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Are large-scale hydroelectric dams inherently undemocratic?

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ABSTRACT

Construction of large-scale hydroelectric dams has increased in recent decades in the Global South and emerging economies. Population resettlement is one of the most severe socioeconomic impacts caused by dam construction. Processes aiming to mitigate its impacts and restore livelihoods are often described as inadequate. The resettlement process' ineffectiveness could be explained by persistent deficiency in citizen participation, which is also a sign of the impacted population not being able to participate in the process affecting their lives. Our research presents a medium-N comparative study showing the pathways explaining deficiency of participation across 23 large-scale hydroelectric dams in Asia, Africa, and Latin America. We conducted a fuzzy-set Qualitative Comparative Analysis based on information from a qualitative *meta*-analysis and secondary sources. Our results suggest that there are at least two scenarios to explain deficiency in participation. The first scenario includes dams constructed during autocracies, mostly before the release of the World Commission on Dams guidelines. The second scenario involves the largest dams in our analysis, with high economic and political interests at stake built under both autocratic and democratic regimes, despite the presence of what we categorized as effective forms of public opposition to the project and resettlement process. We discuss features that make large hydroelectric dams less participatory or inherently undemocratic in the Global South.

1. Introduction

Since 1975, large-scale hydroelectric dams have rarely been built in the Global North. However, in the Global South and emerging economies, their construction has been booming for the past several decades (Moran et al., 2018; Zarfl et al., 2015). Their construction has been justified by both growing population and economies and the need of countries to be energy independent, and to reduce dependence on fossil fuels (Yüksel, 2010). According to the International Hydropower Association (IHA, 2018), in 2018 the globe had an installed hydropower capacity of 1,267 GW, with the biggest gains in capacity occurring in China, Brazil, and India.

The negative social-ecological impacts generated by large-scale hydropower dams have been reported widely in the literature (Benchimol and Peres, 2015; Fearnside and Pueyo, 2012; Grill et al., 2019; Hay et al., 2019; Winemiller et al., 2016; Ziv et al., 2012). One of the most severe impacts is population resettlement or displacement (Égré and Senécal, 2003) because it is a multigenerational process (Scudder, 2005) that impoverishes and disrupts the lives of those being resettled (Cernea, 1997a). The World Commission on Dams (WCD) estimated that last century up to 80 million people were displaced due to dam construction (WCD, 2000). Unfortunately, the processes aiming to mitigate and restore livelihoods of resettlers have largely failed (Cernea and Maldonado, 2018; Nakayama et al., 1999). Studies show that resettlement has typically disrupted community trust and social networks (Kirchherr et al., 2016b), and caused loss of land and houses (Aiken and Leigh, 2015; Akca et al., 2013). Some authors argue that these processes have been ineffective in part because of the low involvement of impacted communities in their design and implementation (Cernea, 2008; Wilmsen et al., 2018). Since the 1980s, studies have identified persistent participation deficiency in project decision making by affected communities in the Global South (Baldwin and Twyford, 2007; Hay et al., 2019; Siciliano and Urban, 2017; WCD, 2000). On addition, this lack of participation has a negative impact on the rights of people displaced by dam construction to decide over the project that will affect their lives and livelihoods and those of future generations.

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Governments blame the victims for failures in participation (Boanada Fuchs, 2016), but the degree of participation of those displaced by dam construction in resettlement processes is influenced by many factors, such as political conditions, i.e. the roles of different actors—especially the state—and their interactions, such as among the state, civil society, and transnational non-governmental organizations (NGOs). These conditions can be related to the national political regime (Blake and Barney, 2018; Burrier, 2016; Jusi, 2006; Olson and Gareau, 2018), governments' top-down policy making (Hall and Branford, 2012; Nakayama et al., 1999), bureaucrats' perceptions and practices (Burrier, 2016; Nakayama et al., 1999), geopolitical relations (Olson and Gareau, 2018), nationalist and modernist ideologies (Mohamud and Verhoeven, 2016; Wang et al., 2013), social mobilization, and the extent to which international NGOs and funders (i.e World Bank) pressure dam builders to include citizens' participation (Hall, 1994; Olson and Gareau, 2018; Wang et al., 2013), among others. These conditions often are interrelated; for example, Hall (1994) shows that the combination of organized local activism, Catholic church support, and pressure from World Bank achieved a more participatory resettlement process for the people uprooted by the Itaparica dam in Brazil.

Most research describing political conditions and participation in resettlement processes are single-case studies (Asiama et al., 2017; Habich, 2015; Hall and Branford, 2012; Jusi, 2006; Morvaridi, 2004; Olson and Gareau, 2018; Ty et al., 2013), single-country studies (Blake and Barney, 2018; Burrier, 2016; Mohamud and Verhoeven, 2016; Wang et al., 2013), or comparative studies of two dams (Hall, 1994; Nakayama et al., 1999). These types of studies hinder empirical generalization and theory building about "large-scale social entities and process" (Ragin, 2014: 13), such as deficiency of citizen participation in hydroelectric dam projects built across different societies and historical moments. We complement the literature with results from a medium-N comparative study of the political conditions explaining deficits of participation by affected populations in resettlement processes at 23 large-scale hydroelectric dams in the Global South. We used fuzzy-set Qualitative Comparative Analysis (fsQCA), which has been used by scholars to enhance knowledge and compare cases in the context of anti-dam movements (Kirchherr et al., 2016a) and natural resource management (Baggio et al., 2016; Basurto, 2013; Lam and Ostrom, 2010; Pahl-Wostl and Knieper, 2014; Villamayor-Tomas, 2018). We use this method because it allows for comparing relatively large numbers of cases while keeping the possibility to delve into the details of each case on a needed basis (Ragin, 2000). Also, fsQCA builds on the possibility that the explanatory variables are highly interrelated with each other, as shown in the literature reviewed for this study.

The main objective of this study is to explore the pathways of political conditions explaining the deficiency of participation in resettlement processes in dam construction in the Global South and emerging economies—Brazil, China, and India. We implemented fsQCA based on a qualitative *meta*-analysis of peer-reviewed articles exploring the social impacts of hydroelectric dams, as well as other secondary sources of information. The results contribute to identify possible explanations for the persistent deficiency of participation in resettlement processes.

2. Theoretical background

This study aims to explain the deficiency of citizen participation in resettlement processes by using three political conditions and one project characteristic measure as each dam's installed capacity. The political conditions are (1) forms of public opposition or social mobilization against the project; (2) national regime or the political opportunity structure (POS), i.e. the formal and informal political opportunities available to mobilize individuals in a state (Tarrow, 1998); and (3) the existence of international guidelines for citizen participation in dam construction, specifically the WCD report. In this paper, participation and public opposition are different concepts, and subsequently they have different roles in the analysis. Participation is understood as the extent citizens have a say in the resettlement process ranging from receiving information to negotiate with dam authorities when, where, and how to be resettled. Meanwhile, public opposition refers to the social mobilization of civil society against the project and resettlement process.

2.1. Deficiency of citizen participation in resettlement processes

We explored deficiency of citizen participation in resettlement processes. Literature on dam-induced displacement and resettlement has described the need for genuine participation of resettlers (Cernea, 1997a; Goulet, 2005; Hay et al., 2019). However, authors such as Cernea (2008) and Scudder (2012) note that in the context of dams, there is a lack of affected communities' participation, which is considered as one of the reasons for resettlement and compensation processes failure.

Scudder and Gay (2011) developed an index of participation in the context of dams based on four defined variables, but it does not consider participation as the degree of citizens' empowerment in the processes of decision-making. Therefore, we adopted Arnstein's (1969) ladder of participation. This author defines participation as the degree of citizens' empowerment in decision making, with three steps subdivided into eight levels ranging from the least to the most participatory. The first step includes non-participatory policies that lack community involvement. The second step, tokenism, includes information, consultation, and placation, in which the community cannot give their opinions or influence the decision making. The last step is citizen power that covers partnership (e.g., negotiation), delegating power, and control. The use of Arnstein's ladder of participation is useful because dam-building projects include information activities; however, they tend to overlook citizens' involvement in negotiations (Hay et al., 2019).

2.2. Causal conditions explaining deficiency of citizen participation in resettlement processes

Communities' participation in resettlement processes can be influenced by political conditions such as public opposition, national regime, international guidelines on citizen participation in dam construction, and hydroelectric project characteristics such as installed capacity. All of these are included in our analysis as causal conditions.

2.2.1. Forms of public opposition

Social movements aim to influence policy, and in some cases they manage to do so (Amenta et al., 2010; Hall, 1994). Kirchherr et al. (2019) found that anti-dam public opposition in Asia was present when local communities near the dam construction were not consulted nor considered for decision-making by dam authorities (e.g. Kaeng Suea Ten Dam in Thailand and Myitsone Dam in Myanmar). Thus, the lack of participation in dam projects is one of the motivations of public opposition against dams.

To understand the effect of public opposition against dam construction and/or its resettlement processes, it is important to identify whether there is or is no presence of activism and to recognize the different actions that activists implement to vindicate their demands. McAdam et al. (2010) differentiate between institutionalized opposition (using procedures through formal institutions, such as legal complaints) and contentious forms of protest (e.g. demonstrations and boycotts). Scheidel et al. (2020) report that environmental activism using institutionalized procedures like lawsuits are more likely to achieve their goals, and that activists implementing more diverse or multiple forms of public opposition (e.g., street protests combined with lawsuits) are more likely to succeed or to be effective in their demands (e.g., preventing the construction of a hydroelectric dam or obtaining a better-than-planned resettlement arrangement). For instance, because of a referendum and other forms of opposition (e.g. street protests) the construction of the Corpus Christi dam in the border of Argentina and Paraguay was stopped (Del Bene et al., 2018; EJAtlas, 2019a).

In a review of dam-building conflicts, Del Bene et al. (2018) also argue that activism actions can be classified as violent or formal. Formal actions are defined by the authors as forms of institutionalized public opposition. Examples of non-violent and non-formal (non-institutionalized) actions are protests and public campaigns, whereas violent and non-formal actions are like sabotage and property damage. They also highlight "alternative knowledge" actions that include community-based and participatory research, among others. These are actions that "detect specific impacts, or that denounce repression against communities" (Del Bene et al., 2018: 625). Alternative knowledge is relevant because it makes dam builders more accountable since people impacted can use this information to contest official information and influence the development of the project (McCormick, 2007).

Following Scheidel et al. (2020), we suggest that public opposition using institutionalized actions, or both institutionalized and contentious (including violent or non-violent actions), might be more effective in addressing their demands, compared to public opposition that only uses contentious actions. Therefore, we use *forms of public opposition* to explain deficiency of citizen participation in resettlement process. We expect dams facing less effective forms of public opposition to be sufficient, in combination with other causal conditions, with deficits of participation in resettlement processes. Following the ideas of Scheidel et al. (2020), a less effective form would be one in which environmental activists and locals do not use institutionalized procedures, nor diverse strategies (e.g. no combination of institutionalized and contentious actions, or institutionalized and alternative knowledge).

2.2.2. Political opportunity structure (national regime)

The literature on social movements suggests that the effect of public opposition on policy is mediated by *political opportunity structure* (POS) (Bohmelt, 2014). In this study, we understood POS as the national political regime. National governments are essential to determine whether a dam will be built or not and provide a legal framework for citizen participation (Baldwin and Twyford, 2007; Cernea, 1997b; WCD, 2000). Thus, the national political regime in which a dam is built is critical for policy and resettlement processes outcomes. Dam construction contributes to the making of state regimes or nations (Blake and Barney, 2018; Mohamud and Verhoeven, 2016). National regimes defended dam building based on nationalistic and modernist ideologies (Blake and Barney, 2018; Mohamud and Verhoeven, 2016; Wang et al., 2013). Nationalistic discourses for dam construction have happened in autocratic regimes as Wang et al. (2013) report for China in the period 1949–1977, Mohamud and Verhoeven (2016) inform for Sudan in the 2000s, and in democratic regimes, as Hausermann (2018) describes for Ghana in 2013. Social movement scholars argue that in more democratic regimes more opportunities exist for the rise and development of public opposition compared to autocratic regimes (Kirchherr et al., 2016a; Vrabiblikova, 2014). Therefore, we expect that effective forms of public opposition (institutionalized and diverse) will be lower in autocratic regimes that present less POS, and lead to lower participation of displaced population in resettlement processes.

Nonetheless, it is important to note that in autocratic regimes, public opposition and/or civil society opposition mechanisms exist (Bohmelt, 2014; Bohmelt et al., 2015). Meyer (2004) suggests that a lack of POS can hinder the rise of institutionalized forms of protest and trigger contentious ones.

2.2.3. International guidelines for citizen participation in dam construction provided by the World Commission on Dams

International guidelines on citizen participation in dam construction may also influence the degree of participation in resettlement processes. The leading international guidelines for decision-making processes in the context of dams is the WCD report, which was released in 2000 (Baldwin and Twyford, 2007; WCD, 2000). According to Schulz and Adams (2019), the report should be viewed as a set of best practices for stakeholders involvement in dam projects. The WCD report set the basis for planning, designing and operating hydropower on embracing participatory decision making (Schulz and Adams, 2019).

Acceptance and adaptation of the WCD guidelines among stakeholders (e.g. governments, private sectors, transnational organizations, and banks) have been diverse. Since the recommendations were not mandatory, the three largest hydropower developers decided not to endorse them because their governments perceived the WCD was bias against dams (India), was not improving the existing policies (Brazil), or did not include country representatives (China) (Schulz and Adams, 2019). Other stakeholders such as the World Bank recognized the importance of the recommendations but did not endorse them (Schulz and Adams, 2019). Nonetheless, the WCD recommendations are a reference point for the assessment of hydroelectric dams. In some cases, it have helped social movements to legitimize their vindication for more participatory processes (Seneddon and Fox, 2008; Schulz and Adams, 2019). Some funders such as the African and Asian Development Banks have agreed to adhere to its guidelines, other like the German Development Bank funds dams that follow the WCD recommendations (Scheumann and Hensengerth, 2014). Countries like Vietnam are following the WCD guidelines (Schulz and Adams, 2019). Despite having diverse responses from different actors, we argue that the WCD report facilitated awareness of the social implications of dams and revealed the polarization about dam construction at the global level (Schulz and Adams, 2019).

Therefore, *the existence of international guidelines on citizen participation through the* WCD report, is the third political condition in this study. We suspect that dams built in a context before the publication of these guidelines had fewer awareness for incorporating the voices of people affected by resettlement in decision making compared to dams built in a context after their publication.

2.2.4. Installed capacity

In the analysis we included *installed capacity* as a characteristic of the dam. The size of the dam, measured in megawatts (MW), reflects its potential benefits to the country and what is at stake in economic terms (WCD, 2000). Dam size is relevant because project authorities prioritize the technical and economic rationality of decision making over ethical and social concerns (Goulet, 2005). In addition, the size and funding of dam projects are critical for facilitating or challenging public opposition and influencing policy making (Kirchherr et al., 2016a; McAdam et al., 2010). We expect that larger dams, in combination with less effective forms of public opposition, autocratic regimes, and no international guidelines for dam construction, coexist with resettlement processes with deficiency in participation, because the economic stakes and interests are more likely to override participation.

In general, we expected deficiency of citizen participation to be present in scenarios in which dams face less effective forms of public opposition in autocratic national regimes, constructed before the publication of the WCD guidelines, and with larger installed capacity.

3. Research design

The literature described in Section 2 shows that there are at least three political conditions and one project characteristic that explain deficits of citizen participation in resettlement processes. To study the configurations among these conditions that coexist with deficit of participation of affected populations in resettlement processes, we used information from a qualitative *meta*-analysis dataset of peer-reviewed articles exploring social impacts of dams. In addition, we used secondary sources for the forms of public opposition, POS (national regime), and installed capacity. For the analysis, we implemented fsQCA.

3.1. Data collection

The qualitative *meta*-analysis dataset was constructed after a literature search done in Google Scholar. Our selection criteria included

articles written in English focusing on large-scale hydroelectric dams (with a wall of 15 m or more) built in the Global South or emerging economies about social impacts of hydroelectric dams, the processes of resettlement and/or compensation, published in academic peer-reviewed journals in Indexed or Scopus databases, and based on primary data collection. In our qualitative *meta*-analysis, we included 227 case studies contained in 129 peer-reviewed articles published between 1980 and 2019. The *meta*-analysis included articles for 87 distinct dams.[1]

We selected only peer-reviewed journal articles, assuming these are the most reliable in terms of information quality. Studying different sources of information reporting number of people resettled by dams, Kirchherr et al. (2019) found that academics papers tend to report more negative impacts generated by dams than project advocates such as governments and donors, but less than reports done by activists. The authors conclude scholars are, among all sources on dam resettlement, the ones less likely to have a bias.

The articles contained in the *meta*-analysis were coded in the software NVivo 12 by four coders, following a codebook created to study the resettlement processes for hydroelectric dams. We utilized the results of the qualitative *meta*-analysis for the outcome (deficiency of participation), and for the causal condition of forms of public opposition (Appendix 1 in the Supplementary data contains detailed information about the variables taken from the qualitative *meta*-analysis).

We also gathered the information for the forms of public opposition from the *Global Atlas of Environmental Justice* (EJAtlas, https://ejatlas.org/). The EJAtlas is one of the largest datasets of environmental conflicts worldwide, including those related to the construction of hydroelectric dams (Scheidel et al., 2020). The EJAtlas classifies opposition from civil society into 21 forms—street protests and marches, occupation of buildings and public spaces, lawsuits and judicial activism, creation of alternative knowledge, among others (Del Bene et al., 2018). Public opposition against dams happened either because of the dam construction project (e.g. Chan 75, Ralco, Tehri, and Yacyreta), the resettlement process (unfair compensation, time of resettlement, place of resettlement, and the lack of community inclusion in the decisions such as Aswan, Bapanxia, Bayano, Hoa Bin, Liujiaxia, Machadinho, Merowe, and Three Gorges), or both (e.g. Belo Monte, and Ilisu).

We used the Democracy Index from the Polity IV Project of the Center for Systemic Peace (https://www.systemicpeace.org/polityproject.html) to obtain information about the national political regime in place during the year construction began on each dam. We retrieved the dataset from Our World in Data of the University of Oxford (https://ourworldindata.org/democracy). This index gives a yearly score to each country from −20 to 10 according to the extent that a country has democratic institutions. The index differentiates among democracy, anocracies, autocracies, and countries under colonization. In our study, all dams were constructed under democracies or autocracies. For this index, "democracy is a political system with institutions that allows citizens to express their political preferences, has constraints on the power of the executive, and provides a guarantee of civil liberties. In an autocracy, political preferences cannot be expressed, and citizens are not guaranteed civil liberties" (Roser, 2013).

3.2. Case selection

From the 87 large-scale hydroelectric dams covered in the qualitative *meta*-analysis, we included for this analysis 23 dams. We selected these dams because these were the ones that we had data for the outcome and causal conditions. All dams used in our study faced public opposition. Table 1 describes the characteristics of the 23 dams. These dams were built between the 1950s and 2010s and have an installed capacity between 220 and 22,500 MW. Construction of 14 of the 23 dams started before the publication of the WCD report and during autocracies. Autocracies include single-party regimes, dictatorships, and military dictatorships. Fifteen of the 23 faced public opposition that used institutionalized actions, whereas 14 faced diverse forms of opposition—institutionalized with contentious and/or alternative knowledge.

3.3. Data analysis

3.3.1. fsQCA

For the analysis we used fuzzy-set Qualitative Comparative Analysis: fsQCA (Ragin, 2008). fsQCA compares purposively selected cases using a dataset of medium or small N. It is based on set theory, configurational logic, and complex causation. fsQCA aims to understand how the configuration among different causal conditions (independent variables) explains the success or not of an outcome (dependent variable) regarding a particular social phenomenon (Ragin, 2008). It creates multiple configurations of causal conditions that are *necessary* or *sufficient* to bring about an outcome among the cases being compared (Ragin, 2008). A causal condition is *necessary* if it must be present for the outcome to occur (Ragin, 2014); a causal condition or a configuration of causal conditions is *sufficient* if when the causal condition(s) is(are) present, the outcome is present (Ragin, 2008). According to this method of analysis, multiple pathways or configurations, which are combinations of causal conditions, can explain the success or no success of an outcome. In this study, fsQCA served to understand the causal conditions (political conditions and project characteristic explained in Section 2) that are necessary or the configurations among these causal conditions that are sufficient to explain the deficits of participatory resettlement processes related to large-scale hydroelectric dams in the Global South and emerging economies. We did the analysis in the fsQCA software.

3.3.2. Calibration of outcomes and conditions

The analysis with fsQCA is possible only if the outcome and causal conditions have values between 0 and 1, which requires a calibration process to transform the original values of the outcome and causal conditions . Table 2 presents this calibration. It shows the value for the fsQCA, the definition for each value, and the sources of information (see Appendix 2 in the Supplementary data for an expanded description of the calibration).

To calibrate the outcome *deficiency of participation* in resettlement processes (LACKPAR), we used the direct method suggested by Ragin (2008), which is based on the researcher's knowledge and/or theory. We followed Arnstein's (1969) suggestion to use a scale of participation ranging from information-sharing that includes consultation, to direct involvement of the impacted population that allows them to negotiate (e.g. negotiation with the dam builders). Thus, we selected five variables from the qualitative *meta*-analysis that are features of civil society participation: consultation and information, participation, choice, negotiation related to when, where, and how to be resettled, and no delay of the resettlement (see Table 1A in Appendix 1 in the Supplementary data).

For the calibration of LACKPAR, we implemented a four-point scale using these variables. We calibrated LACKPAR from less participatory resettlement processes to more participatory (see Table 2) and assigned a value of 1 to resettlement processes with the most deficits (Fully not participatory). These are processes that showed no signs of participation and did not present a process of negotiation, choice of resettlement setting, or consultation/information activities. Dams with resettlement processes that had some deficits (Partially not participatory) were assigned a value of 0.66. Resettlement processes of these dams were implemented with neither negotiation nor choice, but they did have some sort of consultation and information process. Dams with

[1] Our coding strategy distinguished between studies and cases (Cox et al., 2014). A paper can analyze more than one dam project case if it studies the same dam over different time periods (e.g. longitudinal study) or compares different types of communities impacted by the same dam (e.g. resettled and not resettled).

Table 1
List of cases.

Region	Country	Dam name	Year construction started	Installed capacity (MW)	Political regime	Form of public opposition
Africa	Egypt	Aswan	1960	2,100	Autocracy	Institutionalized; contentious
	Ghana	Bui	2009	400	Democracy	Institutionalized; contentious; alternative knowledge
	Nigeria	Kainji	1964	760	Democracy	Institutionalized; contentious
	Sudan	Merowe	2004	1,250	Autocracy	Institutionalized; contentious
Asia	China	Bapanxia	1968	220	Autocracy	Institutionalized; contentious; alternative knowledge
		Nuozhadu	2004	5,850	Autocracy	Contentious
		Liujiaxia	1958	1,225	Autocracy	Institutionalized; contentious; alternative knowledge
		Sanmenxia	1957	400	Autocracy	Institutionalized; contentious
		Three Gorges	1994	22,500	Autocracy	Contentious; alternative knowledge
	India	Tehri	1978	1,000	Democracy	Institutionalized; contentious
		Sardar Sarovar	1987	1,450	Democracy	Institutionalized; contentious; alternative knowledge
	Lao People's Democratic	NamTheun 2	2005	1,075	Autocracy	Contentious
	Republic	Xenamnoy	2013	410	Autocracy	Contentious; alternative knowledge
	Turkey	Ilisu	2006	1,200	Democracy	Institutionalized; contentious; alternative knowledge
	Vietnam	Hoa Binh	1979	240	Autocracy	Contentious
		Son La	2005	2,400	Autocracy	Contentious; alternative knowledge
Latin America	Argentina/Paraguay	Yacyreta	1983	3,100	Autocracy	Institutionalized; contentious; alternative knowledge
	Brazil	Belo Monte	2011	11,233	Democracy	Institutionalized; contentious; alternative knowledge
		Machadinho	1998	1,140	Democracy	Institutionalized
		Sobradinho	1973	1,050	Autocracy	Contentious
	Chile	Ralco	1998	960	Democracy	Institutionalized; contentious; alternative knowledge
	Panama	Bayano	1972	260	Autocracy	Contentious
		Chan75	2007	223	Democracy	Institutionalized; contentious; alternative knowledge

resettlement processes that presented less deficiency (Partially participatory) were assigned a value of 0.33 because they provided choices to affected communities or allowed negotiations between resettlers and dam authorities but delayed the resettlement process. Finally, we gave a score of 0 (zero) to fully participatory schemes where dam authorities and government provided options and/or allowed negotiations and did not present delays in the resettlement process (see Table 2). Information from the qualitative *meta*-analysis did not report dams that have no delays in the resettlement process, except for Son La dam (see Table 2A in the Appendix in the Supplementary data).

The fsQCA aims to explain variation in deficits in participation as a function of configurations of conditions. In fsQCA terms this comes down to exploring which configurations of conditions tend to co-appear in cases that show participation deficits over 0.5 (0.66 and 1), as compared to the configurations that co-appear in the rest of the cases (0.33 and 0).

Table 2 also presents the calibration for all causal conditions. We calibrated forms of public opposition (NONINSTPROTEST) from less effective to more effective considering the extent to which the actions are institutionalized or contentious (Del Bene et al., 2018; McAdam et al., 2010; Scheidel et al., 2020), including Del Bene et al.'s (2018) category for the creation of alternative knowledge. Less effective forms of activism (dams with values of 1 and 0.66) do not or could not implement institutionalized procedures and therefore do not involve a diversity of activist strategies (Scheidel et al., 2020), as opposed to dams that have more effective forms of public opposition (values of 0.33 and 0).

We assigned a value of 1 to dam projects that faced less effective activism because the forms of public opposition were only contentious. Contentious can include one or more of the following actions: street protests or marches, strikes, sabotages, holding politicians or dam authorities as hostages, hunger strikes and self-immolation, occupation of buildings or land, blockades, public campaigns, boycotts of official procedures, artistic and creative actions (e.g., theatre, murals), developing a network of collective action, or involvement of national and/or international NGOs. Dams with fairly effective public opposition in which people implemented contentious actions and created alternative knowledge but did not use institutionalized opposition received a value of 0.66. We include in alternative knowledge community-based participatory research, media-based activism/alternative media, and creation of alternative reports/knowledge. The more effective forms of public opposition received values of 0 and 0.33. We assigned a value of 0.33 to dam projects that faced public opposition with alternative knowledge and institutionalized actions. The latter actions covered one or more of the following forms: lawsuits, court cases, judicial activism, referendums or other local consultations, objections to the environmental impact assessment, official complaint letters and petitions, refusal to accept compensation, or appeal or recourse to economic valuation of the environment. Finally, dams facing an effective combination of all three forms of public opposition—institutionalized, contentious, and alternative knowledge—were assigned a value of 0.

We calibrated the second causal condition, autocracy index (AUTOCRACY), into two categories. The first category was for dams whose construction started in autocratic regimes and had a score between −10 and −6 in the Polity IV Project index; we gave a value of 1 to these cases. The second category was for dams that began construction under democracies and had a score in the Polity IV Project index from 6 to 7; we assigned a value of 0 to these dams (see Table 2). We classified Yacyreta, a dam located at the border between Argentina and Paraguay, as an autocracy since its construction began in 1983 when Paraguay was ruled by an autocracy and Argentina's military dictatorship had ended a year earlier. We calibrated the causal condition *WCD* (BEFOREWCD) with a two-point scale considering the year of publication of the WCD guidelines (1 = before WCD; 0 = after WCD) (see Table 2).

To calibrate the installed capacity (INSTALLEDCAP), we used the direct calibration method described by Ragin (2008) (see Appendix 2 in

Table 2
fsQCA calibration and sources of information for the outcome and causal conditions.

Condition	Calibration		Source
	Value	Fuzzy-set value definition	
Outcome			
Deficiency of participation in resettlement processes	1	Fully not participatory: (no choice & no negotiation) & (no participation & no consultation)	Qualitative *meta*-analysis
	0.66	Partially not participatory: (no choice & no negotiation) & (participation & consultation)	
	0.33	Partially participatory: (choice or negotiation) & delay	
(LACKPAR)	0	Fully participatory: (choice or negotiation) & no delay	
Causal conditions			
Forms of public opposition	1	Less effective: only contentious	EJAtlas and qualitative *meta*-analysis
	0.66	Fairly effective: alternative knowledge & contentious	
	0.33	Partially effective: (institutionalized & alternative knowledge) or (institutionalized & contentious)	
(NONINSTPROTEST)	0	Effective: institutionalized & alternative knowledge & contentious	
Closed or autocratic national regime (POS)	1	Autocratic national regime: from −10 to −6 in Polity IV Project Index initial year of construction of the dam	Democracy Index retrieved from University of Oxford, Our World in Data (Polity IV Project, Center for Systemic Peace)
(AUTOCRACY)	0	Democratic national regime: from 6 to 7 in Polity IV Project Index initial year of construction of the dam	
World Commission of Dams (WCD)	1	Before international guidelines: before WCD: before 2000	World Commission on Dams Report (2000)
(BEFOREWCD)	0	After international guidelines: after WCD: 2000 and after	
Installed capacity in megawatts (MW)	1	Megadam: 2,100 MW or more	Multiple secondary sources from Internet, EJAtlas, and
	0.66	Large dam: 1,075–2,099 MW	qualitative *meta*-analysis
	0.33	Fairly large dam: 400–1,074 MW	
(INSTALLEDCAP)	0	Smaller dam: less than 400 MW	

Note: LACKPAR, lack of participation; NONINSTPROTEST, no institutionalized protest; AUTOCRACY, autocratic regime; BEFOREWCD, before the WCD ; INSTALLEDCAP, installed capacity of the dam at time of installation.

the Supplementary data for details of calibration). We classified megadams with a value of 1, large dams with a value of 0.66, and smaller dams with values of 0.33 and 0 (see Table 2). We define a megadam as one with installed capacity of 2,100 MW or more.

4. Results and discussion

The fsQCA results indicate political conditions explain deficiency of participation in resettlement processes. Among the 23 dams in the study, 16 had deficits in participation for resettlement processes. Among those, 11 had a score of 1 (no consultation, information, negotiation, or choice): Banpaxia, Bayano, Belo Monte, Bui, Hoa Binh, Liujiaxia, Merowe, Sanmenxia, Sardar Sarovar, Sobradinho, and Tehri. Five dams had a score of 0.66 (consultation or information, but no negotiation or choice): Aswan, Son La, Three Gorges, Xenamnoy, and Yacyreta (see Table 2b in Appendix 2 in the Supplementary data).

The fsQCA analysis shows that none of the causal conditions is necessary, or must be present, to explain the deficits in participation for resettlement processes for the 16 dams. None of the consistency scores for necessity is above 0.9, which frequently has been used as a threshold to determine whether a condition is necessary to explain an outcome (Schneider and Wagemann, 2012). Consistencies for conditions of NONINSTPROTEST, AUTOCRACY, BEFOREWCD, and INSTALLEDCAP are 0.46, 0.67, 0.67, and 0.57 respectively (for in-depth information about the fsQCA results, see Appendix 3 in the Supplementary data).

Three configurations of causal conditions or pathways are sufficient to explain deficits of participation (LACKPAR) in resettlement processes (see Table 3 and Appendix 3 for more information in the Supplementary data). In the first pathway (AUTOCRACY * BEFOREWCD), an autocratic regime in combination with a context before the publication of the WCD report is sufficient for resettlement processes to have deficits in participation. The second pathway (AUTOCRACY * ~INSTALLEDCAP) indicates that an autocratic regime in combination with an installed capacity of 1,074 MW or less is also a sufficient pathway for a deficit participation. The third pathway (~NONINSTPROTEST*INSTALLEDCAP) shows that public opposition with institutionalized and contentious actions in combination with large installed capacity (more than 1,074 MW) is also sufficient for fewer participatory processes. Thus, the solution formula of fsQCA shows three pathways of political conditions and a project characteristic that are sufficient for deficiency of participation in resettlement processes in hydroelectric dam projects.

Table 3 portrays the scores of consistency and coverage for each pathway. The consistency score assesses the sufficiency of each pathway. It "gauges the degree to which the cases sharing a given combination of conditions … agree in displaying the outcome in question" (Ragin, 2008: 44). All pathways are significant because they have high consistency scores above 0.80, whereas the coverage scores assess the empirical relevance of each pathway (Ragin, 2008). Table 3 illustrates the raw and unique coverage scores, which show the proportion of dam projects covered by the pathway (Ragin, 2008). The raw coverage

Table 3

fsQCA for outcome: Deficiency of participation in resettlement processes (LACKPAR)			
	First scenario		*Second scenario*
Causal pathway	*First pathway* AUTOCRACY*BEFOREWCD	*Second pathway* AUTOCRACY*~INSTALLEDCAP	*Third pathway* ~NONINSTPROTEST*INSTALLEDCAP
Consistency	0.89	1	0.88
Raw coverage	0.48	0.36	0.46
Unique coverage	0.08	0.04	0.26
Cases covered	Aswan, Banpanxia, Bayano, Hoa Binh, Liujiaxia, Sanmenxia, Sobradinho, Three Gorges, and Yacyreta	Banpanxia, Bayano, Hoa Binh, Sanmenxia, Sobradinho, and Xenamnoy	Aswan, Belo Monte, *Ilisu*, Liujiaxia, *Machadinho*, Merowe, Sardar Sarovar, and Yacyreta
Solution formula	(AUTOCRACY*BEFOREWCD + AUTOCRACY*~INSTALLEDCAP + ~NONINSTPROTEST*INSTALLEDCAP) → LACKPAR		
Solution consistency	0.89		
Solution coverage	0.82		

Note: AUTOCRACY, autocratic regime; BEFOREWCD, before WCD; INSTALLEDCAP, installed capacity of dam at time of installation; NONINSTPROTEST, no institutionalized protest. * = and; ~ = negation; + = or; → = sufficient for. The results of fsQCA is the parsimonious solution.

covers all the cases explained by a pathway, including those that are also explained by other pathways (e.g. Banpanxia dam is explained by the first and second pathways); the unique coverage covers the cases that are explained by only one pathway (e.g. Belo Monte, Merowe, and Sardar Sarovar dams are explained by the third pathway). In addition, the solution formula (all pathways together) is consistent because it has a solution consistency score of 0.89 and a high empirical relevance with a solution coverage of 0.82.

Although there are three separate pathways, the first two are related. Both are in the context of autocratic regimes, and all dams covered by the first and second pathways except Xenamnoy were built before the publication of WCD guidelines. Also, these configurations cover almost the same dams, which makes their unique coverage low. Consequently, we explain the first two pathways together since it is inherent for autocratic regimes to discourage public participation in decision-making processes. Our results suggest that the solution has indeed two scenarios: one in the context of autocracies (pathways 1 and 2) and the other involves the largest dams in our analysis with institutionalized and diverse public opposition (pathway 3) in both autocratic and democratic regimes (see Table 3). Appendix 3 in the Supplementary data shows in detail the fsQCA analysis.

4.1. First scenario: Autocracies in the absence of the WCD guidelines, and smaller dams in autocracies

The first scenario summarizes the findings of pathways 1 and 2. The first pathway (AUTOCRACY*BEFOREWCD) indicates that dams built in an autocratic regime and before the WCD report have deficits of participation in the design and implementation of resettlement processes. This pathway persists regardless of the forms of public opposition against the hydroelectric project and dam's installed capacity. This pathway has 0.89 of consistency and it explains 48% of the total cases that have a deficit in terms of participation in resettlement processes (Table 3). The second pathway (AUTOCRACY*~INSTALLEDCAP) shows that fairly large dams (between 400 and 1,050 MW) and smaller dams (less than 400 MW) built during autocracies are sufficient for deficits in resettlement processes. This is regardless of the form of public opposition and the year in which construction of the dam started. This pathway has a consistency of 1 and unique coverage of 36%. All but one of the dams in this set also are covered in the first pathway. This dam is Xenamnoy, built in 2013 after the WCD recommendations were published, under Lao People's Democratic Republic's autocratic regime. Thus, this set is almost a subset of the first pathway.

In general, this first scenario, covered by the first two pathways, includes dams that were built in a specific historical moment of autocracies, between the 1950s and 1980s, in Asia (Banpanxia, Liujiaxia, and Sanmenxia in China; and Hoa Binh in Vietnam), Latin America (Yacyreta in Argentina and Paraguay; Sobradinho in Brazil; and Bayano in Panama), and Africa (Aswan in Egypt). During this period, national rulers and military dictators possessed power over major agencies in their nations. Thus, the objections against government-sponsored projects, like large-scale hydroelectric dams, were repressed with violence, human rights violations, and strong legal penalties. Examples of this phenomenon include Hoa Binh in Vietnam and Aswan in Egypt (Dao, 2010; Weist, 1995). Many of these autocracies had internal policies that reduced participation in resettlement processes, and there was little to no international guidelines for citizen participation.

This scenario includes four dams built in the 1950s and 1960s in the communist/socialist single-party nations of China and Vietnam, before their economic liberalization. For instance, Banpanxia, Liujiaxia, and Sanmenxia dams in China did not have a process of negotiation between the affected population and the dam's authorities during resettlement (Jing, 1999). They were built in the era of Mao Zedong's communist government (started in 1949), a historical moment in which national interests were frequently used to justify the imposition of large dam construction (Wang et al., 2013). When locals affected by these hydroelectric dams protested, resisted leaving their houses, and made legal complaints against the resettlement processes, the government responded with violence by arresting or publicly executing the opponents for being enemies of the progress of the nation (Jing, 1997; Jing, 1999). Hoa Binh dam in Vietnam is also a case in this scenario. It was built during the first presidency of the Socialist Republic of Vietnam, and the authorities did not inform or consult with local communities since, at that time, the land was owned by the State and there was no requirement for undergoing environmental impact assessments before starting the project (Dao, 2010).

There was also a deficit of participation in more recent dams built in China. This is the case of the Three Gorges project that began in the mid-1990s—it is the largest dam in the world with 22,500 MW of installed capacity. Three Gorges was built during the period of market-oriented reform in China, in which citizens' participation started to be part of dam construction projects (Wang et al., 2013). The resettlement policy for Three Gorges ostensibly improved compared to the dams built in the Maoist era, since it delivered information to locals and allowed choices for resettlement (Heggelund, 2006; Wang et al., 2013). However, the affected community could not negotiate with dam builders. Civil society protested with contentious actions (e.g. people blocked the passage of dam authorities through the villages around the dam site and protested in Beijing) (Heggelund, 2006; Jing, 1997; Wilmsen et al., 2011) and produced alternative knowledge (EJAtlas, 2015). Opponents to dam projects were accused of being a counterrevolutionary group that sabotaged government projects (Jing, 1997). Three Gorges' very large installed capacity and the political, economic, and energy significance of it contributed to the regime's return to a more repressive and less

participatory way of operating.

As mentioned before, Xenamnoy is also a dam constructed in Lao People's Democratic Republic under an autocratic regime, but it is the only dam in this scenario constructed after 2000 – it is part of pathway two (see Table 3). This dam is part of the Xepian-Xenamnoy complex with 410 MW of installed capacity by 2019. Its planning started in 1994 as part of the economic development objectives of the Lao People's Revolutionary Party's Central Committee Politburo (Green and Baird, 2016). Xenamnoy was inspired by neoliberal policies that aimed to position Lao People's Democratic Republic as an energy exporter to neighboring countries Cambodia, Thailand, and Vietnam (Green and Baird, 2016). Resettlement began in the 1990s, but construction did not start until 2012, with some impacted people receiving compensation (Green and Baird, 2016). By 2012, Lao People's Democratic Republic had a legal framework on resettlement and compensation that resembled the WCD principles (Green and Baird, 2016). However, Green and Baird (2016) report that there was no participation of affected communities when the resettlement first started in the 1990s. This case shows how political conditions can change over time for the same dam project: resettlement plans started before publication of the WCD guidelines, but construction occurred afterwards.

Three of the dams in this pathway were built during military dictatorships in Latin America between the 1950s and 1970s. The Bayano dam in Panama did not have a consultation/information process (Finley-Brook and Thomas, 2010). This project started under General Omar Torrijos' military dictatorship (1968–1981). The military responded with violence (using tear gas and pellets) and human rights violations against those who protested the dam (Finley-Brook and Thomas, 2010). Sobradinho in Brazil was built during the military dictatorship of Emilio Medici. In this case, people did not have any input to the resettlement policy (Hall, 1994). Sobradinho displaced more than 70,000 people without any resettlement plan. The resettlement was so catastrophic that it was a catalyst for organizations such as the World Bank to implement the first international standards for resettlement in 1980 (Vanclay, 2017). Construction of Yacyreta dam, located on the border between Paraguay and Argentina, started in 1983 during the dictatorship of Paraguay's Alfredo Stroessner and a year after a military dictatorship ended in Argentina. Impacted groups engaged in multiple forms of mobilization, including legal complaints, creating alternative knowledge (e.g. reports and community-based participatory research), and protests. According to Del Bene et al. (2018), around 40,000 people from the Guarani indigenous group were forced to leave their territory.

Aswan is the only case in Africa included in this pathway. According to Weist (1995), dam authorities informed and consulted with people subject to displacement. However, there is no evidence of negotiation or that people were able to make choices in resettlement according to our qualitative *meta*-analysis. This dam was built between 1960 and 1970 in the Nile river during the autocracy of President Gamal Abdul Nasser, who presented the project as critical for the development of the country (Weist, 1995).

4.2. *Third pathway: The largest dams that face institutionalized and diverse forms of public opposition*

The second scenario is composed by the third pathway (see Table 3). It shows that the largest dams in our analysis (1,075 or more MW), including megadams (2,100 MW or more MW), facing legal complaints and protests from citizens (~NONINSTPROTEST*INSTALLEDCAP) also have deficits of participation in resettlement processes. Dams included in this pathway were built under autocratic or democratic regimes with top-down policies for development projects because they were seen by their governments as critical for the progress of the nation. Dams in this pathway were built before and after the WCD 2000 report. Under these political conditions, the hydroelectric projects had resettlement processes with no negotiation, choice, or even information or consultation procedures. The pathway that constitute this scenario has consistency of 0.88 and raw coverage of 0.46. It includes the Aswan, Yacyreta, and Liujaxia dams that are also in the first scenario, and other dams such as Belo Monte, Merowe, and Sardar Sarovar that are solely in the second scenario (see Table 3). Although Three Gorges is the largest hydroelectric dam in the world, it is not included in this scenario because available information on public opposition from our sources does not reflect social mobilization against this dam using institutionalized actions.

It might sound contradictory that more effective, diverse and institutionalized forms of public opposition against dam projects and /or resettlement processes, in combination with the largest dams in our sample, coexist with dams with deficiency in participation. According to Scheidel et al. (2020), the implementation of diverse forms of activism and legal procedures are related to successful outcomes for environmental movements, specifically in preventing the construction of infrastructure projects. However, our results illustrate that this is not always the case, especially considering that our research focused on dams that were built. We hypothesize that some of these largest dams in our sample (e.g. Belo Monte and Sardar Sarovar) had too much at stake in terms of political and economic interests to allow participation to influence or even undo the projects, despite the claims of civil society for better resettlement processes. Likewise Wood (1993) suggests for the Sardar Sarovar project in India, where it seems that dam authorities and governments were vested in building the dams rather than including displaced population in the decision-making of resettlement despite the multiples forms of public opposition. This pathway does not imply that institutionalized and diverse forms of public opposition lead to less participation of the displaced population in resettlement; instead, it shows that even in the presence of what we have categorized as effective forms of public opposition still there are deficiency of citizen participation in the largest dams in MW in our sample.

In this pathway, four dams were built during autocracies in Asia, Latin America, and Africa. Aswan, Liujiaxia, and Yacyreta were built before the WCD 2000 report and are also in the first pathway. Merowe dam was built during the autocracy of Omar Hassan Ahmad al-Bashir in Sudan after publication of the WCD recommendations. This dam is one of the largest hydroelectric projects in the Nile River (Kleinitz and Naser, 2011) and faced national and transnational public opposition repressed with violence by the government (Mcdonald et al., 2008).

The third pathway includes two dams built in democratic regimes; Sardar Sarovar in India (construction started in 1987), and Belo Monte in Brazil (construction started in 2011). Both dams implemented resettlement processes using a top-down developmental perspective. In the case of Sardar Sarovar, dam authorities did not consult with the affected population (Wood, 1993). The dam had 1,450 MW of installed capacity with institutionalized and contentious public opposition for almost 30 years at national and international levels. Nonetheless, the project commenced in 1987 during the era of "planned development" in India that was characterized by boosting infrastructure projects and centralized state decisions (Flood, 1997).

The Belo Monte dam, which is the fourth-largest hydroelectric dam in the world with 11,233 MW of installed capacity, displaced about 20,000 people (Randell, 2017). As in the case of Sardar Sarovar, the activism against this infrastructure project was massive, diverse, and with global support. The public opposition started when the project was conceived in the 1970s during the Brazilian military dictatorship and when the project was proposed again during the democratic governments of Luiz Inácio Lula da Silva and Dilma Rousseff in the 2000s. Protests, legal complaints, and creation of alternative knowledge were among the forms of activism implemented (EJAtlas, 2019b). According to the EJAtlas (2019b), the forms of public opposition included artistic and creative actions (e.g. murals), blockades, land occupation, building occupations, street protests, alternative knowledge (reports and research), and lawsuits. From the government's perspective, this dam was critical to meet the country's energy demands (Sousa Júnior and Reid, 2010; Randell, 2017). Because of a national blackout in 2001, President Lula da Silva and later President Rousseff prioritized

accelerated energy generation (da Costa, 2014). Some people had the opportunity to choose among resettlement options offered by the dam builders (Randell, 2016; Randell, 2017), but they were not allowed to participate in the decision-making process for resettlement—they did not have the choice of where, when, and how to be resettled (Hall and Branford, 2012). The decision-making process was neither transparent nor participatory (Sousa Júnior and Reid, 2010). Hall and Branford (2012) mentioned that this project recalls the "authoritarian tactics" in the realm of large infrastructure projects during the Brazilian dictatorship. When it came to economic development, none of the democratic regimes that followed the military dictatorship period renounced the priorities set during that period, which included hydropower development as a critical infrastructure to ensure Brazil's access to energy independence. In fact, a substantial national military force was made available at Belo Monte to control efforts to stop dam construction.

Belo Monte and Sardar Sarovar are examples of how democratic regimes also can have deficiency of citizen participation in resettlement process, despite the presence of diverse and institutionalized public opposition of civil society. There are at least three hypotheses for this phenomenon. First, the construction of hydroelectric dams in democracies of the Global South and emerging economies with lack of participation processes reflect governments' prioritization of large scale development projects because they are seen as critical for the construction of the nation, fit Western notions of the Modern state, and provide them with international reputation and political credibility at the national level (Blake and Barney, 2018; Hausermann, 2018; Mohamud and Verhoeven, 2016; Siciliano et al., 2019; Wang et al., 2013). Second, public interest stakes in large dams are very high, meaning that dam builders prioritize building a project over its ecological and social costs, including the well-being of communities living at the site of planned construction (Flyvbjerg, 2007). A third hypothesis is that the environmental norms of investors influence the process of dam construction, including resettlement schemes (Hensengerth, 2013).

Our study brings to the forefront at least two main insights that could be explored in the future. First, deficits in participatory resettlement schemes in democratic regimes happened under a certain scenario: for large-scale dams of high economic importance, and in countries with top-down approaches for the implementation of development projects. Second, development projects that generate environmental harms and negative socioeconomic effects on rural communities in the Global South are surrounded by violence. This violence can happen in democratic and autocratic regimes. Del Bene et al. (2018) illustrate how repression, criminalization, murder, and other violent actions against anti-dam social movements can occur in both democracies and autocracies. Dam construction is inherently undemocratic in both democratic and dictatorship regimes, since governments or private organizations use diverse forms of oppression against voices of civil society (Del Bene et al., 2018). Scheidel et al. (2020) discovered that approximately 13% of environmental activists around the world are assassinated and others are subject to other tactics of criminalization, with mining and water-management projects (including dams) being more associated with violent repression than other types of infrastructure projects.

5. Concluding remarks

In this research, we conducted a medium-N comparative study to identify the political conditions – forms of public opposition, national regime, and international guidelines for citizen participation in dam construction-, and one project characteristic – dam installed capacity – surrounding the deficiency in participation of citizens in resettlement processes by hydroelectric dams. We show that there are at least three pathways to explain the persistent deficiency of participation in resettlement processes, summarized in two main scenarios.

The first scenario highlights the roles of national and international political contexts. It shows that an autocratic national POS (national regime) in the absence of the international guidelines of the WCD coexist with less participation of citizens in resettlement processes. Within the first scenario, POS (the national regime) has a greater role than the forms of public opposition and the project characteristic in explaining lack of participation in resettlement processes. The combination of autocracy and the context before the WCD report limits participation of affected communities to influence decisions during dam construction.

The second scenario (third pathway in fsQCA) shows the importance of economic and political interests around dams in both, autocratic and democratic regimes. We found deficiency of participation of affected communities in resettlement despite the presence of institutionalized and diverse forms of public opposition when the construction of the biggest dams in our sample, the mega dams, served high economic and political interests. This latter pathway happens in democratic and autocratic national POS. We showed that in the case of the largest dams, democratic governments implement top-down policies and defend economic objectives over social outcomes in a similar way that autocratic regimes do. These results align with the observation of Del Bene et al. (2018) suggesting that oppression of activism and undemocratic practices are inherent to large-scale hydroelectric projects. However, our results provide an important qualification – that the size of the project and forms of public opposition can make participation in resettlement processes more or less likely.

We recommend future research into three aspects that we did not cover in this analysis. First, we need to better understand the conditions under which democratic countries have deficits in participation. Comparative studies that seek to find the differences and similarities between dams built under democratic and autocratic regimes, and their performance regarding resettlement processes can help answer this question. A second recommendation is to investigate what conditions are sufficient for the implementation of better participatory resettlement processes in dams. Finally, this study included only cases in which there was public opposition, and we did not differentiate dams that faced transnational activism versus national activism. Transnational activism has been critical in shedding light on impacts generated by dams and even by delaying and changing construction plans like in the Belo Monte case. We encourage future comparative analysts to consider dams that did not face social mobilization along with dams that face local and transnational activism.

The study has at least two limitations in terms of sampling and method of analysis. Firstly, we went through two sample processes to select the 23 dams included in the analysis, the first one done with the qualitative *meta*-analysis that included 87 dams on which academics have written and published in peer-reviewed journals on the topics of resettlement, compensation and social impacts of dams. The second one was looking among those 87 dams which ones had the variables needed to conduct the analysis presented in this paper. Therefore some large-scale hydroelectric dams such as Itaipu (border between Brazil and Paraguay), Xiluodu (China), Guri (Venezuela), and Akosombo (Ghana) where left out of the analysis since they were not reported in the studies that fulfilled the selection criteria. Despite this limitation, the sample includes a wide variety of large-hydroelectric dams across Africa, Asia, and Latin America, and important megadams in terms of installed capacity (e.g. Belo Monte dam in Brazil, Three Gorges dam in China, and Yacyreta dam in the border of Paraguay and Argentina). Therefore, the sample offers sufficient evidence to start examining deficits in participation with a Global South perspective. Secondly, scholars have mentioned that fsQCA simplifies the explanation of an outcome since it allows for a very limiting number of causal conditions (Kirchherr et al., 2016b). In this case, we selected four causal conditions. We did not include other causal conditions that can be critical to explain deficiency of participation, such as donor and type of contracts. However, the public information about these potential causal conditions in the case of dam construction is limited or unreliable.

Our results suggest that more equitable and participatory resettlement processes cannot be achieved if the complex political environment and economic development drivers are not recognized and

comprehended by the different actors involved. It is essential to note that although this study focused on political context and one project characteristic surrounding the functioning of the dam construction, it does not overlook the importance of recognizing that the largest dams, suppress participation in both democratic and autocratic governments despite the mobilization of civil society and the existence of international guidelines, such as the ones of the WCD. Our research raises questions of whether large-scale hydroelectric dams as sources of energy generation in the Global South and emerging economies should be challenged as inherently undemocratic. A robust democracy is also about respecting minorities and including them in decision-making processes – in this case, minorities are local communities affected and resettled (or not) by dam construction. Recognizing this fact is a first step toward finding democratic and participatory solutions to meet democratic societies' energy needs.

CRediT authorship contribution statement

Maria Alejandra Garcia: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft. **Laura Castro-Díaz:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft. **Sergio Villamayor-Tomas:** Conceptualization, Methodology, Writing – review & editing, Supervision. **Maria Claudia Lopez:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that might have influenced the work reported in this paper.

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Appendix A. Supplementary data

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