS database. For him, this justifies how the rising of

scientific productivity with Brazilian authorship in indexed databases is still counterbalanced by the decrease in scientific impact (Interview 25). Around the same time, WoS confirmed its increasing interest in Brazilian science integrating SciELO into their platform (Packer, 2014). Although SciELO maintained its commitment to remain an open access library, this partnership could be interpreted as a positive sign of the international community's recognition or interest, but the impact of the internationalization of Brazilian academic production are yet to be evaluated. Since WoS is a subscription-based paid platform owned by for-profit business called Clarivate that is traded in the global market, it is key to highlight that their sudden interest in SciELO is also in line with their financial interest in expanding the market of citation data and journals across Brazil, Latin America and other countries in the Global South.

While the increasing interest and legitimation directed towards knowledge production from developing countries can be considered an achievement, there are important unintended consequences to consider. The most important of them is the threat to the availability and uptake of knowledge by those who could potentially benefit from it the most: decision-makers, protected area managers, non-bilingual scientists, teachers and professors around Latin America.

As part of its internationalization efforts, in 2014, SciELO released a document establishing new standards of minimum and recommended percentages of articles in English language necessary for journals to remain part of their library (Table 2). The concern with journals' international reach and impact has subverted significantly what made SciELO such a unique effort and creates an interesting conundrum in which, in order to access the best available knowledge of one's own country, it is necessary to do so in a foreign language.

TABLE 2: Goals for minimum and recommended percentages of articles in English language and authors with foreign affiliation in each thematic area and for the entire SciELO collection expected until 2016 (adapted from SCIELO, 2014, p.11-14):

Thematic Area	Percentage of reviews and original articles in English (%)		Percentage of authors with foreign affiliation (%)	
	Minimum	Recommended	Minimum	Recommended
Agronomic	50	75	15	30
Biological	85	85	30	30
Engineering	70	85	30	40
Exacts and Earth Sciences	70	85	30	35
Humanities	25	30	20	25
Linguistic, Letters and Arts	20	30	20	25
Health	80	80	25	35
Applied Social	25	30	20	25
SciELO Brazil	60	75	20	35

Source: Extracted from Prata, 2015 (adapted from SCIELO, 2014, p.11-14)

An important conclusion of this research which was previously published in my undergraduate thesis was that scientists from smaller and younger federal and private Universities were most affected by publication pressures and requirements than those working under State Universities. They report to be less likely to work with knowledge-users than researchers in the State Universities, who have more stability and flexibility in their career to do engaged work, either through the production of technical material (manuals, books, workshops) for public communication or through extension-type of work. Although technical production weights less for the Triennial Evaluation of CAPES, programs with a long tradition of research

and publication are already well ranked in the system due to the ability to maintain a rhythm of international publication from faculty and students that is far ahead in comparison to what is produced by new programs in private and federal universities. In order to maintain a program working regularly under MEC, the minimum score of a graduate program is 3, and only programs which award both Master's and Doctorate degree can achieve the maximum scores of 6 or 7. For all Area Committees covered by this research, only programs in the Southeast and South regions as well as one program in the Capital, Brasilia, reached score 7, according to the 2013 CAPES Trienial Evaluation report. Most, Sao Paulo's State Universities: Universidade Estadual de Sao Paulo (USP), Universidade Estadual de Campinas (UNICAMP) and Universidade Paulista Julio de Mesquita (UNESP) (CAPES, 2013).

The Southeast region concentrates not only the highest percentage of wealth in the country (30% of the GDP), but also some of the oldest graduate and post-graduate research programs in the country. The disproportionate share of resources and tradition, particularly in Sao Paulo State, are also tied to the access to international networks, the leverage of private, state and federal funds along with a substantial set of infrastructure and equipment that are not equally enjoyed by their peers across the country. In absolute terms, universities in the Sao Paulo state receive the majority of national funding directed to higher education (86%), concentrating 30% of the PhD programs in the entire country. In result, their academic productivity continues to be significantly higher. It is key to note that this discrepancy is both reflected and reinforced by Sao Paulo universities predominant authorship of indexed publications in the country. About 50% of the Brazilian indexed papers come from Sao Paulo State, representing a quarter of all scientific literature published in Latin America. Researchers in the Sao Paulo state alone produce more papers than any other country in Latin America (Figure 3). Close to 30% of those come from

authors working under three internationally recognized State Universities: Universidade Estadual de Sao Paulo (USP), Universidade Estadual de Campinas (UNICAMP) and Universidade Paulista Julio de Mesquita (UNESP). These institutions have been cited in most of our interviews as successful representations of Sao Paulo's scientific prestige and an ideal towards which other programs in the country hope to strive for.

While self-critique and drive for success are important traits for a good scientist, there is a danger in comparing and measuring success in reference to international criteria. CAPES has created and implemented in Brazil one of the strongest systems for continuous assessment, expansion and improvement of graduate programs in all Latin America. The system counts with some innovative measures to take into account local journals and field specific dynamics, leading Brazil to the opportunity to have an incentive that strengths and invests in national journals while creating a strategic niche of open access and locally available knowledge. Yet, CAPES centered its evaluation system in a format that still privileges fast, high impact factor, English language, and academic publication in detriment to other forms of scientific communication, supporting the idea that the best work of scientists should be the ones that are internationally published and publishable. For Barata (2015), our policies are sending conflicting messages: at the same time that Qualis and the triennial evaluation invest in open access journals and the valorization of SciELO, they also reinforce the use of internationalized indexes and indexing criteria, increase the demand for productivity in international outlets. Mugnani (2006) and many others argue that the definition of quality standards for publication influences the sets of journals which will concentrate most of the national production. For him, this concern should guide the definition of criteria for the classification of journals and what counts as qualified production, once they predict how national productivity behaves.

In summary, Brazil managed to enter and consolidate its presence in the international scientific scenario through the establishment and strengthening of a centralized system of evaluation of graduate and post-graduate programs – CAPES Triennial Evaluation – along with the expansion of access and production of scientific papers in specialized journals. Despite being associated with the Brazilian Ministry of Education, CAPES evaluation system relies heavily on measurements of indirect scientific quality that are based on indexed publications, rather than the papers themselves or educational knowledge transference measurements. The system includes a policy bolstering SciELO journals that preceded its recognition and inclusion in the prestigious Web of Science (WoS) database.

Although SciELO's growth and incorporation to WoS has been considered a successful step towards increasing Latin American science's international visibility, the leaning of knowledge production towards English language comes at the cost of its availability to local stakeholders and often young scientists and students who only know Portuguese. Altogether, these policies tend to reinforce an ideal of scientific excellence and productivity that is increasingly tied to international quantitative standards, while displaced from regional specificities and the engagement with local and/or non-academic knowledge users.

When international prestige means that the Brazilian users of Brazilian science need to know a second language in order to access the best of what national scientists and journals have to offer, it is time to ask ourselves: which role is our system of knowledge production and evaluation playing? And is that the model that best fits our own needs and goals? Is incentivizing publication in international high impact factor journals a priority and/or the best way to direct public and human resources in S&T? What are our gains and losses walking towards that

direction and can those coexist? How did this become the norm? And is there a way to counterbalance these expectations?

Once scientific policies are always subject to revisions: what steps could we take to assure that scientist's choices are responding directly to questions related to the appropriateness of the audience and journal in relationship to the problem studied? How can we guarantee the engagement and input of different stakeholders in science? What are other options to evaluate science? These are some of the questions that I hope to reflect upon in the following chapters as we lay out learned lessons from the implications of the current policies in the Brazilian Amazon and in Peru.

Background of Science Policies in Peru

Peruvian Scientific Performance and R&D Indicators

The present section offers an introduction to Peru's R&D productivity according to indicators commonly used to diagnose and compare country-level performance. Although these indicators are useful for a broader comparison, later, I cover in larger depth how the Peruvian S&T system has actually worked on the ground and how scientists have perceived their particular model of governance, and their relationship with the country's priorities and demands.

As an upper-middle income country, Peru's indexed productivity (in both Scopus or Web of Science) as well as investments in R&D and scope of scientific policies are still timid. It is in its early and defining stages of development in comparison to Brazil and other countries in Latin America. R&D expenditures in the country are estimated at 0.12% of its GDP, a mark way

below the 1.15% invested by its neighbor, Brazil, and the 0.7% average reached by Latin American and Caribbean countries. For comparison, see Figure 4, bellow (UNESCO, 2015).

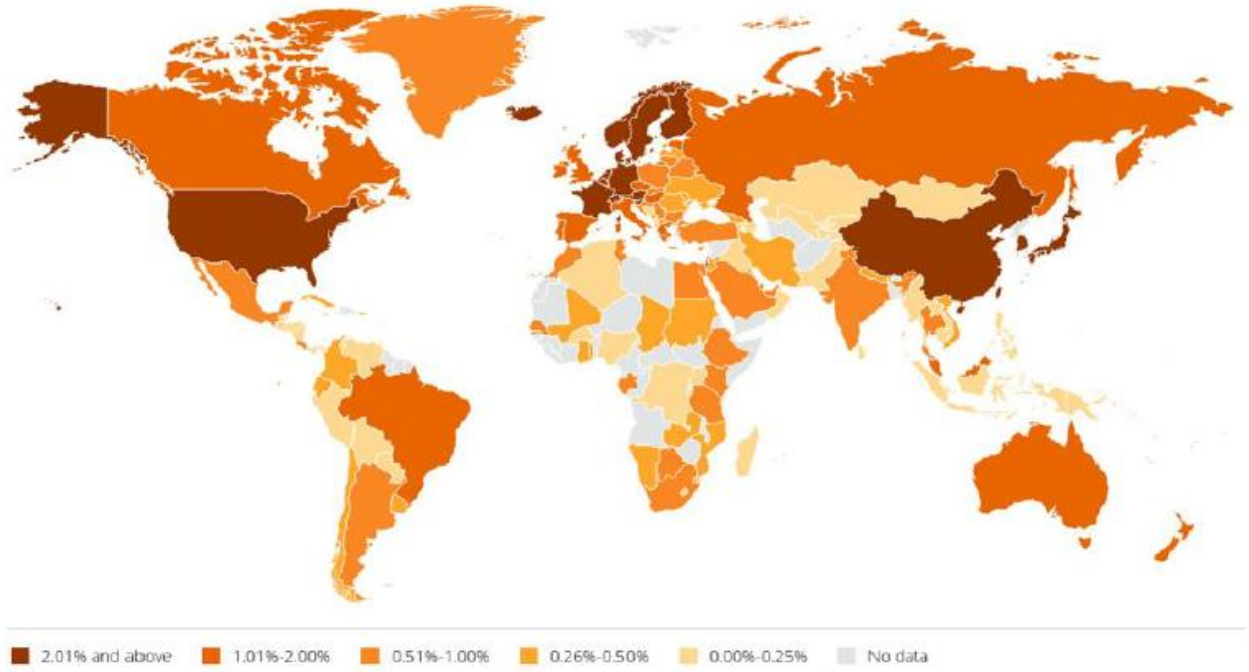


FIGURE 4 – Gross domestic expenditure on R&D as a percentage of GDP, 2016 or latest year available (Source: UNESCO Institute for Statistics (UIS) database, http://data.uis.unesco.org, Accessed in May, 2019)

Peru recently published its First National Census of Research and Development to Centers of Investigation (Censo Nacional de Investigación y Desarrollo a Centros de Investigación 2017). The report discloses that about 77% of the 517.5 million Soles (approximately US$155.49 million) invested in R&D in the country comes from national funds, while the rest (22.9%) comes from foreign sources. The data also shows that 58% of expenditures in R&D in Peru came from research center or institution's own institutional funds, while 16% came from business, 1.7% from funds of higher education, only 0.6% from competitive public funds or national grants, and finally 0.5% from funds of private non-profit institutions. In regard to foreign investment, foreign donations or competitive funds correspond

to 18% of the total invested in R&D in the country, while 4.3% come by means of R&D consultancy (CONCYTEC, 2017).

According to the First National Census of Research and Development, Peru has a deficit in PhDs (Table 3). Only 31.8% of all researchers have a Ph.D. - a percentage below other countries in the region such as Chile (39.2%), Brazil (39%) and Uruguay (64.2%). For OECD countries, that average is 42.8% (CONCYTEC, 2017; OPNE, 2019).

TABLE 3 – Highest degree achieved by Peruvian researchers in 2015 (Adapted/translated from CONCYTEC, 2017, Source: I Censo Nacional de Investigación y Desarrollo).

Category	**Researchers**	**%**
Doctor	1,072	31.8
Masters	1,158	34.3
Professional Degree	906	26.9
Bachelor	229	6.8
Not declared	9	0.3
Total	**3,374**	**100**

The report chose to define "researchers" as "people who are dedicated to the conception or creation of new knowledge, products, processes, methods and systems, as well as the personnel that directs plans and/or coordinates R&D tasks as well as *research fellows*. This category also incorporates *full-time researchers* and *professor researchers*" (author's translation from CONCYTEC, 2017, p. 23). The research reported a total of 5,408 people dedicated to generating Research and Development in 2015 - an increase in 13% from the previous year. Curiously, from the total number of personnel dedicated to generating Research and

Development, only 62.4% were declared a “researcher”, while 22.1% were categorized by the census as “technicians”, and the remaining 15.5% as “other support personnel”. “Technicians” were defined as “the people whose main tasks required technical knowledge and experience in one or several fields of engineering, physics and sciences. Their tasks include performing bibliographic searches and selecting material and information in archives and libraries; developing computer programs; performing experiments, tests and analysis; registering data; developing calculations, preparing tables and graphs; conducting surveys, statistics and interviews, usually under the supervision of researchers. This category includes assimilated personnel who perform R&D work under the supervision of researchers in the field of social sciences and humanities” (free translation from CONCYTEC, 2017, p. 23). Whereas “other support personnel” were characterized as “qualified and unqualified office personnel, clerks and secretaries who participate in research and development (R&D) projects or are directly associated with such projects” (free translation from CONCYTEC, 2017, p. 23). Those definitions are important, as we try to learn through a critical lens what is considered legitimate and measurable for Peruvian scientists and the world.

For every 1,000 members of the Economically Active Population (EAP) in Peru, there are only 0.2 researchers – the equivalent to a single researcher for every 5,000 inhabitants of working age. That rate is 6 times lower than the Latin American and Caribbean average (1.3), and 11 times lower than Brazil (2.5) (Figure 5). The average for OECD countries is 12.7 researchers per 1,000 inhabitants. (CONCYTEC, 2017).

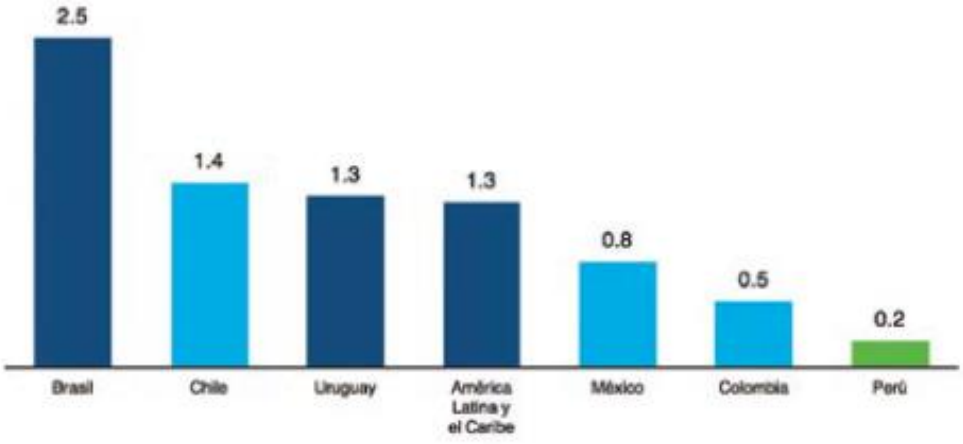


FIGURE 5: Number of researchers per thousand members of the EAP – Economically Active Population (Extracted from CONCYTEC, 2017)

As of 2014, 31% of researchers with graduate and post-graduate degrees in Peru earned those degrees abroad. Since Brazil leads the regional offer of PhD, it is not uncommon for Peruvian researchers to get their degrees in Brazilian universities. About 21% of all PhDs received abroad by Peruvian researchers come from Brazil, followed by Spain (16%), and the United States (12.6%). That fact also explains how Brazil became one of the main partners in publication with Peruvian researchers (6.25% of internationally co-authored articles), second only to the United States (20.36%). With base on that, and on the rate of 74% of international collaboration reported by SCImago – SCOPUS' journal ranking - the National Council for Science, Technology and Technological Innovation (Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica, CONCYTEC) has shown concern for Peru's knowledge generation system's dependency on international collaboration. (CONCYTEC, 2014)

Similar to Brazil, most of the researchers in the country are employed by higher education centers in a teaching regime tied to tenureship. They are also the responsible for most of the academic productivity in the country. About 85% of all indexed publication in Peru come from Universities (Figure 6): 50% from private universities and 36% from public universities,

justifying our study's focus on researchers' working in higher education (CONCYTEC, 2017). It is interesting to note the census' choice in quantifying only articles published in Journals indexed by the SCOPUS database, instead Web of Science or SciELO. That shows a tendency of which platforms Peruvian researchers and scientific agencies may use to define its scientific productivity parameters.

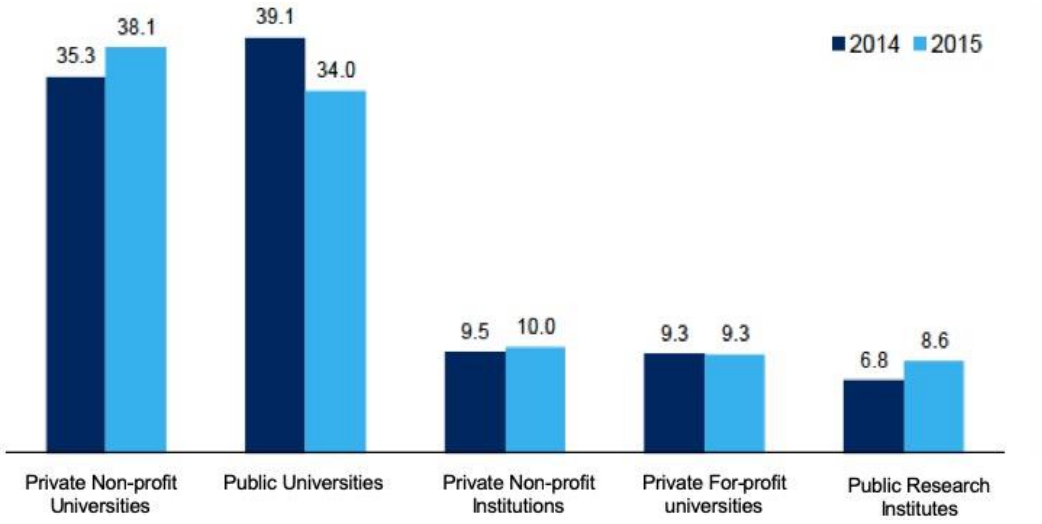


FIGURE 6: Percentage of scientific production indexed in the SCOPUS database by institutional sectors (Extracted from CONCYTEC, 2017).

In comparison to other Latin American countries Peruvian researcher's publication efforts seem very timid (Figure 7). Despite of having less of a tradition in publishing, it is important to highlight that their average citation rates are among some of the highest in the region, expressing better academic impact's average than several countries, including Brazil (Figure 8).

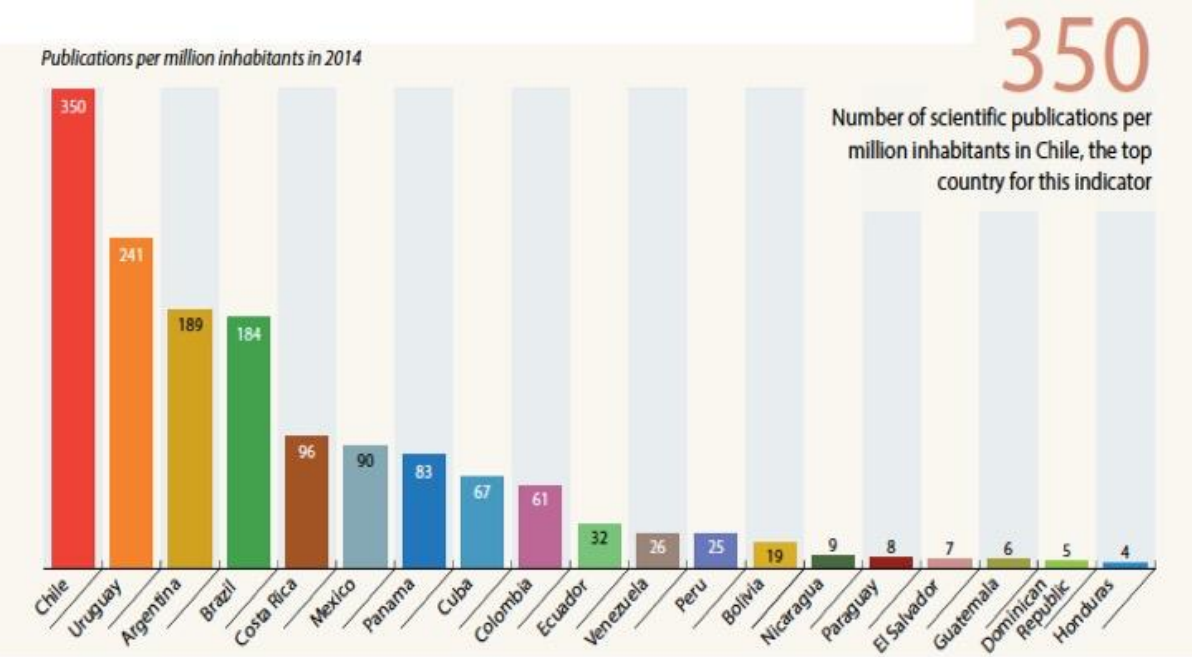


FIGURE 7: Latin American and Caribbean countries' publication indexed in the Web of Science database per million inhabitants in 2014 (Extracted from UNESCO, 2015).

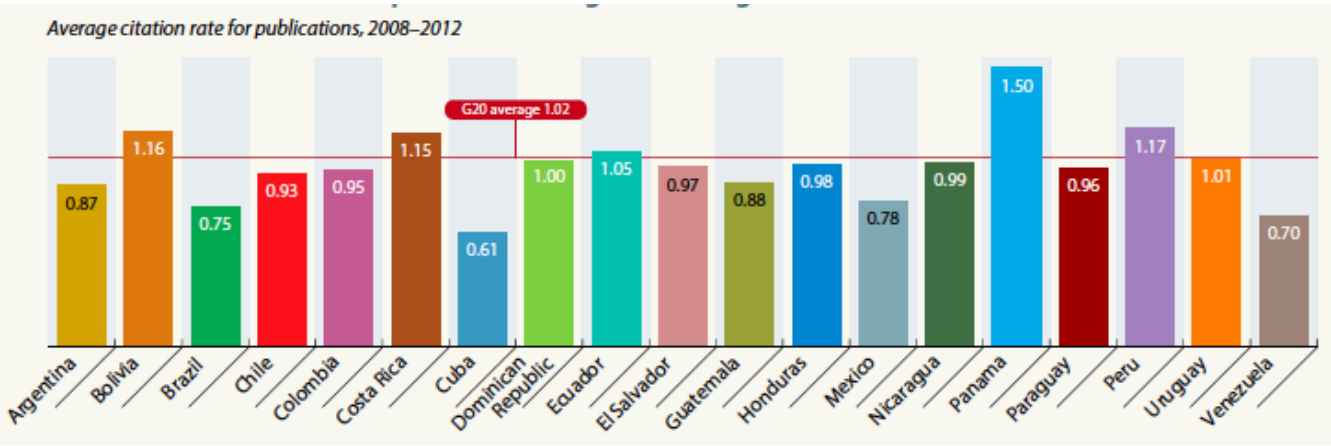


FIGURE 8: Latin American and Caribbean countries' average citation rate for publications indexed in Web of Science, 2008-2012. For comparison purposes, the red line shows G20 countries' average (Extracted from UNESCO, 2015).

Main Scientific Agencies and Policies in Peru

Peru is home to the first University in the Americas – Universidad de San Marcos, instituted in 1551 by Spanish colonizers, just 16 years after the foundation of Lima (Ortiz, 2006) – but its system of science and technology governance has only started to get more attention in the past couple of decades. To highlight a few of these initiatives, in 2005, the creation of the first "Marco Legal de Ciencia Tecnología e Innovación Tecnológica" (Legal Framework of Science Technology and Technological Innovation) and "Plan de Desarrollo de la Sociedad de la Información" (Development Plan for the Information Society) started to open the pathway for Peruvian S&T, strengthening and defining the roles of players such as the private, public and civil society. Thenceforward, CTI activities were declared as "public necessity and of preferential national interest" highlighting its "fundamental role for production and national development in its different levels of government "(Art. 2) (Lemarchand, 2010; UNESCO, 2015).

The creation of the Marco Legal also institutes in 2005 the "Sistema Nacional de Ciencia y Tecnología" (National System of Science, Technology and Technological Innovation), SINACYT, which articulates public, academic, business institutions, social organizations and people dedicated to research in Peru. The responsibility of governing SINACYT was assigned to the pre-existing "Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica" (National Council of Science, Technology and Technological Innovation), CONCYTEC, which was founded in 1981 but didn't have as large of a budget or influence until recent years (Lemarchand, 2010; UNESCO, 2015).

According to their official website, CONCYTEC's purpose is to "regulate, direct, guide, encourage, coordinate, monitor and evaluate the actions of the State in the field of Science,

Technology and Technological Innovation and to promote its development through concerted action and complementarity between the programs and projects of public institutions, academic, business social organizations and people who are members of SINACYT." And to also align those organizations with the "National Plan for Science and Technology and Innovation for Competitiveness and Human Development 2006-2021". As one of the first and main scientific agencies in the country, CONCYTEC works, since 2008, as an executive agency along with other State institutions. More recently, in 2011, CONCYTEC has started to operate directly linked to the Presidency of the Council of Ministers setting S&T agenda and policies with a budget that rocketed from US$ 6.3 million to around US$ 43 million between 2012 and 2014, following a period of economic growth of 2.4% in 2014 Peru, led in part by mining and natural resources exploitation. CONCYTEC is also responsible for using and managing national funds such as the Fondo Nacional de Desarrollo Científico y Tecnológico - FONDECYT (National Fund for Scientific and Technological Development) and redistributing that money in the form of grants and scholarships, similarly to Brazil's CNPq (*¿Quiénes somos?*, n.d.; UNESCO, 2015).

CONCYTEC does not have the objective nor the capacity to offer periodic assessments and evaluations regarding the overall quality and legitimacy of SINACYT organizations. With that gap in mind, since 2015, an agency named Superintendencia Nacional de Educación Superior Universitaria ("National Superintendence of Higher Education University", SUNEDU) has been given the responsibility to license higher education institutions, acting as a specialized technical public body attached to the Ministry of Education in Peru. SUNEDU has also been responsible for verifying compliance to basic quality conditions established by the government and monitoring whether public resources and benefits granted through the legal framework are being used for quality improvement and educational purposes. Along with the creation of

SUNEDU, a new law called “La Nueva Ley Universitaria N° 30220” published in 2014 instituted standards and guidelines for higher education that include concern with academic productivity and the intensification of research as an inherent part of bringing higher education’s quality to the “highest level” (“Historia y funciones,” n.d.). The context in which this law emerges will be covered in the following session. For a detailed graphic illustration of the abovementioned policies and agencies, please review Figure 9 below in combination with the Main Acronyms Key (p. viii).

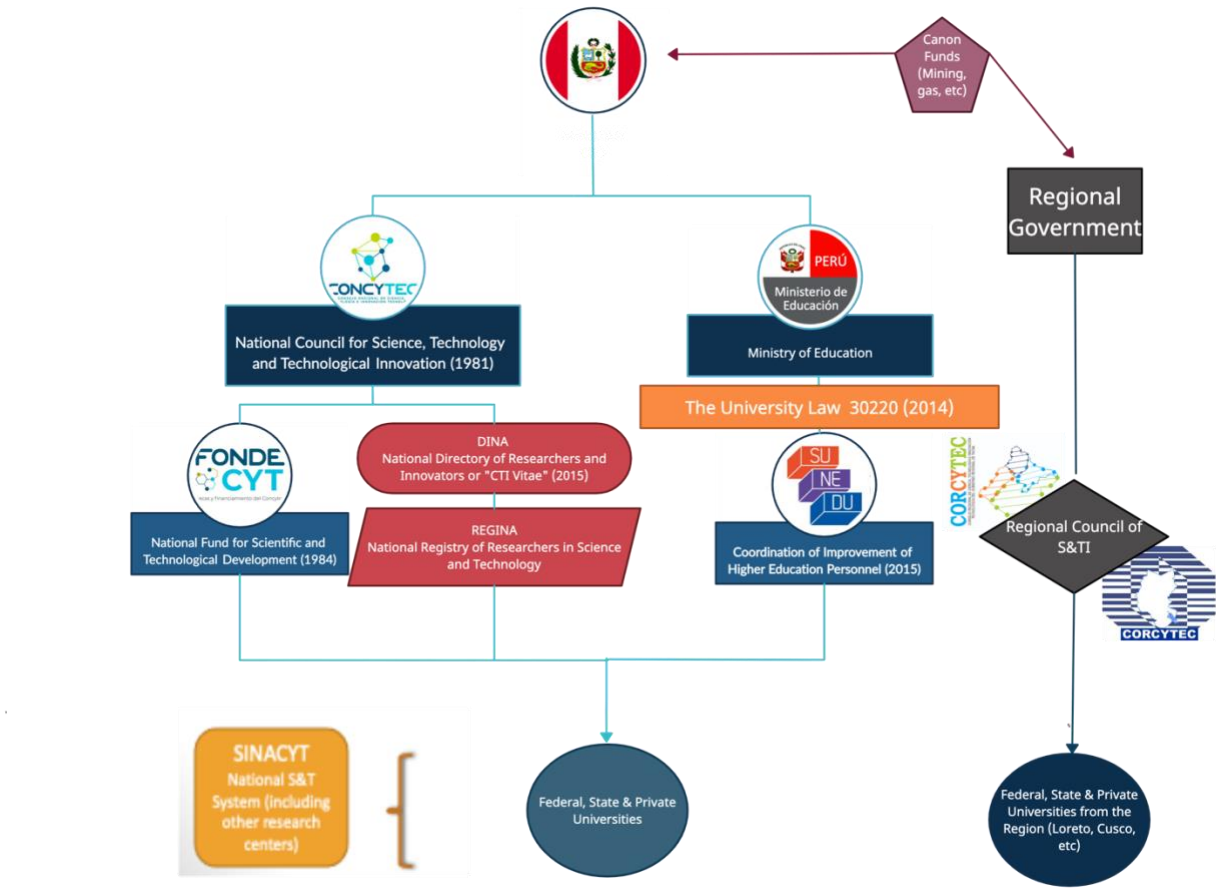


FIGURE 9: Simplified organizational flow chat of the main Peruvian scientific agencies and policies covered in this thesis.

While the Universidad de San Marcos and other prestigious Peruvian Universities such as Cayetanno Heredia Universidad (CHU) and Pontificia Universidad Católica del Perú (PUCP) – all located in the metropolitan capital of Lima, Peru – have independently created internal mechanisms to incentivize publication, it wasn't until the creation of the "Ley Universitaria" that an initiative in the national level started to assess, regulate, rank, license and close universities across the country. The new law defines, for the first time, indexed publication requirements as indirect indicators of quality, while offering standards to respond questions such as: "What is the role of a university? What qualifies as a good university? What is the role of professors and professor researchers in the universities? And finally, what counts as research and how to measure it?".

In the light of such essential boundary work and historical context, it is vital to analyze the potential repercussions of the new policies described here in the scientific scenario in Peru, as well as to learn from the mechanisms currently in place what could be applied to other countries across the globe. Analyzing Peru in contrast with the experience of other countries in different trajectories, such as Brazil, whose complex mechanisms have been defining and quantifying science for a longer period of time, can also offer especially useful insights for policymakers, researchers and educators in Peru and elsewhere in the globe.

La Nueva Ley Universitaria 30220 (the "New University Law"), DINA and REGINA

Contextually, the New University Law came about after a boom of private universities that spread over Peru in the previous decade. The liberalization of the educational market in the 90's led to the creation of several private higher education initiatives as a lucrative way to fill in the demand for technical and educational capacity building. Acknowledging that efforts to supply these demands needed to guarantee minimum quality standards and regulations led to the establishment, in 2001, of a committee linked to the Ministry of Education (Ministerio de Educación, MINEDU) that took on the responsibilities of working on a diagnosis of the Peruvian universities and consecutively starting a process of revisions and reform that preceded the new law (Cuenca, 2015; Ugaz, 2016; British Council, 2017).

One of the newest developments of the reform started by Ley Universitaria is that this year only 94 (ninety-four) out of the total 145 (one hundred and forty-five) Universities existing in Peru were approved and licensed to continue operating. About one-third, or 51 (fifty-one) higher education institutions – three public and 47 private – were considered unqualified and demanded to be closed by the Ministry of Education. In this first step of the reform, SUNEDU evaluated several parameters, among which the schools' curriculum, infrastructure, the number of full-time professors, professors with postgraduate studies, as well as the production of research and technological innovation. According to SUNEDU, the process led to an increase in full-time professors in private universities from an average of 13% to 30%, and a 50% reduction in teachers without postgraduate degrees in public universities and private. They say: "SUNEDU provides the country with a different and orderly university system, with important advances in research, greater technological innovation and better conditions for the exercise". In the

meantime, it is unclear what will be the pathway for the 232,000 Peruvian students who have continued their education or graduated from universities with degrees that will not be accepted throughout the country (Bell, 2021). According to SUNEDU and many of our interview subjects, it is fair to expect that after the licensing process, higher education quality requirements in Peru tend to become progressively more rigorous, especially in terms of academic productivity standards.

In parallel with the many components regulated by the new University Law, there were also the first initiatives to qualify and categorize researchers in Peru. The ones which were specifically relevant to the present study and mentioned by all interview subjects are the creation in 2015 of DINA (Directorio Nacional de Investigadores e Innovadores or "National Directory of Researchers and Innovators") recently renamed CTI Vitae[7], and REGINA (Registro Nacional de Investigadores en Ciencia y Tecnología or "National Registry of Researchers in Science and Technology"). These platforms were created by CONCYTEC as a strategy to order SINACYT, working complementarily in the process of accreditation of universities and researchers started by the New University Law. While DINA works as a public standardized database with the self-reported Curriculum Vittae (CVs) of researchers, REGINA has specific restrictions and benefits based on bibliographic academic production. Under the New University Law, researchers who

[7] Since 2019, CONCYTEC decided to change DINA's name to "CTI Vitae", affirming that the platform was never a directory of researchers per se, but a self-reported Curriculum Vitae (CV) repository for people who declare to work in STI (Science, Technology and Innovation). According to their website, "in that sense, it (DINA/CTI Vitae) should not be considered as a source of information to generate national STI statistics, such as academic information, scientific production, technological and industrial production, among other indicators". The platform is still currently linked to Georeferenced module called GeoCONCYTEC, which allowes users to visualize in real time the distribution of researchers in Peru, by geographical location, gender, academic degree and institution of belonging and is still available at:
https://public.tableau.com/profile/concytec#!/vizhome/GEOCONCYTEC_v2/GEOCONCYTEC .
For the purpose of this thesis, I decided to keep referring to the CTI Vitae as DINA, since it was the name cited by all interview subjects, including agents of CONCYTEC, at the time of the interviews, in 2016.

qualify through REGINA could occupy a new position called “Researcher Professor” in their university and receive a 50% bonus to their salary.

DINA works as a database that records self-reported qualifications and resumes of Peruvian professionals who carry out science, technology and innovation activities (CTI), both in the country and abroad. The Directorio Nacional de Investigadores e Innovadores was one of the first initiatives to quantify the number of researchers in the country and was created with the intention to give visibility to the work of the Peruvian researchers and innovators, as well as to link them with their peers, strengthening potential collaboration networks. Registration is voluntary, free and public access, and its only requirement is for researchers to go through an online six hours training and questionnaire Certification of Responsible Conduct in Research. Yet, being registered in DINA is a requirement for applying to access to scholarships, grants and funds from CONCYTEC, as well as accessing virtual bibliographic databases, specialized networks and full-text scientific journals. DINA allows researchers to generate a standardized CV and is a preliminary step for those who want to be certified in the following, more restrict platform, REGINA (“CONCYTEC pone a disposición nueva plataforma virtual DINA para investigadores, innovadores y profesionales,” 2015).

Once registered in DINA, one can request a qualification to REGINA. The process takes one month to be evaluated and the qualification lasts for two years. According to the 2017 regiment of SUNEDU, REGINA was created with the goal of establish minimum standards in the National System of Science and Technology (SINACYT) for a person to be considered researcher. REGINA is described as a registry of persons “who possess capacities, established according to a qualification, to perform scientific research and/or technological development”. In order to access the platform apply to qualify as a researcher in REGINA, individuals need to

have at least 1 publication on Scopus or Web of Science or at least 2 publications on SCIELO, although interview subjects have reported that SCOPUS was more respected, and SCIELO was not equally endorsed by them, as suggested by the statistical choices of CONCYTEC in reporting SCOPUS' SCImago indexes in their Census and diagnosis of S&T previously mentioned in this chapter (Interview P2, P3, P12). One granted patent, copyright or plant or animal breeder's rights can also fulfill the minimum productivity requirement. In 2018, CONCYTEC released a new regiment, including the Mexico led bibliographical database, Redalyc (Network of Scientific Journals of Latin America and the Caribbean, Spain and Portugal) and the Brazilian SciELO with the same weight: now, 1 publication on the primarily bilingual SciELO or Redalyc indexes equals 3 publications in Web of Science or Scopus. This distinction is important because it further legitimizes international indexes that favor English publication in relationship to local databases. This decision goes in the opposite direction of the Brazilian Qualis rankings, which bolsters SciELO publications intentionally in order to strengthen national journals (La Ley Universitaria, 2014; CONCYTEC, 2017)

REGINA point system includes other qualifications beyond publication, although it is noted that without publications or patents you cannot qualify. The system counts level of degrees acquired, participation in research projects, thesis advisory, papers in congresses, journals, patents and SCOPUS' H-index – which are linked to Elsevier and to their subscription based foreign commercial products. In order to qualify, researchers need to achieve the minimum of 30 points. The weight of the point system goes as described below:

Table 2: Score table for the qualification of REGINA researcher in Science and Technology of SINACYT. In order to qualify as a researcher, individuals must have at least 30 points. (Direct translation from Annex 1 of "Reglamento de Calificación y Registro de Investigadores en Ciencia y Tecnología del Sistema Nacional de Ciencia, Tecnología e Innovación Tecnológica - SINACYT" Nº 184 -2015-CONCYTEC-P, 2015)

EVALUATION			
ITEMS	**REQUIREMENT / PERIOD**	**SCORE**	**INDICATORS**
Academic Degree	Bachelor's / Licencado[8] / Master's / Doctor's	15	Bachelor's (2), licenciado (3), master's (7), doctor's (15)
Publications	7 last years	30	Scopus (3), Web of Science (3), Scielo (1). Patents granted of utility model (3), patents granted of invention (5), copyright (3) or breeder's right (5)

[8] While bachelor's degrees are awarded to students who successfully concluded their undergraduate coursework in a university, "licenciatura/licenciado" is an additional professional title or certification which requires the defense of a thesis and/or a professional proficiency test. According to the University Law (Ley Universitaria 30220, 2014 p.24, Articulo 45):

- "Bachelor's Degree: requires having passed the undergraduate studies, as well as the approval of a research work and knowledge of a foreign language, preferably English or native language.

Books or Book Chapters, edition	7 last years	5	Editorial ISBN in specialized research. International book (3), national book (1), chapter (1), editor (3)	
Human Resources Training	7 last years	10	Main advisor of theses defended to obtain: professional title (1), master's degree (2), doctor's degree (5))	
H-Index	no requisite	5	If H <5, the score equal to H; for H> 5, the maximum score is awarded, i.e.,, score = 5	
Projects	7 last years	25	Principal investigator (International Fund - 6), principal investigator (National Fund - 3), associate and post-doctoral candidate (2), doctoral candidate (1)	
Presentation in national and/or international conferences	7 last years	10	International (3), national (1)	
TOTAL	---	**100**		
* Only one grade will be assigned for an academic degree, in this case the highest degree.				
** To be considered in the qualification, the researcher must have at least 1 publication in Scopus or Web of Science, 2 publications in Scielo, or 1 patent granted in any of its modalities, 1 copyright or 1 breeder's right				

In an interview with a CONCYTEC worker, we've learned that the plan for science policies in Peru is to continue to qualify not just the universities and researchers, but also to categorize them based on productivity (Interview P014). "(…)So, the university looks at the qualification of CONCYTEC to decide which of their professors are researchers. Because not all of the professors in these universities are researchers – that is the reality. In that way, REGINA is a support system for them. (…) One of our references is CAPES. CAPES qualify centers by categories, so we are taking an example of that to qualify [our research] centers". She has acquired her PhD in Brazil and has mention that CONCYTEC's decisions are inspired by CAPES' Evaluation System and similar productivity incentives created globally.

The trend in quantifying research in Peru following international standards has more recently been translated into a new regiment for SINACYT that will replace REGINA, called RENACYT, Registro Nacional Científico, Tecnológico y de Innovación Tecnológica or "National Scientific, Technological and Technological Innovation Registry" ("Calificación de Investigadores - Manual de Uso del CTI Vitae," n.d.). In an interview about RENACYT to the Pontificia Universidad Católica del Perú, PUCP, Andres Melga Sasieta, the Director of the Direction of Evaluation and Management of Knowledge of CONCYTEC said: "The first thing that was done was to review the regulations of the peer countries. We visited Colombia, Uruguay, Chile. Mexico has a system that classifies its researchers. We saw that the classifications were something natural" ("'Brasil, aunque es un país más grande, produce al año más de lo que el Perú ha hecho en toda su historia' | Portal de investigación | PUCP," 2019).

The new system will divide researchers into two categories based on hard sciences or humanities, and stratify them in levels based on their productivity, degree achieved, involvement

with research projects and thesis advisory. The new categories are named after two of the most prominent Peruvian academics of all times: Ancient Cultures and the Inca Empire historian, María Rostworowski; and Carlos Monge, the medical physician who first described altitude sickness.

Carlos Monge's category seems to be focused on hard sciences, it puts a high weight on indexed productivity, requiring at least 40 indexed articles published and 2 books or book chapters for researchers in their highest level's researchers, while the María Rostowrowski's group has other requirements for activities such as work related to the productive sector and consultancies. Yet, María Rostowrowski's researches' highest level still needs a minimum of 10 indexed articles and 3 books and/or book chapters published in the last 10 years. While having two categories shows the attempt to acknowledge the variety of roles performed by researchers, the most rigid requirements are still based on indexed productivity for both categories.

According to CONCYTEC's website, researcher's RENACYT levels will not affect their access to funds, and merit will be assessed based on the research proposals, but as Sasieta's interview highlights, the new structures are meant to encourage "meritocracy" and motivate researchers to "level up". Although the impact of this new policy has not been encompassed by the interviews of this thesis, it is important to acknowledge that it confirms the trends in quantification of research observed in 2016 both in Brazil and Peru ("Reglamento de Calificación, Clasificación y Registro de los Investigadores del SINACYT - Reglamento RENACYT - Preguntas Frecuentes," n.d.).

An Intro to Regional Dynamics in Peru

Nationally, Peru has increased its investments in S&T accompanying the growing revenue and royalties generated by a particularly interesting feature of the Peruvian R&D system is that the country has developed a mechanism to devote a portion of the royalties from the exploitation of various natural resources to the regional government where the exploitation took place through what are known as "Canon funds". This policy is particularly relevant for regions such as Cusco, for example, where 5% of the royalties from mining are allocated to national universities by law (2004) and 20% is allocated specifically for public investment in academic research that promotes regional development through science and engineering (UNESCO, 2015).

In our research, interview subjects acknowledged that Canon funds have been particularly helpful in funding infrastructure and technical apparatus such as high technology microscopes and other equipment but declare that there are many bureaucratic challenges in accessing and using them for research (Interview #4P, 13P, 16P and 18P):

> *"(...) we do have money coming from the canon, because there is a lot of extraction in the country. And many regions have this money, who say it is for research, but the universities who do not have the concept of what is research they have used it to build a big and pretty laboratory where there is nothing" (Interview #14P).*

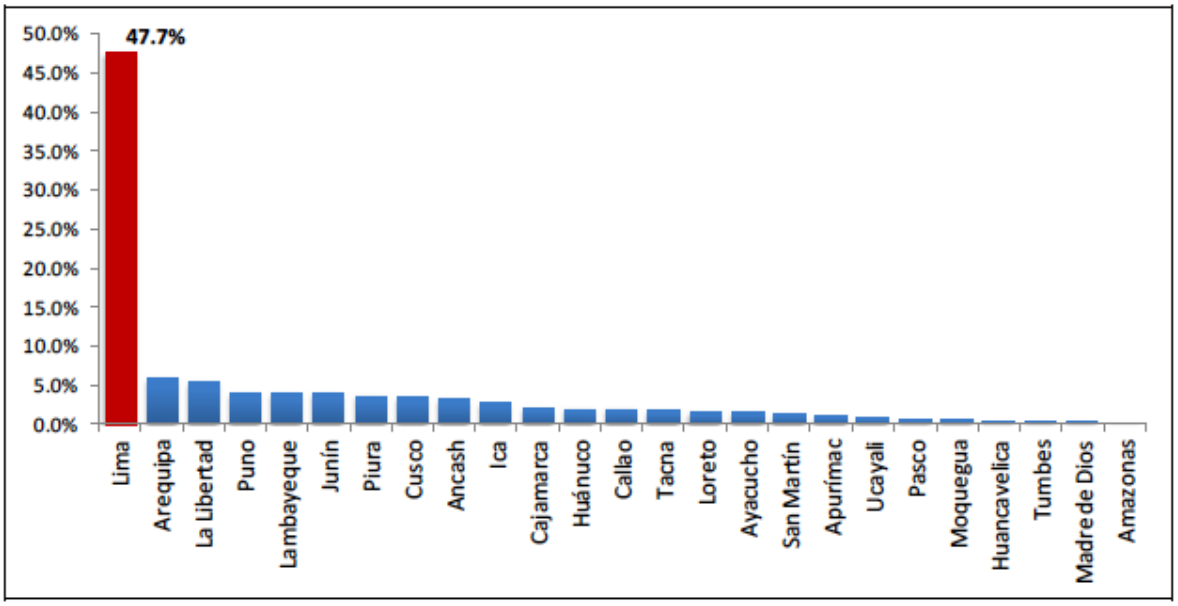
Unlike San Marcos, PUC, and Cayetanno Heredia who have access to international funding and have already learned to comply with publication requirements created institutionally, researchers in other parts of the country are more susceptible to the requirements imposed by the new accreditation mechanisms and CONCYTEC. They've shown to be especially concerned with the end of the canon funds. Lima concentrates not only the majority of funds in the country, but also 47% of the professors in the country (Figure 10, Figure 11, Figure 12).

Departamento	Investigadores por cada 10 mil individuos de la PEA
Amazonas	1.1
Ancash	2.1
Apurímac	0.5
Arequipa	2.5
Ayacucho	3.0
Cajamarca	0.1
Callao	4.3
Cusco	0.4
Huancavelica	1.6
Huánuco	0.1
Ica	0.8
Junín	1.0
La Libertad	1.4
Lambayeque	0.2
Lima	3.6
Loreto	0.7
Madre de Dios	4.3
Moquegua	4.1
Pasco	0.6
Piura	0.3
Puno	0.5
San Martín	0.8
Tacna	1.6
Tumbes	0.9
Ucayali	5.5

Fuente: I Censo Nacional de Investigación y Desarrollo. INEI-Estimaciones y Proyecciones de la Población Económicamente Activa 2000-2015.
Elaboración: CONCYTEC – Dirección de Investigación y Estudios.

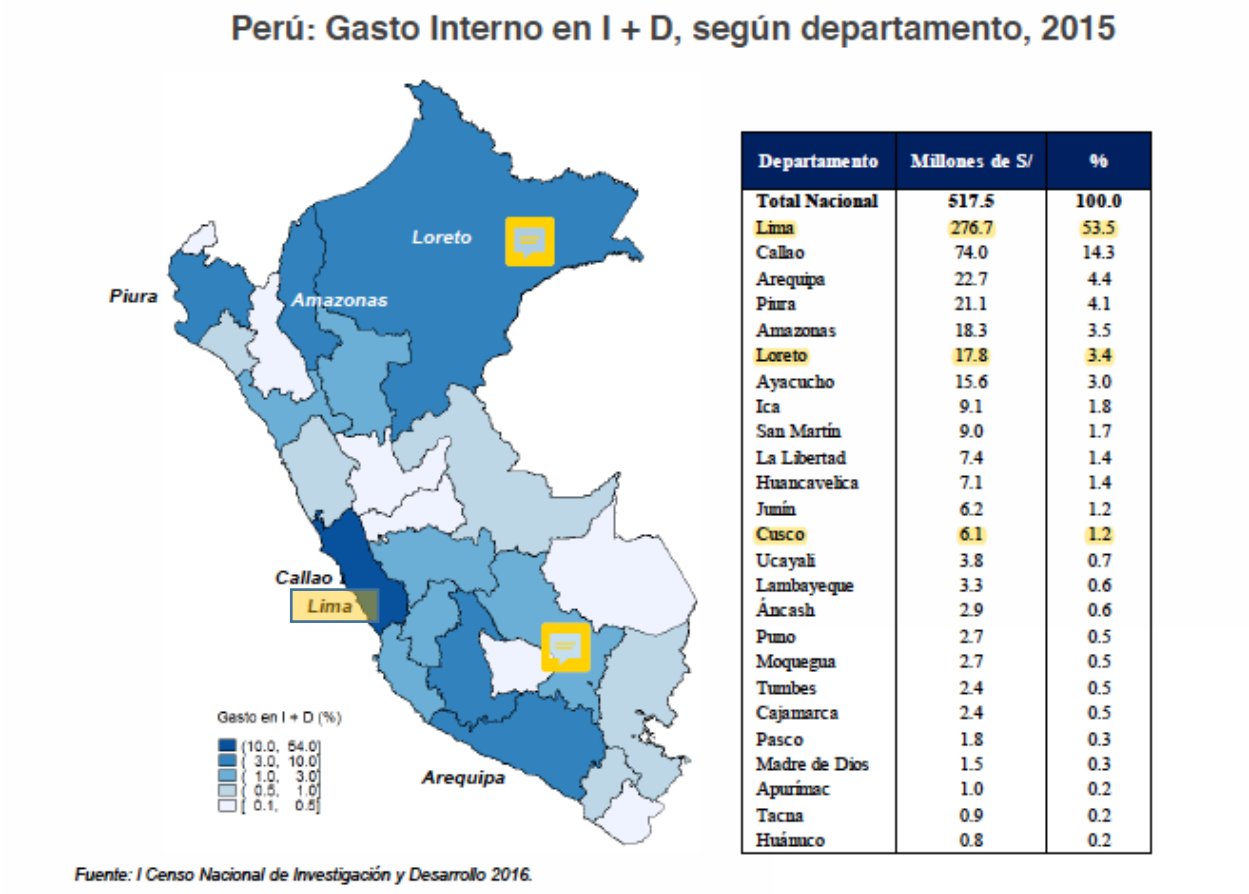
FIGURE 10: Number of researchers per 10,000 members of Economically Active Population in Peru, divided by regions.

Gráfico 11: Docentes de universidades peruanas por regiones



Fuente: II CENAU (2010)
Elaboración: CONCYTEC

FIGURE 11: Percentage of professors in Peruvian universities per region.



Departamento	Millones de S/	%
Total Nacional	**517.5**	**100.0**
Lima	276.7	53.5
Callao	74.0	14.3
Arequipa	22.7	4.4
Piura	21.1	4.1
Amazonas	18.3	3.5
Loreto	17.8	3.4
Ayacucho	15.6	3.0
Ica	9.1	1.8
San Martín	9.0	1.7
La Libertad	7.4	1.4
Huancavelica	7.1	1.4
Junín	6.2	1.2
Cusco	6.1	1.2
Ucayali	3.8	0.7
Lambayeque	3.3	0.6
Áncash	2.9	0.6
Puno	2.7	0.5
Moquegua	2.7	0.5
Tumbes	2.4	0.5
Cajamarca	2.4	0.5
Pasco	1.8	0.3
Madre de Dios	1.5	0.3
Apurímac	1.0	0.2
Tacna	0.9	0.2
Huánuco	0.8	0.2

FIGURE 12: Internal R&D expenditure according to "departamento" or region. The regions encompassed by this study are highlighted in yellow.

Science Policies in the Margins – the case of the Brazilian and Peruvian Amazon

Why research "the Amazon"?

Speaking about ecological research without including the Amazon would make this research not only limited in scope, but also incomplete. The desire and concern to encompass other regions of Brazil was an idea present since the early stages of this research. Due to resources and time restrictions, in 2014, we had to make the practical decision of constraining our first field work to the Southeast region of Brazil, where a disproportionate concentration of

people, universities, R&D expenditures and formal centers of knowledge production were evident. Although we learned many valuable lessons about the path towards which what is considered the "finest" of Brazilian science is heading, many different questions arouse and remained unanswered until the following 2016 field trip to Peru (Lima, Cusco, Iquitos cities) and the neighboring Brazilian North (Manaus city), two years later. The goal of this section is to cover through national and regional comparisons a different outlook of what constitutes the Brazilian experience with science policies in a distinct region of the country and how that relates and differs from the experience of its Peruvian neighbors. These results elicit connections between the biological, cultural and scientific resources and experiences shared between Brazil and Peru, laying the ground to an analysis of what it means to produce knowledge from and about one of the most biodiverse regions in the world – the Amazon region.

First and foremost, it is key to start by acknowledging that "the Amazon" are many. In the book, "O país do Amazonas", or in English, "The Amazonas Country", Marilene Corrêa historicizes the rich social dynamics of the vast region that we choose to call the Amazon, covering and explaining many adjectives that we traditionally associate with it: i.e.,, Amazonian Basin, Brazilian Amazon, Amazon Forest, Legal Amazon, etc. Her work explores and conceptualizes the conflicts between what she dissects as three Amazons: Indigenous Amazon, Brazilian Amazon and the Amazon Lusitania (Portuguese – or colonized Amazon). And explains the transnational history of territorial disputes that precedes Portuguese and Spanish colonization. Despite and perhaps because of the struggles over this territory, it is essential to state that the land we visited belongs to indigenous people and it is key to show our respect by acknowledging that indigenous peoples have studied, stewarded and shared knowledge about these landscapes from much longer than Western Science can comprehend.

Broadly speaking, the Amazon region encompasses a huge diversity of ecological and cultural dynamics that this thesis does not have the presumption of fully covering. It is a great challenge to discuss a region that covers over 6.7 million km^2 of forest distributed among 8 countries, which is home 34 million residents who are primarily concentrated in cities, including over 350 indigenous groups. The Amazon Forest comprises between 17-20% of global freshwater, 10% of global reserves of carbon stored, and 10% of the world's species, making it one of the most biodiverse regions in the globe (Charity, Dudley, Oliveira, & Stolton, 2016).

Nonetheless, the cities of Manaus, in the Northern State of Amazonas, Brazil, and Iquitos, in the province of Loreto, Peru served as samples of an interesting range of experiences that differ significantly from the perspectives offered by researchers in the metropoles of Lima (Lima province) and the Southeast of Brazil (Sao Paulo, SP; Campinas, SP; Sorocaba, SP; Rio de Janeiro, RJ). Due to ecological, historical and socioeconomic differences in comparison to their respective metropolitan centers, these cities make a great case to contrast and add to the results covered in the preceding sections of this thesis. Additionally, because of the similarities of the phenomena described by Amazonian researchers across national boundaries, we chose to cover the analysis of what we learned in these two cities in one chapter.

It was not uncommon to hear researchers from other regions of Brazil and Peru mentioning their experience conducting research about the Amazonian region (BR 01, BR 02, BR 12, BR 13, BR 17, BR-PR 24, BR 27, P7). An ecologist from the Sao Paulo region who worked between academia and the municipal Environmental Secretariat laid it out to us, as he explained the challenges of getting locally relevant, socially engaged work published: "things that are local are really discouraged, even if it is novel information. (…) There are some international journals that still accept some works that are more local as long as they are relevant

in terms of Biome: Atlantic Forest, Amazon, for example. You stick a “Rainforest”, or an “Amazon” in the work and you’ll have a stronger appeal, even more than Atlantic Forest and Cerrado [local biomes of the State of Sao Paulo]. (…) Otherwise, you won’t be able to publish this work” (BR12). Another interview subject who was a senior researcher and prolific scientist, previously employed by of a major scientific agency in the State of Sao Paulo, agreed stating: “I mean, if you have the word ‘Amazon’ in your paper a few times, it's going to go in Nature or Science. (…) Everybody in the world is interested in the Amazon. As long as you do the science well, I don't see why you won't be publishing in excellent journals! This is one of the myths that exists in Brazil, it is widely propagated “Brazilians do not study the Amazon”, you probably heard that. Some organizations in Brazil might say "well, Brazilian students studied the Amazon". Well, at FAPESP we have a portfolio of research in the Amazon that, I would think, very few organizations in the world have!”. Yet, the contradiction of having Amazonian scientific samples and knowledge accumulated, owned, interpreted, accounted for, funded and produced primarily by foreign and other regional agencies weren’t fully addressed until we finally spoke with local scientists who lived, worked and taught in Manaus and Iquitos.

This chapter is dedicated to the Amazonian scientists – some of whom became my friends - who dedicated their time to introduce me to their peers and explain how science policies and publication requirements impacted their life and work. This has been the hardest thing I have written in my life, mostly because of the fear of misrepresenting their voices, but here is my attempt to honor what they taught me through the critical lenses, struggles, biases and privileges I carry as a Latina woman, a Paulista, and a first-generation immigrant living, organizing, and studying in the United States.

Setting up the Rules of the Game – Amazon as a scientific actor vs. scientific object

One of the last interviews we conducted in Manaus, gave us a new crucial understanding of the birth and history of the graduate program's Triennial evaluation system of CAPES. The interview subject was an Australian tropical ecologist who has lived and worked in Brazil for decades. His story provides anecdotal evidence of how the evaluation system in Brazil came about, the impact it had in Amazonian research institutes, as well as its intentions in the quest for legitimacy and quality of science. In the following quote, this ecologist explains how a more subjective evaluation system that proceeded the CAPES' Triennial Evaluation – explained under the Chapter about Science Policy Landscape & Background in Brazil and Peru. The current system uses complex criterion including bibliometric measurements defined by Area Committees to rank programs on a scale 1-7, while the interview subject reports that the previous system was based on biases and personal ideas of prestige.

> *"[20:45] If you don't have a system for evaluating productivity then it comes down to personal things. And these personal things are very complicated. Well, many years ago I was the head of the postgraduate course at INPA and at that time, they had a different system [for Capes Evaluation of the Graduate programs], they had ABCD – with D, you were cut out. And we had level C, every year and I started to complain about it. I got myself "credenciado" in Sao Carlos and in Minas Gerais. And so, I went, and I gave these courses there, and they were different, and I couldn't figure out why the hell they were different. So, when I was on the Capes Evaluation Committee, I said: "Let's do is quantified. You say that we're down there [on the list of grades] so let's quantify that. Nobody quantified it! They weighed on things like tradition. And when it's tradition, if you don't have tradition you will never have it. It's circular. So, I was the first person to*

convince that group in Capes to quantify, which was basically "tempo de titulacao" [student time to degree], number of publications, number of students per [instructor]… and they did that, and we [Amazonian INPA program] were the first group to go from C to A in one jump!

The year before, when I went there, I have asked… We were given a C. And I said: "Look, I did all the calculations[22:33min], and we were up here [in the rankings]!", but they still gave us a C. And when I asked why they said, "it's because you're dependent on outside researchers". We had three people from outside, who weren't credenciados, and I thought do we have to take those three out? And in that year, [State University of] Campinas had forty-nine! And I said how come we're C, because we have three and they're A, because they have the forty-nine. And they said: "you have to understand the difference between 'dependents' and 'scientific exchange'". So, when it was in the South, it was 'scientific exchange', and when it was here, it was 'dependents'. And so, we managed to change that. [23:35min] So now, all of CAPES works… and people complain about it because of things like Qualis, okay? But if you don't have something like an evaluation system that is quantitative, then you go back to the subjective one." [BR 37]

When asked if the past one was more qualitative or what were the criterion for the ABCD scores, he responded with a serious look:

"We thought it was based mostly on latitude. The higher latitude you were, the better you were. That's it, the only criteria there were."

"[24:18] The first year that we got them to do the calculations; in fact, I sat there, and we sat there and calculated it out. But they did, there's a whole group there and they said "no no, but look, Rio Grande do Sul has gone down to C. It has gone from A to C in one

jump! We can't do that. We'll have to change the things… I mean, you know, tradition! They're white! They can't be C. We'll change this, and we'll lighten this…" [BR 37]

The first system of evaluation was very much based on arbitrary measures of "prestige" or what our interview subject called "tradition". INPA and other ecology programs in the Amazon were ranked lower than most programs in the South and Southeast region. Skeptical of the measures used to quantify quality, this interviewee, along with other researchers, contested the objectivity of the process and asked to see what data and criteria were used for the classification. At the time, experts from CAPES explained the educational, productivity and other criterion used to identify the best program in the country, and, once it all was on pencil, Amazonian programs rose above many Paulista and Southern States in the rankings. From then on, the system was changed from a simplified but subjective ABCD grade, into numeric scores 1-6 described earlier in the Brazilian section of this thesis. Currently, those continue to serve the purpose of stratifying graduate programs according to their "academic quality" as defined by CAPES' Area Committee representatives, which continues to rank low most except for one of the Ecology programs in the Amazon. That is one of the most important findings of this research.

While the intention for more objectivity stemmed from a desire of fairness, many of the bibliometric criterion used to define scientific quality have not benefited Amazonian researchers at large. In fact, the evaluation lacks nuance to validate and support some of the most important work that contributes to conservation efforts such as community-engaged pedagogical materials, books, management manuals and conferences, etc.

For instance, one of the most dedicated researchers I got the chance to interview was an Indigenous educator, activist and PhD Linguist who produced alongside her dissertation, a phone app and methodological proposal to teach her language, a series of illustrated teaching materials

or pedagogic books, all while working on a policy to require education of indigenous language in the public school system in her city. The money and planning for the project came from her PhD scholarship and was collectively crowdsourced in collaboration with her indigenous community, whose language is connected across the border of Peru and Brazil. None of these efforts, according to her, counted towards her degree or helped boost her program's score with CAPES, only the papers and her thesis. She said:

> *" I used the scholarship money that was for me to do this project because I believe that - WE believe, not only me, but the movement, that if we didn't take the initiative to be protagonists of our own history, nobody would do it! Because nobody sponsors culture, nobody sponsors language revitalization in Brazil.*
>
> *And many peoples who want to revitalize their language have initiative, [but] they don't have the finance for it and everything has a cost. So, I took the opportunity since I had this money in my hands and gathered the people who were united with us and in this perspective, we did it! Because I didn't do it alone, despite of most of the financials coming from me, the elaboration and thinking of the materials, the execution… we did Ajuri, which is how do you say it in Portuguese? Workshops!" [BR 30]*

When asked about the academic expectations and navigating pressure to publish academically, while also being accountable to the pedagogical, political and innovative work that she produced with her community; she described how the stress contributed to her developing a autoimmune disease. And that the work that was continuously required before her Phd defense was a certain number of papers published on highly regarded Qualis journals, which thankfully, in her field, were in Portuguese – though that is not the case for many environmental journals.

Among the people that we interviewed in the Brazilian Amazon was a University Ecology Professor elected president of the Amazonas Regional Council of Biologists. Across Brazil, Regional Councils are professional associations created for the purpose of regulating the professions they represent and defining the scope, rules and guidelines for exercising a given profession. In his interview, he expressed frustration that his work serving such important professional association didn't count in his evaluation. Since he couldn't keep up with the fast pace of academic publications required to teach and advise in the graduate program, he made the choice to quit the Regional Council so he could progress in academia (BR 34). Similarly, management experts working in Amazonian research institutes across Brazil and Peru share the frustrations with academia's struggles to evaluate their work. In both cases, they mention that manuals and conference presentations, which increase efficacy as well as social and transnational cooperation should weigh at least as much if not more than international publications. One of them says: "Researches have twice the work. They have to do work for the community... and work that is relevant for publication as researchers" *[P26]*.

Another one [BR 35] completes:

> *"The whole world talks about climate change, sustainability, but in the end, the solutions to this type of problem - which are management problems - are a change in human behavior and a change in attitude; how do you measure these in a paper? I think we have to think in terms of management practices, how conflicts have been resolved? This is a metric of success. This is a metric of success, in management, for example. [12:39]"*

Later, in the same interview, she reveals that participation in management conferences does not count in the graduate program's evaluations, and continues:

"[23:02] Of course, because we keep emphasizing publishing in Science. You ask if American decision makers are poorly informed about the Amazon?! No, they aren't! Because they are reading in their language, in the magazine they can buy at the newsstand about what is happening here. Now ask if our own people here are informed? And where do we publish!? Our system is offering us the opportunity, encouraging us more and more to speak another language, with other people. I say this because in the area in which I work, which is management, decision-makers in the management field are far from this universe [of academic publications in English]! The main users of the information that we are generating! So, there is no rewards for that, there is no prize. All I can do it as a decision that I made from an understanding that it is the right thing to do; but there are no rewards to do it. As a graduate student, no matter what you are doing in terms of internal, local communication. Communication work that maybe are more important to put on television than in the journals, because we are talking about public policy and public policy means public politicians too, right? (...). I have a conservationist friend who says that the biggest newspaper in Brazil is called the New York Times. If it's published in The New York Times it's known here. If it didn't work there, it doesn't become known here, so that's how it is. And he's right. Do you want to impact an environmental policy in Brazil? Put her in the New York Times. But why? Because we are talking with those [foreign] decision makers, who have an impact on our [local] decision makers here."[BR35]

What the quantifiable internationalized system leaves behind for all regions of Brazil and Peru, but specially for the Amazon are: applied research programs, ecological management and policy work, outreach and extension, book publications and public-facing materials such as

manuals and pamphlets. This dynamic disfavor and keeps in the margins the engaged work that Amazonian scientists do to inform decision-makers while it favors, objectively, the academically prolific, but perhaps inaccessible work, of those in the so called "Centers" or metropolis – in the case of Manaus, Sao Paulo, and in the case of Iquitos, Lima. Reinforcing the dynamic of South America as the periphery of science, and the Amazon as the "periphery of the periphery" or, the "colony within the colony". Amazonian Researchers in Brazil and Peru, even referred to the preference and need to recur to international funds, since the absence and neglect of the Federal State in the region, followed by the lack of financial support for local Amazonian research agencies such as FAPEAM resulted in a form of forceful independence from the State (BR 27, BR 28, BR 29, BR 33). In Peru, researchers in Iquitos reported not being eligible to access DINA and Regina's resources and/or not being invested in their bureaucracy, recurring instead to international funds, which they deemed more easily accessible and, according to at least one person, perceived as more concerned with societal engagement (P25, P 26, P28, P29, P30).

> One of our first interview subjects, a European ex-patriate living in Manaus put it bluntly: *"You can imagine the Amazon as a colony within Brazil. So, the flow of extraction of resources is higher than the flow of investments. You have social conflicts typical of regions that maintain their relationship with the center-periphery. Relationships that are very disfavorable and have a social structure that the Nova Cartografia*[9] *portrays with a lot of care, typical of this region, with pits of deep poverty and deep autonomy, even within an absent State. Meaning, the absent State triggers an excess of autonomy which means that everyone has to solve their own problems in the way that they can, margin-to-*

[9] Referring to the Project Nova Cartografia Social da Amazonia, a research and self-cartography project of traditional peoples and communities across the Amazon. To learn more about the project, visit: http://novacartografiasocial.com.br/

margin. That is deepened by the lack of communication; to go from one way to another you have to cross rivers... Make a map of all the places studied by the Nova Cartografia and ask how many hours of traveling between one point and another? There are no roads, you have to go through 3, 4, 5, 10 days, a week... So, it is a universe that would demand very particular scientific and social policies; [A place that] Requires large investments, and that does not happen." [BR 28]

The disregard for local particularities and a detailed account of the colonial dynamics theorized above was also exemplified by the experience of researchers in other hinterlands of Peru: the Andes. Both an entomologist and an ornithologist who we've spoken with in Cusco have described the challenges of accessing collections of national specimens, since the richest collections are in the U.S. and Europe [P17, P21]. They also describe how their University – one of the oldest in the Americas, wasn't built as a traditional research Center, and until recently did not have the funding or equipment to conduct research. Now, that funding for equipment and research is available through the Canon - the program that channels taxes from oil and gas exploitation to the Universities - researchers themselves have little to no saying on how the money can be spent.

"On the other hand, there has not been support on behalf of the university, as far as providing internet, libraries, etc. We are trying to raise the level of research, and with the canon funds we have been able to equip several laboratories. This here is an example; all of this has been equipped by the canons. Now, you will see that we have high technology equipment, microscopes with digital cameras, microscopes with various focuses, fluorescent microscopes, you will be able to take a tour. This is the entomological collection for example, so these all here are insects basically from Cusco.

So, then I have a project, which is financed by the canon the regional fauna of Cusco. The information about the fauna of Cusco, comes from basically some 100 years ago. From the Jane expedition, which was in Peru between 1910 and 1915. All the material that was collected by the Jane expedition was taken to museums in Europe and the United States. In Peru, there is no references of the information. What we are trying to do is update the information about the fauna, and to have a collection as reference. I am entomologist, I have worked in phylogeny, and biology. So, I am dedicated to studying insects, but we also should have reptiles, birds and all that. So, then we have a very serious problem, for example... Since there has been no research that updated the information by Jane, we have based ourselves on the original descriptions by Jane. [00:47:51].

First, it is very difficult to access the bibliography by Jane, because they are publication that are in journals in the United States, and Europe. So, then we don't have access to the material. In Peru, it is very difficult to borrow scientific material from large museums. In Argentina, Brazil and Chile, it is very easy. And in the United States and Europe it is a routine thing, but in Peru it doesn't work that way.

In addition, you all have observed that in Peru, there is no research system. So, each university works in an independent way, but there is no national system. Our education system is horrible, you have already probably noticed it for several reasons. So, then with having those limitations, we are trying to overcome them; and we now have students that do thesis, do seminars, we participate in projects of research.

We also have a strong network of collaboration with institutions abroad. For example, the Department of Agriculture of the United States, the University of Brazil San Carlos,

in Argentina, in Buenos Aires, in Chile… so then, we send photos, or we send material and the specialists allow us to identify all of that. In this moment, we now have a good collection, but definitely a lot better than what we had before. Logically, we place a lot of emphasis on the fauna of Cusco. Now, in the aspect of all the insects in the tropic Andes, is basically unknown. Everything that has been worked on tropics has been the wet areas, or low land wet areas. However, in the high Andes there has been very little research. So, then an example this is the campus of Perayoc, where the university is. Nobody has studied the diversity of the campus of Perayoc. And if we did an inventory here, I am sure we would find that half of the species are new for the scientific community.

So then as I mentioned before we are receiving support from many institutions from abroad. We are having people come from the Department of Agriculture in the United States, we are trying to make agreements with the University of Brazil, but it is important in this moment to make connection with international universities. So, then for example we have in the mountain range of Peru, Cusco, Puno, Huancayo, Ayacucho, several universities, even Acacamaca which is up north. But there is no system that articulates the work of these [local] universities. Some do one thing, another one does another thing, and some do nothing.

(…) Yes, so we already have the equipment. What we are now looking for is people that will use the equipment. We do thesis, we do these things, and I am worried about publishing the thesis and all that... Since we don't have a system, it's almost a personal effort." [P21]

This forceful interdependence of other countries and the struggles to have a national project of collaboration, qualified personnel and access to their own materials, was reiterated and further contextualized by a Peruvian ornithologist and conservation nonprofit founder in Cusco:

> *"The thing is, by training I am a biologist, I did all my research trying to become a bird expert. I started to learn, and monitor birds, and I have worked with good teachers. I have worked with professors from Denmark, with professors from the U.S, from Kansas University, and some others. I am so glad for having had good teachers. [00:51:44]. My problem started when, the research needed examples or killed specimens, to take them to the lab. And when you work in ecology, therefore I became more interested in the ecology then in taxonomy, when you are in ecology you have a strict rule, and you review a lot of literature to try to learn the possible families of the birds you are going to study. Sometimes, you must travel with a daypack with only books, not like the others. In contrary, the taxonomist doesn't care for that. The only thing that they want is to have as much as it is possible on victims, or we can say vouchers. And they would take them with the university and start reviewing their specimens. Taxonomists do, ecologist spend much time suffering through all the hard conditions but following the specimens that they want and reporting everything. This where many of them fall in love with the specimens that they are taking care of, and they start opening a new branch that starts in conservationist. Because they start looking at their specimen, and they say you aren't able to push and kill, you say "no, sorry, I want this specie to be alive and be more useful for us". Each generation is best, when they are alive, and to maintain a specie alive, it is not best for it to make posters, t-shirts for the species, it's about the entire habitat. And when you start to work for the habitat, for the forest, it is a lot more work and investment.*

For that reason, so I am an honorary researcher for the Natural Museum of Lima, and including with them, inside of the museum I have conflicts. Because most of the leaders of each area, everyone wants to kill as much in order to increase the collection. It is completely normal.

For a normal student, when they don't have proper teachers, the best way to become a master's or PhD student, is to have the greatest collection. [00:48:19]. There is like a list of over, 5,000 specimen's dead. And sometimes I complain, and it creates me a lot of problems, because I sent a report to my friends in American Conservancy, I have been working on conservation and I tell them, sometimes researchers kill more than the hunters. There is an ego in doing the most and becoming the best." [P17]

What is interesting about the dynamic described above is not just this enforced dependency of the Western scientific "pioneers", but also how this description can work as a metaphor for the challenges between the Westernized, quantitative, positivistic modes of knowledge production and a decolonial, dialectical, conservation-oriented and socially engaged approach to knowledge production. P17 goes in depth during his interviewing explaining how compulsive collection of specimens does not equate to better ecological conservation efforts; in fact, it can do the opposite for endangered species, serving only as an ego or career-boosts for those who just want to raise in rankings as collectors. Similarly, in the scientific world, incentivizing researchers to publish compulsively without incentives for social engagement and have their success measured based on how many articles they produce, have not yet yielded better ecological conservation practices or solutions. In fact, it might have increased the gap between current career-oriented scientists and the dialectical, collaborative modes of knowledge

production that were birthed in the global South based on the thinking of many decolonial intellectuals and educators, including Brazilian pedagogist Paulo Freire. In the words of another Peruvian researcher P23 in Lima: "Yes, yes, I know that in Sao Paulo, they published 48,000 articles, but there are still the problems of the favelas, environmental problems, the problems with the Amazon…".

In addition to explaining how marginalization worked in the political and social field, many other researchers interviewed in the region discussed how the precarious work conditions and geographical isolation of the forest further contributed to push Amazonian researchers to the margins, or away from their homelands in the search of better opportunities or training [BR 28, BR 29, BR 32, BR 35, P30, P29]. Meanwhile, researchers from Sao Paulo, Lima or abroad are disproportionately reviewed positively and even hired as professors and consultants in Amazonian land.

A Peruvian forestry management specialist explains the dilemma:

"I believe there are some good scientist in Peru, the bad part is that many times they leave. The science in Peru is good, like in all places there are people who do good research, but they are in other places. I have stayed here - because I have had the opportunity to live in the United States - but I… so I am ecologist, ecologist in tropical forest, so I have to be here. So yes, perhaps the status of studying abroad would help me a lot, but it doesn't my people a lot, so I am convinced that if my ambitions are not enough to carry my people, then I am just being selfish. All I am thinking is I want to be a doctor, and I want everyone to see my PhD, but how does that help my region if I can't help them? I have a lot of students who go and postulate in Brazil, I have about four who are there right now studying through this program of "bags of OEA", and that is my

function here. I do research with international funds, I would like to be primary author, but I must be placed as second, in this last one I was the 11th, but I am publishing without the need to have it done it abroad. Which is fine, we do need people abroad! But not everyone can leave, so then to say someone must stay home and take care of the house. I think that is harder work, I am not having too hard of a time, because luckily, I can work here, because if I only worked at the university, my salary is about $350 dollars, a month. That is how much the university pays us. Who does science with that? I earn 1,200 soles with insurance discounts and all that, and that is about $310 dollars about, I don't like just on the university. Many have judged me because, I have had the opportunity to work in Lima, now with the new government they have called me to go, but I don't have a reason to do so. Here, I don't earn a lot but it gives me enough and I can be doing what I want. Lima is a chaos! So, I don't want to live there. I am someone who is very used to the forest, I love the forest and explore and take my samples, so I would have nothing to do over there. Even from here, we train. Recently, I directed a course which U.S Forest Service, paid me to go and teach them how to use Arc Studio. So, then I would laugh a lot because I would tell them, "no one taught me how to use Arc studio, I would learn how to use it as part of my research." [P29]

He also problematized the issue with foreign researchers coming to the Amazon to extract knowledge without giving back or dialoguing with the community:

"Recently the state has been promoting itself lately with scholarships, they have even been giving credit in some cases, in a way of trying to fix research. However, I wouldn't be able to tell you how this has completed its objectives or goals. (…) A lot of the research that has been done in the Amazon, especially here in the region of Loreto, there

have been many researchers that have come, that we can say have had the financial capacity to conduct their research projects, they have taken knowledge, they have taken research, they have even taken traditional knowledge. [00:06:07].

They have never given back to the communities, nor they have made recognition to the state, and many of these cases as we have seen in the news, have been patented [abroad] by those researchers. So as state policies, I think we are not just lacking a promotion and diffusion, but to also to give continuity to what is going to happen, or what is happening with the research. If it's just going to stay in the library, or is it just going to stay in a scientific article, or what is being developed and what will be the final objective. Because there is a lot of this today, where researchers even take the traditional knowledge, ancestral knowledge. So, then I will say it again there some things that have been taken, and there are species, who have been patent in other countries, so this is worrying." [P29]

A Brazilian Ichthyologist from INPA – National Institute of Amazonian Research – described a similar dynamic, with the aggravated factor of the challenges to hire new Amazonian researchers at INPA:

"So far so good, but when next year I can retire, you know? There is no one to replace me and there are no public calls [for hiring new researchers] here. Just in this hall there are two researchers who are going to retire in the next four years, the rest are all already retired. Downstairs everyone is at the point of retirement. Upstairs they are too. So, we are what we see in Brazil today! And, unfortunately, INPA as a research institute does not have autonomy for hiring... INPA, the Goeld Museum, are the institutes here Amazon region are both in the same situation. They are both bound to disappear from the map,

first, because every year that passes the federal government cuts the budget, cuts the budget, cuts the budget for them – dumbly!

(...) Because there is a migration of bright minds, for example. There is not a fixation of researchers. (...) A person comes here [to INPA], does research, receives a scholarship currently four thousand and a few reais. Their purchase power is higher in the South than here, because the cost of living here is much higher, you know? So, if he has the possibility to stay in the South, he will stay in the South with this scholarship... He will not come here to this infernal heat [laughs loudly]! Is that not true? Prices are very high, difficult transportation, you can only leave this place by airplane. So, when that person comes here, they lose a lot of things, and the scholarship is the same amount!" [BR 32]

In addition to the physical isolation several scientists interviewed also highlighted the financial and infrastructural challenges of doing research in the Amazon and how those challenges contribute to weakening Amazonian regional scientific fixation and reproductive capacity. The head of the department of a Professional Masters for management from INPA further elaborated on that point:

"*The problem with fixing [scientists workforce locally] is that there are no public calls open. And, so far so good, if it was just that there were no public calls open for hiring, but there were at least scholarship opportunities, postgraduate fellowships, right? So, like, we are seeing more and more that these scholarships are no longer available, the graduate programs themselves are suffering sharp cuts, these last two years were critical right? In terms of scholarship cuts. So, then the person finishes their degree, but what are the opportunities that they'll have? They were trained to be researchers, but research institutes do not open calls for hiring, nor does the person have a scholarship to become*

an associate researcher? So, this evasion is a consequence of an incomplete public policy, which ends before closing a whole cycle.

And another issue is INPA, for example, I can speak for my institution, everyone says that INPA is disappearing, it is losing human resources, it is shrinking, it is an institution that has aged. People are on the verge of retiring, and there are no public calls open to replace this loss. So, from an institute that had 500 researchers, currently we have less than 200. It is obvious that it is a process, it is a matter of time for us to… "puff", right? To vanish! Here is a strategic national issue that is the construction of technical scientific knowledge - is it important or for us to have sovereignty of the Amazon? Is it more important to strengthen the military? [21:39] than scientists? So, should we have more armies at the borders? Is this what will ensure sovereignty or is it our domain of our territory, with our knowledge?" [BR 35]

Even with both national and global interests in understanding the biome and region, only researchers with access to an abundance of resources get to study it, while fewer local scientists are fixated with valuable jobs and research opportunities. The Australian tropical ecologist who told us he advocated for a more objective system of evaluation, also provided us with evidence on how the quantitative system reproduces their own inequities:

"*Proportionately, the North gets less money than they produce. (…) But the problem is you don't have people to use that money. [13:19] When they [National Scientific Agencies] give out the money they always require some level of production, so if you have researchers that are isolated in an area, they can't keep up their production, they can't compete with somebody from Sao Paulo. (…) All of the calls for researched, they're all linked to scientific production, so you have a catch 22 situation. [15:20] (…) So, you*

can't beat the rule. The rule is already there, you have to be productive or you can't receive money, so if you're not productive, you can never become productive, because you can never get money. So, anyway, that's the biggest problem: you have to have people to receive it [the money]. I have had arguments with several presidents of CNPq, in fact, who have said that said nobody wants the money. "We make an edita [public call]l, we offer it, and the people in the Amazon don't take it". And they don't take it because there's nobody here that is level 1A researcher from CNPq that can take it. They make a rule… And there's certain regions where there are just no established researchers to apply to that. And since that means that there never will be, because when there's money instead of investing in their own training and making the conditions fair for those people they send them to Sao Paulo. So, it's a catch 22!" [BR37]

A Paulista geneticist working at the same institute as BR 32 and 37 complements these thoughts by sharing her personal experience coming from Sao Paulo to Amazonas for her masters and being hired by a hydroelectric company to work on an Environmental Impact Assessment:

"Usually, they hire a certain consulting firm, and then it is the company that goes after people. And many times, at least that's what I saw at the two hydroelectric plants, they hire people from São Paulo. A lot of people from São Paulo, so then these people arrive, and they don't even know what it is ... like, we are in the Amazon, what animals occurs here? So, you don't know the biggest problems... They come here, thinking you're going to work the same way as in the Southeast, and it's not the same. So, these people who get work here in general, everyone was from the Southeast [05:18], everyone from São Paulo, everyone from São Paulo."

Just as the revenue from the extraction of oil and natural gas products in the Amazon and Cusco are tied to Peru's overall development in the past years; energy production in Brazil has a analogous dynamic. The exploitation and extraction of natural resources in both the Amazonian and Andean regions have been used to benefit and power development across Brazil and Peru without a particular policy – with the exception of the Canon funds – that addresses the local needs and demands. This dynamic was described by one of our first interview subjects in Manaus as following:

> *"The scientific issue is tied to a more complex, social, political and economic context. The Amazon region accounts for 50% of energy in Brazil, what benefits are brought back to the Amazon region? None! We have science, technology and energy… And instead of benefits, the aggressions against the Amazonian biome caused by the exploitation of energy are devastating, they destroy the environment. There is a lack of recognition of the role of Amazonia in Brazil itself. But I think that is true in the planet; the role of the Amazon is caricatured. In international meetings, like COP16, the Amazon is a star of the night; once the party is over, no one else says anything... [42:13]." [BR 28]*

Earlier, in the same interview, he also pustules:

> *"[9:11] the Amazon is a vital scientific lab in Brazil and in the planet, which holds special interest in international context; but not in the Brazilian scientific policy". [BR 28]*

In summary, the impression that Amazonian researchers expressed is that the Amazon exists and is often highlighted in the international scientific rhetoric as an *object* rather than an

agent of science. Due to the Amazonian geography, culture and shared history of colonialism and exploitation, Peruvian and Brazilian researchers in the Amazon face similar challenges with issues of recognition, brain drain, imperial gaze and a State that is neglectful of regionals socio-environmental context, particularities and material needs. In this strange international order, Brazil and in particular Sao Paulo, have been playing the US-and-Euro-centric game of climbing hierarchies that places them in an advantageous position in comparison to Peru and other Latin American countries, but still in a secondary placement when compared to American scientists or other developed countries' researchers. Yet, within Brazil & Peru, there is a second layer to that game, where Amazonian researchers are seen as another secondary class within their own countries, even when the topic of study for all these "classes" of scientists are the Amazon itself. That dynamic has been codified and reified in the research evaluation process in Brazil, and we are starting to see the first signs of that emerge in Peru with the Ley Universitaria, DINA and Regina. In these dysfunctional hierarchies are embedded concepts of prestige and indirect measurements of productivity, which are different from the actual impact of science. My hope is that by highlighting the incredible work and critical awareness that many Amazonian scientists displayed in these interviews, this thesis captures at least in part the intellectual, political, environmental and scientific power that deserves to be unleashed through equitable policies that values local knowledge-holders and regional differences.

Reflections on Science Policies and User-Engagement in Brazil and Peru

In the past two decades, the publication of scientific articles on topics related to sustainable development has grown 30% faster in Latin America than in the rest of the world

(UNESCO, 2015). This trend underlines a growing interest in sustainability science in Latin America. But it is important to question: how about the transference of knowledge to Latin American people? Is published knowledge guaranteed to be usable and accessible knowledge to the people? Or is all this productivity only to inform decision-making of the international academic community?

User-engagement in Brazil

While the goal of this study was not to quantify the existence of user-engagement, it is also important to address how the scientific community in Brazil and Peru perceives the idea of engagement with non-academic actors. Using the current framework and inductive methodology, our questions and initial findings lead to the recognition that, with few exceptions, user-engaged research is not conceptualized in the mainstream scientific networks in Brazil as an inherent part of the scientific process. That was evidenced both by the written evaluation systems' focus on publication and by the responses of researchers when asked about their audience and methodological approaches. Elements such as social accountability or co-production are rather seen as desirable, secondary steps for most scientists, which are not equally required, rewarded or even recognized both in the evaluation systems and in the rhetoric of scientists themselves. Researchers' primary concerns are to foster communication with other scientists and, maybe, make it available for other audiences afterwards, as an optional, and often unidirectional step of the process.

In many cases, even researchers who are doing applied work do not acknowledge stakeholder's engagement and participation as an effort happening previously or concomitantly to the research itself. References to research projects structured towards a co-production model

are less common than the broader mentioning of a desire to fulfill social responsibility. Despite researchers often stating to consider an array of ideas about the potential needs and uses of scientific outcomes, it seems to be rare for them to actually include diverse stakeholders in the process of designing research questions and/or methodology, gathering and interpreting their results and/or demanding what kinds of knowledge and trainings are needed beyond academia.

With the exception of a few anthropologists and interdisciplinary researchers in the Amazon, most of the ecologists who we talked, particularly in the Southeast, tend to conceptualize engagement with non-academics in the design and implementation of scientific projects as something else, that goes beyond the scope of what is considered science per se. Those efforts happen, occasionally, in complementation to what is understood as their real work: the scientific work. Engagement with non-academic audiences usually takes form as scientific dissemination – which can be outsourced to third actors such as journalists, media vehicles or the third sector (NGOs). Another name that engagement occurs under, is "extension" work (also translated to English as "outreach"), and there are hardly any requirements for extension or outreach work through the evaluation processes that we studied in this research.

The tradition of tying together education, research and extension is structured in the Brazilian universities through what is called University's tripod. The balance between these three axes is supposed to be one of the components that guarantee the excellence of higher education in Brazil. But it created instead a really interesting dynamic in which professors at the most prestigious public universities are hired by contract to teach, rewarded and evaluated by their research and indexed publication, and expected to do extension and other administrative work on top of that. Interestingly, unlike it in many other countries, Brazilian professors are not fired for not doing any of these specific tasks thanks to the security of public jobs. Yet, academic

productivity and research are often a factor that drives hiring of public servants and other professors in both public and private Brazilian universities in Brazil, who compete in the market for prestige and the validation of international rankings.

In the Triennial Evaluation system, the direct interaction between scientists and knowledge-users tends to yield outcomes that are either not as easily quantifiable – such as community uptake of knowledge, practice, policy change, etc – or not equally valued as intellectual production in indexed journals – such as capacity-building workshops, public lectures, conferences participation, books and manuals' publication. Ultimately, the Ministry of Education via CAPES and Qualis, ends up evaluating the quality of its Graduate Programs through a system that relies largely on international publication. When I first realizing the irony in these conclusions – of a National Educational System being assessed based primarily on written publication, I couldn't help but wonder what the Brazilian educator and intellectual Paulo Freire would've thought of our current system for evaluating higher education? After all, the father of critical pedagogy was born and raised in Brazil. His answer, in 1994 to a question about then President Fernando Henrique Cardoso's "external evaluations" of Brazilian public-school systems, comes to mind. In the lecture at an USP campus in Sao Carlos, SP, he said:

> *"The federal government should instead save the money they're thinking about spending to do these competency tests, to instead equip and launch the Brazilian Universities' responsibility to public education. These colleges from Brazil, need to become Brazilian, not half-Harvards. They have to be Brazilian, not Swiss – Sweden doesn't need our Universities because they already have theirs. It has to be a university for our own! I mean, a country that has 33 million people dying of hunger, 8 million children without access to schools; a country like this can't afford the luxury of only teaching classes to a*

half dozen students who will stay and get a post-grad degree, to those who can get to those degrees! We need to provide that as well… Listen, I'm not proposing to close the University and end post-graduate degrees; it's quite the contrary Graduate programs in this country propelled our country in unquestionable ways. I come from a generation that didn't experience that and we saw the changes between now and then. Unquestionably, we advanced so much. But it is necessary that now these PhDs that Brazil formed turn their attention to the teachers in the Northeast of the country, who don't even have elementary education, but who are heroic!" (Freire, 1994).

It is disappointing for the country that birthed an educator of the caliber of Paulo Freire to witness the corrosion of its own pedagogical praxis and epistemologies through the mechanization of quality assessment processes focused on sustaining a global market of knowledge production. Freire's quote, in this lecture, speaks precisely to how the social role of Brazilian Higher Education and its intellectuals needs to be in dialogue with regional contexts, contradictions and its own people through an agenda that truly supports national sovereignty. But the issue of how to maintain these goals, when they're often overshadowed by the alienating international hegemonic norm of competition, standardization and internationalized intellectual productivity remains a challenge.

User-engagement in Peru

Similar to Brazil, we now see the first signs of a Peruvian structure for academic productivity requirements and assessments emerging from the concern for globalized higher education quality standards. SUNEDU, which operates under the Peruvian Ministry of Education, aimed to use La Ley Universitaria to reform, assess and license University degrees

that actually serve the Peruvian people, instead of enriching for-profit University owners, who saw higher education as a for-profit endeavor. Despite of the important intention, it is essential to highlight the role and pressure of international productivity norms and rankings that have informed the boundary work currently being done in Peru. The policies and structures that are being created now will define what counts as good and necessary science and what are secondary expectations and practices of current and future scientists. And as we've learned in Brazil, even well-intended policies and objective measurements can become a complex game of counting and scoring publication points when disconnected from regional realities.

The moment can be seen as both crucial and promising, as it will impact under which guiding values, practices and expectations the Peruvian model of science and technology is developed. And while many of the expectations created by La Ley Universitaria are tied to publication, one of the most exciting opportunities of this work, lays in the chance to consolidate social engagement as an inherent part of the scientific process. Based on our interviews, that seems to be a very possible outcome, although local scholar Kuramoto has a less hopeful perspective. She writes:

Researchers in Cusco, Iquitos and Lima alike, even when critical of national S&T governance strategies, shared a hopeful attitude towards higher education reform, new publication incentives and the growth in investments in research in Peru over the last couple of years. While many researchers described an aspiration to publish more and to reach better status internationally, the focus on social engagement and economic development was a fundamental principal common for most of them. The codification of stakeholder engagement as an expectation and standard academic practice would be a welcome and refreshing development for the Peruvian system of Science and Technology. That would be especially true now, as we face

the challenge of the global covid-19 pandemic, aggravated by a crisis of public trust in science and governance, that is decimating health and care workers, poor people, and particularly Black, Indigenous, People of Color across the Americas.

Reflections on the relevance of social engagement in science in the current times:

In face of the greatest global public health crises in our lifetime, the UN recently launched a document called "UN Research Roadmap for the COVID-19 Recovery Leveraging the Power of Science for a More Equitable, Resilient and Sustainable Future" (2021). According to the UN, strengthening national research capacity is critical to ensure that local researchers are able to generate adequate knowledge for decision-making. Therefore, the research endeavor must also be more equitable, diverse, inclusive and participatory.

The last chapter of the document focuses on "social cohesion and community resilience", discussing the importance of social engagement for creating affective health systems and developing sustainable solutions and recovery strategies for the post-pandemic world. Those remarks were of special relevance to both the health, economic, socioenvironmental, and public trust crises we are experiencing. Despite of having the most complex and wealthy systems of S&T in the Americas, both the U.S. and Brazil lead with respectively the first and second highest numbers of Covid-19 infections and deaths. If we adjust the numbers to population size, Peru was also one of the hardest hit countries, with more than 1,000 excess deaths – that is, deaths outside the normal annual death numbers previous to Coronavirus - per million inhabitants ("Coronavirus tracker:", 2021).

While the UN Roadmap suggested more collaboration among environmental scientists and health workers to avoid the next pandemic and proposed that "health practitioners and government should engage with diverse stakeholders", the present study shows that evaluation

systems are not encouraging scientists to take responsibility in creating dynamics of social cohesion, innovation, public trust and knowledge exchange through socially engaged research designs. How can marginalized peoples share their needs, build trust and have access to scientific papers that often locked behind Paywalls, language barriers, among other structural challenges? In other words, it seems that the current pandemic evidences how the pressure to publish and lack of rewards and expectation for social dialogue in the scientific career play a strong role in reinforcing inequities and disconnect with society. Across regional and national lines, in addition to vaccines and better scientific collaboration, public trust and dialogue will be needed.

One of the great challenges of this study is to draw connections, distinctions, and lessons for science policies of two culturally, politically and ecologically diverse countries in very different stages of developing their scientific system. While Brazilian's S&T and productivity evaluation systems have existed and been tweaked since at least the 90's, Peru had just published the University Law in 2015 and created initiatives such as DINA and REGINA over the past couple of years to incentivize scientific production and filter what qualifies as science. Peru starts with the advantage of setting the stage for a S&T system that can create reward structures and expectations for social engagement; but they have been signaling in the direction of reproducing the same biases of the Brazilian system, relying on indirect indexes and standards of quality and relevance set up by international publishers rather than its own people.

What all of these systems take for granted is that the way that science works is through publications: researchers write scientific articles based on evidence collected and that's how science makes a difference in the world (Figure 13). That is a limited, Euro-centric, Western Model that was inherited and imposed to most countries through the processes of colonization and globalization. This model is far from being the only model that exists. Yet, this model has

not been deeply questioned by most researchers and policymakers creating evaluation systems for higher education. The appealing nature of mistaking scientific neutrality, quantitative indexes, and objectivity for fairness are one of the ways through which systemic biases and power-unbalances are maintained in our law, policy-making processes and scientific endeavors (Crenshaw et al., 2019). Higher Education Centers in Brazil and recently Peru have adopted a foreign, flawed model that hinders diverse approaches to co-production of knowledge, with all kinds of implications that this thesis documents. Ironically, one of the main theories of a different model of science are rooted in the work of Brazilian thinkers and educators such as Paulo Freire. These alternatives were born and practiced across Latin American territories, particularly in the field of agroecology, popular pedagogy and anthropology. Although elements of an engaged praxis are flavoring regional scientific development, they're not challenging enough the hegemonic model through which science is made, counted and validated. Whilst some researchers continue to find creative ways to work that matters for their communities, current evaluation systems are still focused on counting papers written for other scientists to read, which sometimes are delivered to potential knowledge-users, rather than encouraging collaboration throughout the process with stakeholders outside of academia.

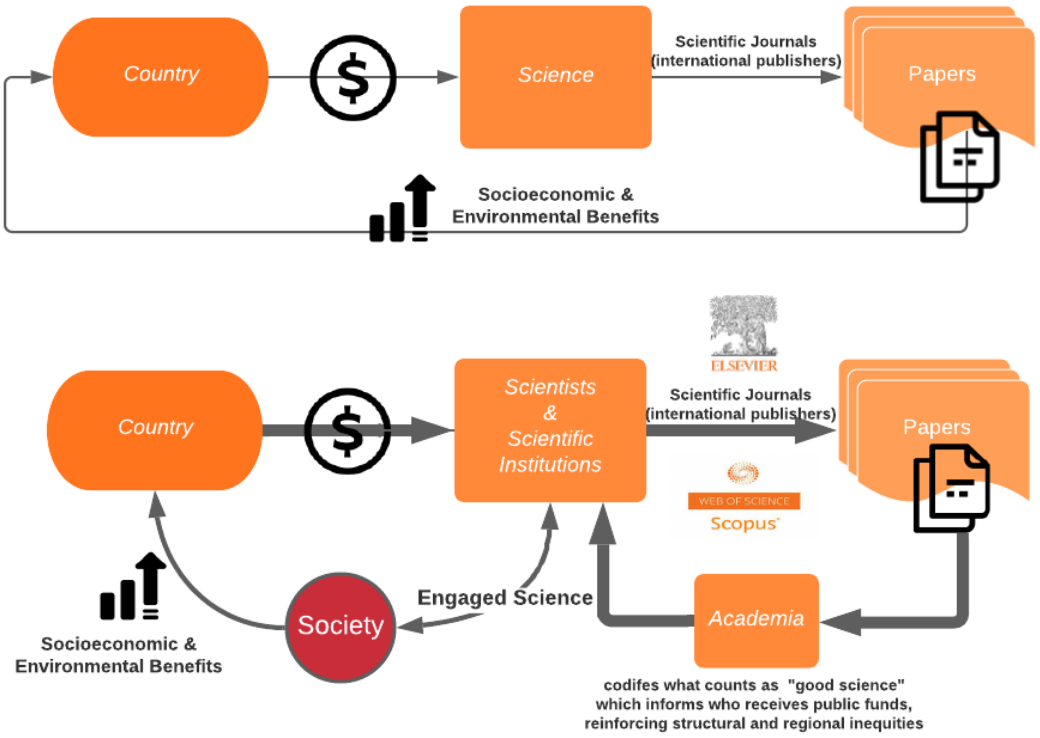


FIGURE 13: Comparative flow charts explaining the common notion of how science works (above) vs. the reality (below). In the first model, a given country funds science, which is then transformed into published papers, with the expectations that the knowledge will be translated into national socioeconomic and environmental benefits for all. The flow chart of what happens in reality, paints a more complex picture, where the investment in scientific institutions and individuals by a country doesn't always yield socio-economic and environmental benefits. In fact, scientists and society benefit from each other the most, not through the voluntary and casual uptake of scientific papers by people in society, but through the dialogue and exchange of ideas, resources and priorities between scientists and other stakeholders. Socially engaged science is often done on a tight budget, in addition to academic obligations and pressures to publish. Meanwhile, international for-profit publishers and gatekeepers from the global North such as Elsevier's Scopus and Clarivate's WoS are the ones who continue to profit from filtering and

selling scientific relevance and access of local knowledge production. This model prevents some of the expected social benefits to reach society and its filters put the market interests above the needs of local stakeholders. Finally, the hegemonic internationalized academic productivity-driven norms, expectations and notions of relevance are then codified into National scientific policies and culture, informing who receives and concentrates funds based on academic stand.

It is important to acknowledge that this study was conducted in a time of intense political, economic, environmental and scientific turmoil, that would deserve their own thesis to be explained. Many of the current changes in governance, especially in Brazil, are threatening the bases of the scientific tradition and structures by retaining funds, trust, intellectual freedom and, of course, democratic access and participation in knowledge production (Hallal, 2021; Quintans-Junior et al., 2020). By focusing on building a historical register of what those systems look like today, and how they operate now, I hope to inform the re-building and transformation that these evaluation systems can undergo as S&T governance systems continue to change in rapid speed. To give a few examples, I can mention the growing edge of political lawfare used against progressive presidents Dilma Rousseff (2016) and Martín Vizcarra (2020) preceded by intense political unrest, the devastating fires in the Amazon (2019 and 2020) combined with record-breaking deforestation rates. Brazil in particular, has suffered in 2019 with two major environmental crimes: Brumadinho's damn disaster in Mariana, MG and a mysterious oil spill that lasted weeks in the beaches of the Northeastern coast of the country. One of the most relevant and symbolic events worth mentioning was the 2018 National Museum of Rio de Janeiro's fire. The Museum was Brazil's oldest scientific institution and one of the largest natural history and anthropology collections in Latin America. Many irreplaceable records and artifacts,

including original audios of indigenous languages that are no longer spoken, were lost in the fire, marking the last few years of scientific, cultural, and biological destruction and neglect. The scenario seems to match the ever-growing chaos and cuts in S&T spending in Bolsonaro's Brazil, where the president claimed that the new covid-19 vaccines could turn people into crocodiles, fired the Ministry of Health for supporting social distancing, and cut student's scholarships and University's funding during the worst global pandemic in a century. Here's to hope that with popular support and engagement, scientists can root themselves in their local communities and rebuild from the ashes a different and more collaborative S&T system that is both valued and valuable.

Final Considerations

Some of the main findings of this study are the formal and informal descriptions of main policies and S&T governance systems in Peru and Brazil; including how ecologists, especially those in the Amazon interact with those systems and policies, and whether they impact engaged research designs in an environment of ever-growing pressures to publish internationally, which are worth recapitulating.

Brazil has a solid centralized system of evaluation of graduate programs existent since the 70's and led by CAPES, which has shown to have the mechanisms with potential to enable more engagement with science – by incentivizing publication in open access bilingual platforms such as SciElo, for example. Yet, the pursuit of impact as defined by international publishers such as Elsevier and Web of Science has required the local repository to push for English language publications to compete in the global market of citations. Currently, the entire system is being

impacted by the political crises and austerity measures that followed a coup d'etat and holding federal funds for universities and agencies such as CAPES, FAPESP and CNPq among others. In this study, we also found that there are strong disparities to be addressed between North and Southeastern universities in terms of access to public funding and status, following the lines of historical access to wealth, international networks and scientific tradition that CAPES' evaluation system reproduced since its conception. Peruvian researchers from the Northern Amazonian region also shared similar infrastructural, material and professional challenges that are rooted in the legacy of colonial exploitation and inequities typical of the region.

Peru is just now beginning to set up and invest in a system of S&T by reforming and accrediting higher education centers and regulating professional titles and rewards for scientists. As a result of the reform process initiated by the University Law, one third of Peruvian universities were closed this year. Through the University Law and Concytec's DINA and REGINA platforms, Peru is doing boundary work and defining what it means to be a scientist, a university, and consequentially what counts as science. Such work is exciting, but treacherous as it can hinder diverse approaches to knowledge production that are more subjective and harder to quantify. Yet, based on our interviews, Peru signalizes a legitimate concern for engagement and social accountability from its beginning. It is yet to be known whether those concerns will be compatible with the evident tendency to quantify and stratify the productivity levels of researchers based on international publication through RENACYT.

Beyond sharing the Amazonian Forest and the colonial past, Peru and Brazil had a considerable later start on developing their democratic structures and formal system of S&T in comparison to developed nations. The fragile democratic traditions across science, education and governance models, are aggravated by rampant inequality, environmental injustice and S&T governance

designs that are inspired by international traditions inherited from the Global North and Western world. Yet, alternatives decolonial models and praxis exist and were inspired by local intellectuals such as the Brazilian educator, (.

Our findings suggest that fast, universalized, internationally published, fast science, doesn't necessarily translate into better outcomes for society, and that trusting the filter of international publishers for what constitutes impactful science, leads to an S&T system that is disconnected from sense of place, sovereignty, and community beyond academia. Active engagement between scientists and society can decrease democratic gaps, enhance social cohesion, support and trust in science. Falling short from that task can have devastating consequences, as we are already witnessing with the current Covid-19 global pandemic, where thousands of lives could be spared through clear and strategic communication tactics, contact-tracing efforts and governmental investments in public science and science communication. In order for that model to be affective, it is key to develop science policies at the federal level that account for regional disparities and idiosyncrasies across the country, translating democratic participation in science into policies that are both socially and scientifically robust.

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Appendix A

APPENDIX A: Table of interview subjects' locations, institutions and other descriptors.

Interview Subject's ID	Region	City, State (also called Province or Region), Country	Year	Institution Type	Department, Field of Study, Other Notes and Descriptors
Br0	Center-West	Goiânia, GO, Brazil	2013	Federal University	Interviewed in the U.S. at Allegheny College, Ecology Department
Br1	Southeast	Sao Paulo, SP, Brazil	2014	State University	Ecology Department, Senior Researcher
Br2	Southeast	Sao Paulo, SP, Brazil	2014	State University	Environment and Society Department
Br3	Southeast	Sao Paulo, SP, Brazil	2014	Other	Scielo staff
Br4	Southeast	Sorocaba, SP, Brazil	2014	Federal University	Ecology Department, Young Researcher, PhD abroad
Br5	Southeast	Sorocaba, SP, Brazil	2014	Federal University	Ecology Department, Senior Researcher
Br6	Southeast	Sorocaba, SP, Brazil	2014	Federal University	Conservation Biology, Senior Researcher
Br7	Southeast	Sorocaba, SP, Brazil	2014	Federal University	Conservation Biology, Forest Engineer, Senior Researcher
Br8	Southeast	Sorocaba, SP, Brazil	2014	Federal University	Protected Area Management background
Br9	Southeast	Sorocaba, SP, Brazil	2014	Federal University	Ecology Department
Br10	Southeast	Sorocaba, SP, Brazil	2014	State University	Ecology
Br11	Southeast	Sorocaba, SP, Brazil	2014	Private University	Environmental Sciences Department
Br12	Southeast	Sorocaba, SP, Brazil	2014	ivate University, Governmental Agen	City's Secretariat, Environment and Society Department
Br13	Southeast	Sorocaba, SP, Brazil	2014	ivate University, Governmental Agen	City's Secretariat, Ecology Department
Br14	Southeast	Campinas, SP, Brazil	2014	State University	Physics Department, Former Staff of a prestigious Scientific Agency
Br15	Southeast	Campinas, SP, Brazil	2014	State University	Ecology Department
Br16_A	Southeast	Campinas, SP, Brazil	2014	State University	Graduate student, Interdisciplinary Program
Br 16_B	Southeast	Campinas, SP, Brazil	2014	State University	Graduate student, Interdisciplinary Program
Br17	Southeast	Campinas, SP, Brazil	2014	State University	Politcal Science Department, Governmental Agency
Br18	Southeast	Campinas, SP, Brazil	2014	State University	Environmental Studies Deparment
Br19	Southeast	Campinas, SP, Brazil	2014	State University	Environmental Studies Deparment
Br20	Southeast	Campinas, SP, Brazil	2014	State University	Animal Biology Department
Br21	Southeast	Campinas, SP, Brazil	2014	State University	Botanics Department
Br22	Southeast	Campinas, SP, Brazil	2014	State University	Ecology Department
Br23	Southeast	Campinas, SP, Brazil	2014	State University	Zoology Department
Br24	Southeast	Campinas, SP, Brazil	2014	State University	Peruvian citizen, young researcher conducting his PhD in Brazil
Br25	Southeast	Rio de Janeiro, RJ, Brazil	2014	NGO	Science Policy Scholar, Senior Researcher
Br26	Southeast	Rio de Janeiro, RJ, Brazil	2014	State University	Environmental Studies Department, Young graduate student
Br27	Southeast	Rio de Janeiro, RJ, Brazil	2014	State University	Ecology Department
P1	Coast	Lima, Lima, Peru	2016	Private University	Senior Researcher, Tropical Ecology and Medicine researcher
P2	Coast	Lima, Lima, Peru	2016	Private University	Senior Researcher, Tropical Ecology and Medicine researcher
P3	Coast	Lima, Lima, Peru	2016	Private University	Information Technology and Biblioteconomy Scholar, Education researcher
P4	Coast	Lima, Lima, Peru	2016	NGO	NGO's Science and Research Director, Ecology background
P5	Coast	Lima, Lima, Peru	2016	Private University	Chair of Biology Dept., Ecology background, Senior Researcher
P6	Coast	Lima, Lima, Peru	2016	Private University	Coordinador of Palinology and Paleobothany Lab
P7	Coast	Lima, Lima, Peru	2016	Private University	Marine Sciences Department
P8	Coast	Lima, Lima, Peru	2016	Private University	Applied Bothany Department
P9	Coast	Lima, Lima, Peru	2016	Private University	School of Public Health and Administration
P10	Coast	Lima, Lima, Peru	2016	Private University	Director of the Research Evaluation Office, very interested in societal impact
P11	Coast	Lima, Lima, Peru	2016	Private University	Director of Research Management Directorate
P12	Coast	Lima, Lima, Peru	2016	Federal University	Chief Editor of local Biology Journal, Department of Zoology
P13	Coast	Lima, Lima, Peru	2016	Private University	Sciences Department, Senior Chemestry Researcher
P14	Coast	Lima, Lima, Peru	2016	Governmental Agency	CONCYTEC's Leadership Staff
P15	Coast	Lima, Lima, Peru	2016	NGO	NGO Executive Director, works in Lima and in the Amazon
P16	Andean Mountains	Cusco, Cusco, Peru	2016	Federal University	Ethnoecologist/Ethnobotanist, Agroecology and medicinal plants expert, Senior Researcher
P17	Andean Mountains	Cusco, Cusco, Peru	2016	NGO	NGO President
P18	Andean Mountains	Cusco, Cusco, Peru	2016	Federal Institute	Engineer, Campesino, Director of a Local Agrarian Research Station
P19	Andean Mountains	Cusco, Cusco, Peru	2016	NGO	Engineer, Andean Studies
P20	Andean Mountains	Cusco, Cusco, Peru	2016	Federal University	Researcher specialized in Ecology and Natural Resources
P21	Andean Mountains	Cusco, Cusco, Peru	2016	Federal University	Environmental Education researcher
P22	Andean Mountains	Cusco, Cusco, Peru	2016	Federal University	Enthomologist, insect biodiversity and ecology expert
P23	Andean Mountains	Cusco, Cusco, Peru	2016	Governmental Agency	Cusco Regional Research Agency Staff
P24	Andean Mountains	Cusco, Cusco, Peru	2016	Federal University	Vice President of Research, Agricultural Sciences
P25	Andean Mountains	Cusco, Cusco, Peru	2016	Governmental Agency	Engineer, Cusco Regional Government' Directorate of Production Staff
P26	Andean Mountains	Cusco, Cusco, Peru	2016	Federal Institute	Local Agrarian Research Institute Staff
P27	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	Federal Institute	Researcher in Environmental Management and in Phyto-therapeutic Plants
P28	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	Federal Institute	Director of Biological Diversity Program
P29	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	Federal Institute	Etnobothanics Researcher
P30	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	Federal University	Researcher in taxonomy of Amazonian plants, Forest Engineer, ethnobotanicist
P31	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	NGO	Environmental Law Researcher
P32	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	NGO	Environmental Law Researcher
P33	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	Federal University	Engineer in Tropical Forest Ecology & Master in Environmental Management
P34	Amazonia/Rainforest	Iquitos, Loreto, Peru	2016	Private University	Head of the Sustainability department, backrgound in Biology and Forest Management
BR28	North/Amazonia	Manaus, AM, Brazil	2016	Other	Physics backrgound, Director of a Science Communication Center
BR29	North/Amazonia	Manaus, AM, Brazil	2016	State University	Anthropology Department
BR30	North/Amazonia	Manaus, AM, Brazil	2016	overnmental Agency, State Universit	Education Secretariat Staff, Anthropology Graduate Student, Indigenous
BR31	North/Amazonia	Manaus, AM, Brazil	2016	State University	Law student, Environmental Ministry Staff
BR32	North/Amazonia	Manaus, AM, Brazil	2016	Federal Institute	Ecologist, Ictiologist, Senior Researcher
BR33	North/Amazonia	Manaus, AM, Brazil	2016	Federal Institute	Ornitologist, American
BR34	North/Amazonia	Manaus, AM, Brazil	2016	Federal University	Ictiologist
BR35	North/Amazonia	Manaus, AM, Brazil	2016	Federal Institute	Protected Area Management Researcher and Program Coordinator
BR36	North/Amazonia	Manaus, AM, Brazil	2016	Federal Institute, NGO	Conservation Genetics Specialist
BR37	North/Amazonia	Manaus, AM, Brazil	2016	Federal Institute	Ecology and Biodiversity Program, Australian