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External Invasions and Local Management of the Forests: The Case of Indigenous Communities in Brazil and Peru*

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〈Abstract〉

This study examines the issues in the management of forests by indigenous communities involving deforestation-driven intruders, focusing on the dynamics of resource and governance. Drawing from Ostrom's work on commons management, the study introduces a modified social-ecological systems(SESs) framework that incorporates external resource extractors and applies it to Brazil's Wajãpi and Peru's Shipibo indigenous communities. The comparative

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analysis underscores governance rights and systematic responses of the communities as pivotal for resource management and addressing challenges posed by external users. This highlights the importance of indigenous autonomy and institutional coordination that can induce an effective management of commons amidst external invasions.

Key Words: Common Resource Management, Social-Ecological Systems(SESs), Indigenous Communities, Governance Systems, Latin America

Ⅰ. Introduction

As the severity of deforestation and climate change intensifies, there is a growing international interest in sustainable development and biodiversity conservation. As one of the most effective means to protect biodiversity, indigenous communities are regarded as environmental stewards, especially highlighting the role of indigenous lands in maintaining low deforestation rates(Dawson et al. 2021). However, IPBES(2019) warns that regions managed by indigenous communities face unprecedented challenges, which is a serious concern considering that indigenous people own, use, manage, or occupy at least a quarter of the world's land area. Multiple studies highlight the importance of promoting equitable conservation practices that empower and support indigenous people and local communities for long-term biodiversity conservation, particularly effective when complemented

by laws and policies aligned with community collective rules.

Resource-rich countries often pursue policies aimed at extracting natural resources, posing a serious threat to indigenous communities. This problem is particularly noticeable in Latin American countries such as Brazil and Peru, where conflicts arise over encroachments by corporations and illegal resource developers in the forests. This study conducts a comparative analysis of the indigenous communities of the Wajãpi in Brazil and the Shipibo in Peru. Both communities have a history of traditional sustainable resource management and the challenge of intrusion by illegal external resource extractors, yet they exhibit distinct rates of deforestation. The aim of this study is to explore the different approaches to managing common resources within the two indigenous communities in the context of external users, while examining the associated dynamics of resources and governance.

The structure of the study is as follows. First, it provides a summary of past research on deforestation and indigenous communities, along with a theoretical framework on commons management. Next, the framework is adapted and put into practice, for the Wajãpi and Shipibo indigenous communities' cases, to enable a comparative analysis on the interactions and responses of the communities in the conflicts involving external users. Building upon this analysis, the study concludes by emphasizing the significance of indigenous people's governance rights and systematic responses as pivotal factors for effective commons management.

Ⅱ. Theoretical Background

1. Literature Review on Deforestation and Indigenous Communities

The significant role of indigenous communities in environmental conservation is emphasized in numerous studies. This importance is particularly evident in the conservation of protected areas involving indigenous communities(Garnett et al. 2018). Examining the case of Wajãpi Indigenous Land(IL), the correlation between population growth and deforestation is weak, with no discernible impact on land use(Campos et al. 2021). This may be attributed to their isolated living conditions and adherence to traditional practices, such as limited soil use for agriculture and restrained land clearing for crops and housing.

The significance of governance rights for effective management of natural resource systems by indigenous communities is also discussed. Dyck(2019) discovered that indigenous communities possess unique knowledge and resilience to adapt to climate change, rooted in their expertise in village layout, food cultivation, and herbal use. Simultaneously, the study argues that autonomy, based on secure property rights, is essential for indigenous knowledge to function effectively. Securing land tenure plays a central role in indigenous resilience, enabling communities to self-govern based on their knowledge(Cronkleton and Larson 2015; Finley-Brook 2016; Whyte 2016 cited in Dyck 2019). The empowerment and safeguarding of indigenous communities can pave the way for benefiting from the self-sufficiency of local communities. Furthermore, Van Velthem Linke et al.(2020) contend

that national policies and frameworks hold the potential to empower indigenous communities by granting them control over their lives, fostering critical thinking, and reshaping social power dynamics, citing Brazil's National Policy for Environmental and Territorial Management of Indigenous Lands(PNGATI).

2. Ostrom's Social-Ecological Systems (SESs) Framework and Common-Pool Resource Management

Elinor Ostrom's work challenges the conventional concept of the tragedy of the commons, which posits that common resources inevitably become over-exploited and depleted. She rather demonstrates that local communities can effectively self-manage resources. She highlights key elements such as clear boundaries, collective decision-making, monitoring, graduated sanctions, and dispute resolution mechanisms that facilitate responsible and equitable use of common-pool resources. However, while such common structural elements exist, no universal solution applies due to the complexity of social-ecological systems(SESs)(Ostrom 2005). Ostrom(2009) delves into the intricacies of SESs which consist of various interconnected subsystems and internal variables that operate at multiple levels, resembling organic organizations. Within the framework of a complex SES, discrete subsystems like resource systems(RS) and units(RU), governance systems(GS), and users(U) are identified individually, yet their interactions collectively shape outcomes at the social-ecological level. In the context of forests, each subsystem also mutually influences one another.

Each subsystem is further divided into variables at a deeper level, such as the size of resource systems, the mobility of resource units, the level of governance, and user knowledge. While suggesting that different dynamics are at play, Ostrom(2009) presents the following variables that are often cited as either aiding or hindering users' self-organization to manage resources. First, the size of resource systems matters, as large territories are difficult to manage, while small territories do not yield much value. Second, users are more likely to invest in self-organization when they observe a lack of resource systems, rather than when the systems are already depleted or abundant. For the predictability of system dynamics, users are more likely to configure and establish resource management rules when resource systems are predictable. Similarly, the mobility of resource units influences self-organization, as highly mobile resources are challenging to self-organize due to the cost of observation and management. Conversely, stationary resources, such as trees and plants, are better suited for self-organization.

Furthermore, various differences among users also influence self-organization. First, the size of the group can negatively impact the transaction costs of self-organization, as coordinating larger groups can prove challenging. Nevertheless, large groups may also be advantageous for costly tasks that are resource-intensive, like monitoring extensive local forests. Leadership, social capital, and shared norms can mitigate the transaction costs associated with consensus-building and resource monitoring, including factors like trust, reciprocity, and shared moral standards. The organizational costs decrease when users share information about how their actions affect one another and possess sufficient knowledge about the SESs.

Additionally, users are more inclined to self-organize and maintain resource systems if they heavily depend on these systems for their livelihood and thus prioritize sustainability. Finally, in governance systems, institutionally ensuring users' autonomy and authority to establish and enforce their own rules leads to decreased transaction costs and improved resource management.

Built upon the theoretical framework, this paper aims to broaden its focus to encompass concerns surrounding external intrusions within indigenous communities. Thus, in order to explore the dynamics that emerge from the involvement of external users in the resource systems and units, as well as in the interactions between the governments and the users of the Wajãpi and Shipibo indigenous communities, Ostrom's SESs framework is modified and put into practice as detailed below.

3. Modified SESs Framework: Intervention of External Users

The framework undergoes two main modifications. First, users(U) are specified as internal users(IU), and second, external users(EU) are introduced as a novel subsystem. The modifications stem from the following contextual considerations. The two study regions exhibit intricate systems wherein users(U) can be categorized based on their unique attributes. Specifically, these can encompass indigenous communities, migrants, tenant farmers, and enterprises of diverse sizes. Moreover, both regions face analogous challenges: the intrusion of external individuals and corporations impacting the livelihoods of indigenous communities. In defining indigenous

communities, this study adopts the working definition used by the UN Working Group, based on Martínez Cobo's(1987) study, which delineates them as historically connected to pre-invasion societies, distinct from dominant sectors, and dedicated to safeguarding ancestral territories, ethnic identity, and cultural heritage.

The study introduces five variables in the external users(EU) subsystem to delineate their unique characteristics compared to internal users(IU). First, it discerns types of activities(EU1), differentiating between commercial and subsistence practices, which are central to the ongoing debate on agriculture contributing to deforestation. In tropical and subtropical countries, commercial agriculture accounts for 40 percent and subsistence for 33 percent, with Latin America showing a pronounced commercial-scale dominance(FAO 2020, 3). Second, the legality of actions influences the motivations, objectives, approaches, and conflict resolution strategies of external users involved in illicit activities, emphasizing the necessity of taking legal authorization(EU2) into account. Additional variables include settlement behaviors in villages(EU3), where migrants often prioritize extraction rather than regenerating previously cultivated lands(Parkswatch 2003). The remaining variables, the number of users(EU4) and the importance of resources(EU5), mirror IU1 and IU7 in the internal user subsystem.

To enhance the contextual understanding, the shared attributes of illegal farmers, ranchers, loggers, and miners can be elucidated as follows. Unlawful operators, often lacking the permits or licenses required by law, frequently operate within safeguarded or restricted zones, encompassing national parks, indigenous lands, or environmentally sensitive areas, thereby

disregarding legal demarcations and regulations. Additionally, these illicit operators often resort to unsustainable practices, such as extensive deforestation, the use of harmful chemicals, overgrazing, or the pollution of water bodies, often without due consideration for environmental preservation or sustainable management of resources. These behaviors may stem from a lack of oversight and accountability, with unlawful operators typically functioning beyond the purview of official regulatory frameworks, evading scrutiny and responsibility for their actions, and resulting in considerable social, economic, and environmental ramifications.

Within this context, outlining the connection between the indigenous communities, whose territories border or intersect with states' protected areas, and the non-indigenous external entities engaged in hunting, farming, land appropriation, or resource extraction around their territories becomes more straightforward. From this relationship, the study distinguishes users(U) as internal users(IU), representing indigenous people, and external users(EU), comprising non-indigenous individuals and organizations involved in resource development within the indigenous territories. The adaptation of the framework is presented in Table 1.

〈Table 1〉 Modified SESs Framework with Subsystems and Variables

Economic, political, and social settings (S)	S1 Economic development S2 Demographic trends S3 Government resource policies S4 Market incentives S5 Media organization
Resource systems (RS)	RS1 Sector (e.g., water, forests, pasture, fish) RS2 Clarity of system boundaries RS3 Size of resource system

	RS4 Productivity of system RS5 Predictability of system dynamics RS6 Location
Resource units (RU)	RU1 Resource unit mobility RU2 Growth or replacement rate
Internal users (IU)	IU1 Number of users IU2 History of use IU3 Location IU4 Leadership/entrepreneurship IU5 Norms/social capital IU6 Knowledge of SES/mental models IU7 Importance of resource
External users (EU)	EU1 Type of activities (e.g., commercial, subsistence) EU2 Possession of legal permits EU3 Settling behavior EU4 Number of users EU5 Importance of resource
Governance systems (GS)	GS1 Government organizations GS2 Non-governmental organizations (NGOs) GS3 Network structure GS4 Property-rights systems GS5 Operational rules GS6 Collective-choice rules GS7 Constitutional rules GS8 Monitoring and sanctioning processes
Interactions (I)	I1 Information sharing among users I2 Conflicts among users I3 Self-organizing activities I4 Networking activities
Outcomes (O)	O1 Social performance measures (e.g., efficiency, equity, accountability, sustainability) O2 Ecological performance measures (e.g., overharvest, resilience, biodiversity, sustainability)

Source: Adapted from Ostrom (2009)

Ⅲ. Applying the Modified SESs Framework: Wajãpi, Brazil and Shipibo, Peru

This paper primarily engages in a comprehensive analysis of existing literature and conducts case studies on the selected regions to achieve an in-depth understanding of specific contexts and dynamics. Gathering data and information on the indigenous communities from central-level statistics is limited due to their geographical and social isolation, as well as frequent population relocations. To supplement the understanding of these populations and address the challenges posed by the behavioral traits of illegal external users, the study incorporates media materials, reports, and data from various non-governmental organizations and institutions for a comprehensive interpretation. The research results are derived from the analysis of the collected literature data, applying the adapted Ostrom's SESs framework.

1. Economic, Political, and Social Settings(S) in Brazil and Peru

The selection of the two cases is based on the following economic, political, and social contexts. First, the GDP composition and structure between the regions differ(S1). The state of Amapá in Brazil, where the Wajãpi community resides, had a provincial GDP of thirteen billion real as of 2015, accounting for 0.2 percent of national GDP, with primary sectors contributing only 2.1 percent(Sousa Costa and Borges 2021). In contrast,

Ucayali in Peru, home to the Shipibo community, relies significantly on agriculture, livestock, and forestry, contributing about twenty percent of the regional GDP, and timber and agricultural processing account for thirteen percent(Porro et al. 2015). This factor gains importance as it suggests that the higher contribution of natural resources in Ucayali could attract a greater influx of commercial or illegal extractors encroaching upon indigenous lands.

While both nations grapple with balancing resource development and environmental protection, the governments' resource policies(S3) complicate matters with the indigenous communities. Historically, Brazil's pursuit of economic development has led to significant deforestation driven by the expansion of agricultural and ranching activities. The Bolsonaro administration's focus on agri-business also has weakened environmental regulations, leading to budget cuts for indigenous support, such as in the National Foundation for Indigenous Peoples(FUNAI). Moreover, the government's PL 191/2020 legislative proposal, which aims to allow mining of indigenous lands, has led to increased illegal activities by attracting land invaders and criminal gangs to the relevant regions(Cimi 2022). Similarly, Peru's development dynamics include agricultural expansion and mining prioritization since the 1980s(Marquardt et al. 2019), which led to an influx of large numbers of settlers and an increase in illegal logging as a major cause of deforestation(Smith and Schwartz 2015). The Fujimori administration's push for foreign investment and resource development also led to conflicts with local communities, as there were no institutional means to facilitate discussions(Kim, Y. and Kim, W. 2015). The media(S5) and international community are increasingly focusing on both countries' actions.

In Brazil, incidents like the murder of a Wajãpi community chief underscore the issue, with heightened reports of incursions by illegal miners and resource extractors by 2021. In Peru, consistent reports emphasize the rising threat to the livelihoods of the Shipibo community due to external intrusion.

While not entirely representative of all indigenous communities in Latin America, the two selected cases serve as illustrative examples offering insights into communities facing similar conditions. They showcase potential responses to external intrusions based on acknowledged circumstances within indigenous communities. Geographically, the Wajãpi reside in Brazil's Legal Amazon, where over 98 percent of the country's Indigenous Lands are concentrated(Souza 2021). Meanwhile, the Shipibo inhabit an area within the Amazon rainforest currently grappling with extensive deforestation. Both communities, like numerous indigenous groups, are profoundly impacted by deforestation due to their dependence on forests for sustenance. These two communities have been chosen for comparative analysis because, despite facing threats from deforestation caused by external interventions, their systematic responses based on governance rights differ. Comparing these cases sheds light on the significance of governance rights and systematic responses, forming the primary discovery of this paper utilizing the framework and offering implications for other indigenous communities.

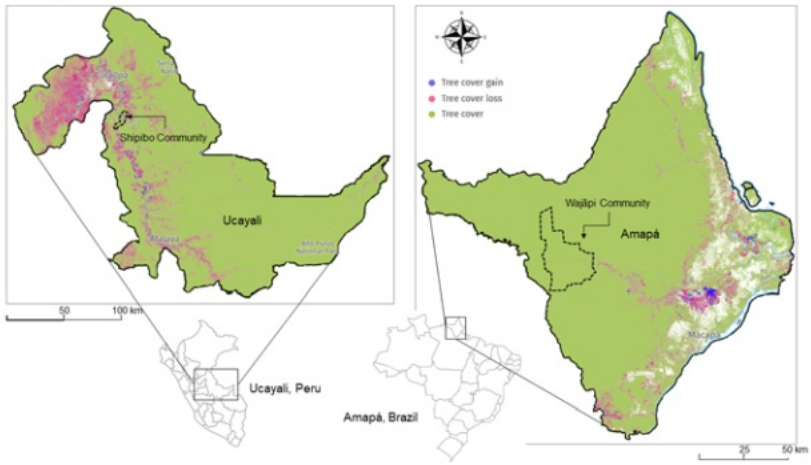
2. Comparison of Deforestation Rates in the Two Regions

The deforestation rates in the states of Amapá and Ucayali, home to the Wajãpi and Shipibo communities, show different patterns. Due to limitations

in data availability, this paper cannot present the exact numerical values for the corresponding indigenous regions. However, it may still be possible to compare the levels of deforestation using visual maps. Figure 1 illustrates the locations of the indigenous communities and the levels of deforestation in the two regions. In the figure, each community's inhabited region is outlined by a separate dashed line within each state.[1] The extent of deforestation is depicted by the colored dots, sourced from Global Forest Watch(2023) and its satellite imagery. It identifies the areas of gross tree cover and tree cover loss, updated annually from 2001 to 2022. Within the provided dataset, tree cover encompasses vegetation exceeding five meters tall, including both natural forests and plantations spanning different canopy densities. It refers to the biophysical presence of trees, whether in natural forests or plantations. As depicted in the figure, the difference in dot density of tree cover loss between the two regions indicates that the Wajãpi community region has experienced less tree cover loss than the Shipibo community region.

1) The locations of each indigenous community refer to Gobierno Regional de Ucayali(2014) and Mata et al.(2012), which have been adapted by the author in creation of 〈Figure 1〉.

〈Figure 1〉 Location and Deforestation Level of the Communities



Source: Adapted from Global Forest Watch (2023)

3. An Illustration of the SESs Framework in Action: Wajãpi, Brazil

1) Resource Systems(RS) and Resource Units(RU)

The Wajãpi indigenous community resides in the municipalities of Pedra Branca do Amapari and Laranjal do Jari in the midwestern Amapá state (IU3). The Wajãpi IL shares borders with several protected areas(RS6), including Tumucumaque Mountains National Park, Iratapuru River Sustainable Development Reserve, Amapá State Forest, and Beija-Flor Brilho de Fogo Extractivist Reserve(Moreno et al. 2018). There is no specific indicator for the size of the resource system(RS3), but it can be approximated using the size of IL as a proxy indicator which is 607,017

hectares. Within the resource system, the Wajãpi people engage in subsistence agriculture for sustenance and income generation. Farming, hunting, and gathering contribute to the community's income by providing minerals, handicrafts, and a variety of crops from forests such as maize, cassava, banana, sweet potato, sugarcane, and cashew(RS1).

Some factors that support Ostrom's emphasis on the conditions that increase the likelihood of indigenous communities' self-organization for resource management are found. First, the stationary units of trees and plants within the forest(RU1) and the overall stability and consistency of the forest ecosystem's dynamics and behavior over time(RS5) make it easier for the community to manage the resources. Within these resource systems, indigenous people have maintained sustainable agricultural cycles of harvest and fallow through the controlled use of fire, a practice that keeps forests at rest, prevents soil nutrient depletion, and controls agricultural pest infestations. The resource growth rate and replacement rate are estimated to be stable(RU2) because the community engages in regular village relocations to facilitate environmental restoration(Portal Governo do Amapá 2015). It is a way for the Wajãpi indigenous people to engage in sustainable agriculture and mining based on traditional non-deforestation practices.

2) Internal Users (IU)

The indigenous people of Wajãpi exhibit the following characteristics in their utilization of the resource system. As of 2021, the indigenous land had about 1,500 inhabitants(IU1), living in 81 villages scattered across the territory(Apina et al. 2017). According to Campos et al.(2021, 334), the

Wajãpi IL has a low population growth rate with an average of 52 births per year and a low land use rate of 0.63 percent, so most of the territory is preserved. This highlights the weak correlation between population growth and deforestation in the territory, indicating that land use is not significantly affected and deforestation remains limited. This may also be due to their sustainable cultivation methods, allowing the land to rest and recover from soil nutrient depletion and agricultural pest intrusion by controlling land-clearing fires. While practicing limited land use, they heavily depend on the resources for food, housing, and income(IU7).

The indigenous community has a rich history of resource utilization passed down through generations(IU2). They teach and acquire from one another on how to grow different species of crops and utilize staple crops like cassava for sustaining livelihood and preserving cultural autonomy (Tomassoni 2019b). It is evident that the community possesses in-depth knowledge of the SESs(IU6), manifested by periodic relocations of villages for land recovery, fallowing after the aforementioned controlled fire use, and diversification of extractive stocks(ISA 2018). They also share the norms of reciprocity and social capital(IU5), reflected in a collective activity called pusirõ, in which members help each other in burning and clearing land in a controlled manner as a common effort. In addition, under the leadership of their chieftains(IU4) they study non-indigenous cultures to represent and speak out for their tribe(Charner et al. 2019).

3) External Users (EU)

The intrusion of external users is complicated by the lack of clarity

regarding the boundaries of the system(RS2). Despite the legal demarcation of the Wajãpi Territory, access is difficult to control, and entry by outsiders is made easier due to the North Perimetral Highway, also known as BR-210, which connects the indigenous land to the outside world(ISA 2018). Beginning with fur trappers, prospectors and mining companies followed for gold, cassiterite, manganese, and tantalum. Moreover, with sawmills, farms, and prospecting operations having established themselves along the edge of the North Perimetral, the pressure from their encroachment increased. Land encroachments within the territory are increasing(EU4) and threats from miners, loggers, and farmers persist(Londoño 2019).

The provided information indicates that the majority of intrusions are motivated by individual extraction and commercial activities of enterprises (EU1). The challenge found in verifying legal authorization itself leads to a presumption that individuals and companies encroaching on the territory are likely to engage in illegal activities(EU2). As for the individual intruders, many of them are migrants(EU3), often covering their tracks by preventing the indigenous people from reporting the intrusion and in some cases resulting in assassination(Londoño 2019; Charner et al. 2019). Issues of legality(EU2) and the importance of resources (EU5) are manifested in measures and policies that endorse their encroachment and exploitation of the indigenous lands by federal governments and officials. Legislative proposals like PL 190/2020 and 490/2007 seek to legitimize the degradation and utilization of indigenous lands for endeavors such as mining, agriculture, and infrastructure projects(Cimi 2022), jeopardizing the territorial rights and sustainability of indigenous communities.

4) Governance System(GS)

① Property Rights Systems(GS4)

The Wajãpi IL was designated as a protected area in 1996 under the 1988 Constitution of Brazil(Tomassoni 2019a). The Wajãpi IL also intersects with the National Reserve of Copper and Associates(RENCA), a 4.6-million-hectare area rich in gold, manganese, copper, and other minerals, protected by presidential decree for commercial mining since 1984. Prior to the constitutional protection, the Wajãpi natives had independently established boundaries since the early 1990s, aided by donor states and an international initiative of the Pilot Program to Conserve the Brazilian Rainforest(ISA 2018). The natives themselves also shared a conviction that demarcation was necessary to safeguard their land and resources from non-indigenous intrusions(Charner et al. 2019). To deter external encroachments, the Wajãpi members continually occupied and protected all areas including remote regions, by defining clear boundaries marked on foot. The demarcation of the Wajãpi IL, as defined by the Constitution, reflects the outcome of a protracted process wherein the indigenous community reclaimed the forests by creating their own maps through forest clearing and boundary delineation efforts.

② National Policy(PNGATI) and Indigenous Management Plan(PGTA)

In the governance system, indigenous people receive support from NGOs and government organizations in responding to the absence of national policy or opposition to anti-indigenous policies. This has facilitated the systematic inclusion of the indigenous community in government decision-

making processes related to the management of indigenous territories. PNGATI and PGTA serve as illustrative examples of this system. The National Policy for Environmental and Territorial Management of Indigenous Lands(A Política Nacional de Gestão Ambiental e Territorial, PNGATI) was established by the federal government through Decree No. 7,747/2012, aiming to enhance the well-being of indigenous people in their territories through sustainable means while preserving their socio-cultural autonomy and unique forms of territoriality(GS7). Van Velthem Linke et al.'s(2020, 53) study evaluates PNGATI, highlighting its alignment with the constitutional rights of indigenous people, reaffirming their exclusive rights to utilize their traditionally occupied lands and ensuring that demarcated territories cater to the unique needs and characteristics of each indigenous community.

Within PNGATI, the Plans for Territorial and Environmental Management of Indigenous Lands(Planos de Gestão Territorial e Ambiental de Terras Indígenas, PGTA) is the most crucial instrument for management, developed by and for indigenous communities with the support of the NGO Iepé. It has been publicly recognized, as FUNAI defines it as the instrument of "intercultural dialogue and planning for the territorial and environmental management of the Brazilian Indigenous Lands"(RCA and Rainforest Foundation Norway n.d., 7). PGTA of the Wajãpi outlines diverse forms of internal decision-making processes, encompassing regional, cross-regional, and general decisions, based on the levels of participation and agendas of the Wajãpi villages(Apina et al. 2017). The agenda items include tasks such as cleaning rivers, organizing expeditions to clean demarcation trails, purchasing collective equipment, managing surveillance funds, and

collectively deciding on areas reserved for game reproduction by different family groups(Apina et al. 2017, 28). As such, the community has its own operational rules for managing resources and making related decisions(GS5).

③ Wajãpi Consultation and Consent Protocol

The Wajãpi Consultation and Consent Protocol represents the inclusion of the community's opinions in the central decision-making process regarding land ordering(GS3). The community itself developed the Wajãpi Consultation and Consent Protocol in 2014(GS6), aided by the Amazonian Cooperation Network(Rede de Cooperação Amazônica, RCA) and Iepé(GS2). It comprises a set of guidelines and procedures to ensure their participation, consultation, and consent in matters directly affecting their lands, resources, and rights. This protocol establishes a framework for engagement between the Wajãpi and external entities, such as government agencies, companies, or organizations, to respect and uphold the Wajãpi's rights to self-determination and territorial governance.

Following these rules, government agencies(GS1), including the Amapá Institute for the Environment and Land Planning(Imap) and the Amapá State Forest Institute(IEF), held several prior consultation meetings regarding public policies on territorial ordering from 2015 to 2017. This aligns with the International Labour Organisation(ILO) Convention 169 on Indigenous and Tribal Peoples, guaranteeing the right to free, prior, and informed consultation affected by government measures, which was integrated into the national legislation through Decree 5,051/2004(Brasilia, DF 2018, 53). Among the first consultations, the 2015 meeting brought together representatives of Imap and Wajãpi to discuss topics on land tenure

regularization, agrarian conflicts, Amapá State Forest(Flota), and proposals for the creation of a conservation unit reserve(Portal Governo do Amapá 2015). During this meeting, the community was able to suggest and present their proposals and needs.

Subsequent meetings in 2017 aimed to engage in discussions regarding the occupation and regulations on the use of the surrounding areas of the Wajãpi territory. Specifically, the pre-consultation process concerning the expansion of the Northern Perimeter Settlement Project, a land redistribution and agricultural reform initiative within the state of Amapá, was addressed, and the policy took into account the indigenous people's demands(Portal Governo do Amapá 2017). The IEF announced the establishment of a corridor between the Wajãpi indigenous lands and Flota, which would be managed by a new committee of Wajãpi indigenous people, settlers, the National Institute for Colonization and Agrarian Reform(INCRA), and state government officials. At the end of the discussion, it was agreed that the committee would conduct detailed assessments of the social, economic, and environmental aspects of new settlements, considering the proximity to and their impacts on the indigenous lands. The decision aimed to establish boundaries to prevent encroachment or unjust interference in the indigenous territory, thereby averting future invasions.

④ Monitoring Processes(GS8)

The Wajãpi people have adopted a proactive approach to defend their land by monitoring their territory since the 1980s to drive away invaders(ISA 2018). They are dedicated to establishing and maintaining control over their

territory through various territory control activities. The community's monitoring strategy involves both self-surveillance and state coordination. Community members remain vigilant in deterring illegal gold prospectors and loggers by promptly flagging down and thoroughly scrutinizing drivers passing through their territory(Tomassoni 2019a; 2019b). Furthermore, the community's determination to seek cooperation with the government for monitoring is evident in the public policies suggested in PGTA. Objective 1 of the proposed policies for territorial and environmental management advocates for collaboration between the Wajãpi and the governmental protection agency FUNAI to control the entry of cars and outsiders into the territory, particularly through the road BR-210(Apina et al. 2017, 79).

5) Interactions(I) and Outcomes(O)

The main pattern of interactions is outlined by the efficient management of forests among internal users and their control of external users, which involve information sharing(I1), conflicts among users(I2), the Wajãpi's self-organizing(I3), and networking activities between the indigenous people, government organizations, and NGOs(I4). In response to the destruction of forests and animal farms along with physical harms on the village people(Londoño 2019; Charner et al. 2019) brought by invaders(I2), the Wajãpi people have taken active measures to protect and manage their land. Their actions on information sharing(I1) include warning each other about the presence of invaders(DDB-NY 2019) and discussing how to manage surveillance(Apina et al. 2017). The village members also have self-organized(I3) through their internal councils, and within their PGTA, the

community is resolute in preventing external user invasions, aiming to achieve the objective of no intrusion by mapping the locations(Apina et al. 2017, 88). Furthermore, the Wajãpi community is committed to networking activities(I4) with the government and NGOs. This is reflected in two ways: PGTA and the demand for prior consultation. Objective 2 in PGTA requests assistance from the government agency managing the nearby conservation unit, implying their intention of strengthening political ties with it(Apina et al. 2017, 40).

Thus, through their self-organization, the Wajãpi actively engage in self-governance and territorial protection, demonstrating proactive efforts in decision-making processes that affect their rights, resources, lands, and cultural heritage, demonstrating efficiency, equity, accountability, and sustainability in social performance measures(O1). Furthermore, ecological performance measures, including resilience, biodiversity, and sustainability, are highly likely to be ensured(O2). Notably, between 2002 and 2018, the Wajãpi people used up to only about one percent of the Wajãpi IL, implying a low level of forest usage compared to the Galibi IL of the same state of Amapá, where ten percent of the region was utilized during the same period(Campos et al. 2021, 332).

4. An Illustration of the SESs Framework in Action: Shipibo, Peru

1) Resource Systems(RS) and Resource Units(RU)

The Shipibo population is dispersed across the Ucayali River, both north and south of the regional capital, Pucallpa. The Shipibo population is formed

into different groups according to their locations and comprises an ethnicity of 36,000 people and approximately 150 communities in total(Dyck 2019). The Shipibo community that is the target of this paper resides in Caimito, a town within the Coronel Portillo province of Ucayali(RS6, IU3). Similar to the Wajãpi, the territorial size is used as a proxy indicator to measure the size of the resource system(RS3). The territorial size of Caimito is reported to be extending over 6,800 hectares(USAID 2022, 19). A notable feature lies in the overlap of the indigenous territory with the Imiría regional conservation area(Áreas de Conservación Regional Imiría), established by the Ucayali regional government in 2010 with the objective of conserving the Amazonian wetland ecosystem(RS2).

The characteristics of forests as a resource system(RS1) within the Shipibo territory are assumed to display similar traits to the Wajãpi IL. These include the presence of stationary units(RU1) and the stability and consistency in forest dynamics(RS5). With food consumption and income generation through farming and timber harvesting being the main uses of resources(IU7), the community places high importance on their sustainable usage, which is facilitated by their traditional farming practices. These are also the factors that increase the likely of management of common resources by the community members highlighted by Ostrom.

2) Internal Users(IU)

The Shipibo community of Caimito, known as the first settlers in the forests around Lake Imiría in the 1930s(IU2), is estimated to consist of about 750 people(IU1)(Arkana International 2023; Galdos and Somra 2020).

While there are differences in the territorial size and population between the Wajãpi and Shipibo communities, these factors do not appear to have a significant impact. Rather, it seems that the behavioral characteristics of the users in both communities affect the possibility of effective management of common resources. Members share norms and social capital, and they show leadership to gather their interests and raise their voices(IU5, IU4). However, whether these lead to effective resource management needs deeper analysis. There are two main manifestations: peaceful demonstrations at the local government conservation area post and the establishment of their own Indigenous Guard, known as Guardias Indígenas, to safeguard the forests.

The first case is the July 2022 incident in which a coalition of Shipibo members staged a peaceful demonstration at the guard post in Junín Pablo, which was established by the local government as a monitoring center in the conservation area. They expressed their dissatisfaction with official corruption within the reservation and defended their rights, demanding that the administration and management of the area be removed. In addition, the Indigenous Guard was formed as a local organization of the Shipibo territories, organized to resist government intervention. However, these indigenous activities have had less systematic interaction with the government than the Wajãpi community and have not received official recognition or response from the government.

3) External Users(EU)

Like the Wajãpi community, the forests of the Shipibo community are

threatened by resource scarcity(RS4) owing to increased illegal exploitation of the resource by outsiders. Although there is no statistical data on the specific number of users(EU4), reports of continued exploitation of common resources within the territory persist. Incidents involving illegal logging, land encroachment, and unauthorized fishing activities are on the rise(Begert 2023), contrary to the stated goals of conservation areas to curb illegal resource extraction and land trafficking. These threats have intensified due to land concessions granted to timber enterprises and private farmers along the borders, compounded by overlaps between indigenous territories and the Imiría regional conservation area. This involves corruption-based land transfers, the absence of business licenses for commercial resource users(EU2), and indiscriminate extraction driven by profit-seeking behavior patterns(EU1, EU5). The land trafficking has been exacerbated by collusion between industrial farmers in the forests and local officials. The government also has allowed leasing of forests to logging companies near the conservation areas, which has led to an increase in illegal logging and coca cultivation, and conflicts are found between the indigenous people and those who often migrate to the area(EU3) in search of affordable land with government support(Begert 2023).

4) Governance System(GS)

The resources within Caimito's Shipibo territory are subject to a complex system of governance in which indigenous land rights conflict with the government's conservation efforts. The Shipibo community acquired official land title in 1975, but later the overlapping territories in the Imiría regional

conservation area, established in 2010, limited the community's resource use under the conservation area regulations(GS5). Article 5 in Supreme Decree Establishing Imiría Regional Conservation Area(Supreme Decree N º 006-2010-MINAM) stipulates that the use of all natural resources, both renewable and non-renewable, by local residents must be controlled and approved based on the environmental impact assessment by competent authorities (GS7). Due to the regulations, certain Shipibo members are arrested and punished. For example, some families have been fined, timber logs for sale downstream have been confiscated, and some individuals have been prevented from expanding their agricultural activities(Begert 2023).

This is further complicated by the changes in government decisions on decentralizing forestry management. In the 1990s and early 2000s, the government created communal reserves where indigenous people act as legal co-administrators. However, in 2005, the authorities adjusted the area of conservation zones to facilitate land concessions in accordance with plans of a new regime(Begert 2023). The change raised community concerns, as the new model did not require the indigenous people to participate as co-administrators. The community also claims that the situation has deteriorated despite the initial management plan's goal of restoring and preserving the local ecosystem.

Shipibo communities on the state level have formed their own guard(GS8), Guardias Indígenas, to protect their communities and territories. Several communities, including the one from Caimito, have been organized into local boards. Caimito's guards also organize themselves to monitor intrusion by outsiders engaging in activities related to unauthorized logging,

illegal fishing, and drug trafficking in the forests(Área Ecológica Indígena Imiría 2023). However, the natives' guard has not been sufficient to deter the growing invasion.

5) Interactions(I) and Outcomes(O)

The main interactions in Caimito are characterized by the conflicts between users due to external intrusions(I2) and the low levels of systematic responses in information sharing(I1), self-organization(I3), and networking activities between indigenous people and governmental or non-governmental organizations(I4). External users, including farmers, poachers, land grabbers, and organizations operating in various legal and illegal structures in Caimito(Farman and Morales 2022), often supported by the government, migrate to the region in search of inexpensive land, causing conflict(Begert 2023). Indigenous self-organizational efforts in this regard have been partially undertaken(I3), but information sharing was not active(I1). The enforcement of the regulations continued, limiting their resource use only to subsistence purposes for farming, timber harvesting, and fishing, thus significantly constraining livelihood activities and income generation. As an alternative, the local government implemented an income compensation program for a small number of women through the sale of handicrafts, but this did not have much effect on generating income(Begert 2023).

However, the efforts of Caimito's Shipibo community were confined to sporadic protests and incomplete legal proceedings, yielding no tangible results. Moreover, given the collusion between local authorities and commercial farmers and businesses on the territory, Caimito's indigenous

guard alone is unable to prevent outsiders from entering. Additional ongoing perimeter patrolling and further cooperation with the local government are required(I4) to implement legal measures to prevent illegal land rentals from corrupt local authorities. Thus, the interaction pattern among these actors reflects low efficiency, equity, accountability, and sustainability in measuring the social performance in Caimito village(O1). Accordingly, low resilience due to overharvesting and increasing deforestation will also persist, which is implied to have negative consequences for ecological performance measures(O2).

5. Comparison by Key Variables: Governance Rights and Systematic Responses

Comparing the two regions, the core conclusion underscores governance rights and systematic responses as primary factors shaping the differing indigenous community actions in the presence of external users. An effective external control mandates indigenous-government collaboration, vital for sustainable resource management. The recognition of community autonomy in forest management and decision-making varies in the two regions. Brazil's PNGATI upholds the indigenous-created PGTA, and the local government has proceeded prior consultations on land reforms. Conversely, Peru restricts the Shipibo community's co-administration and resource use through Imiría regional conservation area regulations, without formal consultations or adoption of indigenous management plans.

Further, community awareness and response to government actions prove significant. The Wajãpi community exhibits proactive awareness, utilizing

NGOs' support to craft indigenous management plans and formalize consultation protocols. Consequently, the community co-administers the external settlers' land reform corridor. In contrast, the Shipibo community in Caimito struggles to counter violations of their autonomy by the government in an organized manner. Peaceful protests and lawsuits occurred briefly, yet systematic actions and internal cooperation remain limited. Indeed, government officials encountered indigenous resistance when attempting to address their concerns by approaching the people, making it difficult to engage with the community to address these concerns(Gob.pe 2022).

These differences in governance rights and systematic responses between the two communities may explain the differing effectiveness of their management approaches, in which the Wajãpi community has yielded relatively stronger outcomes in managing externally driven deforestation based on the two factors. This also strongly correlates with the differing deforestation levels depicted in 〈Figure 1〉.

Ⅳ. Conclusion

Ostrom's theoretical framework examines the factors of resource, users, and governance elements that influence users' self-organization in managing common-pool resources. This study further categorizes indigenous people and external resource extractors as internal and external users respectively. It analyzes the systems and interactions, addressing social and environmental issues involving external users within the indigenous communities. The main finding of this study from the comparative analysis suggests that governance

systems play a crucial role when incorporating external users into social-ecological systems. The efficient forest management of internal users is significantly influenced by governance rights and systematic responses. The Wajãpi community in Brazil asserts governance rights through land ownership, deploying internal councils to establish management plans and consultation protocols, systematically demanding government support against deforestation-inducing invaders. In contrast, the Shipibo community in Peru has limitations on land tenure guarantees and legal mandates to adhere to regional conservation area regulations. The Shipibo community also lacks systematic responses such as developing action plans to control external users.

For policy implications, in the context where both countries grapple with the balance between forest conservation and resource development, it becomes imperative to develop and uphold governance structures and policies that ensure the full engagement of indigenous communities in combating deforestation. For Brazil, maintaining national policies like PNGATI that uphold the rights of indigenous communities to their traditionally occupied lands is crucial, particularly to complement legislative initiatives or bills such as PL 490/2007 which regulate the recognition, demarcation, use, and management of indigenous lands. Furthermore, it is essential to bolster political strategies and directives that support plans and protocols developed by indigenous groups, such as PGTA and the Wajãpi Consultation and Consent Protocol. Strengthening these mechanisms is vital to ensure the participation of indigenous communities in governance, guaranteeing their right to be consulted and involved in decision-making

processes regarding the use of their traditional lands.

For Peru, implementing policies that reform or complement articles within the Supreme Decree Establishing the Imiría Regional Conservation Area could address the issue of overlapping land titles and the administration of conservation efforts by the state. For instance, Supreme Decree N º 006-2010-MINAM mandates that indigenous communities obtain approval for the use of natural resources while also respecting any previously established rights. To address this, establishing effective dispute resolution mechanisms may ensure fair and timely resolutions through mediation. Moreover, fostering new collaborative governance structures among stakeholders to jointly manage and co-administer the conservation area can ensure shared responsibilities, with indigenous people playing a pivotal role in decision-making regarding resource usage. Additionally, international agencies or NGOs can monitor the consultation and coordination process between government authorities and the Shipibo, who should organize internal councils to formally address their needs. In light of these findings, the imperative lies in the necessity for indigenous communities, governments, and NGOs to coordinate efforts, led by the communities themselves, all while acknowledging the importance of indigenous rights in the management of commons within forests and protected areas amidst external users.

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〈국문요약〉

본 연구는 외부 침입으로 인하여 증가되는 삼림 벌채를 마주한 중남미지역 원주민 공동체가 실시하는 숲의 공동자원 관리를 자원과 거버넌스의 역학에 초점을 두고 살펴보고자 하였다. 공동자원 관리에 관한 오스트롬(Ostrom)의 연구를 기반으로, 개선된 사회생태체계(Social-ecological system, SES) 분석틀을 소개하고, 외부 개발자를 포함하여 브라질의 와자피(Wajãpi)와 페루의 시피보(Shipibo) 원주민 공동체에 적용한 사례를 분석하였다. 공동자원 관리와 외부 사용자에 의해 제기되는 문제 해결에 대한 분석 결과는 거버넌스 권리와 체계적 대응이 핵심인 것을 보여 주었다. 와자피 공동체는 관리 계획 및 규약서의 수립을 통해 외부 사용자 통제에 대한 정부 지원을 적극적으로 모색하였으며 거버넌스 권리를 주장하였다. 반면, 시피보 공동체는 국가 보호지역의 규제로 제약을 받았으며 외부 사용자 통제를 위한 공동체의 구조화된 대응 전략 또한 부재하였다. 이 같은 결과는 외부 침입 아래 공동자원의 효과적인 관리를 유도할 수 있는 공동체의 자치권과 제도적 조정의 중요성을 상기시킨다.

주제어: 공동자원 관리, 사회생태체계(SES), 원주민 공동체, 거버넌스 시스템, 라틴아메리카

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