

## Article

# Hydro Power Plants as Disputed Infrastructures in Latin America

José Carlos Hernández-Gutiérrez <sup>1,\*</sup> , José Antonio Peña-Ramos <sup>1,2,\*</sup>  and Víctor I. Espinosa <sup>3</sup> 

<sup>1</sup> Department of Political Science and Public Administration, Faculty of Political Sciences and Sociology, University of Granada, 18071 Granada, Spain

<sup>2</sup> Faculty of Social Sciences and Humanities, Universidad Autónoma de Chile, Providencia 7500912, Chile

<sup>3</sup> Department of Business Administration, Universidad Autónoma de Chile, Providencia 7500912, Chile; victor.espinosa@uautonoma.cl

\* Correspondence: jchernandez@ugr.es (J.C.H.-G.); japramos@ugr.es (J.A.P.-R.)

**Abstract:** Non-violent methods can strongly support achieving the 2030 Agenda of sustainable development goals, increasing energy efficiency and access in the poorest countries. However, hydroelectric power stations are disputed strategic elements in any region of the world. This paper analyzes, firstly, the role of hydroelectric power stations as elements that have been generating conflicts in Latin America in the period 1982–2018 and, secondly, the conflicts themselves. The results show that indigenous peoples face the most significant risks from constructing dams and, consequently, they are the primary opponents of hydroelectric projects.

**Keywords:** sustainability; development; hydroelectric power stations; strategy; water conflicts; energy production



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## 1. Introduction

Water is the most critical natural resource globally and has become a strategic element due to its increasing scarcity and the possibility of its use in the form of energy, given the predictions of depletion of fossil fuels in the near future [1]. Hydroelectric energy is generated by transforming the force of water into electrical energy using large hydraulic infrastructures. A hydroelectric plant comprises three elements: a dam, which is the civil works infrastructure; a reservoir, which is the water store or 'artificial lake'; and a power plant, which is the facility where the electricity generation groups are located [2]. In this sense, the construction of gigantic infrastructures to generate electricity through water generates resistance and enormous economic, environmental, and social costs in different regions of the planet [3,4].

Latin America is a paradigmatic example in this regard. It is the region with the most significant water resources on the planet, as it has 33% of the world's renewable water resources [5]. This property makes hydroelectricity the most crucial source in today's Latin American electricity matrix [6]. Although Latin America generates around 65% of its electricity from water resources, the world average is approximately 16% [7]. Not only that, but the potential for further development is enormous. However, it is no less accurate than hydroelectric plants' construction, and its operation has caused a series of economic, environmental, and social impacts in the region [8].

In Latin America, there has been significant social resistance to installing hydro mega-projects [9]. Although hydroelectric dams are considered a development instrument, various reports and academic articles indicate that dams may generate numerous environmental, social, political, and economic impacts. The significance of these impacts is related to the fragility of the sector where the project is located and to the size of the project, such as alteration of terrestrial ecosystems and biodiversity, alteration of aquatic ecosystems and biodiversity, and impacts in fishing, changes in the river regime, alteration of natural

cycles of floods, alteration of the landscape, socio-economic and archaeological impacts, and, especially, on indigenous communities [10–14].

Despite this evidence, in order to obtain financial resources, the state authorities of some countries host hydroelectric projects without respecting the procedures established in the regulatory framework of their states (such as prior consultation with affected communities or studies of environmental impact), which generates conflicts between affected communities, on the one hand, and companies and state actors, on the other. Although these communities decide to resist in order to protect their homes, lifestyle, and territories, those who promote the construction of these infrastructures accuse them of slowing down progress and use violent methods to confront the resistance of those who oppose hydroelectric projects [1,4,8,9,13–17]. Freshwater and water systems (and any of their elements), such as hydroelectric power stations, are strategic elements in Latin America. Nevertheless, fossil fuels (mainly oil and natural gas) and fossil fuel systems have constantly been scrutinized [18,19]. In order to address the lack of literature on this subject, this paper analyzes the role of hydroelectric plants as elements that have generated conflicts in Latin America in the 1982–2018 period, as well as the conflicts themselves.

We restrict our study to systems using freshwater to produce energy. Thus, we do not include other conflicts over water desalination, aquifers, water transfers, nor do we include contested barrages or reservoirs that do not have a power plant installed. This approach reflects the aim of this article to show how hydroelectric energy production causes conflicts in Latin America. This article uses a database that has been little exploited in studies that focus specifically on the conflicts generated around hydroelectric power plants in Latin America to achieve this objective. It is the Water Conflict Chronology of the Pacific Institute. This database serves to analyze the socio-environmental conflicts derived from the construction and operation of hydroelectric power plants in Guatemala, Ecuador, Peru, and Honduras, in the period 1982–2018.

The hydro-politics literature has several schools of thought, including water wars due to their scarcity [20,21]; a more legal school of conflict and hydro-diplomacy [22,23]; or hydro-hegemony [24,25]. There is also literature along the lines of Peter Haas's work on the Mediterranean Blue Plan (1989); the work of Dukhovny and De Schutter (2011) is an example of this [26,27]. Additionally, the work of Mirumachi, Zeitoun, and Warner are essential to better contextualize the documentation within the relevant literature on hydro-politics regarding the definition of cooperation around water and conflicts over water [28]. It is also necessary to mention the work of the London Water Research Group on critical hydro-politics, including publications on water infrastructure and the work of Ahmet Conker on "small is beautiful but not trendy", in which he explains how governments use different strategies to build dams, generating transboundary conflicts [29–31]. As we focus on conflicts over energy produced by water, it is essential to consider the hazards that dams may potentially cause [32]. These accumulation systems need deep research regarding the site of construction and adequate management of the volume of water retained to avoid 'natural'—meaning that no deliberate action was observed—disasters as happened, for instance, in Spain [33]. It is, therefore, relevant to mention that these infrastructures represent strategic but vulnerable spots, and conflicts surrounding them are often treated cautiously in order not to cause the collapse of the dam. However, this condition has sometimes been used as a water weapon with great destruction potential [34].

As global warming is expected to affect water availability (because of changes in precipitation patterns, more irregular rainfall distribution throughout the year, an increase in temperatures with subsequent snow-melting), this would inevitably exacerbate tensions between actors. Water scarcity is becoming more widespread in the context of steady population growth and its concentration in urban areas and coastal cities, raising extreme concern among politicians [35,36]. This entails increasing concerns about water supply for human consumption and the availability of freshwater to produce hydroelectric energy. Although water scarcity is believed to represent a key factor when monitoring the risk of conflicts over water and energy, in some other areas where there is not a certain lack

of water resources, the low development of infrastructure makes these powering sites a national interest, often disputed by neighboring nations [37,38]. In these situations, it is not the scarcity of water but the scarcity of energy that triggers a conflict. These two situations are likely to be overcome in rich countries: new water resources are developed (desalination and recycled water guarantee constant water), and other sources of energy are promoted if there is a lack of freshwater (solar, wind, nuclear) [39,40]. Therefore, developing countries are more prone to rely on natural systems for water consumption and energy production. This circumstance suggests that environmental, social, political, and economic conflicts over “water for energy” are more likely to occur in developing countries [41,42]. As mentioned above, hazards should be considered due to the inherent building of a dam and power plant. These constituent elements are targeted amid war and indeed threatened if not permanently damaged. The latter is exposed to any country in the world.

Nowadays, global geopolitical interests determine the management of natural resources. An analytical framework based on the hydro-diplomatic negotiation at various levels, from local to international, helps balance the two areas. This model is a powerful instrument for the rational use of water, the preservation and restoration of marine and terrestrial ecosystems, along with the collection, treatment, storage of wastewater, and possible future reuse. Hydro-diplomacy is an alternative to disruptive civilian behavior and politically driven conflict. Throughout history, we have had evidence of the conflict-generating capacity of water and its ability to foster cooperation and dialogue between geopolitical rivalries. The joint search for facts is sometimes considered the most crucial element of water diplomacy. A multi-stage collaborative process makes negotiating parties with different interests and perspectives work together to find an efficient and lasting solution. “Hydro-hegemony is hegemony at the level of the hydrographic basin, achieved through control strategies of water resources such as the capture, integration, and containment of resources” [24]. Due to power asymmetries between individuals, societies, and countries, such multi-stage collaborative processes are often not applied. Instead, more powerful actors often impose or dictate policies. In the first place, the article explores the role of hydroelectric plants as elements that generate conflicts in Latin America in the period 1982–2018. These geopolitical conflicts are discussed below. Finally, we provide novel findings for future research on hydropower and social and political conflicts in developing countries.

## 2. Materials and Methods

The methodology used is eminently qualitative-interpretive. The primary method involves reviewing, identifying, and analyzing specific scientific literature with theoretical and empirical contributions more relevant to the subject in question. Information gathered from secondary sources has been critical in this research, which has allowed us to access the knowledge accumulated by renowned academics and intellectuals specializing in books, book chapters, articles, interviews, compilations, and documentary analysis of the specialty journals and newspapers (regional and global). Moreover, the legal regulations in Latin America have been extracted from the official gazettes.

The Pacific Institute has built the Chronology of Water Conflicts, periodically compiling, updating, and reviewing freshwater-related conflicts that erupted over five thousand years worldwide [43]. This is one of the most complete chronologies, especially if we are considering the 20th and 21st centuries, on which this article focuses; covering the conflicts that occurred in Latin America from 1982 to 2018. We will build our paper and our research question from the school of thought based on the hydro-political literature.

The Pacific Institute’s chronology classifies these water conflicts, which is the basis for our work. In this sense, it is essential to underline from the beginning that the paper does not intend to weigh the importance of other possible shared causes of some conflicts, but rather to analyze and highlight the role of the hydroelectric plants themselves from a qualitative point of view [44,45].

According to the classification system of the Pacific Institute, there are three categories of conflicts based on the role water played in them.

**Trigger:** Water as a trigger or root cause of conflict, where there is a dispute over the control of water or water systems, or where economic or physical access to water, or scarcity of water, triggers violence.

**Weapon:** Water as a weapon of conflict, where water resources, or water systems themselves, are used as a tool or weapon in a violent conflict.

**Casualty:** Water resources or water systems as a casualty of conflict, where water resources, or water systems, are intentional or incidental casualties or targets of violence.

In this paper, we address the causality category of conflicts. How do we define conflict? According to the Pacific Institute, an incident is classified as “a conflict when there is violence (injuries or deaths) or threats of violence (including verbal threats, military maneuvers, and shows of force)” [43]. Thus, we do not include cases of accidental or unintended adverse impacts on populations or communities associated with water management decisions, such as impacts from extreme events, such as floods or droughts. The chronology includes the 1982–2018 period, numerous conflicts in Latin America related to hydroelectric plants, one or more of the elements composing them, along with their cycle of operation, inputs, and outputs.

However, for this paper, we will also exclude those conflicts related to elements that may be part of hydroelectric power plants (dams, reservoirs, or others), or with factors or elements linked to their operating cycle, their inputs and outputs, but that do not appear explicit, clear, and directly linked to hydroelectric power generation in the Pacific Institute timeline. Finally, we will exclude those conflicts around energy systems that use—or that run through—hydroelectric energy outside the dam’s powerplant (e.g., electrical grids, transformers, power generators, electrical towers, power lines). Other infrastructures that do not deal with the energy produced by water are also excluded: other energy-related power plants and other elements of the water supply system, such as water treatment plants, sewage treatment plants, desalination plants, water pumping stations, and distribution systems, such as pipes, towers, and other water reservoirs.

Therefore, we will exclusively address the conflicts that Water Conflict Chronology relates explicitly, clearly, and directly with hydroelectric plants—with one or more of the elements that compose them—or with factors or elements linked to their operating cycle, their inputs, and their outputs: (i) conflicts between States (existing or candidate); (ii) conflicts between states—existing or candidates—and non-state actors (ethnic groups or collectives, armed organizations, terrorist organizations, insurgent or counterinsurgent groups, rebel groups, liberation fronts, political parties, or others); and (iii) conflicts between these non-state actors; whether for geopolitical, geo-energetic, strategic, military, political, ideological, religious, ethnic, or territorial reasons. All these make a total of eight conflicts. The first took place in 1982, and the last in 2018; therefore, eight conflicts in approximately forty years. We consider these conflicts to be studied first, per se, and independently [42]. As a result of this commonly accepted scientific approach, the actual and potential destabilization capacity in conflicts of this type has not been analyzed in-depth either.

Although there is much scientific literature on conflicts over natural resources in the world, and although there have been a significant number of them over hydroelectric plants in less than six decades, two areas for improvement have been detected in the literature:

1. There is no direct, specific, and transparent relationship between conflicts, on the one hand, and hydroelectric plants, on the other;
2. An exhaustive and structured exposition and analysis of the origin and evolution of these conflicts have not been achieved. This article attempts to address these shortcomings. As we have already indicated, it is essential to underline that the article does not intend to weigh the importance of other possible shared causes of some conflicts, but rather to analyze and highlight the hydroelectric plants’ role from a qualitative approach (without using statistical analysis or similar).

The Pacific Institute's chronology, which is the basis of our work, classifies these conflicts exactly as conflicts over water. The research question is: what was, in qualitative terms, the real conflict-generating capacity of hydroelectric power plants, as elements of tremendous strategic value due to inequality in the distribution of water, in Latin America in the years 1982 to 2018? The hypothesis is that from 1982 to 2018, the unequal regional distribution of water and energy has turned hydroelectric power plants into elements of tremendous strategic value. Its total capacity to generate conflicts in Latin America was very high in qualitative terms. In the following sections, we will describe and chronologically analyze the conflicts.

### 3. Results

#### 3.1. Guatemala: The Chixoy Project and the Río Negro Massacres (1982)

In 1975, the National Electrification Institute (INDE) announced the construction of the Chixoy hydroelectric plant, located on the border between Baja Verapaz, Alta Verapaz, and Quiché. Its construction involved the flooding of some 2000 hectares of agricultural space, affecting 33 communities and causing the disappearance of 23 villages, 471 homes, 10 public buildings, and 45 archaeological sites and natural resources [46,47]. Its construction officially began in 1976 without prior consultation with the affected communities [48,49].

Most of the population of the Maya Achi community of Río Negro opposed the project and the relocation from the beginning, so its members began to have problems with the government, the army, and members of the INDE. In this sense, the contacts between INDE representatives and community members took place during a climate of terror and intimidation, forcing the population to be forced to displacement from the beginning and to take refuge in the mountains to flee from violence [44–46]. Starting in 1978, in order to avoid a constant increase in construction costs, the resettlement of families was considered urgent by the government, and the area was declared a national emergency zone. The place chosen by INDE for resettlement was the Pacux de Rabinal colony, but most of the community members opposed it and considered that the compensation was insufficient since the homes they were offered were based on infertile lands where they could not develop the tasks that they had traditionally performed [48,49].

During the dam's construction (that forms an artificial lake that is fed through a 26-km-long tunnel and its gross head of 500 m allows it to power five turbines that move five generators of 60 megawatts each, which makes it the largest plant in Guatemala), gravel and sand were removed from the lands shared by Pajales, Río Negro, and Xococ, which the residents of those communities protested. To silence the protests, they were awarded USD 120,000 in compensation. Xococ and Río Negro communities were immersed in a conflict over the distribution of money, although this was not the only dispute that occurred between both communities. The community of Xococ was characterized by its ultra-rightist tendency and informed the army that the guerrillas were present in Río Negro. Thus, INDE began to designate these communities' residents as guerrillas and act against them [48]. The state conceived the opposition of many families to the hydroelectric project as community support for the guerrillas, which is why there was an escalation of state-sponsored violence against these communities [49–51].

The development of the dam was completed in the absence of a resettlement plan accepted by all members of the communities, and the communities were evicted by violence. By 1983, 10 communities in the Chixoy basin had been practically eliminated by massacres. Those who survived were persecuted and forcibly relocated to militarized and guarded precincts [52]. In total, from March 1980 to September 1982, 447 Río Negro residents were murdered in a series of five massacres [45,48,52,53]:

- On March 1980, seven people were murdered in Río Negro by agents of the Ambulatory Military Police (PMA) who worked for INDE (some 60 PMA agents worked as security for INDE in the Chixoy project);
- On 13 February 1982, the massacre of the Río Negro community in the village of Xococ. Seventy-three members of the Río Negro community were ordered to report to

Xococ. According to testimonies from the inhabitants of Río Negro, men, women, and children were massacred by the Xococ Civil Self-Defense Patrols (Xococ PAC);

- On 13 March 1982, a massacre at Cerro de Pacoxom. Members of the army and the PACs of Xococ arrived in the community of Río Negro and led more than a hundred women and children into the mountains. Many women and girls were raped, and the death toll was 70 women and 107 children;
- On 14 May 1982, a massacre in Los Encuentros. Some survivors of the Pacoxom massacre took refuge in a sacred place known as Los Encuentros. On 14 May 1982, soldiers and patrols attacked the community and killed at least 79 people. In addition, on at least three occasions, an army helicopter arrived in the community, and the military forced dozens of people to board it. No news was ever heard from those community members again;
- On 14 September 1982, a massacre in Agua Fría. A group of survivors of the two previous massacres fled to a village known as Agua Fría, located in the department of Quiché. On 14 September 1982, a group of patrollers and soldiers arrived at that place and forced the people who were there to gather in a building to later open fire on them and set the building on fire. Approximately 92 people lost their lives.

When an amnesty law came into force in 1983, many people began to descend from the mountains to surrender to the Rabinal military detachment, where the military would systematically torture those who surrendered. In this sense, the amnesty served so that the survivors of the massacres surrendered to the Guatemalan military posts and prevented the soldiers from going out into the mountains in search of them [50–53]. The affected community members later demanded a just reparation from the state. With this objective, the affected communities organized themselves into the Coordinating Association of Communities Affected by the Construction of the Chixoy Hydro-electric (COCAHICH). In 2004, they occupied the dam's intake so that the state would attend to their demands, which led to a dialogue between the communities and the government. This and COCAHICH reached a series of reparation agreements and, in 2014, based on the documents previously signed, the President of the Republic issued in the Council of Ministers the Governmental Agreement (No. 378-2014), approving the "Public Policy for Reparation of Communities Affected by the Construction of the Chixoy Hydroelectric Plant, whose human rights were violated" [46]. This policy contains reparation measures and has a budget equivalent to USD 154 million for individual and collective compensation, which must be delivered within 15 years (2015–2029).

### 3.2. Ecuador: Social Conflict around the San José del Tambo Hydroelectric Project (2002–2006)

The Hidrotambo project began in 2002 when the National Council of Water Resources (later the Secretariat of Water) conferred the waters of the Dulcepamba River for power generation to the Corporation for Energy Research (CIE), which later partnered with three other companies private companies (Plasticaucho Industrial, Electrogen, and Ingehydro SL) to form Hidrotambo SA, the company in charge of executing the work [54]. In 2003, the Water Agency awarded Compañía Hidrotambo S.A. the concession of almost the entire flow of the Dulcepamba River [43,55]. The work would affect 74 communities throughout the river basin, from San Pablo, in the upper basin of the sierra, to San Pablo de Amalí, where the dam was being built. The concession was made without prior consultation with the approximate 13,750 people who lived in the Dulcepamba river basin. Furthermore, compensation was only provided for two families whose farms were located at the dam construction site [56].

The inhabitants of the community of San Pablo de Amalí used the water for domestic consumption, agricultural work, and animal watering holes. In this sense, the members of that community opposed the project because they affirmed that the river would not have enough flow to guarantee the life of the Dulcepamba. To this must be added that the communities located above the dam would not have guaranteed access to water since the company would be in charge of controlling the river and the territory [43,55]. In 2005, the

communities formed the Committee for the Defense of the Dulcepamba River to show their opposition and mobilize. The first construction company hired by Hidrotambo S.A. The Andes Construction Company (COANDES) was responsible for the construction, but it could not carry out due to the community's opposition. This opposition was reflected in several confrontations between community members, COANDES workers, and security guards. Given these events, Hidrotambo S.A. hired the Army Corps of Engineers as a construction company to facilitate the presence of uniformed men to intimidate those who opposed the project [56].

In 2006 and 2008, several clashes between the population and the Corps of Engineers [53]. Then, 15 December 2006 was the moment when the conflict reached its climax. Approximately 1500 peasants faced 300 soldiers in the vicinity of the community of San Pablo de Amalí. Two months later, the Ombudsman's Office asked the Army Corps of Engineers to refrain from carrying out operations against the community. Despite this, on 26 February 2007, some 70 soldiers fired tear gas directly at the community members, leaving several wounded [57]. In the context of these conflicts, 22 legal proceedings were opened, and 14 community leaders were arrested and charged with rebellion. In 2008, the Constituent Assembly granted them amnesty, and the Corps of Engineers refused to continue developing the works [43,55,58].

Due to community resistance, the project could not be concluded and was suspended between 2008 and March 2012 [58]. However, it re-emerged in March 2012, promoted directly by the Bolívar government (where the San Pablo de Amalí community is located) and a series of ministries. On 8 March 2012, the National Electricity Council (CONELEC) and Hidrotambo S.A. signed a new contract. The company became the absolute owner of the energy produced by the power plant, energy produced under the change of figure from the self-generation permit contract to the generation permit contract, which implies the sale of all the energy produced to the National System Interconnected [59]. Despite being a new contract, the company did not update the environmental impact study or process a new environmental license or water authorization [43–55]. The new contract was more rigid than the first since it prohibited peasants from using water for irrigation or raising livestock. Thus, Hidrotambo S.A. became the absolute owner of the water and the entire communal territory surrounding the future hydroelectric power station [56]. After the resumption of works, there were clashes between community members and special police forces, which led to several leaders being brought to trial, accused of sabotage and terrorism.

The community inhabitants reported that, from the beginning of 2013, when the construction was restarted, the earth began shaking, and the stones, due to the explosions, fell on the houses, causing damage to the roofs and walls. In that same year, the company executing the project diverted the river about 200 m from its natural channel towards the community so that the water passed a few meters from some houses. The President of the community, Manuel Trujillo, presented a protective action against the then manager of Hidrotambo and requested that the works be suspended immediately, and that the river return to its ordinary course. However, the action was denied [57]. In October 2013, Manuel Trujillo and Manuela Pacheco (human rights defender) were put on trial for the crime of terrorism, although, in 2016, they were declared innocent [59].

On 20 March 2015, the river overflowed, destroying 12 houses and claiming the lives of three people trapped by the current [57,59]. Subsequently, in 2017 and 2019, the river overflowed again. Community members continue to demand that the irregularities and human rights violations related to the right to water for human consumption and food sovereignty of the Dulcepamba River basin cease [59].

### 3.3. Peru: Environmental Conflict in the Callejón de Huaylas (2008)

On 29 July 2008, members of the Cruz de Mayo peasant community from the province of Huaylas, Ancash, occupied the Cañón del Pato hydroelectric plant, operated by Egenor Duke Energy, controlling the access and discharge of water [56,57]. It generates its energy from a 415 m drop in the waters of the Santa River. The plant is made up of six generation

groups and has an effective power of 263 megawatts. Farmers protested the almost 50% drop in the water levels of the Parón Lagoon after the release of water by the plant to improve its energy production capacity. In addition, the residents also argued that the water discharges by the company had caused problems both in the irrigation canals and in the Caraz drinking water treatment plant [56,60,61]. The act marked the outbreak of a conflict that had been increasing for many years between Duke Energy and several local users of the waters of the Parón Lagoon [43,62,63].

The granting of the license for the waters of the Parón Lagoon for power generation occurred on 7 November 1994, coinciding with the enactment of structural reforms by then-President Alberto Fujimori. This license granted Electroperú the right to discharge a maximum flow of 8 m<sup>3</sup>/s annually up to a volume of 35 million m<sup>3</sup>. The license was granted without an environmental impact study [63]. In 1996, the government privatized Electroperú's operations to form Compañía de Generación Eléctrica del Norte del Perú. Three years later, Duke Energy bought the company [43,62].

However, the most significant problems began on 13 July 2007, when Egenor announced that it would begin to increase the release of water from the lagoon [43,62]. The reasons alleged by the population for opposing this measure were, on the one hand, that the large discharges of water would erode the riverbed and cause damage to local infrastructure and, on the other, that there would be a lack of water for local uses in the end from the dry season [63]. Following a legal dispute between the Caraz mayor's office and Egenor, on 19 October 2007, the Lima court authorized the use of the lagoon's waters by the company under its water use permit. Thus, Egenor announced that the release of water would begin on 24 October 2007 [43,62].

In January 2008, the municipality of Huaylas promulgated a local ordinance to regulate specific guidelines for the use of the province's waters during the rainy and dry seasons. However, this policy had little effect since, as previously stated, in July 2008, the water level in the lagoon had dropped by 50%. Thus, in fear of losing their primary source of water, on 29 July 2008, farmers in the province of Huaylas decided to occupy the hydroelectric plant in order to stop its operation, promising to have the facilities closed until the Technical Administration of the Irrigation District (ATDR) and the Regional Department of Agriculture suspend Egenor's water permit [43,62].

Between 2008 and 2014, farmers, companies, and other actors held talks, and a mechanism called the Dialogue Table was established, promoted by the government of Peru and with the participation of the National Water Authority (ANA). In February 2014, the Dialogue Table signed an agreement between the company and the peasant communities that allow water to generate hydroelectric energy under a third independent actor [63–65]. However, there continued to be attempted by the Cruz de Mayo community residents to prevent the discharge of water from Laguna Parón. For this reason, in 2019, it was agreed to promote a new management committee to establish a permanent dialogue with the community [66].

### *3.4. Guatemala: Hydroelectric Plants and Violence in San Mateo Ixtatán (2009–2011, 2014, 2017 and 2018)*

All conflicts related to hydroelectric plants in Guatemala since 2009 have arisen from three hydroelectric projects in San Mateo de Ixtatán: Pojom I, Pojom II, and San Andrés (Pojom I's installed capacity is 10.2 megawatts; that of Pojom II is 20 megawatts, and that of San Andrés is 10.8 megawatts). In this sense, what will be discussed below can be understood as different episodes within the same conflict. Beginning in 2009, according to the local population, personnel from the company Proyectos de Desarrollo Hídrico S.A. (PDH S.A.) came to the region posing as electricity workers and promised the residents access to said energy (one of the main demands of the population) and tried to attract local leaders and mayors, which generated divisions between the members of the communities. Opponents claimed that they would endanger the Pojom, Negro, Warsaw, Palmira, and



Primavera rivers. They also denounced the diversion of rivers, the loss of biodiversity, and the displacement of the original population [43–67].

In May 2009, before the state granted licenses to hydroelectric plants, which would happen in 2011, the villages in Pojom held a community consultation. Then, 99% of the 25,646 inhabitants of the 59 villages in the municipality of San Mateo Ixtatán rejected the projects. However, the state ignored the result of the consultation, and the licenses were granted [43,67]. The conflict began to escalate in 2011, the year in which construction work began. The state activated military detachments that had been active during the internal armed conflict. The residents expressed their opposition to the felling of trees, the diversion of rivers, and denounced their contamination. Consequently, the inhabitants of the areas affected by the construction of the projects claimed to be the target of threats. Since 2011 there have been numerous violent events in the area [43,68].

On 5 May 2014, the facilities of the Pojom II project were burned [43,68]. Several protesters entered the hydroelectric company's camp facilities and set them on fire. Later they moved to the area of the Solel Boneh company and set fire to some 30 machines. In the context of this episode of violence, four people were injured [69,70]. As a consequence of the various altercations, by mid-2015, a good part of the community authorities involved in defense of the Q'anjob'al territory was incarcerated [71]. The arrests were not always guaranteed. An example is that of Mateo Pedro Francisco, 17, who, on 30 January 2016, was illegally arrested by workers from the Solel Boneh company, was accused of having thrown stones at one of the company's vehicles [43,67].

A year later, precisely on 17 January 2017, members of the 18 communities of the Ixquisis region gathered in the village of the same name to hold a peaceful demonstration against the company PDH SA for the damage it causes to the fauna, flora, development, and social peace of the inhabitants of the communities [72]. On 18 January, the demonstration took place and, upon leaving the company's facilities, unknown persons, according to some sources and protesters, entered the facilities where the machinery was located, and they began to destroy it and set fire to some heavy machines. In response, the company's security guards, hidden in the bushes, opened fire on the protesters, and Sebastián Alonzo, 72 years old, was killed [43,67,69,72,73].

In 2018, on 9 October, the National Civil Police service attacked the civilian population of the communities of the micro-region of Ixquisis with firearms, leaving several people injured [43–67]. Two months later, on 16 December, the bodies of Neri Esteban Pedro and Domingo Esteban Pedro, 41 and 17 years old, respectively, were found with gunshot wounds. Both were part of the resistance against hydroelectric plants. In this episode of violence, a third person was injured. According to the Mexican civil association Otros Mundos A.C., the men were killed in the framework of a series of attacks perpetrated by paramilitaries and official forces in charge of protecting the projects [74]. In response, more than a hundred organizations denounced, on 20 December 2018, the double murder and the increase in aggressions against the population that opposes the projects [43,67,75]. Some projects were temporarily paralyzed due to the strong resistance of the affected communities. An example is the San Mateo Ixtatán hydroelectric plant, which was suspended for a year and a half. However, all the projects continue to be in force with the rejection of a large part of the affected communities [43–67], for which reason altercations and acts of violence and intimidation against community members continue to be recorded [76].

### 3.5. Honduras: Agua Zarca and the Death of Berta Cáceres (2016)

After a military coup in 2009, the General Water Law and Decree 233 were approved. The latter repealed all previous decrees that prohibited hydroelectric projects in protected areas [77]. In 2010, 40 hydroelectric contracts were approved, 21 of which directly affect indigenous communities in the area. In no cases were these communities previously consulted. The concession of the Agua Zarca hydroelectric project was for 10 years in favor of the Honduran company Desarrollo Energético S.A. (DESA) [78]. The plant has three turbines with a capacity of 7.52 megawatts each [77].

In 2011, DESA began acquiring land in the Río Blanco region, Intibucá municipality. These lands were supposedly private and municipal property. However, the reality is that the lands were part of the ancestral territory of the Lenca communities of Río Blanco. Company employees and the Mayor of Intibucá held a series of meetings in 2011 in Río Blanco to inform residents about the project. Almost all the members of the communities expressed their rejection of the project after holding about 150 indigenous assemblies [79]. Then, in 2012 and 2013, residents of Río Blanco reported the presence of DESA and Sino-hydro employees on communal lands, where construction of the dam had begun in 2013, and traditional crops had been destroyed. In addition, the security guards prevented community members from accessing the river to carry out activities, such as fishing, irrigation, or domestic use [79]. On 1 April 2013, a mobilization began that caused the road's closure leading to the project [77–80]. In response, military personnel was sent to guard the project permanently [75]. In June 2013, a soldier shot Lenca leader Tomás García and his son during a peaceful mobilization, killing them both [78–80].

In September 2013, the government, DESA, and the communities of Río Blanco signed an agreement in which it was established that the communities would receive compensation and social programs from the company in exchange for accepting the project. However, the agreement had no validity for those who opposed the project since the signatories were not indigenous people from Santa Bárbara. Thus, the members of the Río Blanco community maintained their position of opposition to the project [79,80].

In order to continue the project while avoiding the opposition of the affected communities, construction began on the other side of the river to avoid indigenous lands. However, for those who opposed the project, the negative impacts of construction would not disappear [80]. The Civic Council of Popular and Indigenous Organizations of Honduras (COPINH) and members of Río Blanco stated that the transfer did not consider the presence of indigenous Lencas in Santa Bárbara and that no prior consultation was carried out with those communities. With the beginning of this new project stage, members of the Río Blanco and COPINH communities set up a camp in front of the project facilities as a form of protest. This brought the presence of military and police units and security guards to protect the project facilities [79]. Although the event with the most significant repercussion in the context of this conflict was the murder of Berta Cáceres, previously there were different episodes of violence [79]:

- In November 2013, 30 policemen entered the homes of Río Blanco leaders to threaten activists and their families;
- In March 2014, María Santos Domínguez, coordinator of the Río Blanco Indigenous Council, which in the country is known for its opposition to the project, survived an attack when seven individuals attacked her with sticks, stones, and machetes while she was walking towards her house. Her 12-year-old son and her husband were injured when they tried to help her. That same year, three other indigenous people from Río Blanco were assassinated for their opposition to the project, including the William brothers;
- On 30 November 2015, Berta Cáceres and other members of COPINH were intercepted by municipal workers armed with machetes and short weapons when traveling in two buses to San Francisco de Ojuera to carry out a peaceful demonstration and meet with the Mayor;
- In February 2016, Berta Cáceres was threatened by a police officer during a forced eviction of 50 families affiliated with COPINH.

In the early morning of 2–3 March 2016, Berta Cáceres was assassinated due to her opposition to the Agua Zarca hydroelectric plant. Berta Cáceres was assassinated after years of death threats and state persecution for her campaign to stop the construction of the Agua Zarca hydroelectric dam on the Gualcarque River [43,81,82]. According to an investigation by Global Witness, high-ranking politicians and businessmen are implicated in the wave of violence against environmental activists in the country. Most of the victims were members of rural and indigenous communities who oppose mega-projects in their territories.

In the context of the trial for the murder of Berta Cáceres, a former Honduran soldier affirmed that the activist's name headed the black list that was handed over to the special forces who received her training in the United States. In that list appeared names and photographs of activists and human rights defenders with the order in which they were to be eliminated [79]. Finally, in November 2018, seven men were convicted of the murder of Berta Cáceres, and Roberto David Castillo, DESA director, was arrested as the alleged mastermind of the crime [78], who, in July 2021, was convicted as an accomplice [83].

#### 4. Discussion and Conclusions

As Biswas has pointed out regarding the debate on dams, “[t]here is no one single solution that would be valid for a heterogeneous world, with differing climatic, physical, social, economic and environmental conditions; varying institutional, technical and management capacities; dissimilar institutional and legal frameworks for managing water; and divergent levels of development and available technology ( . . . ). What is needed is a systematic approach, where the main objectives of water developments are first identified, i.e., poverty alleviation, regional income redistribution, economic efficiency and environmental conservation ( . . . ). The best solution may or may not include dams ( . . . ). Solutions must be case-specific ( . . . ). Solutions may include construction of dams, large, medium or small, and/or other alternatives such as rainwater harvesting and groundwater recharge” [84].

The conflicts studied involve four countries and a period of 36 years (1982–2018). However, it is possible to identify a series of common elements to explain these conflicts and their defining features. Conflicts arise from the opposition of local communities, primarily indigenous, to the construction of dams and hydroelectric plants in the territories they have traditionally inhabited. This finding coincides with Finley-Brook and Thomas (2010) in Central America, where indigenous peoples face the most significant risks due to dams [17,84,85]. The reasons alleged by those who oppose the development of these projects are the social, environmental, economic, and cultural impacts that these projects generate in their different stages (planning, construction, and operation). Among the environmental impacts generated by hydroelectric projects, it is possible to differentiate between those caused by aquatic ecosystems and those that affect terrestrial ecosystems. Among the former is the modification of the natural flows of the rivers, the change in the quality of the water of the affected rivers. At the same time, the latter identifies deforestation due to the construction of the projects, the impoverishment of the populations' animals and vegetables in the area. Likewise, it should be noted the lack of prior, free, and informed consultation of the sociocultural impacts, as established by the conditions described in Convention 169 of the International Labor Organization (ILO) on indigenous and tribal peoples [86], and the involuntary resettlement of the local population impacts indigenous peoples' rights, culture, identity, and ancestral territories.

Furthermore, while the development of hydroelectric projects implies a loss of territory for the indigenous peoples affected, these communities' already precarious family economy is even more affected by not having land for subsistence crops [87]. Even when the affected communities are still standing, the activities of the hydroelectric plants make it difficult for members of these communities to access water. On the other side of the conflict are some state actors and the companies that build and start-up hydroelectric projects, who see the opposition to such projects by local communities as a rejection of progress. As has been seen in the cases studied, the response of the promoters of such projects is, often, intimidation and violence, carried out both by state security forces and by paramilitary or para-police groups [88]. Additionally, governments have undertaken a criminalization of citizen protests carried out by indigenous and rural communities, and many of the community leaders who lead the fight against hydroelectric projects are accused of crimes that have not been committed (terrorism, for example).

Finally, we will propose some recommendations on resolving these conflicts in Latin America. We will point out the following general and contextual recommendations:

- (a) Firstly, the consolidation of more robust and more responsible governments will prevent the negotiations from coming to deadlock or collapsing;
- (b) Secondly, the fight against environmental destruction led at the regional level;
- (c) Thirdly, the compliance by governments with their own protocols and laws regarding public participation and freedom of speech and assembly.

Now, we will point out some concrete recommendations:

- (a) Firstly, the drafting of adequate legislation in water management and its compliance;
- (b) Secondly, achieve steady electricity and water supplies;
- (c) Finally, ensure that this exchange provides greater water availability for human consumption, and, above all, agricultural use.

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