Amazon Assessment Report 2021

Chapter 34

Boosting relations between the Amazon forest and its globalizing cities

Rio Negro na região da vila do Cacau Pirêra, em Iranduba, Amazonas (Foto: Raphael Alves/Amazônia Real)

THE AMAZON WE WANT
Science Panel for the Amazon

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

About the Science Panel for the Amazon (SPA)

The Science Panel for the Amazon is an unprecedented initiative convened under the auspices of the United Nations Sustainable Development Solutions Network (SDSN). The SPA is composed of over 200 preeminent scientists and researchers from the eight Amazonian countries, French Guiana, and global partners. These experts came together to debate, analyze, and assemble the accumulated knowledge of the scientific community, Indigenous peoples, and other stakeholders that live and work in the Amazon.

The Panel is inspired by the Leticia Pact for the Amazon. This is a first-of-its-kind Report which provides a comprehensive, objective, open, transparent, systematic, and rigorous scientific assessment of the state of the Amazon's ecosystems, current trends, and their implications for the long-term well-being of the region, as well as opportunities and policy relevant options for conservation and sustainable development.

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Graphical Abstract

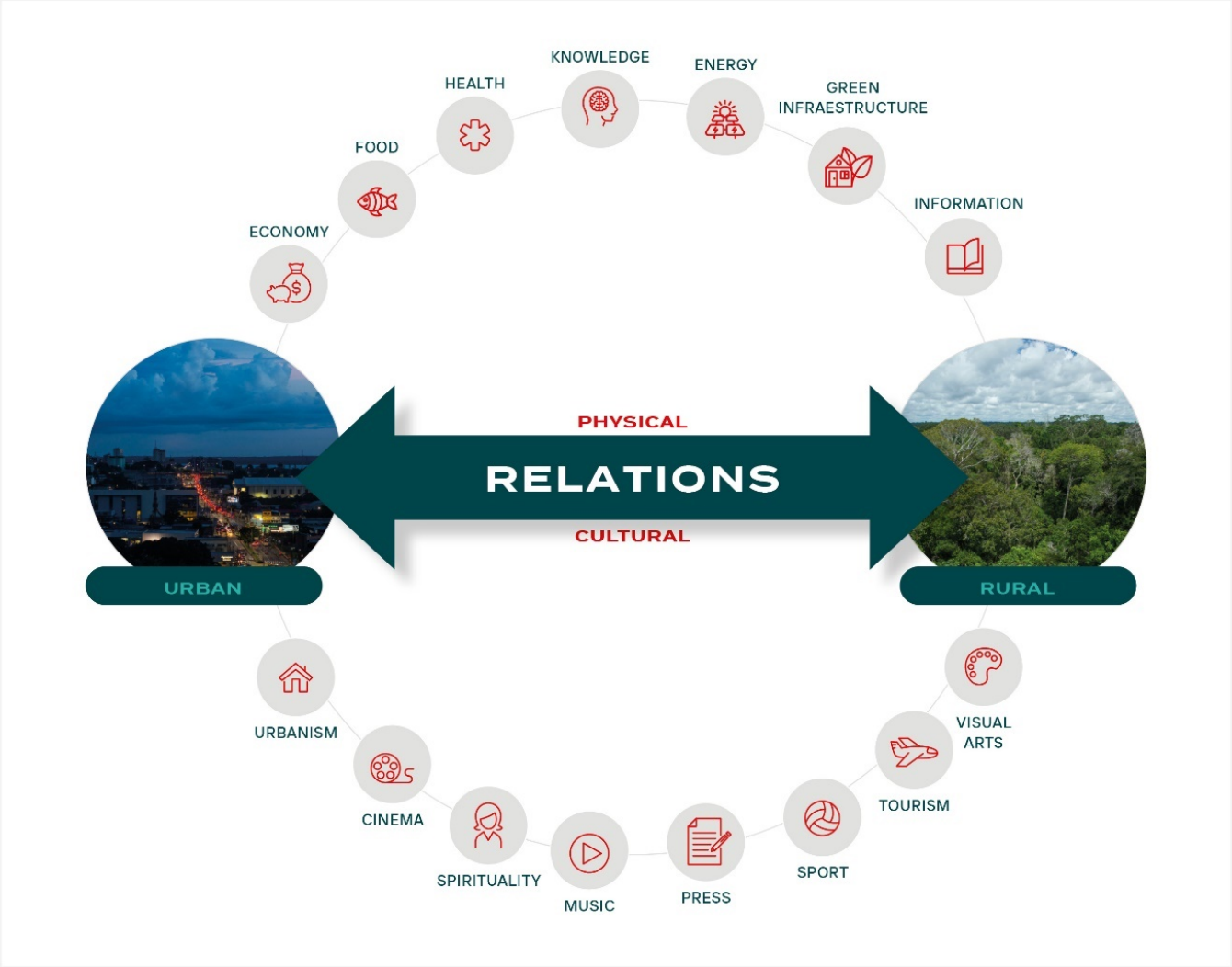

Figure 34.A Graphical Abstract

Boosting Relations between the Amazon Forest and Globalizing Cities

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Key Messages

- The myths of civility versus savagery and of the inexhaustibility of Amazon natural resources, as well as the flattening of increasingly globalized cultures all cause physical and cultural dis- or misconnections between urban and rural environments in the Amazon.
- Physical dis- or misconnections, such as those related to local economies, food security, healthcare, schooling, and green urban infrastructure, could all be improved with well-planned participatory actions beneficial to both rural and urban dwellers. Some of these actions are: effectively involving rural populations in decision-making processes, fostering small-scale food production in peri-urban areas, subsidizing the long-term residence of healthcare professionals and infrastructure in small cities, the establishment of education hubs strategically located in rural areas, increasing urban green infrastructure, and operationalizing the concept of "smart cities—smart forests".
- A cultural (re)connection of urban-dwellers with the forest should be fostered with concerted interventions in various sectors such as tourism, sports, and visual arts as a way to win people's hearts and minds about the forest. Existing well-established rural–urban bonds such as food habits and traditional festivities can serve as good starting points to bring this cultural relation to a higher level.
- This refoundation of the Amazon culture in the context of urbanized populations is a stake not only for policy makers or traditional populations but to society in general, including urban- and forest-dwellers.

Abstract

The myth of civility versus savagery, the flattening of increasingly globalized urban cultures, among several other factors, have historically contributed to a misconnection between cities and rural (forest) areas

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in the Amazon region. Since their establishment, Amazonian cities—where more than 60% of the region's population is located—have been predominantly used as trading posts for global commodities, which favors a poor physical and cultural relation between the cities and their surrounding forests. Urban populations permanently suffer from widespread poor healthcare, education, and sanitation conditions, whereas Indigenous people, who generally live on the outskirts of large cities, can face this urban–rural interactions in a more fluid way, inhabiting both environments more efficiently. Although the rural–urban connections are stronger and better established in small cities (e.g., Brazil nut harvesting in Pando, Bolivia), these relations are not always beneficial (e.g., many small municipalities are responsible for the highest deforestation rates in the region). Notwithstanding, much beyond physical barriers or misconnections between urban and rural forested areas, there are key cultural barriers to be overcome, especially by urban-dwellers. By providing a brief and non-authoritative review of the physical and cultural relations between rural/forest and urban areas in the Amazon, we identify several aspects for improvement such as subsidizing the long-term residence of healthcare professionals in the countryside, implementing peri-urban agricultural/extractive belts for food security in cities, increasing the permeation of forest and green spaces into Amazon urban landscapes, investing in innovation around the "smart cities–smart forests" concept, and, perhaps most important, mobilizing human, financial, and institutional resources to foster a resignification or refoundation of the cultural, spiritual, and affective bonds of urban inhabitants with the forest, supported by the forest people and their cosmovisions. We also present a set of testimonials from distinguished cultural practitioners from different cultural sectors on how they think their work can collaborate to win people's hearts and minds about the ways, beauty, benefits, good influences, and respect of/for the world's largest tropical forest.

Keywords: rural-urban fluxes, health, smart cities-smart forests, Amazon art, cultural movement, biocultural diversity

34.1 Introduction

The historical occupation and urbanization in the Amazon followed models that were created in a complex and multifaceted way, with contradictions and paradoxes (see Chapter 14). From the point of view of social, demographic, and economic forms of use and occupation, the relationship between "rural" and "urban" has been increasingly distancing itself from the idea of "agricultural frontier" (Côrtes and Silva Júnior 2021), as a very limitable and detectable process between the supposed two worlds. The concepts of "urbanized forest" (Becker 2013) or "rural cities" (Padoch *et al.* 2008) are two interconnected examples of this distancing.

Nevertheless, even with this set of established interactions, city life and values (emotional and ethical) are disconnected from the Amazonian rural and forest world (Adams *et al.* 2006) such that urban problems are seen as not interconnected with each other (Brondizio 2017). Among the various consequences of such misconnection are the exclusion of rural populations from the effective participation in the decisions that affect them and the exclusivity of the decision making by a small portion of rural people who inhabit or transit through urban centers (Le Tourneau and Bursztyn 2010); the difficulty of urban social groups in identifying and recognizing the impacts of their livelihoods on issues related to deforestation and biodiversity loss (Diegues *et al.* 1997); and, finally, the weak social engagement in processes and actions to address environmental problems directly related to rural and forested areas (Mansur *et al.* 2016).

In a broad sense, we recognize three factors that support the understanding of this ethical-evaluative disconnections between urban and rural societies in the Brazilian Amazon. Two factors are based on a historical occupation process of the region: (1) The relationship between "settlement" and "*sertão*" (hinterland) in the processes of European colonization (Farage and others 1986; Ra-

minelli 1994; Oliveira 1998); (2) The myth of the inexhaustibility of Amazonian natural resources (Sevcenko 1996; Gadelha 2002) (Pádua, 2019). The third one is linked, more recently, to the processes of techno-scientific modernization and insertion of Amazonian cities into globalization movements: the difficulties related to the construction of subjectivity (a person's own feelings, beliefs, tastes, or opinions) in the complex social dynamics of the globalized populations (Simmel 1997; Sheller and Urry 2016).

The historical colonization process led to the disorganization of millennia-long Indigenous configurations in this macro-region and created images, symbologies, and meanings that last and significantly contribute to the usual predatory economic and social models. It also guided to the processes of urbanization that consider the forest, Indigenous socio-cultural diversity, and hydrological strength as riches to be consumed and, at the same time, "wild" spaces whose civilizing impetus should be responsible for civilizing them (Farage and others 1986; Farage 1991; Raminelli 1994; Sevcenko 1996; Oliveira 1998); [see also SPA Chapters 13 and 14].

Aligned with the widely accepted idea of a civilized and wild desert, the forests have become a gigantic sphere of abundance and affluence to be explored in an unlimited way. Since the arrival of Europeans in South America, the image of an endless nature, impossible to be exhausted by human capacities, has solidified. The difficulties inherent to the colonization process, carried out without planning, with limited human resources, through incursions such as those of *bandeirismo*, and the foundation of the settlements in the middle of the "*sertão*" have solidified this image over the 17th, 18th and 19th centuries (de Lima 2012; Cesco and de Lima 2018). In the 20th century, both modern military incursions, particularly in the Brazilian Amazon, such as Marshal Rondon's expeditions, and the plans for occupation and "defense" of the Amazon, undertaken by military governments, reinforced the image of an inexhaustible nature to be intensively explored (Bolle *et al.* 2010).

34.1.1 Rural-Urban (Dis)connection Today

The idea of occupation/*sertão*, as a reflection of the civility/savagery relationship, and the myth of inexhaustible resources persist to the present and is reflected in the development policies and in the economic and cultural forces acting in the Amazon region. Consequently, this fact contributes to the distancing and an opposing relationship between "rural area" and "city", becoming fundamental components that have prevented the spread of a culture based on caring for forests and their inhabitants. A third fundamental component for this culture of disconnection between "city" and "countryside"—the poor construction of subjectivity in a globalized world—is tied to characteristics increasingly present in contemporary societies, endowed with high mobility and located within the scope of globalized cities (Sassen and others 2002).

The concept of globalized cities, or globalized urbanization, reviewed by (Brenner and Keil 2014), is meant here as "*(...) the planetary "fabric" or "web" of urbanized spaces* (Lefebvre 2003) *(...), with well-defined urban hierarchies conditioned by supranational forces (...), through which corporations coordinate their production and investment activities.*"; It is also viewed as*"(...) an arena of contestation in which competing social forces and interests, from transnational firms, developers and corporate elites to workers, residents and social movements – struggle over issues of urban design, land use and public space."* which is nowadays far from being restricted only to the economic flows but "(...) engages with a broad range of globalized or globalizing vectors – including not only economic flows, but the crystallization of new social, cultural, political, ecological, media and diasporic networks as well." In that sense, globalized cities can also affect people's subjectivity through the flattening of local cultures to comply with a supposedly global, permanently networked, set of communal standards. All the subtleties in these definitions are applicable to the cities in the Amazon region (Fig. 34.1).

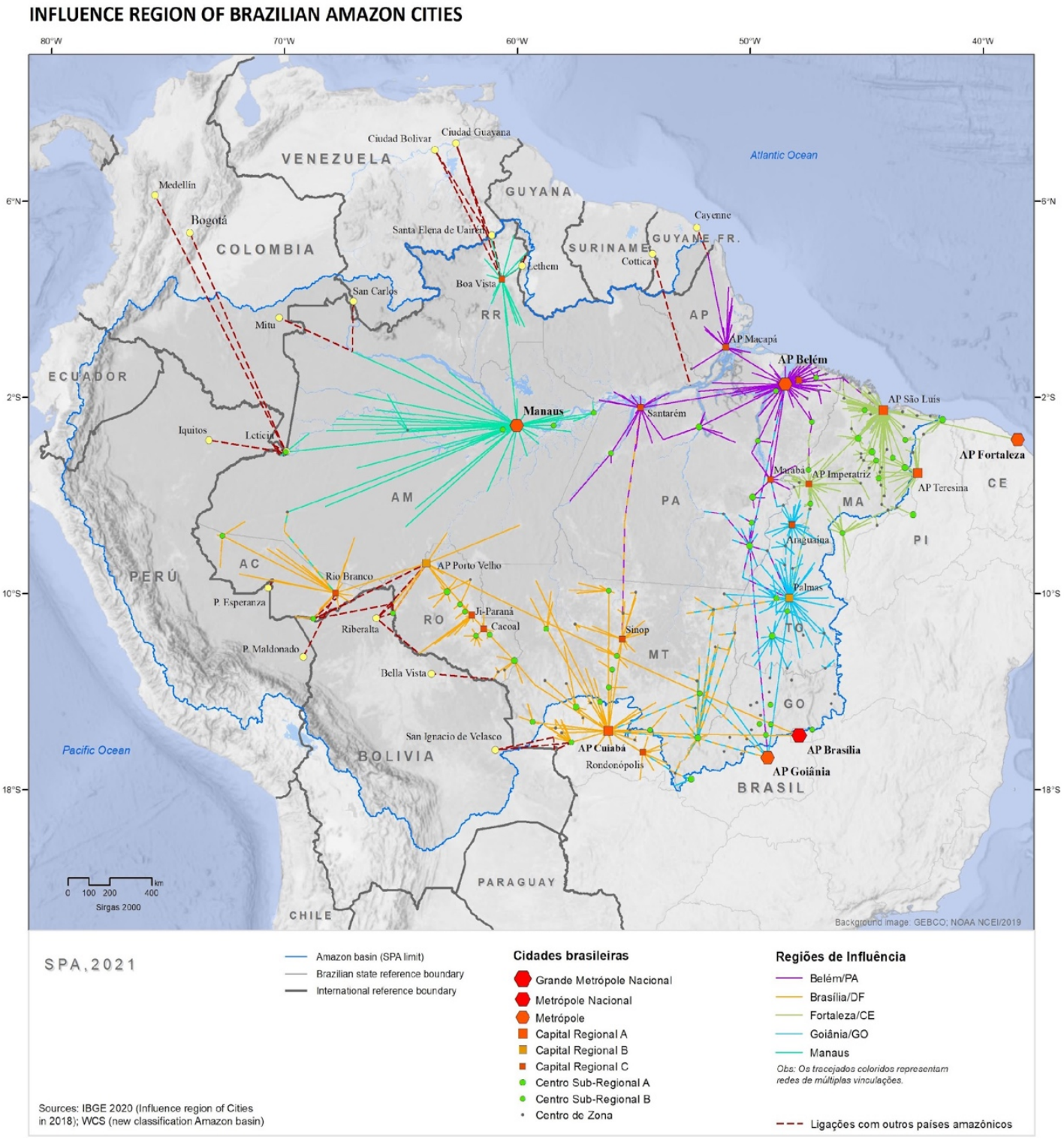

Figure 34.1 Spatial influence of large and medium-sized cities of the Brazilian Amazon. Note the huge area of influence of Manaus over a large fraction of the west Amazon, even towards foreign cities. Both the major urban population of the region and the dominant direction of social, cultural, economic, and political influence from the cities to the rural or forested areas have led to the coining of the term “urbanized forest” for the Amazon region.

By experiencing a world of intensification of flows and processes of artificialization, individuals become increasingly insensitive to situations, activities, and elements that are not linked to their direct daily experiences. The urban life, as the existential experience of the modern world, gives to the individuals exposed to the intense dynamics of a hyper-technology a kind of "desensitization" process (Simmel 2005; Sennett, 2005; Urry, 2008). Such a process causes urban-dwellers to not perceive the far-ranging—up to 1,000-km radius—impacts of urbanization on its surrounding forests and rivers. The tambaqui fish caught around Manaus, for instance, are half the size of those caught 1,000 km from the city, where the catch rate also doubles with increasing distance along the Manaus (Tregidgo et al. 2017). In that sense, both the content related to less evident environmental problems (such as the effects of climate and environmental changes) and the conditions for building an emotional bond with natural landscapes are seriously compromised. In the specific case of the Amazon and its most significant urban configurations, the presence of these three sets of values (the rural as a wild space, the inexhaustibility of wealth and the desensitization of the urban individual) decisively contributes to the development of the culture of disconnection. It is important to emphasize that this disconnection is stronger considering the relation metropolis and rural areas, or even medium-sized cities and rural areas. Solidarity networks exist and make a difference in the lives of residents of small towns in the Amazon. Those who live in the rural area of such municipalities send goods to urban families, such as açai fruit, fishing, or meat from hunting, to help with their maintenance. In contrast, residents of small towns do not send resources of any kind to these family members in the rural areas. However, their homes are used as a place to support these family members, for medical consultations, to receive government benefits, among other aspects (Costa and Montoia 2020).The perception of urban areas tends to be different for forest-dwellers and Indigenous people. "Urbanization" for Indigenous people is a multi-directional process often opportunistic and inspired by a range of drivers, the most common being labor opportunities, schooling, political work, and escaping village conflicts (Peluso and Alexiades 2005; Padoch *et al.* 2008; Alexiades and Peluso 2015, 2016; Peluso 2015). For them, movement back and forth tends to be flexible and reflects strong social, political, and economic relationships amidst the rural and the urban landscape (Andrello 2006; Alexiades 2009), but ultimately is a process that begins in people's minds long before they physically take place, and hence the idea that "urbanization begins at home" (Peluso, 2004).

34.1.2 The Urban Forest (Should Turn into Forest Cities?)

A major portion of the Brazilian Amazon Forest is urban, considering that >75% of its population is located in cities. However, the so-called "urbanized forest' term, coined by the Brazilian geographer Bertha Becker, is not restricted to demographical characteristics and express "*a tendency on the expansion and growth of cities in the region and, namely, of a lifestyle that is not restricted to the small towns and cities, but which defines social and economic reproduction in the region; process already named by Lefebvre (2003) as 'diffusion of the urban society'*" (Becker 2013; da Trindade 2013). As such, the concept of "urban forest" used for the Amazon region is key for understanding the dominant direction of social, cultural, economic, and political influences in the region: from the cities to the rural or forested landscapes (Fig. 1).

After the 1960s, as the region became a target of interest for expanding globalizing markets, policies were put in place to establish cities on the agricultural frontier, subject to regional policies (Becker 1991). In Brazil, this process was more intense and produced new cities such as agrovillages and company towns (e.g., Sinop), which grew from the influence of industrial production and agribusiness. Several other urban areas were influenced by the production and flow of goods: riverside cities, highway cities, industrial cities. Today such cities are a factor of change: migrants learn occupations and trades, whereas peasantry and its relation to labor is conserved and diluted (Bertha 1985).

Figure 34.2 Infrastructure deficit in the city of Afuá, Pará, Brazil (Source: Laboratório de Estudo das Cidades Collection/UNIVAP).

Figure 34.3. The metropolitan area of Manaus: an example of tensions between urban and rural contexts in the Amazon. Source: AmazonFACE/Nitro/J.M.Rosa

The region's historical migratory process from within and outside the region into cities has resulted in intense urban growth, which was not followed by investments in basic infrastructure. As a result, the Amazonian cities, which exert such an influence over the rural and forested areas, are generally devoid of proper access to Infrastructures such as sewage systems and water treatment, which, combined with adequate energy services and garbage collection, are essential public services to guarantee urban well-being (Brondizio 2016). Approximately 86% of Amazonian municipalities do not have an institutionalized sewage treatment service, and only 12% of the urban population is served with a sewage treatment system (Fig. 2) (ANA 2017). This situation becomes more complex when we consider that more than 80% of the Amazonian cities are small, with less than 20,000 inhabitants, a fragile economy, and an inability to improve investments in basic infrastructure.

Links (or lack of links) of people with these rural–urban exchanges in the Amazon region, there are intrinsic dependence relations, or "misrelations", regarding the trade of food and manufactured goods. Cities are now seen more as spaces for the flux of goods that inevitably connects to the region's trading hubs such as Manaus, Iquitos, or Belém and from there to global markets (Becker, 2013). Manaus is an example of an Amazonian metropolis where the tension between urban and rural areas is explicit (Fig 3). While focusing on the control of the territory and the flow of goods, there has been historically little concern regarding social justice, guaranteeing local food production and provision, health care, education, and other important elements in forest areas (Brondízio 2016). Inverting or equilibrating the weight of influence from the rural or forested regions to the cities could help improve well-being and other conditions for both forest- and city-dwellers in the region.

34.2 Addressing the (Dis)connections

The meaning, notion, or connotation placed on an object or event by a society, and adopted by its in habitants, who influence the view or deal with the object or event, is the definition of the 'social construct' concept (Burr 2015). This concept is an important pact for the conservation and sustainable use of the Amazon and requires broad recognition of its importance by/for its urban population. This chapter presents a brief overview of this evaluative (dis)connection between cities and rural areas in the Amazon, pointing out the negative consequences for the sustainable development of the region, and providing some guidelines for building a culture of connection, affection, and ethics between urban and rural environments that can benefit forest conservation and the sustainable use of its natural resources. To that end, we present two major categories of relations: physical and cultural relations.

For physical relations (section 4), we briefly discuss the provision, use, and flow of material goods and services in the regions according to up-to-date scientific literature on the subject, also providing tentative but promising alternatives for improving the rural–urban connections from the perspective of such physical relations. In section 5, on the cultural (dis)connections between the rural or forested areas and cities in the region, we highlight a number of different culture-practitioners to provide, in their own view of their specific culture sector, how well- or badly established these cultural bonds are today, and how their strengthening is important to assure the long-term survival of the world's largest tropical forest. We conclude by summarizing a few recommendations about rural–urban relations in the Amazon, aiming at a long-term sustainable future for the region.

34.3 Physical Rural–Urban (Dis)connections in the Amazon

Approximately 80% of Amazonian cities have less than 50,000 inhabitants and are formally considered as small cities. Although they have a fragile economy, are strongly dependent on subsidies by the central governments, and have a low capacity to provide essential services and equipment such as education, health, and sanitation, small cities

play an important role in the Amazon urban network (Costa and Brondizio, 2009). They represent opportunities to improve life for families by accessing urban services and employment opportunities that are deficient or even non-existent in rural areas. Conversely, large cities (>500.000 inhabitants) such as Manaus (Brazil), Iquitos (Peru), or Florencia (Colombia) function as regional hubs for the provision of services, commerce, health care, and other urban–rural relations. However, these physical interactions are far from ideal. In this section, we explore some caveats and opportunities for improving the connections between the forest and rural localities with cities in the Amazon from the point of view of "physical" relations, pertaining to the access, trade, and utilization of material goods, services (including ecosystem services), and information.

34.4 Formal and Informal Economy

The Amazon is known for its strong cattle and agricultural economies (including large-scale soya production), timber, forest products, gold, oil and gas, and the cocaine and drug trade, (Salisbury and Fagan 2013) all of which have strong informal tendencies and whose importance and differences vary across regions, e.g., soy-exportation in Itacoatiara or the oil-industry economy in Iquitos (Bunker 2003). The region's informal economic activity, based on subsistence, the extraction of raw materials and casual labor, is rife and linked to broader formal and international economies (Peluso 2020). As a result, the Amazon has intersecting informal and formal economic sectors, which exist in a symbiotic relationship (Peluso 2018).

A direct connection between today's Amazon with the global economy is promoted by the trade markets of such goods, which are unequal in many ways. For example, rich countries buy primary products with little added value (e.g., meat, soy, minerals) at low prices, and sell knowledge, technology, and products with aggregated value at high prices (unequal price exchange, *sensu* Prebisch 1962, Prebisch, 1950). To obtain more money for their exports, the Amazon countries are forced to extract increasingly more resources and sell them to developed countries (ecologically unequal exchange, Bunker, 1984, 1985; Martinez-Alier 2002, 2011). In addition, nutritionally adequate calories are exported at low prices (unequal calorie exchange, Falconí *et al.* 2017) and expensive calories with low nutritional content are imported. This has a double impact because the growing trade in primary products generates social and environmental damage in the places where they are produced or extracted—generally the rural areas.

Some cities have developed alternatives for escaping such globalization of local formal and informal economies, generating and diversifying income, and improving the relationship between cities and their surrounding rural areas. For example, cities on the island of Marajó (Pará/Brazil) have boosted the city's economy through ecological tourism (Soure), açaí production (Ponta de Pedras) (Fig. 3), and fishing (Afuá). These income-generating alternatives should be encouraged through state policies, promoting the valuation of the forest by this urban population. In that sense, a wider-developed bioeconomy—based on the respect of traditional way of production by local communities—would be one alternative for economic development for the Amazon as a whole (sensu SPA Chapter 30) if they are enacted sustainably without degrading the forest environments. No doubt that this incentive should be followed by an enforcement policy regarding the handling of some products such as acai itself. Although it has not yet been measured, it is known that the expansion of açai production has been followed by an expansion of the area occupied by palm trees, to the detriment of the diversification of forest species (Cunha and Fonseca Da Costa). Although the açaí economy is an excellent example of a bioeconomy, it can also lead to a loss of biodiversity.

34.5 Food Security

There is a substantial reduction in deforestation and increased family income when the following six points are considered: (1) safe land tenure, (2) appropriate technical assistance, (3) credit lines

Figure 34.4 Riverside community of Fortaleza located in the municipality of Ponta de Pedras, Pará, Brazil, which congregates producers of açaí fruit (Source: Laboratory of Estudo das Cidades collection/UNIVAP, 2019).

suitable for the smallholders, (4) minimum infrastructure for transporting yield products, (5) conditions to sell their products in cities —through institutional or open markets—provided by the local governments, (6) recognition and compensation for the ecosystem services provided by keeping forests standing (see also SPA Chapters 27–29) (Pinto *et al.* 2020; Souza and Alencar 2020).

It is remarkable that at least 4 of these points (2, 3, 4, and 5) depend on urban institutions or urban-to-rural infrastructure. Both the provision of appropriate technical assistance and appropriate credit lines for smallholders depend on institutions located in urban areas and a good deal of communication and presence of, for example, agricultural assistance and bank technicians with farmers and their land. Infrastructure for securing agricultural and forestry production flow to cities and establishing and maintaining the conditions to sell the yield products in cities depend on the level of connection of rural areas to cities and sociopolitical organization. Therefore, the physical proximity of food production units in rural areas to Amazonian cities seems to be key for improving or securing food in the region. In that sense, food production in "peri-urban" areas could be a way forward for effectively engaging urban dwellers in a forest culture and increasing producers' income, promoting forest conservation, and providing quality fresh food to urban populations in the Amazon. Indigenous and traditional communities should be actively favored for the establishment, expansion, or maintenance of such peri-urban food production belts around Amazonian cities, given their extensive expertise in staple agriculture in the region (Irazábal 2009; Schor *et al.* 2018). By promoting the valuation of local or regional food production in Amazon cities (instead of, for example, the nowadays common commercialization of protein (namely chicken) from outside the Amazon region (Schor *et al.* 2015)) these peri-urban food production belts could even foster changes of food consumption habits, (alternatives are presented in section 3; see also SPA Chapters 13 and 14).

34.6 Health Systems and Diseases

Rapid social changes tied to a globalized lifestyle have led to increased sedentarization, changes in diet and nutrition, which have led to increases in obesity, diabetes (Gracey and King 2009; Oliveira *et al.* 2011) and cardio-vascular problems (Liebert *et al.* 2013; de Souza Filho *et al.* 2018). Additionally, urbanization-driven soil and water contamination, as well as deforestation, have increased exposure to respiratory and contact infections, tuberculosis, and faeco-orally transmitted diseases (Kroeger 1983; Kroeger and Barbira-Freedman 1992). The incidence, immunity, and risk perception of a number of transmittable diseases such as malaria and tuberculosis are highly influenced by landscape characteristics, being amplified among more marginal groups within Amazonian cities and more controlled among traditional river-dwelling communities (Confalonieri 2005; de Castro *et al.*

2018). These lifestyle changes have also placed increasing pressure on local natural resources such as soils, wildlife, and timber, leading to feedbacks of environmental degradation and a concomitant impoverishment of health and nutrition conditions (Alexiades and Lacaze 1996; Piperata *et al.* 2011). For Indigenous peoples, health conceptually includes social, political, spiritual, and physical well-being, not only of the individual but of the community and the ecosystem (Alexiades 1999). Such positions mean that urban healthcare approaches are seen to ignore the underlying causes of illness in rural areas and are often only utilized by forest-dwellers as a last resort when health has already deteriorated.

The urban–rural framing typically depicts a scenario in which rural resources serve the needs of city folk, and these populations might often be seen to be in competition with each other (Brondízio *et al.* 2016). Indeed, healthcare professionals often view work in rural areas as a mere stepping stone to employment in cities, where hospitals and well-equipped clinics are located; therefore, they are often absent or disengaged in their temporary outpost medical care positions. This often leaves a void of western healthcare in rural areas and has spurred a series of initiatives on how to best serve these populations (Peluso 2021). In fact, the density of physicians in the interior of the Amazon (i.e., outside capitals) is amongst the lowest in entire Latin America, reaching values as low as 0.2 physicians per thousand inhabitants, whereas 4 is the minimum recommended by the World Health Organization (WHO) (Silveira and Pinheiro 2014). Apart from statewide vaccination campaigns, there have been a variety of approaches, such as that by the WHO in the 1970s to train local health care promoters through community-based approaches (Alexiades and Lacaze 1996), health care boats such as the Amazon Hope project, the Abaré hospital-boat in Pará, and the building of outposts in rural communities.

Nevertheless, the lack of health personnel and adequate infrastructures such as hospitals and first care centers are acute, and the advent of sudden large-scale emergencies such as COVID-19 further increases pressure on the region's deficient healthcare system. For example, widespread forest fires aggravate the health risks of COVID-19 through the augmented concentration of fine air particulates, which can worsen and increase the spread of respiratory (Alves 2020; Pinto *et al.* 2020; Oliveira *et al.* 2020) and COVID-19 infections.

Therefore, apart from the aforementioned itinerant healthcare initiatives and the potential strengthening of telemedicine, it is extremely important to have more subsidies and incentive programs for the long-term establishment of healthcare professionals in the region's small cities and rural settlements. This is tied to the improvement of other living and well-being conditions in these countryside places to make them, in addition to state incentives, more attractive to healthcare professionals. One of these conditions is, of course, the simple presence or improvement of infrastructure, including specialized equipment and installations to decentralize medical services from the major capitals to the countryside. Finally, a positive strategy for prioritizing healthcare in the Amazon is one that allows all local populations—whether rural or urban—to nurture, maintain, and rely on resources that are readily accessible to them. An example of that is the SachaWarmi (https://www.sachawarmi.org/) in Ecuador, who facilitated videos that explain medicinal plant use in practical terms.

34.7 Knowledge Infrastructure and Human Capital

When dealing with Education in the Amazon, a deep approach is needed in which public policies still need to evolve; where formal basic education (kindergarten, elementary and high school) has a very limited form and serious problems that include scarcity and precariousness of physical spaces. In addition, vocational courses and higher education are lower levels compared to the rest of the country. In the State of Amazonas, Brazil, a solution found by the Secretary of State for Education and Sport (SEDUC acronym in Portuguese) to ex-

pand the provision of education in elementary school is face-to-face teaching mediated by technology.

Implemented in 2007, the Amazonas Education Media Center (CEMEAM) is a pioneering state policy in the country. Unlike distance education, this has the presence of students in classes, real-time interactivity resources, and strategically planned media for the development of synchronous and asynchronous classes, making use of a videoconference satellite system with audio and video interaction. Classes are produced by expert teachers and turned into television pieces in an educational production center for TV, using various media resources and communication tools and broadcast live, daily, to all classrooms simultaneously, at regular time. Each classroom has a technological kit and a face-to-face teacher to mediate the learning process. It is present in all 62 municipalities in the state (www.centrodemidias.am.gov.br).

In 2010, the Sustainable Amazon Foundation (FAS) started the construction of nine Conservation and Sustainability Centers (NCS) located in the Conservation Units where the institution operates. Aiming to offer education to remote areas, in addition to supporting the government and providing education and health solutions adapted to local realities, the NCS include classrooms, cafeteria, kitchen, library, accommodation for students and teachers, operational base, and computer labs. The centers also offer formal education within the modalities of elementary, secondary, youth, and adult education (EJA), higher education, post-secondary technical, and free professional courses. It is in these centers, through partnerships, that complementary projects are developed that encourage young people to build life plans, training, and practical experiences.

This structure enables experiences such as the "Repórteres da Floresta" (Forest Reporters) initiative, which works to form a sensitive and sincere look at the local reality through "educommunication" workshops and the creation of communication products. Students also develop innovative solutions for income generation and entrepreneurship, learn leadership techniques to assume important roles within the community, experience reading in its multiple possibilities, tell and retell stories and explore the field of performing arts through the production of theatrical shows. FAS also has a look directed to the appreciation of teachers, investing in training through the development of materials and methodologies with contextual themes and focus on sustainability and the environment for those who work with multigrade classrooms, a reality of communities.

Thus, two recommendations are proposed in relation to forest-city interaction in relation to education in the Amazon: (1) establishment of physical hubs for on-site education in remote locations, aided by remote teaching technologies, and (2) training and stimulus programs for the establishment of teachers, preferably coming from the interior communities themselves, since they already know the realities experienced by these populations outside the large urban centers in the region.

34.8 Green Infrastructure as Nature-Based Solutions

Green infrastructure is an increasingly employed concept for the planning of urban and rural landscapes and can be understood as "the connected network of multifunctional, predominantly unbuilt, spaces that support both ecological and social activities and processes" (Kambites and Owen 2006). Although green infrastructure is sometimes treated as a planning issue (Pauleit *et al.* 2011), in practical terms, it can be seen as the physical green spaces, planted trees, and the corridors connecting them that provide multiple ecosystem goods and services (Tzoulas *et al.* 2007). Green infrastructure has proven to be a useful mechanism to support cities in solving common urban problems, such as urban heat islands.

Apart from a few isolated cases, such as the Acariquara neighborhood in Manaus (Fig. 4), the forest does not permeate urban spaces in Amazonian cities. In fact, Brazilian Amazon capitals such as

Figure 34.5 Contrasting presence of green infrastructure in neighboring locations in the city of Manaus. (a) High permeability of green areas and residential buildings in the Acariquara neighborhood; (b) urbanization with very low presence of streets in the Ouro Verde neighborhood.

Manaus and Belém are amongst Brazil's cities with the smallest green coverage (IBGE 2012). There is extensive evidence on the benefits of greening urban spaces, including contributions to the physical and mental health and well-being of urban-dwellers and lowering of air and surface temperature maxima and variation (Fig. 5) (Norton *et al.* 2015; Amato-Lourenço *et al.* 2016). It is estimated that a 10% increase in tree cover may result in a 3°C decrease in local temperature (Elmqvist *et al.* 2013; de Bello *et al.* 2017).

Several other urban issues could be mitigated by establishing such nature-based solutions into city landscapes. Among the examples are flash floods, landslides, water security, air pollution (especially of particulate material), noise pollution, usage of indoor air conditioning, greenhouse gas emission balance, and even the generation of “green” job posts (Chapters 27–30) (Raymond *et al.* 2017; Nagabhatla *et al.* 2018), as demonstrated for the peri-urban areas of the Amazonian city of Puyo in Ecuador (Huera-Lucero *et al.* 2020).

An increased occurrence of green infrastructure in three large Amazonian capitals (Manaus, Belém, and Porto Velho) has been preliminarily estimated as costing USD 70 million per year, or USD 15.00 per inhabitant per year (Lapola *et al.* 2018), a feasible cost, especially if one considers the incurred monetary benefits such as the consequent energy-savings related to air conditioning. In small and medium-sized Brazilian Amazon cities, the cost would be even lower (USD 7.00 per inhabitant per year, Vieira and Panagopoulos 2020). Nevertheless, despite the hyperdiversity of approximately 15,000 trees species of the Amazon ecoregion (ter Steege *et al.* 2020), more than 40% of the trees in urban areas of the Brazilian Amazon cities are exotic, such as *Ficus benjamina* native to Malaysia (Vieira and Panagopoulos 2020).

There are practical barriers to the greening of Amazonian cities to the level at which these benefits are perceptible. The first is the lack of tax incentives for properties with trees and adaptation of city-level services to cope with such a high tree cov-

erage (e.g., pruning)— again, a cost that is probably smaller than the energy spent on cooling interiors or dealing with health impacts of extremely high temperatures. A substantial greening in these cities (as the example given in Fig. 4) would also demand moving underground a large fraction of the urban electric wire network. But most of all, there is a cultural barrier to be surpassed when it comes to keeping street trees and green spaces in Amazonian cities (see boxes 7.1, 7.3, 7.8, and 7.9 for examples). Many inhabitants of Manaus, for example, do not want trees on their streets or backyards because they associate the presence of trees with dirt, forest people and, therefore, poor development (Lapola *et al.* 2019). Moreover, the permanently constrained budgets of city governments force them to abide by continuous gentrification and allotment of urban spaces that, if better planned, could have a well-equilibrated presence of green infrastructure. Although it is reasonable to assume the small and medium-sized Amazonian cities have the same demands as large cities in terms of the presence of green infrastructure, these small and medium-sized cities generally operate on a lower revenue and skill basis (Pickett *et al.* 2013). In that sense, state- or federal-level coordination for

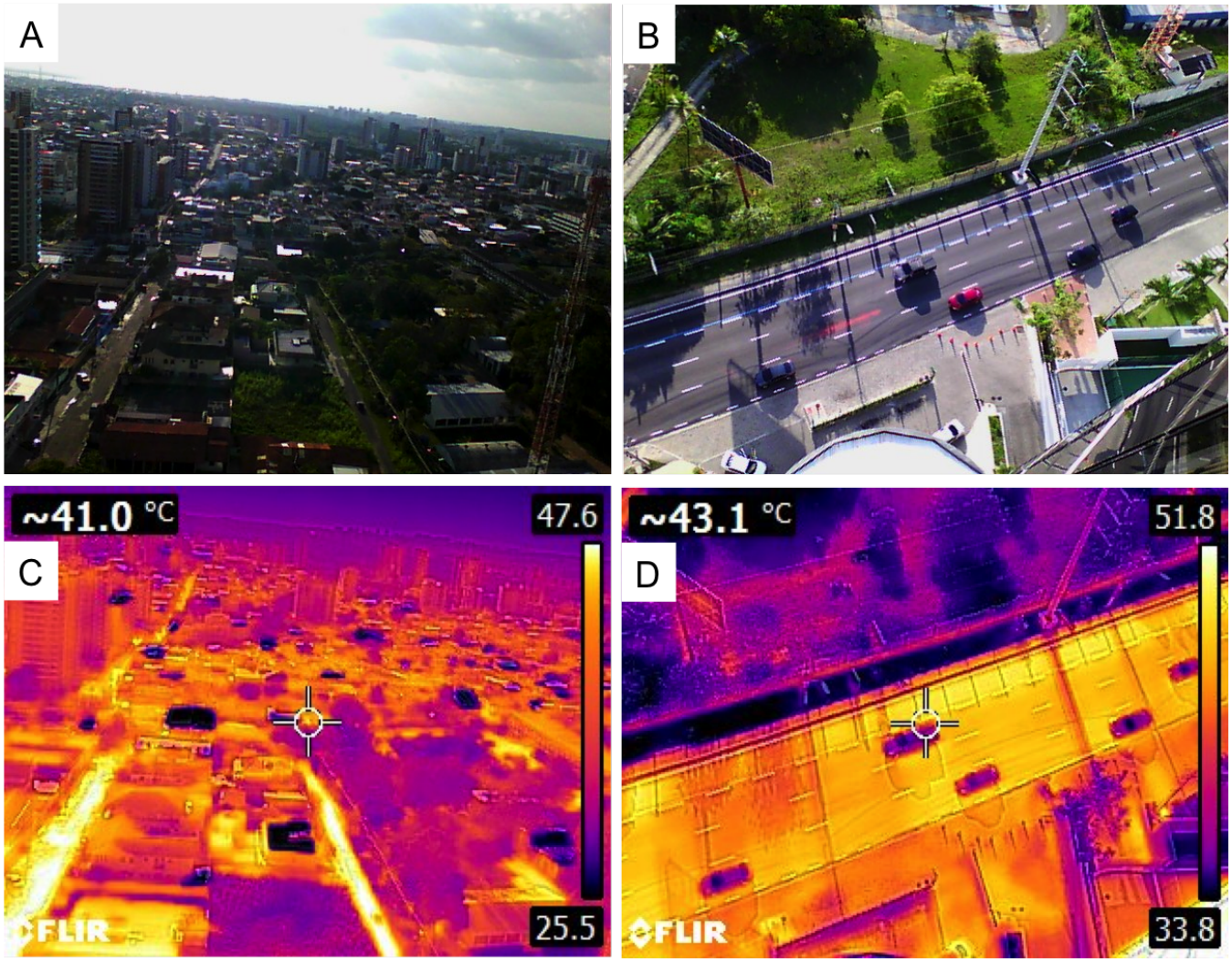

Figure 34.6 Visible (A,B) and thermal infrared (C, D) pictures taken from locations in Manaus city in October 2016 as examples of poor insulation and poor energy conservation in buildings due to air-conditioning (A, C) and cars (B, D) and the importance of vegetation to ameliorate urban temperatures. The top left number denotes the temperature at the target in the center of the image. Source: Lapola *et al.* (2018).

the provision of financial and technical conditions for increasing such infrastructure in small and medium cities is key. We also suggest that clearly demonstrating the financial and well-being net benefits of urban green infrastructure, in a participatory way, might be another way to increase the presence of green infrastructure and green spaces in Amazonian cities, which could ultimately turn more fluid the transition between urban and rural areas in the region.

34.9 Information (Smart Cities, Smart Forests)

The popularization of the internet has undeniably improved communication between small settlements and large urban centers in the Amazon, from entertainment purposes (Colferai 2013) to optimization of agricultural yields (Furtado *et al.* 2020) and even telemedicine (Machado *et al.* 2010). However, the Amazon is one of the regions in Latin America where the digital divide is the strongest, especially considering the differences between urban and rural areas. 72% of households in the Brazilian Amazon make use of the internet, but this percentage is higher in urban areas (83%) compared with the rural households that access the internet (33%), representing the highest urban-to-rural difference regarding the use of internet in Brazil (IBGE 2020). The main reason is the lack of internet services in the region. Communication via internet with rural or forested areas is highly dependent on wireless networks, namely, via radio networks. What happens in the forest/rural areas also affects cities: for example, forest fires in rural areas seem to affect the internet signal in large cities such as Manaus (Medeiros 2020).

Using the concept of "smart cities" (highly participative exchange of information through sensors and devices for better management of resources and services (Cunha *et al.* 2016)) for boosting rural-urban relations could bring about benefits much beyond the improvement of communication in the Amazon and elsewhere. In that sense, the concept of "smart forests" (or "internet of trees") should be popularized in the region: highly technologized forest sites for data collection, processing, and analysis, not only for anticipating fires but also for managing other environmental changes, the sustainable use of forest resources, and the understanding and involvement of urban people with the forest (Gabrys 2020).

One clear example is the use of smart forest technology by the Rainforest Connection initiative (https://www.rfcx.org/) to alert authorities about deforestation, logging, poaching, and smuggling activities. This initiative uses second-hand cellphones to monitor the sounds in remote rainforest locations and generate alerts when the sounds of chainsaws, motorcycles, or trucks are captured. The system is currently employed experimentally in the Tembé Indigenous Reserve in central Pará, Brazil. Other examples include the remote sensing, with cameras, of the production of forest fruits, the *ex-situ* monitoring of forest flammability, industrial-scale tree planting for reforestation or creation of green infrastructure in cities, and the building of cultural connections by sharing touristic information with the urban population, such as the reproduction season of river turtles. The area is still wide open for innovation, and many other examples of such relationships between urban and rural areas in the Amazon regarding the exchange of information and the role of social media are expected in the next years or decades.

34.10 Connecting Culturally with the Forest

Obviously, the forest culture does not go unnoticed in the Amazon metropolis and many other cities of the region, for example, through food consumption habits (consumption of local forest fruits and native fish), traditional festivities (e.g., the Parintins "Boi" Festival) and even through the use of plants with psychoactive compounds for religious purposes in the urban context (e.g., the ayahuasca brew). These unique Amazonian cultural assets are indeed part of everyday life in the region's cities and already represent good connections between the urban and the rural forested Amazon. Although these examples of good connections can be important instruments to help in rural–urban (re)connection, they are not sufficient to secure

deep relations between the local urbanized society with the forest to benefit its long-term existence.

In Manaus, which has approximately 2 million inhabitants, only a minor fraction of people see the surrounding forest as part of their living and cultural space (Higuchi and Silva 2013). In small cities (i.e., <50,000 inhabitants), the relation between nature and urban citizens is more intimate and more solidly established, but not always in a synergistic way. The Brazil nut (*castanha* or *castaña*) harvest intimately drives seasonal socio-cultural cycles in small towns of Bolivia's Pando department (Cronkleton *et al.* 2010). On the other hand, many small cities in the Amazon are responsible for the highest deforestation rates; for example, Lábrea (Brazil) has only approximately 38,000 inhabitants but is among the top-ten deforestation municipalities in the country, with a deforestation of 390 km^2 in 2019 (PRODES, 2020). The improvement of this connection between urban-dwellers and a culture of and for the forest should be accomplished by (re-)touching/instilling people's innermost values, feelings, and beliefs with a forest-based culture.

34.10.1 Are Amazonian Cities Culturally (Dis)connected from the Surrounding Forest?

One of the major challenges humanity faces today is that many of us have lost the vital connection with the living world that sustains life (Beck, 1998). This is as true in the Amazon—whose human population is increasingly urban and subject to a globalized, flattened culture— as in the rest of the world. It is of paramount importance that we stop the relentless destruction of the planet for the well-being of the planet itself and for the survival of humanity as we know it. Preserving the forest is not only central to maintaining biological and carbon assets but also from a cultural point of view.

Biological and cultural diversities are interrelated and mutually supportive (Maffi 2010). Many traditional practices are tied to ecosystem health and resilience and should be considered as the pillars of biodiversity conservation (Porter-Bolland *et al.* 2012; Frainer *et al.* 2020). The current hyperdominance of domesticated native trees in the Amazon is frequently associated with pre-Columbian Indigenous peoples (Levis *et al.* 2017). The so-called biocultural diversity (Maffi 2010) is also evidenced by the linguistic diversity (70% of all the languages on Earth) associated with the biodiversity hotspots (Gorenflo *et al.* 2012). A central tenet of this vision, shared by virtually all Amazonian peoples (e.g., the Sarayaku Indigenous people in Ecuador) is that the world of the forest, the world that is often referred to as nature, is in fact populated by a diversity of selves—persons, or spirits— who live in constant communication with each other and also with us, if we could only hear them (see boxes 7.4, 7.5, 7.7, and 7.10 for empirical examples).

The Sapara Nation in Ecuador/Peru (www.naku.com.ec/declaration) developed a unique communal initiative to take people to the forest and allow them to experience, first-hand, what it means for each one of us to live with a living forest. Heeding the Saparas, we realize the way in which we listen to the forest can be a profound spiritual and ethical practice that can remake our lives and the ways we view and treat nature. Forest dwellers do not recognize a sharp division between human culture and nonhuman nature. Nor do they think of nature as an inanimate resource that can simply be exploited for human benefit. Rather, we all form part of a vast "ecology of selves." What we share with these other selves is a fundamental interiority, a selfhood, a spirit, a soul. This understanding has been well-documented in the ethnographic/ethnoscience literature (Maffi and Woodley 2012; Descola 2013). However, only recently has this been accepted as possibly true by biological scientists (Kohn, 2013).

Religion is also paying attention to the pivotal role of the Amazon: once a religion bent on extricating idolatry and converting natives, the Catholic church today, under the guidance of Pope Francis, is heeding Amazonians and beginning to see the forest as a source of spiritual guidance (Pope 2020). In the same direction, the rights of Indigenous peoples are both nationally and internationally (by United Nations and the Inter-American Commis-

sion on Human Rights) recognized and three Amazonian countries have constitutionally or legally recognized the rights of nature: Ecuador, Bolivia, and Colombia.

Notwithstanding, there is no straightforward and simple recipe to make the non-forest people, the urban dwellers, genuinely feel and recognize themselves as being culturally, spiritually, and affectionately closer to the world's largest tropical forest. Although practicing a more rational economic use of the forest—for example, through a standing-forest based bioeconomy—is certainly a way worth pursuing for the future of the Amazon (see SPA Chapter 30), the long-term existence of the forest will be better secured by winning the hearts and minds of urban-dwellers about the importance of the forest and its role in their daily lives (examples on how to fill this gap are given in the cultural practitioners' testimonials below). Therefore, peoples who live intimately with the forest have a vision of a good life or *buen vivir* (widely understood as *18umac kawsay* and other terms in Indigenous languages), that, if heeded, can help put a brake on the modern idea that the forest is an inanimate resource to be exploited for the sole benefit of humans.

34.11 Practitioner Reflections on Reconnections

Amazonians who live with the forest understand the world "like a forest" and are mobilizing politically and through media to show us how they think with and like a forest (e.g., Kopenawa and Albert 2013). Compared with forest-dwellers and traditional population, Amazonians who live in cities, especially in medium and large urban centers, have a distinct mindset of values and inherited culture, and, as such, one should not simply foster their appropriation of Indigenous and traditional people culture, but rather resignification or refoundation of the cultural bonds of urban inhabitants with the forest, supported by the forest people and their ways. "In the end, we will conserve only what we love; we will love only what we understand and we will understand only what we are taught." (Dioum 1968). And this is not an endeavor for scientists alone or forest people themselves but for people from both the forest and city cultures to suggest how this transformation could be carried out.

Therefore, we present a set of testimonials from cultural practitioners from ten different sectors: architecture and urbanism, cinema, education, health and healing, music, press and communication, spirituality, sports, tourism, and visual arts. Preference was given to non-academic distinguished cultural practitioners based in the Amazon region, attempting to secure a reasonable gender and geographic balance. The selected cultural practitioners were asked to record a five-minute video to provide their testimonial; the contents of those videos are transcribed in the boxes below. They used their expertise in the specific cultural sector to let the world know how their practice field can help build this new cultural, spiritual, and affective vision of the Amazon forest. At first glance, these testimonials are as diverse as can be, not only in terms of the sectors—from urbanism to spirituality—but also in terms of the personal background of the cultural practitioner. They all encourage the establishment of a culture of (re)connection of people with the forest through different but interconnected ways.

Laurent Troost talks about an "encounter of people with nature inside" through better urban planning, whereas Zienhe Castro uses the terms "connections" and "exchange" that cinema can promote. Markus Zangas talks about providing "opportunities to be in nature" for our children, and the great *pajé* Mapulu Kamayurá an invitation that "you come to the forest to help" secure the existence of what she sees as the "pharmacy of the world" for the current and next generations. Nadino Calapucha, talks about a "walk in unison" through the power that music has for establishing or strengthening our relationship with the forest, and Sônia Bridi suggests that showing the "infinite beauty of our planet" on television, the Amazon included, is key for re-establishing what she calls "the lost connection" with the forest. Manari Unishigua, the akameno (authority) of his nationality,

BOX 34.1 Architecture and Urbanism
Laurent Troost

Hi, my name is Laurent Troost. I am an architect, Belgian, living in Manaus since 2008. I have worked as director of urban planning in the city of Manaus for the last eight years.

I would like to make a few points for this very important project, in two chapters: the first is related to the architecture and professional practice of my colleagues, and the second to urban planning and urban strategies to improve the cities in which we live in the Amazon.

Regarding architecture, I would like to say that it seems to me that the most important thing—and this is also what I practice in my day to day—is to work with nature, with this idea of integration, but more than that, it is about preservation and confrontation with nature. Why do I say confrontation? Because today, there is a cultural prejudice that perceives vegetation in a negative way in Amazonian cities. So, today we must confront, provoke the encounter of nature with the users of this city, so that little by little they realize the benefits that it can bring to them.

[In regard to] The matter of preservation, obviously, nature can be treated as the replanting in the city and is often done this way, but more than that, it seems important to preserve any type of biotope or biological system, even if they are a lake, water, what may seem like a poor quality vegetation in the eyes of the first passerby, but sometimes it has much more value than that. (...)

What would be the purpose of this? It seems to me that it is important to reverse the commercial logic of many Amazonian cities' master plans, that, as in the case of Manaus, for example, [which] has reversed, has abolished, the question of the mandatory permeability share of land [tracts], something that seems absurd to me, but there are forces that fight for this, in order to allow a wider occupation of the land. It may seem like a small detail, but which totally transforms the urban landscape.

urges for a look at the forest from the "spiritual world" perspective, where life is suitable, with no diseases, doubts, or complications. Complementary to that spiritual vision, James Junior and Pedro Nassar, advocate that felling, working out, and placing our physical body inside the forest, either for sports or tourism, boosts this "affectional bond" with the forest and its people. Denilson Baniwa brilliantly concludes the argument by saying that in fact "everything is people" in the forest, which takes us to the conclusion that we are in fact the forest.

Rather than being an authoritative statement on how the bonds between urban populations and the Amazon Forest can be better fostered, it provides a broad first-order initiation of this relevant discussion (considering that many other cultural sectors, such as food habits, fashion, literature, photography, and social movements are not covered here). We understand this exercise as key for the transference of the scientific messages of this report to non-academic societal spheres.

34.12 Recommendations: Paving the Way for Transformation

In this chapter, we attempted to systematize the underlying causes of the rural–urban relations in the Amazon region, their current status and possibilities for improvements, both from the physical and cultural perspectives. Although different sectors of such physical and cultural connections were analyzed separately, it is reasonable and desirable that the alternatives for boosting these relations in each sector are done in conjunction with each other. For example, there cannot be a stronger link between rural and urbanized areas regarding food

BOX 34.1 *cont.*

Another front line (...) is to fight against the spread and in favor of the densification of cities. This may seem controversial to the preservation within the city, to densify more, to build more, but in fact this will be much better for the forest (...) or for some spaces within the city because they will have a higher value (...).

Regarding density, the city itself is denser, right, it's not because the small one cannot incorporate vegetation and preserve biological systems. So we have to, from this perspective, look very carefully at neighborhoods like here in Manaus, I would say the INPA [Brazil's National Institute for Amazon Research], UFAM [Federal University of Amazonas], and Acariquara, which are neighborhoods where the vegetation is extremely well integrated. However, if the whole city were like that, the city could be extremely widespread (...). So we have to think about a model that is more efficient than those that I just mentioned.

Another point that political action could guarantee is the mandatory preservation of tree species. There are a number of cases of upper class gated communities, large size enterprises, in which it would be much more interesting if a mandatory tax existed about the preservation of native vegetation instead of the land occupancy tax that does not guarantee anything. (...)

Another [point] is to work politically, legally, to compel cities to recover environmentally, [and integrate] urbanistically, the countless watercourses that are either invaded or degraded. Today smart cities make use of mapping tool [for such water courses and invasions that took place after the Forest Code law]. Thus, there is a legal jurisprudence, which would allow to remove the people who invaded. Of course, it is not done simply like that, one has to go discuss it with the invaders, but without the determination of justice, the city halls never see this as a priority, because, first, there is a lack of money [at the municipality budget] and, second, there are [always] other more important priorities. The needs are great in Amazonas.

To finalize this contribution, I would like to put a dream, the ideal that, just as in recent years literature and urban practices are highlighting the Transit-Oriented Development (TOD) as a way of restructuring the city, from a mobility perspective, it doesn't see mobility just as a component, [but] it can be a component that adds quality and requalifies [city] streets. (...) we could imagine, a dream would be a society that restructures its cities, using E-TOD: the Environment and transit-oriented development; to use the transformations, like the one I just mentioned of a watercourse recovery, to not only solve an environmental problem, but to restructure the city [turning it] more equitable, sustainable and [providing a] better quality [of life].

BOX 34.2 Cinema

Zienhe Castro [originally in Portuguese, translated to English by Nathália Nascimento]

[Zienhe Castro, from Pará, is a filmmaker, producer and screenwriter at ZFilmes. She has been working as a cultural producer for 30 years. Since 2009, she has been responsible for the foundation, general direction, and curatorship of the Amazon Doc Film Festival, a Pan-Amazonian Film Festival which involves the nine Amazonian countries.]

I believe in art with a transforming power, with this power of impact on all of us and I think that cinema is an immensely powerful tool in this aspect, which produces a reflection that disturbs, that provokes,

Box 34.2 *cont.*

and that instigates discussions and debate of different themes. Both fictional and documentary cinema have this important role, not only to entertain but to provoke society to reflect.

In 2009, we founded a group that I coordinate, which organized and continues to produce a film festival to create bridges and build dialogue between the different Amazons, which is Amazônia-Doc, the Pan-Amazonian Film Festival. I think that one of the most important things we achieved was to establish a dialogue between the different Amazons, Amazons that have both commonalities and differences, but that add up and can be enriched. I believe that we Amazonians, through cinema, in the last ten years, managed to connect because of cinematographic works, of a cinematography that was found in these rivers, in these waters, in this forest, which I usually call "The forest of cinema and the cinema of the forest" to talk about the Amazon. And I think this contributes effectively to finding solutions for the forest, to finding this reconnection with the forest. And I believe that cinema, it really contributes in a very powerful way to these encounters.

It is vital to promote and democratize access to these films, to inspire new filmmakers and reach new audiences. We must promote debate and bring people together around the issues and themes raised by cinematographic works. After more than a decade as a director and curator of films in the Amazon, I believe in the enormous contribution of cinema as a vector of connection, encounter, exchange, awareness, and understanding of the peoples who inhabit the macro-region that extends its forest across the nine countries that make up the Amazon territory.

BOX 34.3 Education
Markos Zangas

Hello, my name is Markos Zangas. I have been working with children and nature for the last twenty years in two capacities: one capacity is of taking children on outdoor adventures, so rafting and kayaking, cycling, hiking, camping—outdoors—and the other one is providing environmental education programs in nature for schools and students. I have also been working for the last 5 years with a Danish organization (Inside-Out Nature organization), training teachers around the world on how they can incorporate nature and forests in the pedagogy, how they can use nature and forests as grounds for a holistic development of children.

I have seen this as a very important thing to offer children these opportunities because the global tendency is that children are gradually disconnecting from nature. And that is seen in small villages, it's seen in big cities, even in big cities like Manaus that are next to the forest. There is this disconnection and it is even more so as the years pass, when a young parent has not had that opportunity as a child to be in nature, and doesn't have that connection, they can't see the value, they don't have those memories to try and offer their own children the chance to be in nature and spend time there. So, this disconnection is becoming much more apparent in the last few decades and there have been studies demonstrating how this has detrimental effects on children, [and that] the fact that our culture no longer incorporates being in nature, how it has affected children's mental health. This could be higher stress levels, it could be early signs of depression, but can also be their physical health – child obesity and poor motor skills.

Box 34.3 *cont.*

Around the world, there has been a tendency of including and creating a new culture of using nature not only as something that we have to protect but something that has to be a part of us and a part of education—whether it is the education schools provide or the education that parents provide. When children have these opportunities to be in nature, they have so many benefits and again there have been studies that demonstrate how they benefit children through outdoor play—whether it's their mental health that we mentioned, or their physical health, they exercise more, they run more, they develop more strength, they develop better immune systems. (...) When you are in an environment that is very hospitable such as a jungle or forest, where you have to adapt to the weather conditions or you have to test yourself on hiking or trying to climb a tree—all these problem-solving skills—you learn more about yourself and become more confident. You learn how to take small risks—so these are all really important skills for children to develop when they are in nature.

It is not hard to reverse this tendency, this disconnection—to offer more opportunities to children is not really something new, it's not some new pedagogy in forest and nature school, it's not new, it's not expensive, it's really returning to the basic roots, this is nature, this is forest, where we have developed as a species. It is really our natural surroundings, our natural biotope. It's not something primitive, it is an essential part of who we are. We need to have these opportunities to be in nature, even if it's once a week or on the weekend. It's quite easy to offer—parents go into parks, head into the forest for the weekend, have camping trips, or maybe through schools that offer it as a weekly or a monthly excursion, heading into the forest and having that opportunity to reconnect and appreciate nature. If we start looking at the forest surrounding our cities like Manaus, Iquitos, Belem, the vision and the culture changes of how we envision forests for our children and we start looking at it as a free theme park, or a school where children can learn about nature and themselves, or as a gym where they can work out. It's all of these things at the same time. (...) I know many parents might fear, might think about the risks of playing outdoors. But really, it's not much riskier than riding a bike in the city or climbing a metal play structure. (...)

There is also another positive outcome from children being outdoors – when children have these experiences in nature, they develop an appreciation for the environment and as they grow up it's much more likely that they develop environmentally-friendly attitudes and habits. (...) So, if we are to create a new culture and a new vision of how we perceive [and interact with] the forest, I think it should definitely also have the perspective of children.

And children, families and schools should look at the forest and the Amazon as a play escape, as a place for education and development of the children because it will benefit the children but will also benefit the forest.

BOX 34.4. Health and Healing
Mapulu Kamayurá

Good morning, everyone. My name is Mapulu Pajé Kamayurá [shaman and women leader at south Xingu Indigenous land]. Look, I am transmitting my concern to you. I am really worried, because as a shaman, I evaluate the forest looking at spiritual animals, that are bleeding a lot. For us the forest is important, for us it is very important. Why am I saying this? The forest is important to us because it is

Box 34.4 *cont.*

there that we look for medicine, roots... For us the forest is a kind of pharmacy. It is there that we look for medicine, and when you are in pain, you go to the pharmacy. It is the same thing. We keep this forest to store medicine. (...) That is why we protect the forest.

When people get the snake bite, we look in the forest, we look for medicine there. When they get pneumonia, cancer, high blood pressure, we look for medicine in the forest. Pharmacy that we call it; I call it pharmacy. That is why we don't want to lose it, we... we don't want to lose the most important medicine for us. Folks, forests... we search for medicine there, when the child has pneumonia, diarrhea, we go there to take the medicine, then we say to the "raizeiro" [knowledgeable person on the identification, harvesting and medicinal use of forest plants]: "he will get medicine from there, to give to the patient", that's it, the raizeiro deals more with roots.

When a patient comes to me, first I evaluate what he/she has, I heal, I show to the family, I tell them what he/she has, I pass it to the raizeiro and he takes it out [from the patient]. I do not heal pneumonia, high blood pressure, diabetes, these three I do not heal, just the raizeiro. That is why I have a lot of pity about the forest, this is a pharmacy to me.

When "spiritual" attacks a person, then yes, then this is with me, I heal. When he/she has a headache, I heal, the column, this is with me. I heal all of this, when spiritual attacks people. Now, the raizeiro deals with roots. My husband is a great raizeiro, he knows how to handle it, he has treated many people coming from the city. I see here at the Xingu who has diabetes, high blood pressure, that comes to treat it here in the Xingu. Cancer is treated here... When you need to get treatment, come here to get treated. There is more medicine here as well. People say that there isn't... there was a person who said there was no way to treat it, so he came here, we treated him, my husband healed him. He went back to the city, to São Paulo, we treated him here, I was accompanying him a lot as well.

For us shamans, health... I am a people healer. The life, I heal people. I have treated in the city, Brasília, a boy who was... he was in the ICU for three months, I took the boy, right, he went to... He went out, and they told him that serious illness was incurable. I asked to... His mom asked me to heal him, took him off the hospital, from the ICU, and I treated him. Today the boy is going back to study.

That is why we need support, who want to participate can participate here. (...) When the spiritual does bad things to someone, why is he doing a bad thing to someone? Well, there is no more home, no more home... people here are killing a lot of wood, then that is why I am telling you. I am asking you a favor, that you come here to help me, is that possible? Let's make a kind of a project, let's create a project to raise this forest, right, we do the farming and we don't put down a lot, we put down a little, we hold.

People are sick about wood. Why do we get sick of wood? Because it is it what is taking our health, this wood that is taking our health, if we end with the wood, forest, we will be, we will feel weak, we will be... will be... we will not be happy, because we have already killed all of the wood, that is why us, that is why I protect more, right, folks? That is how I pass this to you, I am a shaman, right, and that is why I am telling you this, so you can support me, me, who heals. (...)

Bye, folks. Anything, any questions, you can tell me. (...) Bye to you, take care, let's go, let's fight. I am fighting for my people here, so this disease does not arrive really strong here at the Xingu.

BOX 34.5 Music
Nadino Calapucha

I am Nadino Calapucha of Kichwa nationality of the Ecuadorian Amazon, and I am one of the members and founders of the Kambak group. The group, which emerged in 2013, is aimed at inviting children and youth, through music, to fall in love with, become fond of, and empower themselves with their language, their culture, their history, and, above all, to join the struggle and protection of our shared Amazon.

In recent years, we have made great strides and had great achievements. It has been incredible to see the children singing in the Kichwa language; in many of our concerts, having many experiences that the communities identify with this music has been wonderful! In contrast with this society that has been dominated by western music and western culture, we have been moving away from our principles but Kambak's proposal is not that they will only fall in love with our culture, the important thing about this project is that we are inviting them to walk in unison, on the one hand with the knowledge and insights of our peoples and on the other, with the knowledge and knowledge of the western world. Within the framework of interculturality, in fact, we have mestizo members in our group who have joined this initiative from the urban areas, so it also has an intercultural aspect. We want to invite the world to build this potential society within the framework of respect. We have also had an international achievement, by being recognized by the Fund for the Development of Indigenous Peoples of Latin America and the Caribbean (FILAC) in 2019, as one of the innovative youth projects. That was incredible and it has motivated us to keep working diligently. Going forward, we want to continue this, working with children and young people because we consider that it is important to listen to their voices, although it is true that the Amazon and its peoples have until now been considered a myth. Us, Indigenous peoples after 528 years of resistance, are still here demanding the fulfillment of our rights, defending our territories and we want to tell the world that we are still here. The Amazon region significantly contributes to the gross domestic product of the countries of the Amazon basin. However, we have been the most excluded, the most forgotten, and much of the time considered a myth in many of the countries. Together with the western world, we want to build what's possible in society and we want to defend our Amazon, since we are at a point of no return. We consider music to be a powerful and key tool; when the people are sad, when we feel alone, we perform ceremonies, rituals and we sing, to revive the faith of hope and ignite the fire in our hearts. That is why we have opted for music and we want to continue working with children, to defend everything we have in our Amazon.

BOX 34.6 Press and Communication
Sônia Bridi [originally in Portuguese, translated to English by Nathália Nascimento]

[Sônia Bridi is a journalist, writer and reporter on Brazilian television, at TV Rede Globo.]

A great future challenge is to repair a connection that began to be interrupted ten thousand years ago, our connection with nature. Since our species began to grow food, domesticate plants and animals, we began to build a gap between ourselves and the natural world; the more we urbanize, develop technology, change the landscape, the more the feeling grows that we are not part of nature and that we have the power to destroy and transform, we have a right to do so. This concept is widely propagated culturally and by some religions, some not all. For some we are the chosen species, for others the chosen people. Basically, it's the same thing, a sad contradiction that leads to worshiping the creator and massacring his creatures, such as plants, fungi, animals, or less favored Homo sapiens.

Box 34.6 *cont.*

How do we repair this dialogue? Communication plays a very important role; I'll start with the communication part that I work with. With few exceptions, it took journalists and documentarists a while to realize the importance of conservation in the media's agenda. Journalists who dedicated themselves to the subject over many years, in some newsrooms were seen as professionals who worked with smaller or less important topics. There has always been, and often still is, a more important agenda than the preservation of life on the planet. This is changing, but at a much slower pace than it needs to. We journalists and documentarians need to realize the urgency of the climate issue and the impact that the destruction of the Amazon has on accelerating this process, and that no topic, no subject, can be addressed today without considering the climate emergency. Urban planning, infrastructure engineering, transportation, education, resource use in offices or industry. The very planning of a reportage or documentary needs to take into account impact, mitigation, and compensation. The Amazon emergency has to be at the top of the checklist of any human activity, and we communicators need to make this clear to the public, explaining the causes and consequences, and offering information on available solutions. “I want to help, but I don't know how”; this is the comment I hear most from a public that is sensitive to information, but doesn't even know where to start, it's up to us communicators to present the paths that are being followed so that people can choose where to go.

On the other hand, we have entertainment, a great showcase of ideas, concepts, and visions of the world. Fiction has the power to transport us to alternative realities and can present us with a force that only literature and cinema carry, the worlds we can build. It can show total destruction of biodiversity and the conditions that allow it, or a more inclusive, restored world where we can enjoy all the amazing things this planet has to offer. We are the privileged ones of the known universe, and remembering that this wonderful biodiversity appeared here and only here as far as we know can have a brutal impact. Stop, look at the sky and think, here we are surrounded by color, water, plants, birds flying in the sky, and the rest of the known universe is monochromatic monotony, dry spots, totally devoid of life. We can't make Mars a planet like Earth, so why make Earth one more infertile rock in the universe?

Finally, I believe that the biggest challenge for all communicators, in any area, is to reestablish that broken connection. How? Showing the infinite beauty of this planet, the incredible complexity of the evolution of species, the co-evolution that makes one depend on the other and we on all of them, we need to go back to loving the natural world and we only love what we know. Only this can reverse the great contradiction of Homo sapiens.

We are defined by knowledge, we are destroying what we don't even know, denying knowledge that points out causes and solutions, and choosing ignorance over knowledge. We know that it is a very large component of denial caused by fear, but disseminating information is also fighting fear because there is nothing more frightening than the unknown. And it is to the unknown world full of dangers that we will walk if we lose this battle of information. The Amazon is the last great library of life that has not yet been read.

BOX 34.7 Spirituality
Manari Ushigua

[Manari Ushigua is a traditional healer and leader of the Sápara Nation in the Ecuadorian Amazon, of which there are less than 500 people remaining.]

I want to explain to you, the tropical forest has a way of making people understand and live their relationship with the tropical forest, because the tropical forest helps us dream and have clear visions to understand how we want to live, for those of us who live in the tropical forest. Facing this reality, the Amazonian city is situated on one path, as it is recognized. And those outside say that these provinces are developing and, therefore, they begin to destroy nature and there is a lot of livestock and the city itself suggests that this is the path of a development model that is not aimed at caring for nature; that is the difference that exists at the moment.

That said, we call ourselves Naku, the tropical forest, which has a way of teaching and a way of welcoming not only the Indigenous people who live in the tropical forest but anyone who visits has also experienced it; they feel that change. So, what the tropical forest gives us is a direction and a vision of life that the natural functioning, how they connect with each other and their life with the birds, right now among the trees.

That relationship and the relationship with the people who live there create an exact balance so that the people who sleep there and have a dream that we call Marquijauma, have an answer to any concern that we may have, so that with this answer we can live the material world. As such, for us the tropical forest is a space that we recognize as a sanctuary of knowledge, to be able to transmit from the tropical forest any question, any doubt that exists in the world, to give a positive answer, where people will understand where the future of humanity is heading.

So, the vision, for the people who live in the tropical forest, we do not only work from this reality, where it can be seen, from where it can be taken, from where it can be felt and that life is connected with the spiritual world. Whether through Marquijauma or not through dreams, we begin to project and understand what is being felt and lived. But seen from the spiritual world, we see our failures and it becomes aligned so that life is suitable, without diseases, without doubts, without complications, but rather its path is on the right track. That is what the tropical forest offers us, the Naku; for us there is only one world, or Kaji.

BOX 34.8 Sports
James Júnior

Hello, my name is James, I am an administrator and entrepreneur in the area of organizing sport events. (...)

Sports; we can split it into two feelings: the sport itself and the organization of sports events. Despite being connected, they have distinct moments, in which the event is a specific date, sometimes the goal to be achieved on this day and use the sport to be prepared on that day. And the sport itself, the practice, which is the daily activity, in which you practice, in which you execute, they move an enormous [market] chain, from companies that produce sports materials, in the food sector, also in the area of healthcare, such as physiotherapy, medicine, sports psychology, the production of materials such as sneakers, clothing, equipment, watches, compass, bicycles, etc.

All of this, to exist, needs that the nature environment is preserved, taken care of. And people when they practice sports, they start to create this feeling, you know, this bond of caring, this bond of investing, of wanting that that environment in which he/she participated is preserved so that he/she can participate again, so that he/she can have somewhere to practice, and that it is always in preserved conditions. And this preservation is not only to not devastate, but to not let it get dirty, to not let it get polluted and, mainly, understand the environment. It is the interactivity of understanding what can be extracted from there and how it works, how is the dynamics of its functionality, from the people who live in that environment, with all the animals, with all the plants that are there together. And sport helps to understand all of this, to create this relationship.

So, imagine that there is a distant community, already with few residents. What will make people reach this locality? Given that the concentration in the urban area is so high, it is the sport. Because there, the person will practice sports, so he/she will travel to this place, the person will know the place, the person will create feelings, and will invite new people to participate. That is, in his ever-growing relationship network, so that more people are together in this process of practicing sports. The person is swimming in the river, and he/she will want the river in swimming conditions, that is, the least polluted as possible, or even unpolluted. The person wants the environment where he/she will ride a bike, where he/she will run the trail, if the person will walk, or will practice any type of sport, abseiling or zipline, or adventure race that involves various types of sport, they are all together with nature. It helps the person to understand, to inform, to seek, to defend even after that experience, the maintenance of that environment.

So, I believe that sports, through sporting events, can be one of the main items to bring people back to nature, to make people have this relationship, this affectional bond, this care, this desire to know, this desire to be close to nature, to the forest, to care, to preserve, to understand the people who live in that place, and to encourage them to stay and, even, the remuneration for that.

BOX 34.9 Tourism

Pedro M. Nassar [originally in Portuguese, translated to English by Nathália Nascimento]

Hi everyone, I'm Pedro Nassar, I'm a biologist with Master's in Management of Protected Areas in the Amazon and I've been working with tourism for about 15 years. I've been in the Amazon for about 12 years and currently I work at the Mamirauá Sustainable Development Institute as coordinator of the community-based tourism program.

The other day I was reading a book by a French naturalist who passed through Brazil in the mid-19th century; this book specifically talked a little about the state of São Paulo, describing the vegetation, climate, and customs, and of the history of Brazil as it was understood at that time in the city of São Paulo. He also talked a little about the rivers, what the city was like at that time, and the fauna, a little bit about everything. I kept thinking how different São Paulo was at that time from what it is today. And that also made me take a trip to the present-day Amazon and think about the changes occurring. What is done in the past directly links to the future, and what we live today is the result of many things that were done years ago. What we are doing today will certainly change the destiny of generations to come, generations that haven't even been born yet.

When the Amazon is deforested, agriculture and livestock expand and take up space in the Amazon, mining causes deforestation, and this is concrete. The figurative distance between the city and natural areas increases and people have less and less contact with nature. This distance generates people who don't care much about nature. Because we tend to be more concerned, and to take better care of, what is close, since we have an affinity for what is there in our day-to-day. A change needs to be made, doesn't it? I believe it is possible, and a very interesting tool to reconnect the urban with the rural, to reconnect people to nature, to make people feel like a part of nature, is tourism. But not just any tourism. And tourism has to be done responsibly. Do you know what responsible tourism is? Responsible tourism thinks first from the point of view of the people who live there; it has to be a and good place for people to live. This makes it a good place, an interesting place, for visitors.

Responsible tourism (or sustainable tourism, rural tourism) must recognize the people who live in the place, the local population, as the protagonists. And they must be the main beneficiaries of socio-economic and environmental benefits. Those who visit will support this idea and spread it to their friends and family. Sustainable and responsible tourism has everything to do with the Amazon; shall we put this idea in everyone's head? Who will join me on this journey?

BOX 34.10 Visual Arts

Denilson Baniwa [originally in Portuguese, translated to English by Nathália Nascimento]

[Denilson Baniwa is a Brazilian artist, curator, designer, illustrator, Communicator, and indigenous rights activist.]

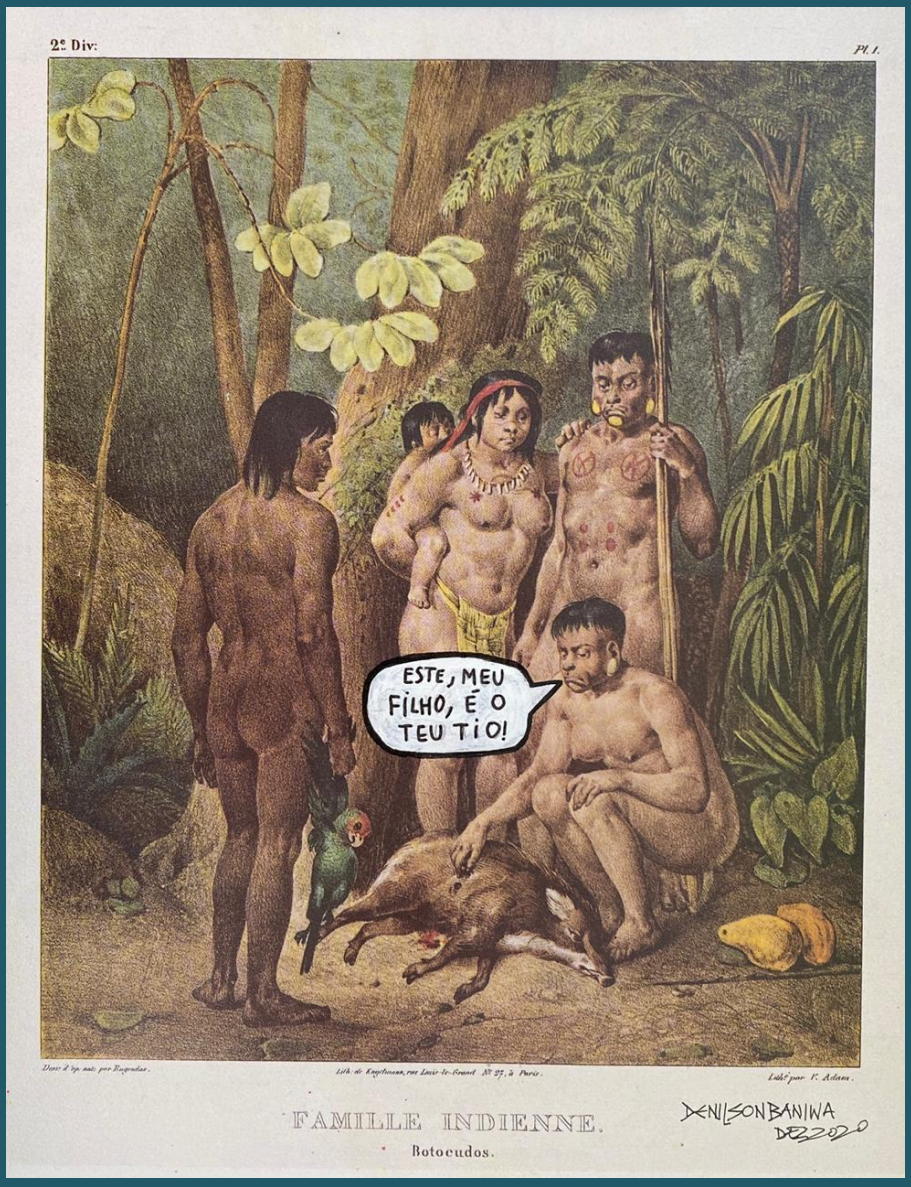

Figure 34.6 "Everything is people"; Denilson Baniwa, acrylic on photographic print, 32x24cm, Dec 2020.

Box 34.10 *cont.*

My grandparents say that in the old days
Before me, you or any other homo sapiens took over the planet
Everything was people: forest, humans and non-humans were people.
There were jaguar people, parrot people, tree people, stone people; and people-people
We all even spoke the same language. We understood each other.
The time was also different, there were no clocks or alarm clocks
Work was not an accumulating function, but a collective one.
But this was from a time that neither my grandparents nor we lived
It's from the time before time
Today we do not know the language of birds and plants
Of rocks, streams, and mountains we don't even remember anymore
We don't even understand each other with our neighbors and residents of the same planet.

I know well that at that time, we can't take it back
But we can today, learn the lost communication
When we start to think that there is an environment
Unlike us humans
In these times, while there is no time machine
That throws us back to the times of the ancestor world
We can come back to understand that we are part of the planet and not its dominant

Art, Indigenous or not, can serve as a metaphysical mechanism of translation
Translations of the voices of the forest, the stones, the water and all living beings
Indigenous art can be allied to the understanding of the worlds
For it, itself, transits between the ancestor and the plasticity of the modern world

Indigenous artists can be art-shamans who share
Knowledges brought from all voices
Including those we don't even remember existing anymore
Art is what unites us
It is the connection between the ancestral world and the world we want from now on.

production and urban green infrastructure without a new culture of urban planning in the Amazon. Or it can prove an easier task to promote a culture of sustainable tourism and sports within the forest if it is connected with improved healthcare assistance to forest- and river-dwellers.

Political, infrastructural, and financial incentives devoted to health, well-being, education, and technology sectors, with the conservation of forests and their biological and cultural assets being the key mechanism, could promote the desired reconnection between urban and rural societies and help secure a sustainable future for the region:

The physical proximity of food production units in rural areas to Amazonian cities is key for securing food. Food production in “peri-urban” areas could be a way forward for increasing producers’ income, promoting forest conservation, and providing quality fresh food to the urban population, and Indigenous and traditional communities should be prioritized given their extensive expertise in staple agriculture in the region.

Subsidies and incentive programs to encourage long-term residency of healthcare professionals in small cities and rural settlements, as well as providing specialized equipment and installations to decentralize medical services. Additionally, to nurture, maintain, and rely on resources that are readily accessible to the local population (such as the SachaWarmi initiative in Ecuador).

The establishment of physical in-person education hubs in remote locations, aided by remote teaching technologies, and programs for training and encouraging the retention of teachers, preferably from the interior communities themselves.

Implementation of green infrastructure in the cities such as gardens, squares, urban forests, restoration of riparian forest, and other areas to minimize impacts from natural disasters (e.g., flooding). Infrastructure minimizes health and well-being costs in the long term and has the potential to generate numerous jobs, but it must be evenly distributed in the city to guarantee access for all.

Expansion of the smart forest technology to alert authorities about deforestation, logging, poaching, and smuggling activities. Additionally, remote sensing would help in *ex-situ* monitoring of forest flammability, industrial-scale tree planting for reforestation, or sharing touristic ecological information with urban population.

The cultural gaps between the Amazon forest and its people and the population inhabiting the increasingly globalized cities should be drastically narrowed through concerted interventions in different cultural sectors such as cinema, sports, and visual arts. Existing well-established rural–urban bonds such as food habits and traditional festivities can serve as good starting points to bring this cultural relation to another level.

Promoting these changes is an issue not only for policy makers but to society in general, from urban- to forest-dwellers, bearing in mind that the sustainability in the Amazon region is and will be shaped by its evolving urban network and its interaction with the rural and forest people and landscapes.

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