Citizen Participation in Environmental Defense Related to Fracking Projects in Colombia

Participación ciudadana en la defensa ambiental en proyectos de fracking en Colombia

Participação cidadã na defesa ambiental em projetos de fraturamento hidráulico na Colômbia

Germán Alfonso López Daza*
Mariela Méndez Cuéllar**
Luis Eduardo Rodríguez Quintero***

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ABSTRACT

This article analyses the guarantees of citizen participation in Colombia, particularly in the context of fracking projects and their environmental impact. Based on the 1991 Constitution, it establishes participation as a fundamental right that allows citizens to influence political decisions through mechanisms such as voting, plebiscites, and popular consultations. It analyses the role of the Constitutional Court of Colombia, which has emphasized the importance of citizen participation in guaranteeing a democratic and pluralistic State, advocating for its adequate regulation. It underlines the need for a legal

* Ph. D. Derecho constitucional. Profesor titular Universidad Surcolombiana (Colombia). E-mail: germanlo@usco.edu.co. Dirección: Cra 5 No. 23-40. Neiva, Huila, Colombia. ORCID: https://orcid.org/0000-0003-4627-0295

** MSc. Derecho Público. Docente e investigadora Universidad Surcolombiana. (Colombia). E-mail: mariela.mendez@usco.edu.co. Dirección: Cra 5 No. 23-40. Neiva, Huila, Colombia. ORCID: https://orcid.org/0000-0002-5120-4623

*** Abogado. Investigador Universidad Surcolombiana (Colombia). E-mail: luis.rodriguez@usco.edu.co. Dirección: Cra 5 No. 23-40. Neiva, Huila, Colombia. ORCID: https://orcid.org/0000-0001-9973-1142

framework that adequately regulates the exploitation of natural resources, ensuring that decisions consider the well-being of the affected communities.

Keywords: Citizen participation; fracking; participatory democracy; mineral and energy resource exploitation.

RESUMEN

Este artículo analiza las garantías de participación ciudadana en Colombia, particularmente en el contexto de los proyectos de fracking y su impacto ambiental. Fundamentado en la Constitución de 1991 establece la participación como un derecho fundamental, permitiendo a los ciudadanos influir en las decisiones políticas a través de mecanismos como el voto, el plebiscito y la consulta popular. Analiza el rol de la Corte Constitucional de Colombia que ha enfatizado la importancia de la participación ciudadana para garantizar un Estado democrático y pluralista, abogando por su adecuada regulación. Subraya la necesidad de un marco legal que regule adecuadamente la explotación de los recursos naturales, asegurando que las decisiones consideren el bienestar de las comunidades afectadas.

Palabras clave: Participación ciudadana, Fracking, democracia participativa, explotación de recursos minerales y energéticos.

RESUMO

Este artigo analisa as garantias de participação cidadã na Colômbia, especialmente no contexto de projetos de fraturamento hidráulico (*fracking*) e seu impacto ambiental. Fundamentado na Constituição de 1991, estabelece-se a participação como um direito fundamental, permitindo que os cidadãos influenciem decisões políticas por meio de mecanismos como votação, plebiscito e consulta popular. Analisa-se o papel do Tribunal Constitucional da Colômbia, que enfatizou a importância da participação cidadã para garantir um Estado democrático e plural, defendendo sua regulação adequada. Ressalta a necessidade de um marco legal que regule adequadamente a exploração dos recursos naturais, garantindo que as decisões considerem o bem-estar das comunidades afetadas.

Palavras-chave: participação cidadã; fraturamento hidráulico; democracia participativa; exploração de recursos minerais e energéticos.

This article presents the main findings of a research project titled "Effectiveness of Citizen Participation Mechanisms in Glyphosate, Fracking, and Mining-Energy Projects in Colombia," funded by the Universidad Surcolombiana. Upon the completion of the research, this publication aims to disseminate its most significant findings. The authors are the same researchers who carried out the study, all of whom are affiliated with the research group *Nuevas visiones del derecho* (Cat. B MinCiencias).

This research article explores the intersection between citizen participation and environmental defense within the framework of fracking projects in Colombia.

Fracking, or hydraulic fracturing, has been a controversial method for oil and gas extraction in the country. Its implementation has sparked significant opposition from local communities, environmental groups, and social movements, which argue that it poses serious risks to water resources, public health, and the environment. In this context, it is crucial to understand how affected communities have mobilized to voice their concerns and demand accountability, thus highlighting the practical application of participatory democracy as enshrined in the Political Constitution of Colombia of 1991.

Through an analysis of the Constitutional Court's case law and the established participation mechanisms, the study seeks to understand how citizens can influence decisions that impact on their environment and ensure their voices are heard in the process of economic development. It examines the challenges and opportunities faced by civil society in its pursuit of a sustainable development model that respects both human rights and ecological integrity. This research not only contributes to the debate on environmental governance in Colombia but also underscores the importance of citizen participation as a tool for defending natural resources and collective well-being.

Colombia's 1991 Political Constitution enshrines essential principles and values, such as citizen participation, which is crucial for democratic governance because it enables citizens to actively engage in decision-making processes that affect their environment. The right to citizen participation implies that the State must not adopt measures that hinder its free exercise and must promote the development of diverse forms of participation, fostering social organization without limiting

participatory democracy. This principle is reflected in citizen involvement in matters that impact the community, encouraging debate and collective decision-making in defense of their interests, which may be affected by the exploration and exploitation of hydrocarbons through hydraulic fracturing.

One notable case is the controversy surrounding the exploitation of hydrocarbons through fracking, which has had negative environmental impacts. In response, citizens have turned to participatory mechanisms and judicial avenues to halt such policies and protect their fundamental rights.

This article aims to assess the effectiveness of citizen participation mechanisms in responding to projects related to the exploration and exploitation of non-renewable natural resources. This objective is framed within the broader issues previously outlined concerning the impact of these policies on community rights, particularly those linked to efforts aimed at countering the spread of illicit crop cultivation.

Methodological Development

This research adopts an analytical-descriptive approach with a mixed-methods orientation, combining qualitative and quantitative methods to comprehensively examine the role of citizens in the defense of the environment in the context of fracking projects in Colombia.

From the qualitative perspective, the study will conduct a documentary and jurisprudential analysis of primary and secondary sources. This includes popular consultations, protection writs, and relevant court rulings, particularly those issued by the Constitutional Court and the Council of State. In addition, national and international legal doctrine on the right to citizen participation and its limitations in the context of extractive economic interests will be examined. The analysis will also consider legal instruments that regulate democratic participation in environmental matters, such as Law 99 of 1993, the Escazú Agreement, and relevant constitutional provisions.

This component will involve a doctrinal review to establish conceptual developments regarding the right to participation, as well as a

follow-up on participatory democracy mechanisms employed by communities in response to extractive projects. The analysis aims to interpret the meaning and scope of the rights at stake, based on a synthesis of jurisprudence and emblematic cases such as the Kalé pilot project.

The quantitative component, in turn, will be developed through a correlational study designed to identify relationships between citizen participation mechanisms, the types of rights invoked, and the governmental or judicial decisions adopted. This component will be based on the collection and systematization of secondary data on popular consultations conducted in Colombia, their outcomes, legal effects, and territorial context. Public statistics and databases from institutions such as the Departamento Administrativo Nacional de Estadística (DANE, by its Spanish acronym), the Ministry of the Interior, and environmental and civil society organizations will also be used to quantify the use of participatory mechanisms. In addition, court rulings will be categorized according to their impact on the protection of collective rights, and patterns in the decisions adopted will be analyzed.

The research will focus on describing and assessing the current state of citizen participation in the context of fracking, integrating findings from both methodological perspectives to offer a comprehensive understanding of the phenomenon. The triangulation of legal, doctrinal, statistical, and empirical sources will not only allow for a characterization of the current situation but also provide insights into its structural causes and potential paths for transformation.

Results

Citizen Participation in the Political Constitution of Colombia

Participatory democracy is a central concept in political theory, representing the original form of democracy in the Western world and contrasting with representative democracy as well as other forms such as direct, deliberative, and strong democracy (Barber, 2015). While every democracy contains participatory elements, grounded in consent through a "social contract" and participation in elections, in modern practice,

the scale and complexity of societies have led to the predominance of more representative forms.

In modern representative democracy, where accountability and indirect governance are essential, participatory democracy has emerged as an alternative due to the perception that the former weakens citizenship, even as it broadens its base (Barber, 2015). This conceptual shift has led to these forms of democracy being seen as opposites, with participatory democracy focusing on direct self-governance and representative democracy on governance by elected elites.

Colombia joined this global trend with the inclusion of the participatory democracy model in the 1991 Constitution, reflecting the context of citizen mobilization known as the "Seventh Ballot Movement." The country's democratic history, characterized by relative stability interrupted by challenges such as violence and drug trafficking, reached a critical point with the 1991 Constitution, which promoted citizen inclusion in public decision-making (Const., C-221/1996, M.P. J. Hernández).

The evolution of participatory democracy in Colombia can be divided into three main stages:

1. **Under the 1886 Constitution:** This stage includes key events such as the 1957 Plebiscite and the 1986 Popular Consultation, although their implementation was limited and not always effective (Álvarez, 2022). This period was marked by bipartisan violence and the dictatorship of Rojas Pinilla.
2. **Reforms of the 1980s:** The internal crisis, exacerbated by narcoterrorism, corruption, and social inequality, led to the Seventh Ballot Movement and the convening of the 1991 Constituent Assembly. This movement, led by university students, allowed for a significant expression of the citizens' will.
3. **Since 1991:** The 1991 Constitution highlights citizen participation as a cornerstone of the Social State of Law, reflecting a clear mandate from the people to strengthen participatory democracy (Const., C-180/1994, M.P. H. Herrera). However, the practical implementation of these principles still faces significant challenges, including the need for greater pedagogy and political culture.

Participatory democracy in Colombia has also been influenced by new political action dynamics, which are less institutionalized and more diverse. These new political actors, often spontaneous and lacking formal structures, seek to advocate for fundamental issues such as equality and social justice, although they often operate outside traditional democratic mechanisms (Rubio, 2021).

The manipulation of information, as evidenced during the 2016 Plebiscite on the Peace Agreement with the FARC (acronym for the Colombian armed group *Fuerzas Armadas Revolucionarias de Colombia),* is one of the current challenges facing participatory democracy in Colombia. Although these mechanisms are enshrined in the 1991 Constitution, their effectiveness and ability to fulfill their intended purpose remain subject to debate.

Participatory democracy in Colombia has evolved through a complex historical process, marked by significant progress and persistent challenges. The effective implementation of these mechanisms requires a continued commitment to political education and adaptation to new forms of citizen political action.

The constitutional, legal, and jurisprudential framework for citizen participation mechanisms in Colombia is based on the 1991 Constitution, which establishes the country as a Welfare State of Law. In this model, sovereignty resides with the people, who exercise public power in two ways: directly, through participatory democracy, and representatively, through the election of representatives (Political Constitution of 1991, art. 3).

The 1991 Constitution, in Article 103, establishes several mechanisms of political participation, including voting, plebiscites, referenda, popular consultations, open town halls, legislative initiatives, and mandate recalls. These mechanisms are further developed in Statutory Law 134 of 1994 and Statutory Law 1757 of 2015, which promote and guarantee the right to participate in the political, administrative, economic, social, and cultural life of the country, allowing citizens to oversee power.

Voting is the most widely used mechanism and is defined as the act through which an individual expresses their opinion or preference for a candidate or proposal. The Constitution enshrines it as both a

right and a duty of citizens, to be exercised without coercion and in a confidential manner (Political Constitution of 1991, art. 258). The Constitutional Court has highlighted its importance as a fundamental pillar of democracy, ensuring citizen participation in the formation and oversight of political power (Const C-224 of 2004, M.P. R. Escobar Gil).

A plebiscite, defined as a mechanism for consulting people on an important public decision, is another form of participation enshrined in Article 103 of the Constitution. This instrument allows government leaders to consult citizens directly on matters of great national significance, thereby seeking legitimacy for their decisions.

The referendum, considered the most representative mechanism of direct and participatory democracy, allows citizens to approve or reject rules proposed by authorities. Statutory Law 134 of 1994 defines the referendum and establishes its types: abrogative, to decide on the elimination of existing rules, and approbative, to decide on new legislative proposals (López, 2023).

Popular consultation is a participatory mechanism through which authorities submit matters of general importance to the people's consideration. This mechanism is mentioned in several articles of the Constitution and is regulated by Statutory Law 134 of 1994. It allows for resolving disputes between branches of public power and preventing administrative paralysis (Const., C-180 of 1994, C-150 of 2015, C-784 of 2014, T-123 of 2009).

The open town hall is a public meeting where citizens can directly participate in the discussion of matters of local interest. Regulated by Statutory Law 134 of 1994, this mechanism facilitates interaction between citizens and council members or *ediles*[1], promoting deliberation and the search for solutions to community issues (López, 2023).

The popular legislative initiative allows citizens to present bills or legislative acts before public bodies. This mechanism is enshrined in Articles 103, 154, and 155 of the Constitution and regulated by Laws 134 of 1994 and 1757 of 2015, establishing specific requirements for its exercise.

[1] *Ediles* in Colombia are public officials who represent a community before the mayor's office and other government entities. They are elected by popular vote for four-year terms.

Finally, the mandate recalls, enshrined in Articles 40, 103, and 259 of the Constitution, allow citizens to remove mayors or governors through a popular vote. This mechanism of oversight and accountability requires compliance with specific legal requirements and has been used both due to citizen dissatisfaction and for political reasons (López, 2023, p. 414).

Law 131 of 1994, as amended by Law 1757 of 2015, regulates the recall of mandates, and the Constitutional Court has issued numerous rulings defining the scope of democratic participation and establishing subrules for each mechanism.

The Constitutional Court's jurisprudential development on citizen participation in Colombia is deeply rooted in the 1991 Political Constitution. The preamble of this Constitution establishes a "legal, democratic, and participatory framework" to guarantee "a just political, economic, and social order," which grants binding force to citizens' active participation in the State.

In this context, the Constitutional Court has played a fundamental role in shaping the framework for citizen participation, even in the face of challenges posed by fracking. Its rulings have not only emphasized the importance of participation in consolidating a democratic and pluralistic State but have also promoted the proper regulation of these mechanisms. Through various decisions, the Court has recognized the fundamental right of communities to influence decisions that directly affect their environment and quality of life.

This participatory approach is not unique to Colombia but rather reflects a global trend. The democratization of States and the incorporation of basic principles for peaceful coexistence have historically evolved to promote citizen oversight and the active involvement of diverse social groups in decision-making processes. Today, participation has become a cornerstone of contemporary societies, as it enables the achievement of inclusive agreements that address the interests of diverse and plural communities.

The jurisprudential advancements of the Constitutional Court regarding citizen participation are grounded in Articles 1 and 2 of the Constitution, which highlight the importance of participation in Colombia's political model. The Court has stated that the relationships between the State and individuals must develop within a democratic

and participatory framework, as established in the preamble and the fundamental principles of the Constitution (Const., C-089 of 1994, M.P. H. Herrera Vergara).

The Constitutional Court has emphasized that citizen participation should not be viewed merely as a desirable practice but as a fundamental principle and objective of state activity. This implies that authorities have the responsibility to facilitate and promote participation in all aspects of individual and collective life, fostering democratic and political participation in decision-making processes that affect collective well-being (Const., C-180 of 1994, M.P. H. Herrera).

Citizen participation is essential to ensuring democratic, just, pluralistic, and diverse State in which the interests of different social groups can be heard and debated. This participation ensures that society is not subject to unilateral decisions by public authorities but can actively influence the economic, political, administrative, and cultural life of the Nation. Citizen participation is considered both a fundamental right and an essential principle and objective of the State, as established in several judgments by the Constitutional Court (Const., C-1338 of 2000, M.P. Cristina Pardo Schlesinger).

In Ruling SU-1122 of 2001, the Court highlighted the connection between citizen participation and other fundamental rights, stating that participation allows for the oversight and control of public power, preventing the violation of these rights. The Court noted that the expansion of democracy involves ensuring that participation is voluntary and that decisions reflect personal choices, guaranteeing that every opinion is equally valued and that normative procedures are followed (Const. SU-1122 of 2001, M.P. E. Montealegre Lynett).

Within this framework, the Constitutional Court has made it clear that participation goes beyond electoral processes; it involves the effective ability to influence legislative processes and arenas of public power. As established in Ruling C-150 of 2015 (Justice M. González), "the people, as holders of sovereignty, have the right not only to elect, but also to constitute, legislate, judge, administer, and oversee power, (translated by the authors)", either directly or through representatives.

This dual nature —both as a guiding principle and as an enforceable right— has led the Court to develop a robust body of doctrine. In the

same jurisprudential line, it has clarified that participation is not limited to being a foundational principle of the Social Rule of Law but also functions as an instrumental right for ensuring political decisions that are legitimate and beneficial to society as a whole. Evidence of this can be found in the Court's consistent emphasis on the need for appropriate legislative regulation of participatory mechanisms, as reiterated in Ruling C-150 of 2015, in which it urged the Congress to develop normative frameworks that prevent their hollowing out.

The evolution of this approach became especially evident in Ruling T-445 of 2016, which, although focused on prior consultation with ethnic communities, established standards applicable to all forms of citizen participation. In that decision, the Court distinguished between formal and substantive participation: genuine participation requires collective self-determination, not mere informational procedures. In its own words, it must involve a "genuine dialogue" in which communities affected by extractive or development projects have a real capacity to influence decisions concerning their territories, with prior access to information and the possibility of giving free consent.

This standard was consolidated months later in Ruling C-035 of 2016, in which the Court examined regulations concerning territorial planning. In issuing a conditional rule of constitutionality on several articles, it emphasized that participatory mechanisms must be designed to ensure real (not merely symbolic) citizen influence in decisions that affect their surroundings. The ruling was paradigmatic in requiring that these participatory spaces promote effective public deliberation, including procedural adjustments to incorporate community interests from the early stages of planning.

The primacy of citizen participation in environmental defense, which has been developed by the Constitutional Court, is complemented by the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (Escazú Agreement). This instrument, ratified by Colombia, serves as a binding normative framework that elevates the standards of the three access rights to ensure democratic environmental governance.

In the context of high-impact projects such as fracking, Escazú requires States to guarantee timely and meaningful public participation

in environmental decision-making processes, by providing necessary and adequate information. This obligation reinforces the concept of substantive participation (distinguished by the Court in Ruling T-445 of 2016) and provides an international legal tool for communities seeking to influence or halt extractive projects within their territories.

Subsequently, Ruling T-236 of 2017, although focused on aerial spraying with glyphosate, articulated arguments concerning the right to a healthy environment and the precautionary principle that are directly applicable to fracking. In this decision, the Court issued a strong call to apply the precautionary principle in the face of scientific uncertainty regarding the impacts of certain activities. This principle became especially relevant in the fracking debate, given the controversies surrounding its long-term effects on water, soil, and human health. Furthermore, the Court linked the right to a healthy environment with the right to participate, arguing that communities have the right to be informed of potential risks and to take part in decision-making processes concerning activities that may affect them environmentally.

Finally, Ruling C-389 of 2023 marked a decisive turning point by clarifying the powers and limits of the legislative branch regarding fracking. Although it did not establish an outright ban on the technique, the Court assessed the constitutionality of a tax provision affecting the extractive sector and acknowledged the inherent tension between the need for fiscal resources to support social development and the protection of fundamental rights to a healthy environment and citizen participation. The constitutional debate over taxation of resource exploitation reflected deep community concerns and underscored the need for adequate social compensation and a broad, informed democratic dialogue.

Citizen participation in Colombia is grounded in the 1991 Constitution and has been developed and protected by the Constitutional Court through its jurisprudence. This fundamental right and essential principle of the State is vital to ensuring a democratic, just, and pluralistic State, enabling citizens to actively influence decisions that affect their lives and collective well-being.

Quantitative Analysis of the Discrepancy Between Social Legitimacy and Legal Effectiveness

To fulfill the objective of evaluating the effectiveness of participation mechanisms, a quantitative review of the popular consultations held between 2013 and 2018 was conducted. The data reveals a pattern of absolute community rejection towards extractive projects, contrasted by a pattern of judicial invalidation.

The systematization of data from the most relevant popular consultations regarding mining and hydrocarbon projects (including fracking) demonstrates a unanimous trend. In every case where the mechanism was successfully executed, the opposition to extraction exceeded 97 % of the valid votes, surpassing the participation thresholds required by Law 134 of 1994.

Table 1. **Results of Key Popular Consultations against Extractive Projects (2017-2018)**

Municipality (Department)	*Date*	*Object of Prohibition*	*"NO" Vote Percentage*	*Total Votes*
Cajamarca (Tolima)	March 26, 2017	Gold Mining (La Colosa)	97.92 %	6,241
Cumaral (Meta)	June 4, 2017	Hydrocarbons	97.04 %	7,703
Pijao (Quindío)	July 9, 2017	Mining	97.7 %	2,658
Arbeláez (Cundinamarca)	July 9, 2017	Hydrocarbons	98.5 %	4,375
Fusagasugá (Cundinamarca)	Oct 21, 2018	Fracking / Hydrocarbons	99.18 %	39,377

Source: Compiled by authors based on data from the National Registry of Civil Status.

Correlational analysis in the "ineffectiveness" breakpoint

The study identifies a direct negative correlation between the democratic mandate expressed in these figures and the legal effectiveness of the mechanism post-2018.

Phase 1 (Effectiveness)

Before late 2018, the statistical weight of the "NO" vote (as seen in Table 1) successfully halted projects like *La Colosa* in Cajamarca, demonstrating high effectiveness.

Phase 2 (Ineffectiveness)

Following the Unified Sentence SU-095 of 2018 issued by the Constitutional Court, a new pattern emerged. Despite the overwhelming quantitative results (e.g., Fusagasugá with 99.18 % rejection specifically mentioning fracking), the legal effectiveness of these consultations dropped to 0 %. The Court ruled that municipalities cannot unilaterally prohibit subsurface exploitation, arguing that the subsoil belongs to the Nation.

Consequently, the quantitative evidence confirms that while the mechanism is highly effective for measuring social license (Social Legitimacy), it has become structurally ineffective for imposing legal binding prohibitions (Legal Efficacy) due to the jurisprudential shift.

Correlational Patterns in Jurisprudence and Invoked Rights

To complete the evaluation of effectiveness, a correlational analysis was conducted to examine how the Judicial Branch responds to different participatory mechanisms based on the specific rights invoked by communities. The systematization of rulings reveals two distinct patterns that determine the success or failure of environmental defense strategies.

The correlation shows asymmetrical effectiveness. In the case of popular consultations, an inverse correlation emerges: the more communities attempted to use mechanisms of direct democracy to exercise a veto based on territorial autonomy, the more restrictive the judicial response became, effectively stripping the mechanism of its binding force with respect to subsoil exploitation.

Table 2. **Correlational Matrix of Legal Effectiveness in Fracking Disputes**

Mechanism	*Rights Invoked (Independent Variable)*	*Judicial Response Pattern (Dependent Variable)*	*Observed Effectiveness*
Popular consultation	1. Territorial Autonomy (Art. 287) 2. Healthy Environment (Art. 79) *Focus:* Prohibition of land use for extraction.	Annulment and Restriction. The Constitutional Court (Ruling SU-095 of 2018) and the Council of State prioritized the Unitary State principle and national ownership of the subsoil (Art. 332).	Ineffective for Prohibition. Despite winning the vote (>97 %), the mechanism is legally unenforceable for banning fracking.
Protection writs	1. Fundamental Right to Participation 2. Due Process 3. Prior Consultation (Ethnic communities) 4. Precautionary Principle	Suspension and Conditional Protection. Courts have consistently ordered the suspension of projects (e.g., *Kalé* and *Platero* pilots) until specific participatory standards are met (Ruling T-445 of 2016; Ruling T-236 of 2017).	Effective for Suspension (Precautionary). High effectiveness in halting operations temporarily due to procedural failures or lack of scientific certainty.

Source: Author's elaboration based on the jurisprudential analysis of rulings SU-095/18, T-445/16, and the suspension orders for Pilot Projects.

Conversely, when communities invoked procedural rights —specifically prior consultation and the precautionary principle— judicial decisions were more favorable. This was evidenced in the suspension of the Kalé and Platero pilot projects in Puerto Wilches, where the judicial branch upheld the suspension due to the lack of adequate consultation, proving that procedural defense mechanisms are currently more "effective" than political voting mechanisms in the context of Colombian fracking.

Concept and Context of Mineral and Energy Resource Exploitation through Fracking

Colombia is a country with a vast variety of minerals distributed throughout its national territory, which has contributed significantly to its economic development. Since the time of the conquest, the colonial

period, and later during the republican era, Colombia has exploited and generated substantial income from resources such as gold, coal, nickel, platinum, phosphoric rock, salt, and other extraction processes from the soil. In the 20th century, Colombia became a producer of oil, a development that has benefited its self-sufficiency and generated significant revenues from exports.

The country drilled its first productive oil well, Infantas No. 1, between 1918 and 1921. Between 1921 and 1951, the oil industry began to develop with the discovery of new fields in the Magdalena Medio region, Catatumbo, and the Lower Magdalena River Valley (Vásquez, 1994).

In terms of hydrocarbons, Colombia benefits from two key resources that have contributed to its development: oil and gas. Both have become the primary sources of foreign currency and wealth for the country, fostering development in the regions where they are exploited.

The notable growth of the hydrocarbon sector has forced the State to implement rigorous regulations and establish oversight and control bodies. This is necessary to mitigate the industry's environmental impact on ecosystems and to monitor its effects on communities.

Given that hydrocarbons are primary energy sources, their deposits are often located in proximity to crucial water flows or potable water aquifers. Therefore, oil extraction activities carry an inherent risk of contaminating the soil and water sources due to possible accidental spills.

The hydrocarbon sector has expanded significantly in recent years and has become an important part of global economic growth. This sector drives transportation networks, gas supply, and petroleum-derived products, including plastics and everyday items, such as affordable clothing lines made from these raw materials. Additionally, it provides energy consumption for the coldest regions of the world, such as Europe and Russia. Research, reserves, and production have increased substantially, making hydrocarbons one of the main drivers of economic growth in many countries worldwide.

However, pollution has intensified alongside the expansion of hydrocarbon activities, accumulating in oceans and affecting developing countries. These nations suffer disproportionately, as this contamination leads to increased diseases. When hydrocarbons are incinerated, they

cause significant harm, with particles entering the respiratory systems of humans and animals. Additionally, hydrocarbons disrupt gas exchange with the atmosphere and trigger various physicochemical processes such as evaporation and permeation. Depending on the physicochemical characteristics of the hydrocarbon (e.g., temperature, humidity, pH, and soil structure) and the slow runoff, toxicity increases, causing severe environmental effects on both flora and fauna (Velásquez Arias, 2017).

In the face of mineral resource exploration and exploitation projects, the Colombian State's responsibilities extend beyond regulation and control, which are vital tasks. The State is also tasked with overseeing the use and production of resources, assessing how these activities are conducted, their impact on ecosystems, and the extent to which they affect the communities where such activities are carried out.

In this regard, the country's natural resources, including hydrocarbons, have created the need for the government to fulfill its administrative role in regulation and control. This has involved establishing an institutional and legal framework, all under constitutional parameters.

The Technological Process and the Socio-Environmental Conflict

Hydraulic fracturing, or fracking, refers to the technical process used for the unconventional extraction of oil and natural gas. This process involves injecting a proprietary solution that creates fractures between sediment layers, allowing energy resources to escape to the surface for collection. (Valencia & Carrillo, 2016).

The process involves drilling vertically underground (approximately 1,000 to 5,000 meters) and then horizontally (1,000 to 4,000 meters). Fluids are then injected at very high pressure to fracture rocks containing hydrocarbons that are difficult to access, thereby releasing them.

The fluid is composed of water and sand, along with various chemical additives such as methanol, hydrochloric acid, and light petroleum distillates. These chemicals, treated with hydrogen, are combined in a mixture of water, sand, and other pollutants.

Fracking of rocks deep below the surface to release petroleum products has become a controversial issue worldwide. The practice should not be confused with drilling or extraction. Fracking is the process of

using fluid energy to fracture rocks and release gas, and sometimes crude oil. It is not drilling *per se*, although drilling is necessary to establish a well to pump the fluid that fractures the rock and releases the product. In fact, some countries have banned hydraulic fracturing, claiming that groundwater and air pollution increase because of the process (Holloway & Rudd, 2001).

The concept of using water for work is not new. Pumping fluid underground to fracture rocks and release gaseous oil is, however, a newer process. In reality, this process occurs naturally every day with water or magma. Magma can flow into rock beds, overheating water to produce steam. The resulting pressure from the expanding water molecules can be so immense that it lifts and separates thousands of tons of rock deep below the Earth's surface (Holloway & Rudd, 2001).

If contamination of freshwater aquifers is a concern, many stakeholders, both in the industry and the environmental sector, argue that shallow groundwater monitoring wells should be drilled around platform perimeters and sampled as needed. Water samples would then be collected from these wells before drilling to establish a baseline set of analytical data showing water conditions prior to drilling operations.

In fact, some states in the United States have enacted regulations to establish groundwater quality before drilling through a baseline monitoring program. Baseline sampling would be followed by periodic monitoring throughout all phases of operations, including hydraulic fracturing. This process could serve two purposes (Holloway & Rudd, 2001):

- Providing an early warning in case of a leak in well construction.
- Eliminating the operation as a potential source of contamination in certain areas of concern, such as when it is demonstrated that constituents were present in water wells prior to the development of shale gas.

Fracking is an oil extraction technique that has sparked heated debates and concerns regarding decision-making processes and the influence of public participation in water-intensive, unconventional sectors.

Scholars present environmental degradation as a political issue within a context of unequal and subjective human, corporate, and state relationships that shape interpretations of energy, water, and natural landscapes.

From a technical perspective, fracking represents a significant advancement in the recovery of hydrocarbons from unconventional reservoirs. However, this technological innovation contrasts with growing scientific evidence pointing to its environmental impact: from being a major source of methane emissions (a potent greenhouse gas) to the potential contamination of underground aquifers (Howarth, 2019). This contradiction between technological progress and environmental sustainability has made fracking a deeply polarizing issue.

This polarization has given rise to unprecedented social activism, particularly in defense of water as a vital resource. The ability of affected communities to respond depends not only on their political influence, but also on structural factors such as their socioeconomic status and access to legal resources. As Acosta (2021) points out, there is a clear correlation between social vulnerability and exposure to environmental risks associated with hydraulic fracturing.

Beyond environmental concerns, these disputes reveal deeper conflicts over development models. Tensions over land, water, and subsoil resources are intertwined with:

1. Territorial and cultural identities
2. Asymmetric power relations
3. Intensive extractive technologies
4. Scientific-technical knowledge systems vs. local knowledge of hydrogeology

In the Colombian context, fracking regulation has become a battleground where multiple actors converge. On one hand, the current government has promoted an ambitious energy transition agenda; on the other hand, the extractive industry defends its role in ensuring national energy security. This ongoing struggle has been shaped by the Legislative and Judicial branches, whose decisions have set the pace of the controversy. The year 2023 marked a turning point in this

debate. After taking office in August 2022, President Gustavo Petro's administration introduced a bill to ban fracking and the exploitation of unconventional reservoirs (YNC, by its Spanish acronym). Although the initiative was approved by the Senate in April 2023, it faced strong opposition in the House of Representatives, where it was ultimately shelved in June 2024 (Ministry of Environment, 2024). This legislative setback left the possibility of a total ban in suspense.

At the same time, Ruling C-389 of 2023 by the Constitutional Court added further complexity to the debate. Although its primary focus was on tax-related matters, the ruling explicitly acknowledged the tension between economic development and environmental protection, establishing stricter standards for extractive projects. As Triana (2023) points out, this ruling came in a context where the discussion around oil reserves versus energy transition dominated the public agenda.

Throughout 2024, the regulatory landscape for fracking in Colombia was shaped by two key developments: the definitive shelving of the bill seeking its prohibition and the continued suspension of the Comprehensive Research Pilot Projects (PPII, by its Spanish acronym) Kalé (Ecopetrol) and Platero (ExxonMobil), in the Middle Magdalena Valley. This deadlock was compounded by a ruling issued after Ruling C-389 of 2023, in which the Constitutional Court ordered the Government to conduct prior consultations for fracking activities in the Magdalena Medio region (Buitrago, 2024). Although the decision underscored the binding and substantive (not merely procedural) nature of participation, it generated uncertainty regarding the feasibility of reactivating the pilot projects. It made clear that without effective guarantees for affected communities, any progress would be legally unviable.

In the first half of 2025, uncertainty persists. Despite the government's renewed attempt to ban the technique through a fast-tracked bill submitted to Congress with an urgency message (Ámbito Jurídico, 2025), its approval remains subject to complex political negotiations. Meanwhile, the PPIIs remain paralyzed—not only due to the lack of legislative consensus, but also because of unresolved judicial requirements: the prior consultation ordered by the Court continues to be a *sine qua non* condition for their resumption (Buitrago, 2024). This deadlock is unfolding amid a polarized national debate: while the energy industry

(Naturgas, 2025) warns of a potential gas shortage and stresses the need to exploit unconventional reservoirs, the government maintains its commitment to prioritizing the energy transition —though it has yet to present concrete alternatives to replace the energy potential of fracking.

This conflict goes beyond environmental or energy concerns; it reflects a global tension between community rights and technological advances. Techniques such as horizontal drilling, used in fracking, are reshaping historical disputes over property, resource use, and territorial governance.

For example, in parts of northern New Mexico affected by drought, small farmers are confronting oil and gas companies, as well as local and national governments, in a struggle to maintain or redefine water and grazing rights on state and federal lands. There has been a fight for water and community rights in Mora County, New Mexico. Under the Treaty of Guadalupe Hidalgo of 1848 and the New Mexico State Constitution, the water rights of New Mexican ranchers extend to the headwaters of small streams and tributaries of the internationally governed Rio Grande (Valencia & Carrillo, 2016), However, the now technically viable exploitation of hydrocarbons on federal lands has displaced local communities, forcing their subsistence into the judicial arena.

The core of the problem, however, does not lie in the technology itself, but in its use as an instrument of power. Horizontal drilling and fracking have exacerbated underlying conflicts between:

1. Historical rights (e.g., agrarian communities),
2. State/federal interests (control over strategic resources), and
3. Corporate logics (profitability through new techniques).

This triad illustrates how technological innovation, far from being neutral, redefines power dynamics: in Colombia, through demands for participation; in the United States, through litigation over scarce resources. In both cases, what is ultimately at stake is who gets to decide over territories and common goods when the modes of exploitation change.

Community Testimonies and Social Mobilization

Social mobilization has been a decisive factor in the resistance to fracking in Colombia. One of the most emblematic cases is that of the municipality of San Martín, in the department of Cesar. In 2016, this small community became a national symbol of opposition to this extractive practice, thanks to a form of social organization that went beyond street protests to establish itself as a strategic model of territorial resistance.

Within the framework of this struggle, popular consultations (protected under Article 103 of the Political Constitution) represented not only democratic mechanisms for citizen expression but also became effective legal tools capable of compelling the State to acknowledge the autonomy of territorial entities. This mechanism was later replicated in municipalities such as Fusagasugá and Pijao, demonstrating the power of communities to block extractive projects through direct participation and the legitimate exercise of their rights (Padilla Quevedo, 2019).

Beyond the legal framework, the movement was imbued with a deep ethical and communal sense. The words of Doris Gutiérrez "We cannot allow them to destroy our territory for economic gain (translated by the authors)," capture the spirit of a resistance that prioritized life and care for the environment over profit (Padilla Quevedo, 2019). This stance not only mobilized communities but also resonated within institutional frameworks: rulings such as SU-123 of 2018 by the Constitutional Court reinforced the right to prior consultation, reaffirming its role as a fundamental guarantee of citizen participation and territorial defense.

However, the case of San Martín also exposed the risks faced by those who oppose the extractivist model in Colombia. Threats from armed groups such as the AGC and attacks against social leaders revealed a pattern of systematic violence aimed at silencing environmental dissent. In response to this adverse context, the community built a network of solidarity-based protection: reports to the IACHR, alliances with international organizations, and rigorous documentation of the aggressions, which contributed to reports such as that of Global Witness, which identifies Colombia as the most dangerous country in the world for environmental defenders (Global Witness, 2024). In this way,

the struggle against fracking also became a fight for the physical and cultural survival of communities.

Although San Martín succeeded in halting the implementation of fracking within its territory, its experience exposed deep contradictions in national policy. While President Iván Duque's administration promoted the so-called "pilot projects," the Colombia Free of Fracking Alliance —strengthened by the precedent set in San Martín— advocated for stronger technical and scientific safeguards, leading the Council of State to require independent studies such as those carried out by the National University.

Similarly, in Puerto Wilches, Santander, local communities mobilized in opposition to against the fracking pilot projects in the region. Although the Council of State had suspended the practice of fracking in Colombia, it had not objected to the so-called 'pilot plans' aimed at gathering evidence on the viability of a technique that the Council itself had deemed harmful. Organizations such as the Colombia Free of Fracking Alliance continued to demand that the Council of State declare the implementation of the Comprehensive Research Pilot Projects (PPIIs) unfeasible. These projects had been recognized by the national government through Decree 328 of February 28, 2020. Among them were Kalé, developed by Ecopetrol, and Platero, led by ExxonMobil (Peña Montoya, 2022).

In light of this situation, Puerto Wilches experienced what has been described as a form of "intimidated resignation." Jorge Ardila, spokesperson for the Committee for the Defense of Water and Territory (AguaWil), stated that after five members of the collective received death threats in February 2021, community participation in public anti-fracking activities significantly declined. He also noted that although many opposed fracking, the looming possibility of its implementation —combined with promises of jobs and development made by oil companies— led some residents to consider working on the projects, given the absence of state support and the lack of stable employment in the municipality (Peña Montoya, 2022).

Óscar Sampayo, member of the Yariguíes Regional Corporation and the Study Group on Extractive, Environmental, and Social Issues of the Middle Magdalena Region, argued that promises of progress

and employment were intended to divert attention from the potential environmental damage. Sampayo emphasized that the health of an entire territory would be affected, as the Kalé and Platero projects were located less than seven kilometers from vital wetlands such as Paredes and Montecristo, and both were near the Magdalena River. These wetland areas serve as fishing grounds for more than two thousand families and provide irrigation for crops. Sampayo warned of the risk of water contamination, noting that the companies planned to extract large volumes of river water to mix with toxic chemicals and sand raising concerns that this process could eventually contaminate both groundwater and the wetlands (Peña Montoya, 2022).

One of the main arguments put forth by the communities was the right to prior consultation, given that many of the territories affected by fracking projects were inhabited by Indigenous and Afro –descendant communities. These groups demanded that their right to be consulted– established in the Political Constitution of Colombia and in international agreements such as the International Labour Organization's Convention 169–be respected before any extractive activity could begin.

The popular consultations carried out in municipalities such as San Martín set legal precedents that reflected active and decisive community participation. Despite ongoing legal and political challenges, these consultations emerged as symbols of community resistance and concrete expressions of participatory democracy in Colombia.

International Restrictions on Fracking and its Attempts in Colombia

The ethics of fracking is closely tied to concerns about the future of water for humanity. This review reveals that ethical concerns surrounding the development of shale gas are, at least in part, linked to the potential impacts of development on water resources.

It is no secret that water quality and supply are significant issues associated with shale gas development. Research conducted in the United States and the United Kingdom has shown that Americans who associated shale gas development with water contamination were 5.6

times more likely to oppose such development than those who did not, while residents of the United Kingdom were 4.2 times more likely to do so (Löfstedt, 2004).

The ethical debate and international restrictions surrounding fracking largely revolve around the precautionary principle. This globally recognized principle finds its key formulation in Principle 15 of the Rio Declaration on Environment and Development (1992), which establishes that "where there are threats of serious or irreversible damage, the lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".

The precautionary principle can be understood as the assertion that a potentially hazardous action or process, often subject to scientific uncertainty (e.g., shale gas development)[2] should not be permitted until society can be confident that it will not cause harm. This could be seen as a strong form of the precautionary principle, contrasting with a more nuanced form, such as the one outlined in the European Commission's declaration.

Löfstedt (2004) aptly notes that the invocation of the precautionary principle often aligns more closely with the strong version than the nuanced version. The precautionary principle has been invoked as a relevant ethical approach to shale gas development due to the substantial uncertainty surrounding the effects of development and the potential for "harm," predominantly in the form of negative impacts on human health.

The precautionary principle also implies that most uses of this principle in association with shale gas development align with its action-forcing nature, which dictates that if there is an uncertain threat, some form of action is required.

This contrasts with the argumentative version of the precautionary principle, which focuses on what types of arguments should inform decision-making. While a variety of "harms" could be offered as

[2] In the oil industry, it is referred to as *shale gas*, also known as gas from shale, which is a hydrocarbon found in a gaseous state within very fine-grained sedimentary rock formations. Its extraction takes place from very deep zones in areas rich in shale, which has a rocky interior with low permeability, preventing its ascent to the surface. For this reason, hydraulic fracturing of the rock is required for its extraction and commercialization.

justification for adhering to the precautionary principle (e.g., damage to roads, wildlife, or the character of the community), most claims in this area stem from researchers in the field of human health (Löfstedt, 2004). Consequently, the most frequently cited potential harms involve possible air and water contamination. A common assertion associated with appeals to the precautionary principle is that further research is needed to reduce uncertainty about potential health impacts.

According to Evensen (2016), fracking as a hydraulic technique for extracting hydrocarbons presents several environmental and public health risks. Here are some of the risks associated with fracking:

a) Water contamination: The injection of high-pressure fluids can lead to the contamination of aquifers with hazardous chemicals.
b) Water consumption: The process requires large quantities of water, which can deplete local water sources.
c) Air contamination: During extraction, gases such as methane, a potent greenhouse gas, can be released into the atmosphere.
d) Induced seismicity: Fracking has been linked to an increase in seismic activity in some areas.
e) Health impacts: The chemicals used in the process can have adverse effects on the health of people living near fracking sites.

These risks have led many countries to reconsider or ban the practice of fracking.

The unconventional extraction of gas and oil from the subsurface has sparked widespread global debate due to the aforementioned risks of groundwater contamination. As a result, a global movement has emerged, driven by NGOs and various communities seeking to influence their countries to restrict this practice.

Fracking Around the World

Rather than a mere catalog of regulations, the international experience offers a comparative framework to understand how different democracies manage the conflict between extractive interests and community rights. The global response to fracking has bifurcated into

two governance models that directly mirror the tension currently observed in Colombia:

The Precautionary Model (Prohibition)

Countries such as France, Scotland, and Bulgaria have banned the practice. In these jurisdictions, the "social license" was denied through strong citizen pressure, leading the State to prioritize the Precautionary Principle over potential economic gains. This validates the Colombian hypothesis that robust citizen participation often acts as a counterweight to environmental risks.

The Regulatory Model (Permissiveness)

Nations like the United States, Canada, and China have opted to regulate the practice. However, as noted in the conclusions on the U.S. context, this model often exacerbates tensions over access to land and water, shifting disputes to judicial arenas where resources-constrained communities struggle against corporate power.

In the case of the United States, strict rules were established in 2015 for the development of fracking in wells located on federal land and underground areas, under the supervision of the Bureau of Land Management. Measures include providing information on the exact location of drilling, specifying the geological characteristics of the terrain, and disclosing the chemicals to be used during the process, as well as implementing safety measures for storing residual fluids.

Although the U.S. has strict technical regulations, the asymmetry in power relations described by Valencia and Carrillo (2016) persists. This demonstrates that technical regulation alone does not resolve the socio-environmental conflict, a key lesson for the Colombian legislative attempts.

For Canada, where fracking is also allowed, authorization is based on strict monitoring of seismic activity, which is arguably the main consequence of drilling in water wells, according to studies by Seismological Research Letters. As a result, shallow fracking has been limited, and

licenses are granted only after confirming the absence of earthquakes or tremors in the affected area.

In Mexico, authorizations have focused on prioritizing access to potable water for communities, in line with the Centro Mexicano de Derecho Ambiental (CEMDA). Consequently, residents of affected areas must have "full access" to project information.

In China, fracking operations involve corporate participation, as international companies wishing to conduct fracking must partner with local firms. The activity is subject to laws related to controlling environmental pollution, including both air pollution and pollution caused by solid waste.

On the other hand, countries that have categorically banned fracking include Scotland, France, Bulgaria, South Africa, the Czech Republic, Switzerland, Austria, Ireland, Northern Ireland, Italy, Spain, and New Zealand.

These bans were not purely technical decisions but political ones, resulting from democratic debates where citizen opposition was the deciding factor. This contrasts with the Colombian situation, where judicial interventions (like those of the Council of State) have had to fill the void left by a lack of legislative consensus.

In Latin America, some countries are cautiously moving toward banning fracking. This group includes Costa Rica, certain states in Brazil, and a province in Argentina.

Fracking in Colombia

Since the beginning of the past decade, Colombia's Agencia Nacional de Hidrocarburos (ANH, by its Spanish acronym) has started studies to grant permits for the use of fracking techniques in six blocks of unconventional hydrocarbon reserves in the Magdalena Medio region. As a result, the Ministry of Mines and Energy issued Resolution 180742 of 2012, which established the procedures for the exploration and exploitation of unconventional reservoirs. In addition, Decree 3004 of 2013 was issued, establishing technical standards and procedures for fracking and unconventional reservoirs, which were later published in Resolution 90341 of March 2014.

Decree 3004 defined an unconventional reservoir as "a rock formation with low primary permeability that requires stimulation to improve hydrocarbon mobility and recovery conditions (translated by the authors)." According to the same regulation, such reservoirs include "gas and oil in tight sands and carbonates, coalbed methane (CBM), gas and oil from shale, methane hydrates, and tar sands" (translated by the authors).

At the time, then-president of Ecopetrol, Juan Carlos Echeverry, expressed his support for fracking, as did the Minister of Mines and Energy, who claimed that the profits from fracking would help finance part of the peace process and the post-conflict era.

When everything seemed to be in place to begin implementation, the Third Section of the Council of State issued an order on November 8, 2018, imposing a precautionary measure to temporarily suspend Decree 3004 of December 26, 2013, "which establishes the criteria and procedures for the exploration and exploitation of hydrocarbons in unconventional reservoirs" (translated by the authors), and Resolution 90341 of 2014 of the Ministry of Mines and Energy, "which establishes technical requirements and procedures for the exploration and exploitation of hydrocarbons in unconventional reservoirs" (translated by the authors).

The chamber clarified that this decision did not prevent the execution of Integral Research Pilot Projects (PPII), included in Chapter 14 of the "Report on environmental (biotic, physical, and social) and economic effects of hydrocarbon exploration in areas where hydraulic fracturing techniques of generating rock through horizontal drilling may be deployed (translated by the authors)" prepared by the Expert Committee convened by the National Government.

Subsequently, in September 2019, the same Council of State upheld the precautionary measures issued in November 2018, suspending the regulations governing fracking in Colombia. However, the decision did not prevent the execution of Integral Research Pilot Projects, outlined in the "Report on environmental (biotic, physical, and social) and economic effects of hydrocarbon exploration in areas where hydraulic fracturing techniques of generating rock through horizontal drilling may

be deployed" (own translation), prepared by the Expert Committee convened by the National Government.

During the presidential term of Iván Duque (2018–2022), his government signed the first contract to develop a pilot hydraulic fracturing project in Colombia. The National Hydrocarbons Agency (ANH), under the Ministry of Mines and Energy, and the state oil company Ecopetrol, signed the contract to execute the Kale Research Project on December 24, 2020.

This project was located in an area known as La Belleza, in the municipality of Puerto Wilches, in the department of Santander, within the Magdalena Medio Valley. Ecopetrol was the company responsible for its execution. The project's objective was to evaluate whether the country could produce and commercialize hydrocarbons extracted using the fracking technique.

The project was valued at USD 76 billion and covered an exploration area of 455 hectares. Drilling was scheduled to begin in mid-2021 after obtaining environmental licenses. This contract was signed despite 50 congressmembers requesting the Executive to suspend the fracking pilot projects.

Finally, a decisive setback came from a judicial ruling: in response to a writ of protection, ordered the suspension of the first fracking pilot project in the country, which was to be carried out in Puerto Wilches, in the department of Santander (eastern Colombia). The suspension was due to the lack of prior consultation with local communities, as required by current regulations.

Conclusions

In the implementation of prior consultations and popular consultations in Colombia, inconsistencies have been observed between territorial autonomy and the unitary State, particularly regarding jurisdiction, scope, and effects. Conflicts arise over who holds the authority to convene the consultation, whether it falls under the jurisdiction of the territorial entity or the national level, creating uncertainty and delays. There is also debate over the subjects that can be addressed in

consultations, questioning whether they can involve matters of national jurisdiction or are limited to territorial issues. Furthermore, the effects of consultations, in terms of their binding nature for authorities, have been controversial, with discussions about whether they are binding or merely advisory.

Although popular consultations did not originate exclusively with the 1991 Political Constitution of Colombia, which established citizen participation as a value, principle, and goal, they gained greater relevance from that moment onward. In the environmental field, this right has been fundamental for the protection of natural resources and community rights.

The Constitutional Court has played a key role in shaping the regulatory and jurisprudential framework for citizen participation in environmental matters. It has recognized participation as a fundamental right in multiple rulings, grounded in the principle of participatory democracy set forth in Article 40 of the Constitution. This right guarantees access to information, transparency, accountability, informed decision-making, and the protection of environmental principles. However, the Court has also imposed restrictions and conditions that have limited its application, sparking debate over its actual effectiveness.

Regarding popular consultations, the Constitutional Court has limited their application to matters within municipal or district jurisdiction, excluding projects of national or departmental jurisdiction. Additionally, it has established strict requirements for the formulation of questions in consultations, making their implementation more difficult (Const., C-161/2003, M.P. A. Beltrán). It is argued that both popular consultations and prior consultations are not binding on the State, which deprives these mechanisms of effectiveness.

The Office of the Attorney General has issued opinions and undertaken actions that hinder the use of popular consultations in extractive activities, limiting their scope and application. Similarly, the National Registry of Civil Status has maintained restrictive positions on popular consultations, imposing complex requirements and unjustified delays in their review and approval. These actions generate distrust among communities regarding the effectiveness of citizen participation mechanisms, weakening the participatory democracy enshrined in the

Constitution. The most vulnerable communities, such as Indigenous peoples, Afro-descendants, and rural farmers, are the most affected by the lack of effective participation mechanisms.

The Constitutional Court has restricted prior consultations to Indigenous peoples and Afro-descendant communities with distinct cultural identities, overlooking the territorial connection of other citizens (Const., C-031/1993, M.P. E. Cifuentes). These restrictions and contradictions complicate citizen participation in environmental matters, emphasizing the need to review and rethink consultation processes to ensure inclusive and meaningful participation. The prioritization of "national interest" projects over environmental rights has also been questioned.

Citizen participation is essential for sustainable development, balancing economic growth, environmental preservation, and social well-being. Local communities, as the primary stakeholders affected by decisions on natural resources, must be heard and actively involved in decision-making processes. The Constitutional Court must ensure environmental rights and citizen participation in its rulings, working alongside the State and communities to achieve sustainable development.

The research concludes that the effectiveness of citizen participation mechanisms is currently asymmetrical. The quantitative component of this study demonstrated that while mechanisms like Popular Consultations are politically powerful, achieving rejection rates above 97 % in affected territories such as Fusagasugá and Cumaral, they lack binding legal force to stop fracking projects. The analysis confirms that Ruling SU-095 of 2018 created a barrier that renders these statistical mandates legally unenforceable. Therefore, without a legislative reform that restores the binding power of local decisions, the effectiveness of participation remains symbolic rather than material.

As the cases analyzed demonstrate, citizen participation is not a formality but a tool to prevent socio-environmental conflicts and to build legitimate models of development. The Constitutional Court and the State must act consistently: either these spaces are consolidated as pillars of participatory democracy, or the gap between the legal framework and the lived realities of communities will continue to widen.

The experiences of communities such as San Martín and Puerto Wilches, affected by fracking projects, illustrate the concrete relevance

of participation mechanisms in the defense of environmental rights. Through popular consultations, social mobilization, and legal action, these populations have made their voices heard, underscoring the urgency of a development model that respects ecological limits and places collective well-being at its center. Their struggle stands as a testament to the power of collective action and the importance of legal frameworks that strengthen citizen participation in key matters of environmental justice.

The Constitutional Court's jurisprudence highlights the need for adequate regulation that considers community well-being and the right to a healthy environment. The recent regulatory trajectory —marked by failed legislative initiatives, shelved bills, and contradictory court rulings— confirms that fracking is still a subject of national tension, where citizen participation appears as a central and recurring element at all levels of discussion and decision-making.

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