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Contradictory distributive principles and land tenure govern
benefit-sharing of payments for ecosystem services (PES) in
Chiapas, MexicoSantiago Izquierdo-Tort^{1,2,*} , Esteve Corbera^{3,4}, Adrian Martin⁵ , Julia Carabias Lillo^{2,6}
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E-mail: santiago.izquierdo@itam.mx**Keywords:** payments for environmental services, distributive fairness, environmental justice, incentive-based conservation, Lacandon rainforest, distributive justice, social equitySupplementary material for this article is available [online](#)**Abstract**

Payments for Ecosystem Services (PES) are incentive-based instruments that provide conditional economic incentives for natural resources management. Research has shown that when economic incentives are parachuted into rural communities, participation and benefits are collectively negotiated and shared. However, we know little about how benefit-sharing evolves over time in community-based PES. To address this gap, we examine distributional justice in four communities of the state of Chiapas, Mexico, which participate in a PES programme, and we assess how local justice principles compare with the programme's goals. Our analysis reveals patterns of both continuity and change in how communities share PES benefits, which reflect a suite of contradictory justice principles, including entitlement, merit, need, and equality. The studied communities distribute PES benefits by providing differentiated compensation to diverse groups of landholders via private cash payments, whilst also attending non-landed community members through public infrastructure investments. We show that benefit-sharing is strongly influenced by pre-existing land tenure features and associated norms, which in the study area include three different types of individual and common-property. Yet, we also show that communities continuously adjust benefit-sharing arrangements to navigate distributional challenges emerging from programme engagement. Overall, we provide novel insights on the evolution, diversity, and complexity of distributive justice in community-based PES and we advocate for a context-sensitive, nuanced, and dynamic account of justice in incentive-based conservation.

1. Introduction

Payments for Ecosystem Services (PES) have become a mainstream incentive-based environmental policy over the last two decades (Salzman *et al* 2018). PES provide monetary or in-kind incentives to landowners and/or rural communities conditional on the implementation of specific natural resources

management activities, including forest conservation, which should directly or indirectly result in the provision of ecosystem services. In low and middle-income countries, and particularly Latin America, many PES involve communities who collectively negotiate participation and benefit distribution (Kerr *et al* 2014, Kaczan *et al* 2017, Hayes *et al* 2019). In these contexts, collective decision-making processes shape the access

to and sharing of PES benefits, whilst also influencing PES prospects for alleviating rural poverty (Bulte *et al* 2008).

Community-based PES implementation often involves different processes than individual PES, for instance, by simplifying programme operation, reducing transaction costs, or fostering community-wide benefit-sharing (Muñoz-Piña *et al* 2008, Pagiola 2008). However, collective decision-making processes can create inequalities and social conflict (Corbera *et al* 2020). Understanding the contextual and policy-related factors that cause negative distributive outcomes in community-based PES is thus crucial because unfair or inequitable experiences can undermine programmes' social legitimacy, local viability, and environmental effectiveness (Corbera and Pascual 2012, Wells *et al* 2020).

Assessing whether PES are equitable requires an understanding of local equity perceptions (Sikor *et al* 2014). This is because perceptions over what constitutes an 'equitable' system to distribute PES benefits—in terms of a defined set of recipients (i.e. who receives benefits), a benefit mode (i.e. how benefits are allocated, such as in cash or in-kind), and an allocation principle (i.e. which equity principles determine distribution)—differs across geographical and cultural contexts (McDermott *et al* 2013). Local institutions can also influence benefit-sharing practices (Martin *et al* 2014, 2019, Hayes and Murtinho 2018, Haas *et al* 2019, Loft *et al* 2019), which may not necessarily match programme goals (Loft *et al* 2017).

In this paper, we investigate the relationship between community-based distributive justice principles, local benefit-sharing outcomes, and policy objectives in Mexico's PES programmes. Distributive justice is broadly understood here as the allocation of benefits and costs between individuals or social groups, and it is one of three other dimensions of justice (e.g. *procedural*, *recognition* and *contextual*; see Friedman *et al* 2018). Drawing on extensive field research in Selva Lacandona (Chiapas), we ask how communities understand and perform benefit-sharing of PES revenues in terms of the distributive principle, recipients of distribution, and benefit mode, and to what extent such sharing practices align with or contradict programme goals. We consider distributive principles as 'decision-making guidelines that organise the relationship between subjects for particular dimensions of justice' (Sikor *et al* 2014, p 526), which reflect what is considered a fair distribution in a given setting.

In a context of PES implementation, the following distributive principles are relevant:

- (a) *entitlement*, where PES benefits are distributed according to a given entitlement, such as property rights;
- (b) *merit*, where PES benefits are distributed based on some measure of merit, such as the

contribution in terms of invested time or land allocated to PES activities, or opportunity costs, understood as income forgone as a result of entering land into the PES scheme;

- (c) *need*, where PES benefits are distributed considering those most in need, although what are real or purported needs may be often controversial; and
- (d) *equality*, where PES benefits are distributed evenly across all recipient subjects.

During fieldwork, however, we realised that PES participants sometimes understood equality as needs-based distribution that promoted equality of capabilities, which suggested that equality and need could be regarded as inseparable. Henceforth, those cases where the distribution of PES benefits prioritised the most vulnerable at community level were considered to be governed by a 'need/equality' principle.

Who should be the set of recipients entitled to PES benefits in a given context (e.g. participants only, or both participants and non-participants) can be influenced by PES programme rules, local institutions, or PES participants. For example, a given PES programme can consider households without property titles non-eligible for PES participation, but these households may still receive benefits from fellow participants. Recipients of distributive justice in a PES context may thus evolve over time and be contextually contingent. Finally, PES literature has shown that the benefit mode ranges from in-kind contributions to payments in cash or investment in public goods (Mahanty *et al* 2013, Izquierdo-Tort 2020).

This article diverges from research that has investigated justice issues in PES in at least three ways. First, we focus on 'intra-community sharing of PES benefits and the correspondent associated equity principles'. Studies have documented that communities may develop multiple benefit allocation mechanisms, including different forms of individual compensation to specific social groups (Yanez-Pagans 2013, Alix-Garcia *et al* 2015, Haas *et al* 2019) and various types of public investments (Mahanty *et al* 2013, Alix-Garcia *et al* 2018). Other studies have revealed a diversity of distribution systems and underlying drivers of benefit-sharing across local contexts, including different local norms and preferences (Martin *et al* 2019). Focusing on local perceptions of equity in a case study in Vietnam, Loft *et al* (2017) show that an equality principle was highly preferred by most households for PES benefit-sharing, whilst merit and needs were much less popular. However, these studies do not reveal if and how communities may employ distinct distributive justice principles to share PES benefits over time and how the latter affects local outcomes.

Second, we examine 'the evolution of community-based benefit-sharing systems'. There is growing recognition that PES programmes' goals

and local notions of social justice may diverge, and that interactions between policy and local principles can foster or hinder programmes' performance (Hayes and Murtinho 2018). However, what communities or policymakers consider as fair may change over time. Community-based PES distributions may change during enrolment years (Corbera *et al* 2007a, García-Amado *et al* 2011), whilst PES scheme design and implementation may undergo significant changes in stated objectives and informal practices (Izquierdo-Tort *et al* 2021). A better understanding of these changing processes should provide clues for what to expect with evolving PES implementation regarding equity, including cases where communities participate in several contracts simultaneously (Le Velly *et al* 2017).

Finally, we provide one of the few 'analyses of distributive justice in PES in Mexico and Latin America'. In a study among six communities participating in the PES programme Socio Bosque in Ecuador, Hayes and Murtinho (2018) found that communities generally distributed benefits based on egalitarian or equality principles and that such distribution tended to be perceived as fair by participant households. In Mexico, nation-wide studies of communities participating in PES have shown variations in how funds are allocated at community level, with frequent uses of funds including: (a) monetary allocation among members; (b) investment in public goods; and (c) purchase of the material required and payment of daily wages for forest management (Alix-García *et al* 2012, World Bank Group *et al* 2017). Further, case studies in Chiapas—where this study took place—have documented the collective benefit-sharing mechanisms adopted to participate in PES (Corbera *et al* 2007a, 2009, 2020, García-Amado *et al* 2011, Izquierdo-Tort 2020) and suggested mixed distributional outcomes. We expand this work by examining the distributive justice principles which underlie benefit-sharing among participating communities. We focus on Mexico because the country's PES programmes are some of the longest-applied schemes worldwide (Shapiro-Garza 2020); they have poverty alleviation as a key programmatic goal (Muñoz-Piña *et al* 2008); and they represent a large incentive-based experiment in collective land tenure because over 60% of Mexico's forests are held in common-property (Madrid *et al* 2009, p 184).

2. Materials and methods

2.1. Mexican PES programmes

Mexico is a pioneer in PES implementation in Latin America alongside Costa Rica (Muñoz-Piña *et al* 2008). Mexico's National Forestry Commission (CONAFOR) implemented nation-wide schemes for hydrological services and biodiversity conservation since 2003 and 2004, respectively. Programmes provide annual payments over renewable five-year

contracts, during which participants must conserve enrolled forests and develop forest management activities (e.g. firebreaks). CONAFOR monitors compliance through remote sensing and on-field visits. Payments are given per hectare (around Mxn\$1000 or USD\$48 in 2021) (Izquierdo-Tort *et al* 2021).

When the applicant involves a community, or a group of landholders, CONAFOR disburses payments to community authorities through bank transfers after verifying compliance. Community authorities then distribute PES revenues among its members based on collective agreements made within the community assembly⁷. Communities may choose to modify these agreements throughout the duration of the PES contract. Intermediary actors certified by CONAFOR, such as Non-Governmental Organisations (NGOs), forest engineers, and other technical service providers, help communities prepare applications and guide field-level implementation of programme activities.

2.2. Four ejidos in Selva Lacandona

We analysed benefit-sharing by four neighbouring *ejidos*⁸ of Marqués de Comillas (MdC) in Selva Lacandona (figure 1) participating in the national biodiversity PES scheme. By 2020, MdC had 12 892 inhabitants⁹ across 22 *ejidos*. MdC's population suffers from economic poverty and lacks basic educational, health, and sanitary services. Most households rely on crop agriculture and livestock for subsistence and income, and many receive cash transfers, agricultural subsidies, and PES (Izquierdo-Tort 2020).

The four selected *ejidos* were established between 1970s and 1980s by peasants from across Mexico (table 1). MdC settlement and associated productive activities triggered extensive deforestation (Jong *et al* 2000, Fernández-montes de Oca *et al* 2015)¹⁰. Previous PES studies in MdC show that programmes have been highly effective in securing compliance and reducing deforestation (Costedoat *et al* 2015, Izquierdo-Tort *et al* 2019).

In the study site, lands tenure includes three property types: (a) '*ejidal* parcels', small communal land

⁷ *Ejido* communities are governed by an assembly of all the household heads who hold formal land entitlements, known as *ejidatarios*. Communities elect three members (i.e. president, secretary, treasurer) as formal authorities in front of the State's administration during three year appointments. The assembly formulates collective decision-making procedures and rules within the community, including those related to resource management and access to and distribution of government subsidies.

⁸ *Ejidos* are a type of collective tenure recognized after the Mexican revolution in the early 20th Century which are composed of individually held land plots and common resource management areas under a communal governance system (Barnes 2009).

⁹ According to 2020 census data from Instituto Nacional de Estadística y Geografía (INEGI): www.inegi.org.mx/programas/ccpv/2020/default.html.

¹⁰ Between 2001 and 2018, 37% of the municipality's forests (24 253 hectares) were lost, at an average annual forest cover loss rate of 2.06% (Izquierdo-Tort *et al* In Progress).

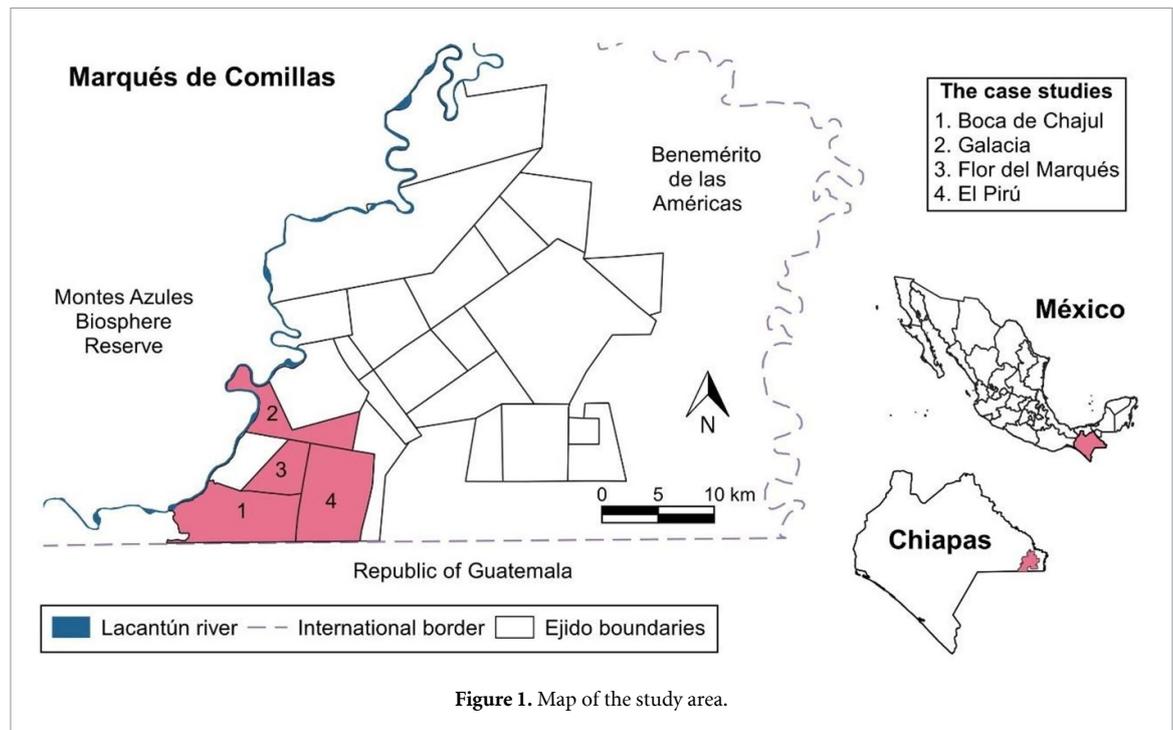


Figure 1. Map of the study area.

Table 1. Key characteristics of the studied *ejidos*.

Feature	<i>Ejido</i>				
	Boca de Chajul	Galacia	Flor de Marqués	El Pirú	
Place of origin of the early settlers (and approx. date)	States of Chiapas, Guerrero, State of Mexico, Tabasco and Michoacán (1970s)	State of Chiapas (early 1970s)	States of Chiapas, Oaxaca, Veracruz (early 1980s)	States of Mexico City, Chiapas, Guerrero, Oaxaca and Michoacán (1980s)	
Population (2020)	385	232	201	207	
Year founded (# of <i>ejidatarios</i> on that date)	1976 (118)	1975 (50)	1984 (27)	1980 (51)	
Total # of hectares in year of founding	3810	2664	1779	4984	
Total # of hectares after PROCEDE during the late 1990s or early 2000s (# of <i>ejidatarios</i> on that date)	4408 (156)	2664 (53)	1779 (25)	4984 (54)	
Individual property as % of <i>ejido</i> (collective property ^a as % of <i>ejido</i>) at time of PES enrolment	De jure	94.4% (5.6%)	45.8% (54.2%)	0% (100%)	65.4% (34.6%)
	De facto	94.4% (5.6%)	99% (1%)	77.5% (22.5%)	65.4% (34.6%)

^a Includes communal lands and *ejidal* parcels.

Source: own elaboration with fieldwork data and information from Registro Agrario Nacional (RAN) and Instituto Nacional de Estadística y Geografía (INEGI).

plots assigned for basic services or for use by specific social groups (e.g. school or women); (b) 'communal lands', collectively managed forests; (c) 'individual parcels', household-managed individual plots encompassing farming, pasture, and forestry areas. Household heads entitled to land rights are known as *ejidatarios*¹¹.

¹¹ Before 1992, *ejidatarios* were not legally allowed to rent or sell lands, but henceforth *ejidos* could obtain individual titles and potentially privatise family-run and communal lands through a

Although Mexican law stipulates that tenure in *ejido* forested lands must be communal and cannot be individually parcelled, the studied *ejidos* developed

voluntary land certification programme called *Programa de Certificación de Derechos Ejidales y Titulación de Solares Urbanos* (PROCEDE) (Haenn 2006). The three PROCEDE steps are as follows. Firstly, *ejidos* can have lands measured and delineated. Secondly, *ejidatarios* can receive land titles to house plots, individual parcels and communal lands. In a final step, *ejidos* can privatise lands and dismantle the *ejido*. The last step concludes by legally changing the land regime to 'private property'. No *ejido* in MdC has completed this last step.

Table 2. Studied PES contracts in the *ejidos*. All *ejidos* participated in the national biodiversity PES scheme.

<i>Ejido</i>	Contract period	Lands enrolled by tenure type
Flor del Marqués	2009–2013	672 ha: 284 ha from individual parcels belonging to 21 <i>ejidatarios</i> ; 19 ha from <i>ejidal</i> parcels (10 ha ‘Women’ and 9 ha ‘School’ parcels); 369 ha from communal lands.
El Pirú	2009–2013	1231 ha: 750.6 ha from individual parcels belonging to 18 <i>ejidatarios</i> ; 68.9 ha from <i>ejidal</i> parcels (28.8 ha ‘School’ and 40.1 ha ‘Women’ parcels); 411.5 ha from communal lands.
Boca de Chajul	2008–2012	1071 ha: 819 ha from individual parcels belonging to 45 <i>ejidatarios</i> ; 250 ha from <i>ejidal</i> parcels (27.6 ha ‘School’, 60.6 ha ‘La Presa’, 126 ha ‘Mariposario’ parcels); 37.7 ha from communal lands.
Galacia	2008–2012	1058 ha: 1039.2 ha from individual parcels belonging to 38 <i>ejidatarios</i> ; 18.8 ha from <i>ejidal</i> parcel (‘Ejidal’).

Source: own elaboration with data collected from Natura Mexicana and fieldwork.

internal parcelling processes. Consequently, some lands *de jure* classified as communal are *de facto* held individually based on internal *ejido* agreements. From here on, land property refers to *de facto* property except when distinctions are required.

The studied *ejidos* participated in multiple national (biodiversity, hydrological) and subnational (Selva Lacandona) PES since 2008 (Izquierdo-Tort et al 2021). However, we focus on each *ejidos*’ first PES contract (table 2). We selected these cases for three reasons. Firstly, these *ejidos* participated in PES simultaneously and therefore faced the same programme rules. Secondly, they had the same PES intermediary, Natura y Ecosistemas Mexicanos (henceforth Natura Mexicana), a conservation NGO whose staff had regional experience since the 1970s (Carabias et al 2015). Finally, a focus on each community’s first PES contract allowed us to examine how pre-existing institutions shape benefit distribution systems without influence from prior programme involvement.

2.3. Data collection and analysis

Sixty-two interviews were conducted by the first author with PES participants, non-participants, and community authorities during two fieldwork rounds (2015–2016, 2020) (appendix available online at stacks.iop.org/ERL/17/055009/mmedia). First round interviews focused on the mechanisms and perceptions regarding PES benefit-sharing during the *ejidos*’ first PES contract. Interviews in 2020 focused on current PES distributive practices and changes over time. All interviews were developed with prior verbal consent and were recorded and transcribed for manual coding.

Considering that first round interviews asked retrospective questions beginning as early as 2008, which could potentially create bias, we made the following efforts to ensure the reliability of recall data: (a) we asked multiple informants in each community about distributive outcomes and decisions in their community, and we compared and contrasted their responses; (b) we asked community authorities to

show payment receipts or other forms of community documentation of how payments were distributed and/or spent. Overall, we found that interviewees’ responses were consistent in each community and that these matched with community documentation. We are therefore confident that the data we gathered is accurate.

We extracted from interview transcriptions the following information related to distribution systems: allocation principle, defined set of recipients, benefit mode. ‘Land tenure type’ emerged as a further theme during coding and we compared responses between informants over time to explore temporal, intra-, and inter-community variations. To understand how local distributive principles aligned with PES objectives, we reviewed the national biodiversity PES ‘rules of operation’ (reglas de operacion¹²) for 2008 and 2009, which specify PES objectives, methodology, and design features. We also conducted two interviews with regional CONAFOR staff in Tuxtla Gutierrez (in 2013 and 2016).

3. Community-based distribution systems

The studied communities devised diverse, complex, and evolving systems to share PES benefits (table 3). Whilst benefit-sharing varied across communities and over time, we identified land tenure type as a common factor shaping distributive outcomes. Overall, communities tended to ‘earmark’ or keep separate accounts for PES benefit-sharing based on whether money came from enrolled individual parcels, *ejidal* parcels, or communal lands. We have thus structured this section in three parts, which correspond to the distribution systems we found for each land tenure type.

The programme’s 2008–2009 rules did not explicitly specify how communities should internally distribute payments nor under which justice principles. Interviewed staff from CONAFOR’s office in Chiapas

¹² Available at CONAFOR’s website: www.gob.mx/conafor.

Table 3. PES benefit distribution in the studied *ejidos*.

Land tenure type	Distribution system			Applicable <i>ejidos</i>
	Allocation principle	Defined set of recipients	Benefit mode	
Individual parcels	Entitlement and merit	Individual parcel holders who enrolled lands	Private cash payment	All <i>ejidos</i>
Communal lands	Need/equality	Users of community infrastructure	Public goods investment	Boca de Chajul
	Entitlement	Communal land right holders	Private cash payment	El Pirú, Flor del Marques
<i>Ejidal</i> parcels	Need/equality	<i>Ejidal</i> parcel beneficiaries (i.e. women, youth, school)	Private cash payment	All <i>ejidos</i> except Galacia
	Need/equality	Users of community infrastructure	Public goods investment	Galacia
	Entitlement and merit	Individual parcel holders who enrolled lands	Private cash payment	All <i>ejidos</i>
	Entitlement	Communal land right holders	Private cash payment	Flor del Marqués

Source: own elaboration with fieldwork data.

confirmed a lack of involvement on distributional affairs, noting an institutional preference to avoid involvement in community politics. Similarly, interviewed *ejidatarios* from MdC confirmed their ability to freely decide regarding benefit-sharing without CONAFOR's influence. However, the rules of the national biodiversity PES scheme in 2008–2009 prioritised the participation of communities located in municipalities classified as 'marginalised', and it did so by awarding extra points in the application system to communities located in such municipalities. This 'pro-poor' emphasis—a persistent pattern in the targeting and selection of participants in national PES schemes in Mexico (see Muñoz-Piña *et al* 2008, Sims *et al* 2014, Izquierdo-Tort *et al* 2021)—reflects a needs-based equity principle within CONAFOR.

3.1. Individual parcels: private cash payments and entitlement and merit

In the four studied *ejidos*, revenues from individual parcels were allocated in private cash amounts proportional to the number of hectares enrolled by each landholder. For instance, an *ejidatario* who enrolled ten hectares of individual lands received an annual cash payment equivalent to ten hectares at the contract's payment rate. All *ejidos* used the same distribution system throughout the PES contract's timeline.

Entitlement and merit governed private cash disbursements that accounted for both land rights and opportunity cost considerations. Firstly, private cash payments recognised individual parcel holders' rights to receive benefits associated with their property, as happens with other governmental agricultural subsidies which directly accrue to landowners. At the same time, cash disbursements compensated landholders for potential opportunity costs of participating in PES. This is because programme rules explicitly forbid crop and livestock agriculture on enrolled

lands, and they also restrict the extraction of timber and other non-timber forest products. The rationale behind this individual distribution of PES benefits based on both entitlement and merit is explained by an individual parcel holder from El Pirú,

The land is theirs. Their parcel is theirs. No way can we take what is theirs, their heritage and give it to the *ejido*. That is for them and their family. Otherwise, that person must use the land, they must harvest. The person is not working their land so that is their money.

However, cash allocations were not perfectly aligned with opportunity cost calculations. Each individual parcel holder received the full payment proposed by CONAFOR in exchange for forest conservation despite potential variations in opportunity costs based on economic activities and land suitability for alternative uses for each landholder. In fact, opportunity costs may be lower than the PES payment per hectare for many participants. After all, previous PES studies in MdC show that enrolled forest parcels are remote and of low soil quality, whilst participants face capital and labour constraints for agricultural expansion (Izquierdo-Tort *et al* 2019).

3.2. Communal lands: entitlement and merit versus need/equality

In the study area, three of the four *ejidos* still held communal lands, and each devised a different system to allocate PES revenues (table 4). In Boca de Chajul, payment distribution was based on need/equality since distribution targeted the needs of specific vulnerable groups. In this case, a share of PES revenues each year was invested in funding a school bus that picked children from neighbouring *ejidos*

Table 4. Distribution systems related to communal lands.

<i>Ejido</i>	Land rights: access and distribution	Distribution system		
		Defined set of recipients	Mode	Allocation principle
Boca de Chajul (2008–2012)	All 169 <i>ejidatarios</i> equally	Users of <i>ejido</i> infrastructure	2008–2012: investment in school bus; 2010–2012: investment in health clinic and public lighting	Need/equality: public investments focused on infrastructure needs
El Pirú (2009–2013)	Group of communal land right holders proportional to share ownership	Communal land right holders	2009–2013: proportional individual/private cash payments	Entitlement: private cash payments according to tenure rights
Flor del Marqués (2009–2013)	2009–2010: all 25 <i>ejidatarios</i> equally	2009–2010: all 25 <i>ejidatarios</i>	2009–2013: equal individual/private cash payments	Equality: payments accrue equally
	2011–2013: all 17 <i>ejidatarios básicos</i> equally	2011–2013: all 17 <i>ejidatarios básicos</i>		Merit: payments awarded according to previous and current conservation efforts

Source: own elaboration with fieldwork data.

to attend the local school. Towards the contract's end (2010–2012), some revenues were invested in the health clinic and street lighting. These allocations were promoted by the *ejido*'s president who saw PES funds as an opportunity to improve deficient public services. Several interviews in Boca de Chajul confirmed that the president¹³ persuaded the *ejido* assembly to invest PES money on certain collective needs as a 'better' use of the money despite some initial interest among communal right-holders for individual distributions. The following interview with the *ejido* president highlights his views about the use of PES funds,

To me there are three basic things that we need in this *ejido*. Education so that this town improves. Health because I have seen people die of nothing. Social development to help people so that their income can be enough. Therefore, when I saw the possibility of making improvements (with PES money), I wanted to do it.

In El Pirú, PES revenues from communal lands were distributed based on entitlement: monies were disbursed in proportional cash payments among the cohort of 22 people who held the set of 54 rights to communal lands¹⁴. For example, each of the six *ejidatarios* who held two rights received 3.8% (2/54)

of the payment. Whilst the distribution system in El Pirú (and in Flor del Marqués as detailed below) resembles that of individual parcels (section 3.1), it was not based on opportunity cost considerations because these lands were not individually parcelled and therefore no *ejidatario* is entitled to engage in income earning activities on PES lands, including agriculture or cattle grazing.

In Flor del Marqués, payment distribution changed from equality to merit-based. In the first two contract years (2009–2010), all 25 *ejidatarios* of the *ejido* received equal cash payments. In the last three years (2011–2013), however, only the 17 *ejidatarios básicos*¹⁵ received payments. Interviews suggest that this change in the distribution principle reflected longstanding internal conflicts related to forest conservation between *ejidatarios básicos* and more recent settlers. The *básicos* asserted a merit-based system based on previous and current conservation efforts within the community. The *básicos* we interviewed argued that some *ejidatarios* did not follow PES rules,

32 *ejidatarios* involved in the PROCEDE process (originally there were 54 rights to communal lands). By 2009, 14 *ejidatarios* held one share each or 1.9% of all communal lands; six *ejidatarios* each held two shares or 3.8%; two *ejidatarios* held three shares each or 5.7%; and one *ejidatario* held 22 shares or 40.7%.

¹⁵ This group of *ejidatarios básicos* are the founding *ejidatarios* of Flor de Marqués, or their families, who are called as such because their names are listed in the 'basic folder' (carpeta básica), which is the official land documentation granted during PROCEDE. From interviews we gathered that PROCEDE officials did not grant individual parcel rights in Flor del Marqués in the late 1990s because the *ejido* was mostly forest-covered at the time, and thus the entire *ejido* surface remained as communal then. *Ejidatarios básicos* have since then sold land informally to more recently community-acknowledged *ejidatarios*.

¹³ The *ejido* president was a proactive individual who was born in the *ejido* but had migrated temporarily in 2003 with his family. He returned in 2007, was subsequently appointed as president, and took other leadership positions in the *ejido* the following years.

¹⁴ Before PES participation, a group of 22 *ejidatarios* had informally purchased all the rights to communal lands from the other

Table 5. Distribution of PES revenues from *ejidal* plots in the study area.

<i>Ejido</i>	Local name (ha)	Parcel purpose	Defined set of recipients and distribution mode		Allocation principle
Boca de Chajul	Escolar (27.6)	School	2008: (a) private cash payments to individual landholders who were rejected;	2008–2012: public investment in school bus, health clinic, and public lighting	2008: (a) entitlement and merit; (b) need/equality
	La Presa (60.6)	Conservation			2009–2012: need/equality
	Astillero (37.7)	Timber extraction			
	Mariposario (126)	Conservation	(b) investment in school bus		
Galacia	Ejidal (18.8)	Conservation		2008–2012: investment in ejido administrative needs	2008–2012: need/equality
Flor del Marqués	Escolar (9)	School	2009–2010: investment in primary school	2011–2013: private cash payments to group of 17 <i>ejidatarios básicos</i>	2009–2010: need/equality
	Mujeres (10)	Women	2009–2010: individual/private cash payments to female <i>ejidatarias</i> or wives of <i>ejidatarios</i>	2011–2013: individual cash payments to female <i>ejidatarias básicas</i> or wives of <i>ejidatarios básicos</i>	2011–2013: merit
El Pirú	Escolar (28.8)	School	2009: (a) private cash payments to individual landholders;	2010–2013: investment in school	2009: entitlement and merit
	Mujeres (40.1)	Women	(b) private cash payments to communal right holders	2010–2013: private cash payments female <i>ejidatarias</i> or wives of male <i>ejidatarios</i>	2010–2013: need/equality

Source: own elaboration with fieldwork data.

mainly by not participating in conservation activities and engaging in hunting, which risked PES participation. *Básicos* also claimed that they had conserved the communal forests and invested in *ejido* infrastructure since they settled long ago, which now entitled them to participate and benefit from PES. Ultimately, being unable to control activities by ‘non-compliant’ *ejidatarios*, the *básicos* opted for excluding the former from payments.

3.3. *Ejidal* parcels: evolving benefit-sharing

The four studied *ejidos* enrolled different types of *ejidal* parcels to PES and devised diverse distribution systems to share benefits (table 5). In each *ejido*, revenue distribution generally targeted the needs of the *ejidal* parcel user’s group (i.e. women or the school). However, the set of recipients and benefit mode varied between different kinds of *ejidal* parcels. PES money from the school parcel was invested in school infrastructure and managed by the school parent board, whilst PES money from the women’s parcel was evenly allocated among female *ejidatarias* or wives of *ejidatarios*, thus excluding other women. Money from other *ejidal* parcels, such as conservation parcels, was also invested in public goods, either to support the community’s administrative

needs (Galacia) or for local infrastructure (Boca de Chajul)¹⁶. In the words of an *ejidatario* from El Pirú,

The ‘School’ parcel is for the school. Whatever the school needs. We have like 25 hectares in the kinder and primary school. There is no high school, children go to Chajul or Orizaba. They used the money for doors, construction, furniture...The school parents decide. When the money gets here, it is given to the committee. The *ejido* decided to give it to the school. The school has always been in bad conditions, there is no more support than that.

However, equity principles associated with *ejidal* parcels evolved over time in all *ejidos* except for Galacia. In Flor del Marqués, the distribution changed from needs/equality in the first two contract years to a merit-based approach. In the first two years, the school’s and women’s parcel money was, respectively,

¹⁶ In this *ejido*, money from the Astillero parcel, which was designated for timber extraction, was also invested in public infrastructure.

invested in the schools and distributed among female *ejidatarias* or wives of *ejidatarios*. In the final three years, the school parcel money was distributed in equal cash payments among the group of 17 *básicos*, whilst money from the women's parcel was allocated equally to the wives of male *básicos* or female *básicas*. This distribution change resulted, as noted previously, from internal *ejido* conflicts regarding current and past conservation efforts.

The allocation principle in Boca de Chajul and El Pirú changed from an entitlement and merit-based approach in the first year of the contract, to a need/equality approach subsequently. In both communities, the beneficiaries used a share of *ejidal* parcel money from the first year to pay a group of people whose individual or communal lands had been rejected by CONAFOR in the *ejido*'s application. In doing so, they compensated fellow community members who had tried to enrol lands to PES but did not meet eligibility criteria. Rejected individual parcel holders in Boca de Chajul and El Pirú received private and proportional cash payments, whilst rejected communal right holders from El Pirú received private cash amounts corresponding to their ownership share (see sections 3.1 and 3.2). In the last four years of each *ejido*'s contract, *ejidal* parcel money was invested in public infrastructure (e.g. schools) or given in cash payments to women. This change occurred because PES applicants who were rejected in the first contract were able to enrol successfully through a new contract.

4. Discussion

The findings above demonstrate that communities involved in PES can develop complex, diverse, and evolving benefit-sharing arrangements reflecting a suite of contradictory distributive justice principles. As shown in previous studies in Mexico (García-Amado *et al* 2011, Alix-García *et al* 2012, 2015, Yanez-Pagans 2013, World Bank Group *et al* 2017) and elsewhere (Mahanty *et al* 2013), communities can allocate PES payments to specific individuals, split such monies collectively, or invest in local public goods. They can ' earmark ' community-based PES funds for certain purposes whilst maintaining flexibility to adapt benefit-sharing to changing contextual conditions.

The principles governing the distribution of PES benefits, such as entitlement, merit, need, and equality, do not always fall in their neat and separately theorised categories. Instead, we have shown that their expression on the ground is messy and intertwined. Previous studies in Mexico (Corbera *et al* 2007a, 2007b, García-Amado *et al* 2011) and elsewhere (Haas *et al* 2019) suggest that pre-existing land institutions influence how communities share PES revenues. We have advanced this evidence further by systematically linking benefit-sharing to land

property 'types'. Specifically, we have revealed strong links between 'individualised' land tenure and cash payments following entitlement and merit considerations. This echoes the distribution of other types of land-use subsidies in Mexico (Izquierdo-Tort 2020), as well as the sharing of PES benefits in agricultural frontier regions where common-property regimes have increasingly become individualised (García-Amado *et al* 2011, Corbera *et al* 2020), but instead contrasts with other studies that have shown a strong preference for equality in the distribution of PES benefits (Loft *et al* 2017, Hayes and Murtinho 2018).

In the studied communities, equality in distribution has only been a relevant concern when a share of PES enrolled lands affected common-property forests owned by a social group (e.g. the school forest plot) or by a group of individuals (e.g. the *ejidatarios*' common forest). The distribution or investment of the correspondent share of payments reflected then wider collective considerations, such as solidarity and conflict avoidance, and considered both need and equality simultaneously.

These insights suggest that distributive justice principles and practices can change at local-level under specific circumstances. Internal conflicts, as exemplified by Flor del Marqués where conflicts between landholders related to perceived non-compliance with PES norms, triggered changes in who was considered worthy of receiving payment. Further, enrolment in multiple PES schemes, as shown in Boca de Chajul and El Pirú where enrolment in a subsequent PES contract soon after the first contract had started, allowed the community to release resources for investments in public infrastructure that had previously been committed for compensating rejected landholders. The coexistence of, and dynamic interactions between, multiple PES participants and contracts can influence how programme incentives are distributed over time, which can have positive or negative distributive implications.

In this regard, it should be emphasised that PES programme's rules did not explicitly specify how communities should share benefits during the study period, which allowed communities to freely decide which distributive norms to apply and why. The participants we interviewed valued the autonomy offered by PES in terms of distributive decisions, which arguably improved the programme's local legitimacy and allowed communities to use their situated agency to craft appropriate benefit-sharing arrangements (Shapiro-Garza *et al* 2020). Such decision-making autonomy in programme implementation has been associated with high participation rates (Izquierdo-Tort *et al* 2021), high compliance with environmental protection conditions (Izquierdo-Tort *et al* 2019), and high effectiveness in reducing deforestation (Costedoat *et al* 2015). This evidence, notwithstanding, should not let one conclude that

distributional practices in community-based PES will always translate into inclusive, or pro-poor distribution systems where the most disenfranchised households of a given community profit from PES directly.

Finally, we acknowledge that the studied communities contain a series of specific features—high deforestation rates, presence of biodiversity conservation policies, small populations, and large proportions of parcelled lands—that strongly influence benefit-sharing practices. Therefore, the studied communities may not necessarily be representative of other *ejido* communities in Mexico or elsewhere. However, we believe that the theoretical and methodological approach developed here, as well as the findings, could well inform other analytical contexts where land-use change is proceeding apace amidst the implementation of PES programmes or other forms of incentive-based conservation policy.

5. Conclusion

This article has analysed how communities involved in PES distribute benefits, which distributive principles come into play, and how such principles are shaped by PES programme's rules and changing institutions and social dynamics at local level. We have shed new light on the diverse local mechanisms through which communities engaged in incentive-based policies, share benefits, and navigate emerging justice challenges. Specifically, we have shown that who is entitled to PES benefits within the community and the norms governing benefit-sharing can differ and evolve over time. Communities make distinctions between subjects of justice, which include individual or collective contributors to forest conservation based on property rights entitlements, and other marginalised or socially relevant groups based on gender or education considerations. Communities also distinguish between benefit types (e.g. cash payments versus collective investments) and between distributive norms, including entitlement, merit, need, and equality.

To conclude, we believe that before making grand claims about the relative fairness of incentive-based conservation policy one needs to understand local manifestations of justice (Corbera 2015). Mexican communities have, in principle, the agency to maximise local fairness in PES, but this hardly guarantees such a goal will be pursued or achieved. For example, none of the studied communities distributed all PES income to people in most financial need, nor did any community target benefits only to households who enrolled lands. Instead, the communities identified multiple beneficiary groups, and established diverse and mutable benefit-sharing systems with distinct distributive norms. There is therefore a research need for explicitly adopting a context-sensitive, nuanced, and dynamic account of justice in incentive-based

conservation to capture the evolution, diversity, and complexity of benefit-sharing in local settings.

Data availability statement

The data generated and/or analysed during the current study are not publicly available for legal/ethical reasons but are available from the corresponding author on reasonable request.

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Ethics declaration

The interviews conducted between 2015–2016 abode to the ethical guidelines of the University of Oxford, where the first author conducted his PhD (Research Ethics Approval—Ref. No. CUREC 1A/ODID C1A 17-061). Those conducted in 2020 followed the same guidelines and ethical standard. We confirm free, prior, and informed consent was obtained from all participants of this study.

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