



ATSAF Academy
Academy for International Agricultural Research for Development

Junior Scientists Tandems

Final Report

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Introduction

In this report, I provide my insights and growth experienced during my research stay in Brazil. I describe the interactions, continuous learning, and the challenges during my Junior Scientist Tandem (JST), which both shaped my professional skills and deepened my commitment to further pursue sustainable development in support of the Brazilian Amazon rainforest (BAR) region and other forested regions in the tropics. During my research stay, a phrase from an interview with Stephen Wolfram frequently re-emerged; it conveys the notion that any system begins simply but quickly escalates into a complexity that may seem unfathomable for the human brain.

After living abroad for four years, returning to Brazil was both personally and professionally profound. The return rekindled and established new and important bonds with family, friends and professional colleagues. A personal journal entry dated March 10, 2024, reflects initial impressions: "Interviewing and conversing with people both clarifies and brings complexities into the research. There are numerous opportunities for action in research and practice, and one of my main goals is to forge a network of trust and competence while in Manaus." Throughout my stay, it was invigorating to engage with peers who shared critical insights that positively influenced aspects of my research and understanding about northern Brazil.

Experiences in Manaus and Belém: Professional Engagements and Challenges

Despite my familiarity with the many parts of Brazil, experiencing life in major northern urban areas including Manaus and Belém during the winter rainy season added new perspectives on the climatic and ecological challenges of the region. Most days I heard of both pouring rains and the forest fires striking the neighboring state, Roraima. Staying with local hosts in Manaus and Belém provided local perspectives and insights on these juxtaposed events, both currently and historically. The local people were quick to offer stories about how the climate used to be fresher and rain more abundant and more frequent, which is supported by scientific data for the region.

Both Manaus and Belém suffer from significant social and environmental issues. More than 65% of their populations lack access to basic services such as sanitation, also to quality education, public transportation, logistics, etc. This is compounded by the inadequate and insufficient green urban spaces, prevalent pollution of rivers, ubiquitous trash on the streets, and violence and crime. Despite these challenges, it was encouraging to witness initiatives tackling these pressing issues, and I am glad to realize that the nature of my research connected me with entrepreneurs and innovators working on these diverse and critical issues. It will be of critical interest to keep track of their progress via future personal and professional conversations.

My choice of Manaus and Belém was strategic. Both cities are at the forefront of innovation and technology development and deployment within the BAR region. They host numerous critical events and are home to several institutions, which allowed me to network extensively and participate in pivotal discussions organized by institutions like SEBRAE, Amazônia+10, FAPEAM, Certi Foundation, and others. Notably, the 5th National Conference of Science, Technology, and Innovation, organized by the Brazilian Science, Technology, and Innovation Ministry, further provided broad awareness of institutional efforts

and emerging applications of technologies for Sustainable Development Goals (SDG)-aligned work within the BAR region.

Engagement with Interviewees

Throughout my stay, balancing persistence with respect was crucial in recruiting interviewees. I learned that participants often appreciated systematic engagement, which encouraged more open and constructive discussions. Semi-structured interview techniques were a well-suited methodological choice for the research purposes as they improved the consistency and quality of the data collected at the same time that they offered flexibility and set a solid foundation for exploring challenging and complex topics.

Daily interactions often led to provocations and insights that were both unexpected and unequivocal. Interviewing local actors (e.g., local researchers, professionals, field workers) who described mostly positive outcomes with the use of technology in the BAR region proved essential for gaining a realistic understanding of the challenges and opportunities to inform this research.

Regional resentment regarding the representativeness (or not) of the BAR region and the perceived unfair distribution of funds and resources were frequently expressed during the interviews. Similarly, challenging issues emerged during conversations on national, regional, and local sovereignty and legitimacy in research, entrepreneurship, and practice. All these interactions revealed underlying tensions related to neocolonial attitudes within and towards the BAR region. Any technological development and implementation should build initiatives that are firmly grounded in holistically coordinated arrangements that both solve local and regional issues and demands and involve local people from the very outset including the design phase of interventions.

Speaking to a wide array of professionals expanded my network and deepened my understanding of the regional dynamics, further enriching my own considerations for further research and my overall worldview. Engaging in self-reflection and with these interactions have refined my understanding of i) the techno-cultural-economic-socio-political landscape in which environmental policies and initiatives are situated, and ii) the regional powers and interests influencing the regional development.

Empowerment through Opportunities

These experiences in the local environment of the BAR were instrumental in shaping my approach to future research and collaboration. My research stays in Manaus and Belém were transformative, as it enabled me to recognize numerous opportunities for forming partnerships and engaging in mentorship both as a mentor and a mentee.

My stay reinforced the importance of holistic analysis and multidisciplinary teamwork, skills I have been developing at TU Dresden and beyond. I became more aware of the specific cultural, logistical, and economic barriers that can constrain the application of technologies. Increasingly, the need for approaches tailored to local contexts that bear systems and problem/solution-oriented mindsets, and do not begin with a priori attachments to any specific technologies or approaches.

Industry Engagement

Throughout my interviews and interactions, I observed the increasing number and diversity of proposed solutions that focus on entrepreneurship and innovation for SDG-aligned social development in the BAR region. The first time I was ever formally interviewed took place during my JST stay. These interactions and the requests by industry partners and organizations who wanted to know about my work and

requested for me to share the findings of this research, further motivates me to contribute back to the research and broader engaged community.

The interview I gave to *Concertação Pela Amazônia* and *Página 22* magazine allowed me to learn of other industry-related activities regarding AI use for the Amazon bioeconomy, which was instructive to learn what they wanted to know from someone who was exploring the issues of AI and its relevance to creating and improving the regional forest-related economy, and opened avenues for future collaboration. I hope their findings get published to inform others about the potential of implementation technologies to accelerate and support SDG-aligned work in the BAR and beyond.

Interaction with the CGIAR Center Team

My time at the CGIAR center was marked by enriching interactions, particularly with Bernardo Caldas, my supervisor and main host who demonstrated exceptional professionalism and support. His pragmatic and results-oriented approach greatly facilitated my research and enabled me to connect with key figures in the field. I engaged with various team members including Wendy Francesconi, Fábio Debonni, and Sacha Senger. Our discussions, ranging from group meetings to one-on-one conversations, sparked keen interest and led to productive exchanges that significantly enhanced my research, by directing me to concepts and realizing tools used by practitioners in field expeditions. This exposed me to multidisciplinary knowledge that broadened my understanding of practical regional challenges, which added to my research. I hope the contributions from this thesis are worthy of being well received by them and others, add valuable insights to the team's knowledge pool for increasing SDG-aligned action in the field, and proving beneficial for their ongoing initiatives in the BAR region and beyond.

Continued Education and Life Experiences

During my stay, I experienced the need for and importance of rigor in research to a personally unprecedented degree. Having clear objectives and pertinent questions (and being constantly aware of such), has proved crucial for keeping a focused and effective investigation.

My JST-CGIAR stay has been instrumental in helping me focus on specific areas (local, regional and global) where I can contribute. Currently, I consider proposing a Ph.D. that spins off from this MSc. thesis work, the incoming weeks and months will be important to understand the focuses I would strategically choose. I feel both honored and motivated to be able to continue exchanging with those people who I have interviewed as well as others (e.g., domain experts, entrepreneurs) to structure and orient my next steps. The experiences shared by the many people I interviewed have exposed regional nuances and challenges; thus, the knowledge gathered during this JST experience will certainly help shape my next steps to contribute to work in regional SDG-aligned development.

I look forward to being part of a dynamic and collective science-based enterprise, and it is increasingly clear to me that this path will be personally rewarding. I also now fully recognize my interest in multidisciplinary approaches that assist in distilling the ever-growing layers of complexity of emerging technologies and their applications, ecosystems and landscapes, regional and cultures, institutional and regulatory regimes, and many other aspects.

As the digital technologies provide unprecedented access to knowledge the intensive, hands-on nature of my MSc educational experience has emphasized to me the essential role of traditional and established learning methods and processes (e.g., developed in universities and research institutions).

This realization on the roles of education and institutions on education lead me to in sum, conclude that i) the pursue of Master's education has assisted fostering commitment, agency, focus, ethics and best practices, resiliency, and so on; and ii) I have much to improve still and guess that will always be true.

Concluding Remarks

A few remarks and questioning that came to me as I wrote this report and revisited the experiences I had during the JST stay:

- How to establish myself as a research-practitioner that can further foster collaboration across countries? How to do so as a European-Brazilian citizen?
- How to design and systematically establish the dynamics within innovation systems in forested landscapes in the tropics? Could this assist in designing public policies and other incentives and disincentives for the optimal degree of complementarity and specificity of SDG-aligned innovation and entrepreneurship initiatives? What does "optimal" mean and for what contexts? How to measure it? What are the variables and what roles do they play? I will keep my eye out for researchers pushing such work forward as potential collaborators. If you know of such, I would be very interested in reading or hearing from you and would thank you for letting me know.
- I want to prepare myself to establish meaningful partnerships with traditional and indigenous communities - a contribution I consider both important and powerful. As these communities increasingly encounter the modern world through digital technologies like social media enabled by satellite internet providers in the BAR like Starlink, the risk of cultural degradation and loss is inevitable and evident. It is urgent to initiate and strengthen projects aimed at providing digital literacy and competencies to these communities. Moving forward, I plan to better equip myself to work with these communities by understanding their challenges and cultural contexts more deeply, as I move forward with becoming a savvier technologist.
- A provocation that has playing on repeat in my mind: how many within funding agencies and organizations in international cooperation speak the languages of these communities, such as Munduruku, Tukano, or Baniwa? Could including these and other languages as a metric, when relevant, in hiring processes become an important step in the decolonization of international cooperation? We should and can do more to truly understand and support these communities by assisting them in preserving their cultural identities while embracing new technologies, if demanded by them. The digital divide is currently widening. Let's close it for the SDGs fulfillment and more fairness and freedom!
- I feel I am on a track that is right for me. As I write this final report, I am also preparing a poster to be presented at IUFRO, a publication with Bernardo Caldas and other colleagues. I am also working to develop a Ph.D. research proposal as a possible next step.
- The issues I focused on during my stay are topics of escalating discussion within Brazil and globally. Given the power of emerging technologies, many and diverse people and institutions are actively working to structure a view of the future that aligns the BAR regional social development with the SDGs for the forest conservation and empowerment of democracies. I look forward to contributing.

Reflecting on my research stay, I recognize

- I. the important lessons learned about the complexities of environmental and socio-economic-political issues in the BAR. These insights will undoubtedly influence my future work and inspire continued efforts to strive for sustainable development in the BAR region.
- II. the insights gathered into the complexities of urban centers in the BAR and their pivotal role in regional SDG-aligned development.
- III. the critical need for concerted efforts towards sustainable urban transformation in the Amazon, which I want to continue being a focal point of my academic pursuits.
- IV. that I look forward to the possibility of engaging in partnership with BAR regional actors to collaborate in research that assists fulfilling SDGs-aligned social development.

Final Note

I would like to recognize and give thanks to Robert Koetter and to ATSAF for having organized the intercultural training and support. Becoming acquainted with the concept of cultural influencing degrees, namely 3rd Culture and so on, has profoundly influenced my worldview and guided me throughout the JST stay. The reflections triggered by this intercultural training fostered a continuous process of cultural self-reflection, in which I have been challenging my assumptions and enhancing my capabilities as a researcher and collaborator, enriching, I sense, my approach to research and interaction with peers. These guiding reflections assisted me navigating through both familiar and new complexities of the BAR during this JST stay.

Dear JST team, my perspective is that your work enables the forging of experiences and connections that have undoubtedly and importantly influenced mine and others for greater positive impact of research and international cooperation. I am deeply grateful for the array of experiences and learning opportunities which took place during the 6 months I lived in new social and natural environments in Brazil and the BAR. Many thanks to all working at the ATSAF for providing me and others with such a transformative opportunity. I would like to especially give thanks to Sabine Baumgartner and Beatrice Breuer for their support in advance of and throughout my JST stay.

As a final note, I very much look forward to a set of next steps that incorporate what I have learned within my MSc. work and with the additional opportunity granted by the engagement with CGIAR in this JST to fully appreciate the local and regional nuances that demand attention from the outset. I feel well prepared for these next steps and, more than ever, I am convinced of the value and critical nature of this work for our planet.

Many thanks! Vielen dank! Muito obrigado!