

# Institutional Crafting and the Vitality of Rural Areas in an Urban World: Perspectives from a Japanese Community in the Amazon

Eduardo S. BRONDIZIO

*Department of Anthropology, Student Building 130, Indiana University,  
Bloomington, IN 47405, USA  
e-mail: ebrondiz@indiana.edu.*

## Abstract

This essay presents the story of the Japanese diaspora community of Tome-Açu in the Brazilian Amazon as a basis for reflecting on the challenges of maintaining social and economic vitality of rural areas in many parts of the world. Over the years, Tome-Açu farmers faced the struggle of finding viable land-use and economic systems to sustain their community, promote prosperity and engage the younger generations. They experienced economic booms and busts associated with monoculture and global markets. They re-emerged from economic collapse by developing a production system based on agroforestry systems and diverse land use strategies. Tome-Açu farmers have cooperated to develop value-added industries for their production. Notwithstanding their specific historical-geographical context, their ability to craft and re-craft cooperative institutions, their agricultural experimentation with regional plants and forest products, and their entrepreneurship in creating value-added industries offer an opportunity to reflect on the potentials and challenges faced by rural communities in an urbanized world.

**Key words:** agroforestry, Amazon, cooperativism, institutional crafting, Japanese-Brazilians, *satoyama*

## 1. Introduction

In 1928 a group of Japanese immigrants sailed from Yokohama towards the Amazon, arriving in the city of Belem from where they navigated to the interior to settle in an area that became known as Tome-Açu. They formed a community that has been recognized for its economic vitality, cooperative organization and mosaic of agroforestry systems. In many ways, their journey has inspired Brazilians in general and Amazonian communities in particular. Their story came alive to me as I reflected on the ideas of my colleague Elinor (Lin) Ostrom, whose work and life has also inspired (and inspires) people around the world<sup>1</sup>). The story of Tome-Açu, and the parallels I intend to raise with rural and coastal areas – the *satoyama-satoumi* – in Japan, reflect some of the cornerstone ideas of Lin Ostrom: the ability of local communities to self-organize, institutional crafting as a process and not an end in itself, the potential of polycentric governance systems to link levels of organization and institutional diversity, and the importance of local resource managers and food producers within an urbanizing world.

I am using the term rural in this essay in a general way, considering that it is not necessary to stress that rural

communities around the world differ in historical, cultural, political and environmental contexts; that their perspectives of well-being, expectations about the future, and ability to thrive are relative to such contexts. I am assuming that it is long past the time when talking about rural implied a sense of dichotomy with the urban. The notion of rural (or urban for that matter) is situational, *i.e.*, relative to a social and biophysical landscape and the social identity of people living in webs of rural-urban continuum. There are, however, numerous parallels one can draw on the transformation of rural areas and landscapes in different parts of the world. This is the approach I will take in this essay using as a foundation the story of a Japanese diasporic community of Tome-Açu and perspectives on collective action from Lin Ostrom to reflect on the transformation of *satoyama-satoumi* landscapes in Japan.

The decline and transformation of rural landscapes, the *satoyama-satoumi*, in Japan – illustrated by the *Satoyama-Satoumi* Subglobal Assessment (Duraiappah *et al.*, 2012) and the subject of this special issue of *Global Environmental Research* – call attention to the interdependence between rural and urban areas and the challenges of envisioning sustainability in an interlinked world. Food policies, currency fluctuation and trade,

industrialization and the lure of urban life and employment have emptied the Japanese countryside of its young population and of a more active agro-resource economy. As a result, it has promoted major changes in community life, the abandonment of managed agricultural-forest mosaic landscapes, and unprecedented forest re-growth. These changes raise concerns about food security, the maintenance of ecosystem services such as through irrigation water management, soil fertility and conservation, as well as the loss of local agro/biodiversity knowledge. The assessment calls attention to the invisible dimension of these ecosystem services provided in these production landscapes, invisible even though they contribute to the well-being and security of a large contingent of urban populations. In many ways, the trajectories of *satoyama-satoumi* areas are iconic of the challenges facing of rural areas around the world.

Notwithstanding their specific historical-geographical contexts, the story of Tome-Açu and their dedication to institutional crafting speak to many of the challenges of the *satoyama-satoumi* in Japan. Over the years, Tome-Açu farmers faced the struggle of finding viable land use and economic systems to sustain their community and bring prosperity. After the Second World War, they became one of the top global producers of black pepper through large-scale monocropping. A price decline and the spread of plant disease led to system collapse. They re-emerged from this collapse into a new phase of production based on agroforestry systems focused on national and global markets for Amazonian/ tropical fruits. Tome-Açu farmers have cooperated to develop a value-added industry for their agroforestry production. Over 80 years since arriving in the Amazon, their story offers many parallels to the current challenge of the *satoyama-satoumi* in Japan. Their ability to craft and re-craft cooperative institutions, their agricultural experimentation with regional plants and forest products, and their entrepreneurship in creating a value-added industry in the community offer an opportunity to reflect on potentials of rural economies and the challenges of small-scale production systems.

## 2. Institutional Crafting and the Making of a Japanese Amazonian Community

This story starts over 80 years ago in Yokohama when a group of Japanese families left Japan to an area located in the northern Brazilian state of Pará. This move was part of a bi-national effort to settle Japanese families in the Amazon, following a similar trend elsewhere in Brazil, particularly the state of São Paulo<sup>2</sup>. They arrived in the city of Belém, in the southern part of the Amazon estuary in 1929 and started a journey along the river to the site that eventually became known as Tome-Açu.

During this first migration trip 43 Japanese families (189 people) left Yokohama to arrive in a region with only indigenous settlements and no modern infrastructure. More Japanese immigrants came later and some of the original settlers left for other parts of Brazil. They

arrived with the goal and challenge of forming from scratch a prosperous community in a tropical and distant forest landscape.

They brought with them the desire to prosper in an unfamiliar tropical environment, a sense of family and community life, and experience with farming systems based on intensive *satoyama* practices. Their trajectory was a difficult one, but over the years became known as one of the best examples of economic success and environmental stewardship of the Amazon. Undergoing hardships during the first years of colonization, they explored economic alternatives and different forms of organization based on nuclear family work linked to a strong sense of community.

Starting their farms from scratch, they cleared forests and experimented with annual and perennial crops. Success with crops varied and access to market remained limited. They planted a variety of crops, including rice, rubber and cocoa, various kinds of produce, several hardwood trees used for wood and/or oils, and various fruit species. They sought to develop their own knowledge of tropical agriculture and to learn about the local agro-environment. They faced significant difficulties with the isolation of the region. The lack of a transportation network compromised the economic viability of local production.

The community settlement was initially within the limits of the municipality of Acará. In 1959 it became the municipality of Tomé-Açu<sup>3</sup>, a process which started early with their investment in crafting institutions to address collective problems and challenges. Having problems storing and commercializing their rice, in 1931 they founded the Vegetables/Produce Cooperative (Cooperativa de Hortaliças) with the intention of stimulating agricultural production and reaching the market in the capital city of Belém. In 1935, this cooperative grew in importance by organizing all settlement production and changed its name to the Agricultural Cooperative of Acará (Cooperativa Agrícola do Acará).

The first decade was marked by ups and downs in success. Diseases such as yellow fever and malaria affected many individuals in the community. For these and other reasons many families left the community towards other parts of Brazil. The Second World War posed another major challenge for those families. After Brazil entered the alliance the community was subjected to pressures and was segregated by the Brazilian population; they were blocked from having open access to markets for their products. During this period they focused on maintaining their own subsistence needs. With the war over, in 1947, the cooperative began to experience success with the production of black pepper, a crop that was experiencing increasing demand in national and global markets. Success with black pepper led farmers to reorganize the cooperative and legalize it as the Mixed Agricultural Cooperative of Tome-Açu or CAMTA (Cooperativa Agrícola Mista de Tomé-Açu). CAMTA remains an intrinsic part of the community today and an emblematic cooperative in Brazil. As one of the largest

global black-pepper producers, from 1947 to the early 1960s Tomé-Açu experienced a period of prosperity and growth. The cooperative made Brazil and the Amazon a force in the global black pepper market. The period of the 'black diamond' (black pepper economy) economy brought a level of prosperity unimagined just few years earlier. Yamada (1999) and Piekielek (2010) reported that in 1956 the cooperative produced over 1,200 tons of black pepper with income averaging over US\$45,000 per member. The average production of black pepper by cooperative members during this period increased over ten-fold.

In the midst of economic prosperity, serious problems struck the black pepper production. During the early 1960s - the compounding effect of a fungal disease (*Fusarium solani*) and oscillations in national and international market prices led to the beginning of its collapse. The story of this crash offers an invaluable lesson on agro-biodiversity and resilience relevant to current discussions of expanding food production. To understand this collapse, we need to understand the origins of the black pepper economy of Tome-Açu. Initial experiments with black pepper were based on a set of no more than 20 seedlings brought to Tome-Açu around 1933 by immigrants who collected the plants when the ship stopped in Singapore for the burial of a passenger. These plants were kept in backyards for years and at one point provided the seedlings to the initial development of the local black pepper agriculture. According to local farmers, much of the genetic basis (or the lack of) of the large-scale black pepper economy that emerged in Tome-Açu originated from these seedlings. The arrival of fusarium disease spread quickly within the monocultural system. In a short period, the production system that had successfully led them to wealth was leading now to an economic collapse triggered by the compounding effect of a market decline and ecological crisis.

Starting during the late 1960s, the collapse of the black pepper economy forced the community to try other agricultural products and their attention turned experimenting with other potential fruit crops from the Amazon and other tropical regions. They turned their attention to creating diverse agroforestry systems mixing perennials like cocoa, acerola, rubber, oil palm tree, *cupuaçu*, vanilla, biannuals such as passion fruit, papaya and melon, among other native and exotic fruits and hardwood trees, in the hopes of spurring a new economic cycle in the region (Homma, 2004). Black pepper continued to be an important crop albeit at a smaller scale.

The 1980s, however, brought other challenges. The market for tropical fruits, particularly Amazonian fruits, was incipient and virtually nonexistent in Brazil. The price of fruit *in natura* was low and disadvantageous given their particular location. The macro-economic crisis affecting Brazil during this period led to limited economic activity and high risks associated with hyperinflation and shifting currencies. Attracted by the job market and new labor legislation in Japan, hundreds of

thousands younger Japanese descendants throughout Brazil moved as *dekassegui* to work in Japan. The story was no different in Tome-Açu as virtually every family had members working in Japan. While increasingly dependent on remittances, families felt the loss of labor for intensive agroforestry and agricultural activities. This was also a period of expanding logging operations and pasture conversion in the region, both of which resulted in significant environmental change and no shortage of social conflicts and violence to the area. In response, they turned their attention to developing institutions such as organized policing against robbery and crimes aimed at the community. These changes and threats also forced Japanese settlers to find a better economic position in regional and national markets for agricultural products. The region was experiencing fast transformations. Like Japan, the Amazon experienced an exponential growth in urbanization during this period (today over 75% of the Amazonian population lives in cities, although most are considered 'rural cities'). As *dekasseguis* starting to return from Japan, culture change and the attraction of cities continued to represent a challenge to families and to the Tome-Açu community as a whole. The younger generations were also increasingly attracted to cattle ranching, an alternative not always considered desirable by the older generations. Many first and second-generation migrants expressed their concerns with the long-term viability of their cooperative and the social values they imprinted in the community.

Arguably, the cooperative system is the most important institution in Tomé-Açu. Members are committed to maintaining the physical and institutional underpinnings of the cooperative and to give a portion of their production in support. The importance and role of the cooperative has been closely linked to other local institutions such as the Cultural Association of Tome-Açu (ACTA). The latter has served as the binding for families to maintain their social cohesion and to introduce new Brazilian-Japanese generations into Japanese culture and language. Along with CAMTA, the cultural association forged strong ties to other communities in Brazil and Japan, and to Japanese government agencies supporting development. Over the years, cooperation around community goals and links to supporting agencies in Japan led to improvements in infrastructure and services such as health, education and communication.

Since the early 1980s and during the 1990s, the community worked on improving infrastructure of communication and transportation. The cultural association continued to expand their role and to welcome a new generation of Nipo-Brazilian families and children. CAMTA carried out market research to study the potentials of their products in other parts of Brazil and the development of new products; they developed products (e.g., frozen fruit pulp, oils) and explored niches and forms of commercialization in supermarkets and restaurants. During the mid-1980s, CAMTA inaugurated the first processing plant to produce frozen fruit pulp, paving the way to an expansion of frozen pulp export to

national and international markets. During the late 1990s and early 2000s, the cooperative underwent a period of change. A younger generation started to take leadership roles of the cooperative bringing new ideas and forms of entrepreneurship. Membership was opened to non-Japanese descendents in an effort to expand participation and production. A second processing plant was inaugurated in 2002 processing a wider array of fruits and products. They aggregated the value of their fruits by tapping into their nutritional qualities and promoting them to a national population with a taste for unfamiliar and exotic produce. They promoted Amazonian fruits such as *cupuacu*, *graviola*, *tapereba* and other tropical fruits such as *acerola* ('Caribbean cherry') unknown to most Brazilians at the time. Cacao production, which expanded significantly during the late 1970s, continued to be an important product for the cooperative. They understood the key function of value aggregation and captured revenues in different segments of a market chain. The globalization of acai palm fruit (*Euterpe oleracea*) during the late 1990s opened further and promising opportunities for CAMTA to build upon their experience (Brondizio, 2008). Familiar with export standards and procedures, sanitary regulations, and marketing, they led global exports of acai pulp to expanding markets in the United States and Japan. Along with acai and a variety of other fruits, small scale production of black pepper continues to be part of local farming portfolio, planted by over 90% of cooperative members. The economic impact of the cooperative is particularly visible when placed within a regional context. Piekielek (2010) reports that in a survey of CAMTA members in 2005 the average income, generated mostly from farm production, was approximately US\$36,226 although it ranged from US\$4,000 to US\$150,000. Comparatively, income per capita in the municipality during the same period averaged around US\$1,500. The median farm size among members has also increased significantly from previous decades to around 200 hectares of land, although most properties are reportedly smaller. In addition to farm size and portfolios of agricultural activities, cattle ranching also started to play an increasing role. Yamada and Gholz (2002) and Batistela *et al.* (2012) reported that the average income of small farmers (property of 10-20ha) in Tome-Açu was comparable to median-size (400-1,200ha) ranching operations in the region.

The agroforestry systems in Tome-Açu continued to evolve along with changes in the Amazon as a whole, and became an example of landscape management based on productive land use mosaics. Increasingly, CAMTA farmers have developed systems including cattle ranching and hardwood, but without losing sight of the anchor provided by production and export of fruit pulp and products, as well black pepper. Virtually all producers associated with CAMTA (around 245 in 2010) work with agroforestry systems and principles of productive landscape mosaics, such as that of the *satoyama* in Japan. Based on a series of field inventories (over 120 sampling units), Batistela *et al.* (2012) and Bolfe *et al.* (2009)

reported on the environmental dimensions of agroforestry systems in the region. For instance, from its initial phase of development to intermediate to mature agroforestry systems, the number of families/species increased from 8/9 (first two years) to 15/19 (2-12 years) to 25/40 (over 12 years). A proportional increase was observed in terms of basal area, average canopy height, and percentage of canopy cover. These agroecological characteristics are also reflected in the above ground biomass and its carbon storage potential. Their studies showed that above-ground biomass and carbon increased from 6.13Mg C/ha to 22.6 Mg C/ha to 42 Mg C/ha to 120.9 Mg C/ha, respectively, the latter comparable to advanced secondary vegetation in the region. Furthermore, Bahia *et al.* (2010) reported that the use of chemical products was lower in areas with agroforestry systems, with 20% of producers reporting such uses.

In sum, the story of Tome-Açu agroforestry systems has become relevant to the Brazilian Amazon as a whole, both as an example of intensive biodiversity-rich production landscape systems built upon regional and tropical species, and as an example of local value aggregation in a global economy. In fact, Tome-Açu agroforestry is perhaps the most used example of a sustainable alternative to deforestation and agriculture development in Amazonia. In a region marked by an economic history of extractivism, extensive land use practices, and continuing emphasis on the export of raw material, they have shown an alternative pathway to a new regional economy, one based on locally controlled transformative, industries.

### 3. The Challenges of Economic and Social Vitality in Rural Areas

Tome-Açu is not free from problems or failures, and while I highlight its history as inspiring, my intention is not to romanticize it. In fact, their struggle to overcome odds throughout their history, as they do now, is what makes their example broadly relevant today. They have confronted (and still do) opportunities and pitfalls of global market connections and the pressures of social change within and around their community. They have confronted these challenges through a continuous process of re-crafting institutions, through experimentation with diverse land use systems, and through a concern with creating employment opportunities and engaging the younger generations (Piekielek, 2010). Their efforts illustrate the importance to rural communities of building strategic partnerships, regionally, nationally and internationally, and maintaining a spirit of entrepreneurship and self-governance. Perhaps what is most relevant is that Tome-Açu families understand the importance of adding value to their products at the local level and inserting their products in national and global value-added chains able to create employment locally and increase the rate of return on their products; they have sought to build commercialization networks in Brazil and abroad, so that today their products reach markets throughout the coun-

try and abroad.

It is interesting to consider the emphasis on land use mosaics and agro-biodiversity that characterizes Tome-Açu's agroforestry systems today, not unlike the land use mosaics associated with *satoyama-satoumi* landscapes in Japan. Their diverse production base, including various forest, agricultural products and increasingly cattle ranching, has been a fundamental strategy to get higher payoffs. In a world experiencing an exponential increase in creation of protected areas, productive mosaic landscapes such as in Tome-Açu and as in the *satoyama-satoumi* offer an alternative view of reconciling agriculture and conservation. These are issues to be carefully considered by programs aiming at payment for ecosystem services (PES) such as REDD+ (programs to reduce greenhouse gases emission through avoided deforestation and degradation), which in some cases may lead to the replacement of active agricultural-forest production landscapes for idle subsidized rural economies.

Lin Ostrom called attention to the importance of recognizing social capital<sup>4)</sup> as distinctive from other forms of capital, and the role of shared cognitive understanding that forms the basis of social capital in local communities (Ostrom & Ahn, 2003; Brondizio *et al.*, 2009). Three key characteristics of social capital are useful to understanding the underlying process of institutional crafting in Tome-Açu, as well as the challenge of maintaining social capital in rapidly diminishing *satoyama-satoumi* communities in Japan<sup>5)</sup>. First, social capital improves with proper use and deteriorates rapidly with disuse. Second, social capital is not easy to see and measure, and it is hard to construct through external interventions; and, third, social capital operates most effectively when it is organized in complementary forms at multiple levels.

Social capital – as referring to the value of trust generated by social networks to facilitate individual and group cooperation on shared interests and the organization of social institutions at different scales – involves continuous investment and participation, increasing in importance and value proportionally to the engagement of participants and their investment in maintaining reciprocity and trust (Ostrom & Ahn 2003; Brondizio *et al.*, 2009). When facing problems and discussing solutions together, community members develop mutual understanding, shared language, trust and commitment that eventually decrease the transaction cost in developing collective action. Experience from one task, including previous failures, facilitates the group to confront new situations. Experience also leads a group to appreciate the particularity of each situation and the importance of adapting and changing institutions to confront new situations. These issues are key concerns to *satoyama-satoumi* communities experiencing rapid population decline, interruption of the transmission of knowledge, and lack of investment in local institutions of resource management. Unused social capital deteriorates rapidly and is not easily replaceable by external intervention. Here we see the importance of a two-way process

between and among communities, civil society, and government. The latter tends to be more effective in improving forms of physical capital such as infrastructure, public services or fiscal incentives, but it is mostly ineffective in creating social capital at the community level. It is encouraging in Japan to see the emergence of urban groups and programs supporting *satoyama-satoumi* communities in rural and coastal areas (Duraiappah *et al.*, 2012). Volunteer groups and school programs helping to maintain irrigation infrastructure and managing agricultural and forest areas illustrate the emergence of new forms of social capital. This is not sufficient, however, to restore the overall social vitality and viability of rural communities and economies, nor is the sole influx of financial capital. Aging rural areas throughout the world experience the conundrum of economies of remittances. In the case of the *satoyama-satoumi*, local cultural memory carries inestimable knowledge of socioecological systems management, agro/biodiversity, and skills and technology. The very nature of socioecological landscapes in Japan is intrinsically linked to cultural knowledge held in rural communities and individuals linked through a variety of social networks. The departure of young family members to urban areas changes patterns of interaction and as a consequence the myriad ways that cultural knowledge and social capital are passed from one generation to the next. The loss of *satoyama-satoumi* landscapes and communities, and its various consequences for (agro)-biodiversity and ecosystem services, also represents major changes in cultural identity in Japan.

It is important to remember that rural to urban migration in Japan is not happening in a cultural-historical vacuum as the sole result of economic shifts and trade policies during the last 50 years; not least, it has been part of a broader process of breaking rigid social hierarchies and ascribed social roles across gender, age and class lines. While the exercise of individual expectations represents an important reason behind urban living, it works in tandem with the lack of social role valorization, access to infrastructure and amenities, economic vitality and opportunities for entrepreneurship in rural areas. These are areas where external intervention – be it from government, civil society or interest groups - can be helpful in setting up incentives for entrepreneurship and conditions to facilitate new rural economies to become attractive, without trying to generalize solutions to diverse regional situations.

The reality of *satoyama-satoumi* areas requires one to see that social capital operates most effectively when it is organized in complementary forms at multiple levels (Brondizio *et al.*, 2009). Social capital present or absent at one level may enhance or retard the effective development of social capital at other levels. This implies two-way solutions that include multiple forms of private-public and private-private partnerships, such as necessary to manage today's complex and intertwined rural-urban landscapes (Ruseva & Fischer, 2012). Local organizations are able to draw on horizontal linkages

with other organizations to establish effective cooperation, and to pro-actively create vertical linkages, as illustrated by Tome-Açu institutions. Effective interaction, however, requires coordinating mechanisms and institutions that facilitate cross-level interaction; these are slower to emerge.

The challenge ahead of Japan in restoring the vitality of *satoyama-satoumi* communities and landscapes is to build a shared notion of their sociocultural and ecological value today and for the future. This includes promoting social and economic incentives that drive the interest of young generations in exercising their individual expectations, creativity and entrepreneurship in their own communities, *i.e.*, to guide an economy that recognizes the value of ecosystem services and that promotes value-added transformations of local resources and a better position in local to global market chains.

#### 4. Final Remarks

Arguably, the relevance of rural communities and landscapes has never been so vital to a society organized in high densities, dependent on external provisioning of food (often from vulnerable global networks), facing scarcity of water and resources; the great 2011 earthquake and tsunami of eastern Japan, and related disasters, have reminded us of the vulnerability of urban areas to disasters and events. The story of the *satoyama-satoumi* in Japan calls for a broader view of sustainability, one that recognizes that we live in a world of functional interdependencies (Young, 2006), where links between urban and rural, local and global are an intrinsic and dynamic part of the system. Reconciling a new notion of rural with today's urban-based society is one of the main challenges in crafting new visions of sustainability. What are the roles of rural areas and managed landscapes in sustaining provisioning, cultural, and regulating services to regional urban networks? In what ways can rural areas continue to provide attractive employment to regional populations? What is the role of managed rural landscapes in buffering and mitigating natural disasters and climate change?

Like Tome-Açu, rural communities are not passive and static. Throughout the world, households and communities have used a range of strategies to maintain social, cultural and economic vitality in rural areas amid a constantly transforming world (Netting, 1993). They have searched for strategies to cope with the needs of production and subsistence, the lack of social services and infrastructure, the pressure of competing external markets, and the challenges of maintaining the interest of young generations in agricultural and community life. As part of this process, the notion of rural is changing drastically along complex fluxes of people, ideas and resources through networks of rural and urban areas, from local to global scales. We, as society, are at the crossroads of global environmental change and sustainability. Lin Ostrom often called attention to the dangers of simplistic solutions or deterministic views that disre-

gard the importance of institutional diversity (Ostrom, 2005, 2007). She always reminded us that while institutional crafting is a bottom-up process, it is facilitated or constrained by higher-level institutions and policies. The stories of the *satoyama-satoumi* in Japan and that of Tome-Açu in the Brazilian Amazon motivate us to consider alternative visions that value the vitality of rural areas in an urban world.

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## Notes

- <sup>1)</sup> This essay was written in her memory.
- <sup>2)</sup> My account of Tome-Açu history is based on ethnographic research I carried out in collaboration with colleagues during the 1990s and benefits from a series of publications about the region including Yamada (1999), Batistela *et al.* (2012), Uhl and Subler (1988), CAMTA Relatos Historicos (1967), Piekielek (2010), Tsunoda (1988), Yamada and Gholz (2002), and Homma (2004).
- <sup>3)</sup> Tome-Açu is closely linked to the neighboring municipality of Quatro-Bocas; the two towns are almost an extension of each other. Several farms and cooperative activities are located in Quatro-Bocas.
- <sup>4)</sup> It is not the intent of this article to discuss the polysemic nature of the term social capital; see Brondizio, Ostrom and Young (2009) for definitions and consideration of different concepts of social capital.
- <sup>5)</sup> This section is partially based on Brondizio, Ostrom and Young (2009).



**Eduardo S. BRONDIZIO**

Eduardo S. BRONDIZIO is a Professor of Anthropology in the Department of Anthropology, where he has served as Department Chair from 2005 to 2012, and Adjunct Professor of Environmental Sciences at the School of Public and Environmental Affairs, Indiana University-Bloomington. At Indiana University, he is associated with the Anthropological Center for Training and Research on Global Environmental Change (ACT) and the Ostrom Workshop in Political Theory and Policy Analysis. For over two decades, his work has focused on the Brazilian Amazon, and involves studying (longitudinally) the formation and transformation of rural families and communities as they interact with government policies and development programs, regional and global markets, and demographic and environmental change. He has written extensively on environmental anthropology and human-environment interaction, household and land-use change, Amazonian small farmers and global markets, rural development and peasantry identity, and geospatial analysis and integrative multi-level methodologies. He is also involved with several collaborative and comparative international research programs examining human dimensions of global environmental change, sociocultural dimensions of ecosystem services, and efforts to develop collaborative frameworks for socio-ecological systems research.

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