

ADVANCES IN SCIENCE

Universidad del Rosario

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**A finding that could
change what we
know about dengue
in Colombia**

**An offline app could
improve the sexual health
in pacific communities in
the Colombian Pacific**

**'The Ciénaga Grande de
Santa Marta (Great Swamp
of Santa Marta) urgently
needs a right that considers
the relationships between
people and nature'**

**Historical monuments:
neither as still nor as
silent as stones**

Special Report:
COLOMBIA,
A DEMOCRACY
WITH FLAWS



Universidad del
Rosario

Advances in Science

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SUMMARY

Editorial

Science, a social good

1. Inclusive Research

10 Special report Colombia, a democracy with flaws

- 26 A finding that may change what we know about dengue in Colombia
- 32 Informality and gender: Major absentees in the discussion on the right to work
- 38 Mixed pain: A new paradigm for diagnosing and treating this symptom
- 44 How life skills transform the university experience?
- 50 Pets dressed in fashion

2. For an ecologically sustainable environment

- 58 Innovation to protect the brains of pollinators: Flavonoids could help bees recover their memory
- 64 Tomogrande: Lessons on climate change from the high plain
- 72 Sugarcane: Between the air and mule
- 76 'Ciénaga Grande de Santa Marta (Great Swampto of Santa Marta) urgently needs a right that considers the relationships between people and nature'

3. Thinking in affairs of the domestic agenda

- 84 Challenges for Colombia in the post-peace agreement era
- 90 Urban sprawl in Colombia continues to expand
- 96 The art of envisioning the economic future





4. Adding up disciplines to improve quality of life

- 104** In Colombia, the virulence of toxoplasmosis threatens vision
- 110** Colombian exoskeletons: The beginning of a revolution
- 116** Colombian schools must renew themselves to welcome Venezuelan migrant children and adolescents



Consult all our topics online here

5. Digital Innovation

- 124** An offline app could improve the sexual health of communities in the Colombian Pacific
- 130** 'Fintech' in Colombia: The bet on financial technologies accessible to everyone
- 136** Machines and artificial intelligence: A new cure for tuberculosis
- 142** How academics perceive publishing houses in Colombia

6. Leadership and social innovation

- 150** Women from Universidad del Rosario motivated by research
- 156** Rhapsodies: A journey of resilience and transformation post COVID
- 162** Lilia del Riesgo: "Everything can be improved in this world"

7. Efforts that transcend research

- 170** Historical monuments: Neither as still nor as silent as stones
- 176** A photographic expedition into Colombia's past
- 182** Young talent for prevention in electrical systems
- 188** Universidad del Rosario, committed to excellence
- 192** UROsario, disclosure and scientific visibility

SCIENCE, A SOCIAL GOOD



By Juan Felipe Córdoba Restrepo
Director
Editorial Universidad del Rosario

Photos by UROsario

*We wish to see the most beautiful creatures multiply,
so that the rose of beauty may never perish, but when
the most efflorescent must shed its petals due to the passage
of time, it may achieve its tender offspring to perpetuate its memory.¹*

Understanding a little more about the institutions of higher education, and the research groups that are part of them, allows us to comprehend the importance of the work they do, at the same time as their commitment to society. A university like ours understands from its origins that its work is motivated by the greater good: the collective benefit. In order to achieve this, its researchers carry out an arduous task that allows us to contribute decisively to consolidate a better society.

Developing research requires a strong associative spirit of networks of people and institutions that work around common purposes, leading to the construction and development of projects that lead, in turn, to achieve conquests for the benefit of all living beings. Discussions generated in different groups or communities result in representative achievements that alone would not have been possible to obtain.

From Universidad del Rosario, we understand science as a social good; a good that belongs to humanity. What the institution produces as knowledge is transferred beyond our enclosure, and this encourages us to advance and build day by day what we are as a society.

¹ William Shakespeare. "Sonnets", in Complete Works. M. Aguilar Editor. Madrid, 1947. (P1815).




We must understand that the knowledge obtained by the different research groups has a connotation that goes beyond us. When we decide to delve into a particular subject we are invoking the principle of the universality of science.

The achievements that we can document in this issue of our journal magazine *Advances in Science* are a sample of the above. Each of the research we present articles on this occasion are the result of the work that each of the people who accompany us in this delivery carry out with a strong commitment. We can count on these testimonies because we work with several scientific journalists, and the developments to which our readers can approach through the copy they have in their hands or the links to which they can access in the virtual universe are also thanks to teamwork, in network.

The bet that animates our proposal is to promote spaces that guarantee the proper disclosure of knowledge beyond their spaces of influence. Science, as a social good, requires this, and therefore, the contents delivered in our journal aim to travel all possible places and reach multiple hands to with

its reading encourage discussions and debates, which constitutes a part of the symbolic capital that readers build from the intellectual goods that researchers, journalists, designers, coordinators and editors are delivering to them.

In today's world, such efforts are necessary. For the University, in its almost four centuries of existence, bringing the knowledge produced to the public is to raise it to the level of social good, and its disclosure, circulation, access and appropriation must exceed geographical boundaries. Fostering the creation of new audiences and new readers, is part of our commitment, as the intention lies in shaping citizens of and for the world. With the contributions contained herein, we seek to evoke new points of view on issues crucial to society.. ■



1

Inclusive Research

Virgen del Rosario "La Bordadita". Anonymous author. 17th century.
Mixed technique, 91 x 65 cm, 94.5 x 69 cm. Universidad del Rosario Collection.





Colombia, a democracy with flaws



How do elections influence the strengthening of our democracy? In this special report, we have asked several researchers of Universidad del Rosario about aspects of the electoral processes in our country that influence the quality and scope of democracy in our country.

By Juan Manuel Sarasua Suárez

Photos by Shutterstock, Archive

DOI https://doi.org/10.12804/dvncn_10336.42715_num7

The vote is one of the characteristic mechanisms of citizen participation in modern democratic states. It is expressed during the electoral contest and is the most civilized way that human societies have devised for citizens to participate in decision-making, choose our leaders and decide on the management and destination of our country's resources. Participatory democracy grants us that power, which we then transfer to political parties with the desire that what we have chosen will be fulfilled.

However, the vote is only one component of a democracy and it is not enough for citizens to give our full trust in our politicians and their parties. A country needs much more than elections to function; above all, it requires strong and transparent institutions and control processes that grant independence to the three branches of power.

Perhaps this is why, historically, abstention in Colombia has been very high. Since 1978, at the end of the National Front, abstention has exceeded 50 percent in the majority of electoral events. In the 1994 elections it reached 66 percent, and in the plebiscite on the 2016 peace agreement it was 62.6 percent. Only in the 1998 presidential elections was there a respite, both in the first round (48.1 percent) and in the second (41 percent). However, it took another 20 years (the presidential elections of 2018) for abstention not to exceed the 50% threshold.

Trust in institutions and politicians has been clearly low throughout the contemporary history of the country, and denouncing the slow and uneven economic and social development does not seem to be a sufficient reason for Colombians to attend to the polls. Nevertheless, the election period (before, during and after that Sunday, the traditional day of elections in Colombia) is a sure rendezvous with controversy and media spectacle, and, in recent years, the opportunity to use new digital techniques aimed at achieving a greater engagement with the voter, knowing them better and attracting them.

Several researchers of Universidad del Rosario spend much of their time studying the voting days in all its stages and facets. In this edition of *Advances in Science*, we wanted to talk with some of them about the topic and the scope of their observations. We also ask them their opinion on the electoral processes, on the aspects that influence the strengthening or weakening of our democracy and on the administrative processes surrounding them.

Perhaps by the end of this text, we will have some answers and clarity on whether our electoral processes are mediocre and unfair, and constantly disappoint us, or, on the contrary, are monitored processes, with reliable and transparent results. Or maybe they are a mix of everything!

A democracy of low quality?

“Despite having clear economic growth and social progress, the country has a democracy of low quality. That is, democratic processes are correct and do not have so many flaws, but this does not translate proportionately into widespread well-being for all Colombians,” says [Andrés Miguel Sampayo](#), PhD in Political and International Studies from the Faculty of Political Sciences, Government and International Relations at Universidad del Rosario.

“Here electoral democracy is performing efficiently, supported by fair and free elections and an admirable electoral system,” he continues. “Competition is fair and multi-party both in the campaign and in the elections, although isolated cases of violence do occur. The transfer of power, even when the parties that are governing lose, is carried out in a respectful manner. However, the shortcomings are evident when trying to extend the democratic benefits, in terms of social and economic rights, in order to cover more people. Another serious flaw lies in the close connec-

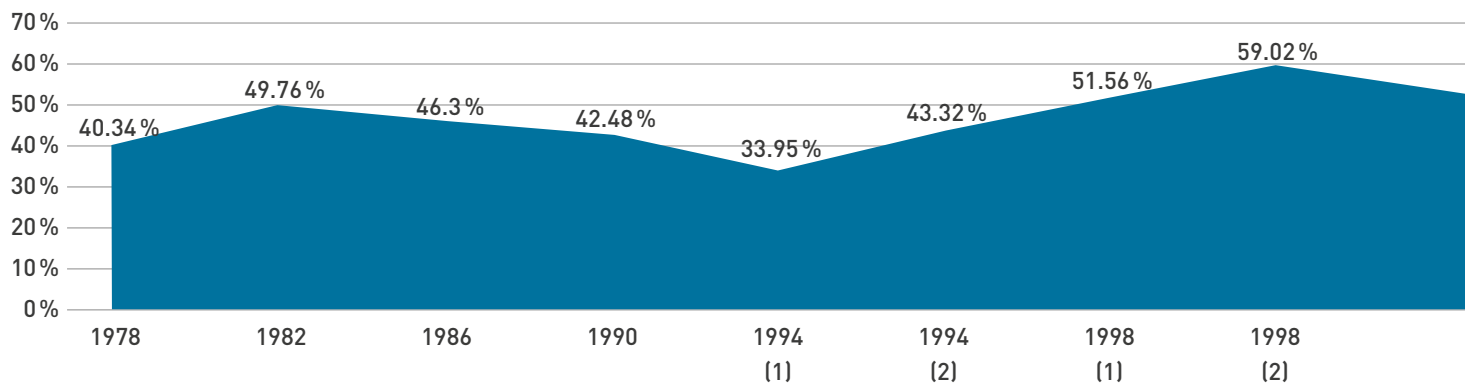


tions between many of the elected or candidates and outlawed groups.”

With this premise, Sampayo developed his doctoral thesis to investigate why dissatisfaction with our democracy persists, despite the country's economic growth in recent years.

Percentage of participation in presidential elections from 1978 to 2022

Source: Data taken from the report Electoral Abstentionism in Colombia (2013) of the National Registry and the Center for Studies in Democracy and Electoral Affairs, and own elaboration with current data, January 2024.





It initially focused on the Santander department, its place of origin, due to its remarkable economic progress and recent social advances, although several of its politicians participate in illegal practices. To do this he obtained a scholarship from the Faculty of International Studies, which for six years awarded him salary, office and resources.

Sampayo employed surveys, a linear probabilistic model, and the unsupervised classification algorithm k-means. It observed the grouping of municipalities according to electoral trends and determined territorial patterns. The algorithm identified clusters that reflect the electoral behavior of nearby municipalities. He found that municipalities do not vote independently when they are neighbors, but that geographically close ones share ideological patterns and trends.

“This methodology allowed me to see that there are some patterns of electoral ‘niching’” he says. “It is the limitation of political competence in a specific number of municipalities,

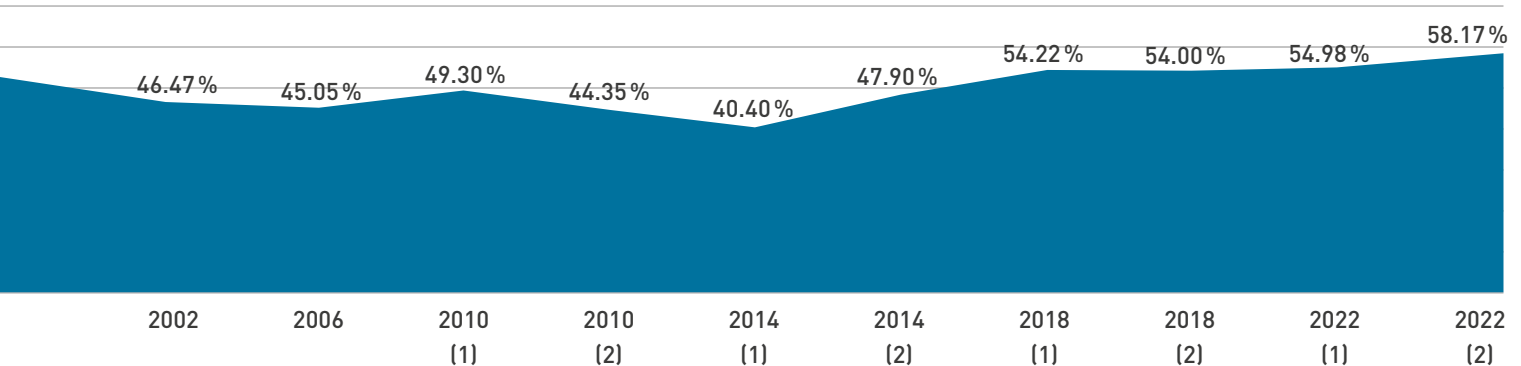
by a political faction that manages to have a majority vote in a sustained way over time,” he replies.

According to his study, this niching occurred mainly in municipalities that had three characteristics in common: the first is that they are the least economically developed in the department. To analyze this variable he used the index of light intensity: the more light is radiated in urban centers, the more development. It compared satellite data from 1990 to 2013 obtained by the Defense Meteorological Satellite Program ([DMSP](#)) and the Operational Line-Scan System ([OLS](#)), both from the United States Office for National Oceanic and Atmospheric Administration (NOAA), and also from the [Global Forest Watch](#) platform.

The second characteristic of the municipalities that are announced is that they had more difficulties in generating their own resources. And the third, that in these municipalities there are fewer planted hectares, even though they depend on agriculture to generate income.

The reason, then, why in many municipalities traditional political parties always win, is because they niche and thus consolidate in power. Many of the political parties or movements have therefore decided not to activate their campaigns in those municipalities where they know they would not get good results.

Sampayo applied similar models throughout the country and found that the niching is repeated in other regions. “The research data show that the Conservative Party is strongly anchored in Bolívar, Córdoba and Tolima; the Liberal Party in Chocó and some areas of Cesar and Sucre, the Party of the U in the Valley and Cambio Radical in the Atlantic region. Alternative parties, on the other hand, win in the big cities and from there they grow to other places; example of this is the Green



"I discovered patterns of electoral niching, which is the limitation of political competition in a specific number of municipalities, by a political faction that manages to maintain a majority vote over time. These municipalities are less economically developed, with difficulties in generating their own resources and with less commercial agricultural activity."

Andrés Miguel Sampayo.

Party, which is already strong in Boyacá and Bogotá."

"Not every form of niche is bad!" he says. "There are many ways to explain that niching, but it doesn't have to be bad. The proposal of the thesis allows us to understand the causes of this niching and proposes to use them for the benefit of honest and committed candidates with Colombia."

This is where the practical part of your thesis comes into play. At the moment, Sampayo is the Coordinator of the Legislative Work Unit (UTL) of [Julia Miranda Londoño](#), the Nuevo Liberalismo militant who got her seat in the House of Representatives of Congress for Bogotá in the last regional elections (October 2023). He was the manager of the campaign in 2022, for which he used this data methodology in order to find patterns to win those elections.

The campaign strategy identified that voters of alternative, progressive and liberal ideas, similar to those of Julia Miranda, vote at the same tables in Bogotá. In this way, the team dedicated inputs, advertising budget and people in the street only in the surrounding areas to the identified tables, and thus, in its first elections, Julia Miranda, achieved 40 000 votes, enough to get that seat.

Increasingly, the percentage of the electoral campaign budget devoted to managing the image of candidates on social networks is higher, as it practically allows us to choose who should receive our message. However, Sampayo says that radio also gave them excel-



↑
The Intelligence Unit of The Economist magazine publishes an annual Democracy Index, which classifies the democracy of 167 countries based on a rating. In 2022, Colombia was described as a "deficient democracy" and ranked 59th in the world and 10th in Latin America.

lent results and that their cost-benefit is much more favorable than in the case of television.

"It is necessary to study why these niching occur in certain places to better understand how democracy works in Colombia. This also makes it possible to increase the level and sophisticate the quality of the candidates who apply. Perhaps this way will allow new leadership to appear or emerge in various places" he concludes.

And what are the boundaries of these niching? Sampayo says it depends on each place. "In Santander, the boundaries between one *cluster* and another are strongly marked by the boundaries between provinces. In Bogota, the results are clearly marked by [UPZ](#) (Zonal Planning Units)."

In his doctoral thesis he concluded "that the low quality of democracy in Colombian departments, despite economic development, is due to the lack of homogeneity in such development. Territorial heterogeneity leaves pock-



ets of marginality exploited by political groups, which reveals the importance of ‘niching’ as an intermediate variable.”

This dynamic explains the paradoxical coexistence between development and low-quality democracy, as Sampayo concludes is the case in Santander.

Does Class Voting Exist?

It is precisely this difference between strata that has been studied by a group led by [Yann Basset](#), a political scientist researching in the Faculty of Political Sciences, Government and International Relations at UR, and member of the Group of Studies of Democracy Demos-UR. This research group publishes research and disclosure pieces on their website [Procesoselector.org](#), in which they analyze some aspect of the country's politics related to voter behavior and try to explain the singularities of the electoral processes carried out in the country, something that is usually not easy to understand. Most of them are conducted by students.

We need to unravel that political gibberish from the elections, to educate ourselves thoroughly at all levels. Above all, however, we need to combat the obstacles to the representation of women in our political positions, something that, although it involves education, requires more precise and realistic regulations.

One of the formats that the team pays the most attention to is the bulletins that they publish biannually. They analyze the results of the elections, once they are issued by the National Registry, in search of electoral patterns.

In bulletin number 17, titled [“Votes and Social Strata: Impact on Colombian Local Elections \(2007–2019\)”](#), published in August 2023, researchers analyzed how different social strata vote in the local elections of mayors of the six main cities of the country (Bogotá, Medellín, Cali, Barranquilla, Bucaramanga and Pereira), from 2007 to 2019. “We were more interested in mayoral elections than national ones, as they are less politicized and more immersed in issues of local interest,” Basset says. The bulletin was presented at the latest political science congress of the Colombian Association of Political Science (Ascopol) in June 2023, and around 10 students from various semesters collaborated in its production.

The results say that the stratum, the logic of the ‘class vote’ is a very important variable in the mayoral elections in the big Colombian cities. “Stratification does not occur in all cities; the bigger it is, the clearer the stratification becomes. There is a form of ‘confrontation between social strata,’ with the lower strata supporting one candidate and the wealthier strata supporting another, which shows that it is a key to the strong reading of local elections in large cities,” argues Basset.

However, this is not the case throughout the country, as the situation changes when analyzing smaller municipalities.

“In these, social strata do not show as many differences in lifestyles; the inequalities are

not as deep as in larger cities because there is not so much diversity; the traditional parties have greater power and are multiclass (having votes across all strata),” he continues. “It is a feature of traditional parties: liberals and conservatives don’t really have a class identity, they ‘fish’ in all strata. The logic of the difference in votes is seen much more in big cities where these parties do not have large votes. In these elections a series of electoral confrontations is presented that has much to do with the differences in lifestyles between social strata.”

Likewise, the data of his observations indicate that in some cities there are cycles of alternation: “Cali, for example, shows that after very stratified elections, there come others that are not so stratified. This means that there is more alternation between candidates who polarize socially and others who achieve greater consensus in the population.”

In the Stratification graph of the local elections between 2007 and 2019, it can be seen that stratification only grows in Medellín, but it is not so in the rest of the cities. In more detail, the 2019 elections in Medellín, in which Daniel Quintero was elected, show a strange event in the city: a high stratification above

the historical trend of the city, which, like other large cities, used to vote with a very little stratification. dominated by traditional parties or those initiatives that gathered consensus (such as that of Federico Gutiérrez).

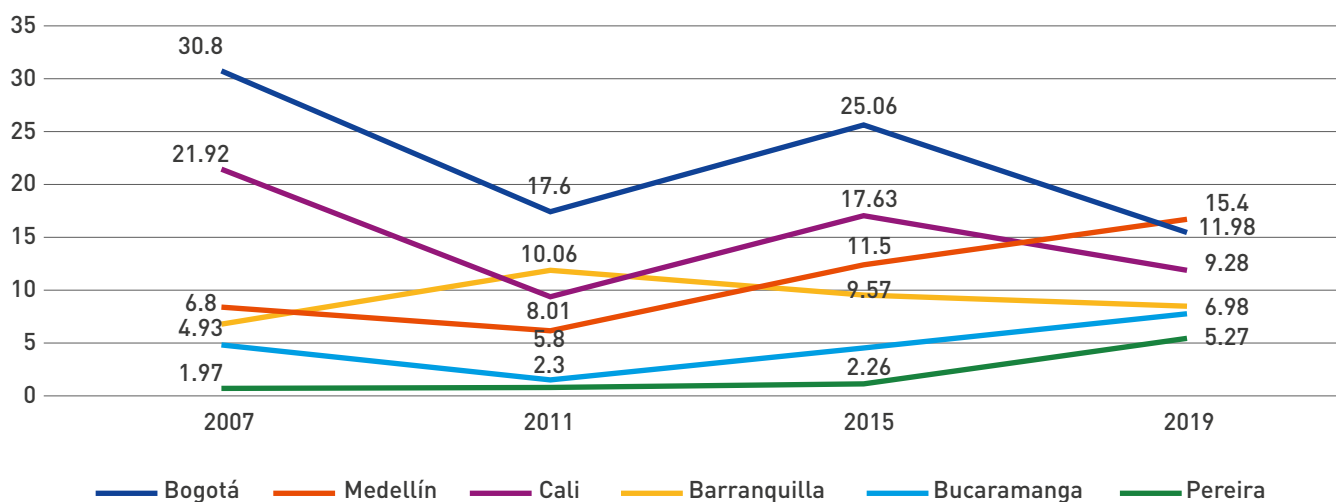
In the following published bulletin, #18 (“...Chiefdoms and local elections: How Much Relation Exists Between the Local and the National?”) In November 2023, researchers analyzed the results of the October 2023 regional elections and map the results of each party in the territories. “We study the logic of candidacies and their relationship with the legislative power; whether there is a link between the power of a congressman over a territory and the fact that his party presents or does not presents a candidacy, either independently or in coalition,” explains Basset.

Do We Need Electoral Education?

Colombians tend to participate regional elections in greater numbers than the presidential ones, something that is not usual in other countries, since it is assumed that the latter are more important for the nation. “Colombia is a very diverse country and not very integrated geographically and culturally; many people feel the impact of their local mayor more than that of the president. In addition, it is a country with many municipalities, where numerous candidates present and where a large majority has a relative or an acquaintance on the lists. These regional elections involve everyone and that is why we have an excess of passions and participation that sometimes end very badly,” adds the researcher.

Stratification local elections 2007-2019

This is the behavior of the stratification in the different cities. Only Medellín shows a clear tendency towards greater stratification. Bucaramanga and Pereira show a more timid increase.



Source: Bulletin 17 of Procesoselectorales.org, portal of the Group of Studies of the Democracy of Universidad del Rosario (Demos-UR). August 2023 .

The candidates who stood in the last regional elections are not few. According to the [Registraduría Nacional del Estado Civil](#) (National Registry of Civil Status), 132 553 candidates registered, 13.73 percent more candidates compared to the 2019 elections (116 546). Among coalitions, citizen groups, social movements and political parties with legal status, there were 251 candidates for 32 governorships (an average of 7.8 candidates per governorate); 6 175 candidates for 1102 mayorships (an average of 5.6); 3894 candidates for the Departmental Assemblies; 106 429 for the Council and 15 804 for the Local Administrative Boards (JAL).

“Political contests are a means to conquer, exercise and preserve power. The electoral system is crucial. It constitutes a set of elements through which citizens express their political preferences and those preferences become seats or political power,” states [Ana Beatriz Franco Cuervo](#), a professor in the Faculty of Political Sciences, Government and International Relations at Universidad del Rosario. Precisely, through this system, power can be conquered or retained, or what is the same, with the same number of votes and depending on the interaction of the set of elements that are understood in this system, it is possible to win, continue or lose.

We have had more than 60 years of a strong bipartisanship that was electorally predetermined and that began to gradually fracture with the 1991 constitution, especially by the change in the senatorial constituency, which went from territorial to national. All this allowed the entry of new actors in the repre-

sentation and conquest of political power both at the local, regional and, recently, national levels.

Depending on what is being chosen and with what principle of representation (whether majority or proportional), constituencies can be in many ways and this can crucially influence outcomes.

“For example, there are political-electoral constituencies as in the parliaments of England, Canada and the United States (Congress) and France (National Assembly). They have a [majoritarian single-member electoral system](#) with one seat per constituency.” This means that the voter can choose a single candidate from among those who stand and the one who has the most votes wins, by a simple majority, except in the French Assembly which is by an absolute majority, which implies a second round.

In Colombia there are predominantly political-administrative constituencies, where the principle of representation is proportional for territorial and population-based corporations. Representing national interests, the Senate is a national constituency, with 100 seats elected and 2 additional seats elected for indigenous people (art. 171, Colombian Constitution).

Since 1991, the Senate has been represented nationally and proportional to the votes obtained. Thus, when the candidate was able to add the votes of all the territories (not only those of the department where he is presented), the departmental electoral fiefdoms that historically prevented the entry of new actors could be broken. In this way, candidates who were once an alternative to traditional ones, such as Carlos Gaviria in 2002, and Gustavo Petro in 2006 became senators.

In contrast, the House of Representatives is elected through territorial constituencies: population-based and special ones. The latter ensure the participation of ethnic groups (2 seats for Afro-descendants and one for indigenous communities) and Colombians living abroad (with one seat).

The issue is not over yet. Since 2016, there are also the Special Transitional Peace Constituencies ([CTEP](#)), through which 16 seats are elected for two electoral periods (from 2022 to 2030). These correspond to specific areas identified in the Peace Agreement as having low political representation and belonging to sectors most affected by violence. The areas are include Southern Meta and Guaviare, Montes de María, Pacífico Medio, Nariño Pacific, Putumayo, Sierra Nevada del Perijá, Southern Bolívar, Southern Córdoba, Southern Tolima, and Urabá.

In order to initiate motivation and electoral pedagogy from schools and universities, and not only during the days immediately before the elections, in 2021, Professor Franco Cuervo and political scientist and political communicator Danny Ramírez Jaramillo, graduate and professor in the Faculty of International, Political and Urban Studies (Feipu) and the Institute of Communal Participation and Action ([Idpac](#)), undertook the socialization and digitalization of the board game [Election Party](#), which simulates an electoral campaign in Colombia.

Researchers indicate that the lack of adequate education leads to misunderstanding of the electoral system, and this aspect would be one of the factors that explain the low participation of Colombians in the elections. “In times of low

What is the Stratification Index ?

It is obtained by subtracting from the percentage of votes obtained in strata 5 and 6, those obtained in polling places located in strata 1 and 2. Thus, the stratification index of a candidate can be either a positive or a negative number. A positive stratification index indicates that the candidate has more votes in strata 5 and 6, in relative terms, than in strata 1 and 2. A negative stratification index means that the candidate has a higher percentage of votes among the lower strata.

Source: Bulletin No. 17 DEMOS-UR

participation, fake news, and the resurgence of populist movements, both left and right, playful-pedagogical experiences such as Election Party become a powerful tool of approach to the voter to address the complexity of the political system,” adds Professor Franco Cuervo.

In addition to this initiative, since 2010, the Electoral Observation Mission (EOM) [has developed several educational booklets](#) covering topics, advice and even warnings about irregularities and electoral crimes, both for general and local contests.

On the other hand, in 2022, the Canal Capital Public Communication System created the campaign [#MásVotosMásDemocracia](#) (More Votes, More Democracy), aimed at addressing questions about the electoral mechanics, the composition of the chambers and, in general, about the democratic system of the country.

To conclude, Professor Franco Cuervo mentions that “the philosopher José Ortega y Gasset, in his well-known work “The Rebellion of the Masses” stated that “the health of democracies, whatever their type and degree, depends on a paltry technical detail: the electoral procedure. Everything else is secondary. Without the support of genuine suffrage, democratic institutions are in the air.”

How are women represented in elected positions in Colombia?

This is the main premise of the project [“Women in the Colombian councils: a red balance”](#) coordinated by [Professor Sandra Botero Cabrera](#), from Feipu at Universidad del Rosario, together with Ana María Moncayo, and whose results are still in the process of publication.

The project analyzes the representation of women in the councils from two perspectives: “On the one hand, we quantitatively monitor the factors associated with the election of women at the national level, in the presidential elections of 2015 and 2019. And on the other hand, we did a case study, based on candidates for the Bogotá Council, on the barriers and obstacles they encountered while the campaign,” explains Botero.

The initial results reveal three gender-related aspects that define these problems. The first is that it is much harder to get campaign funding if you are a woman. “The lack of transparency in campaign financing, which increases the risk of illegal campaign money entering campaigns, means that opportunities for women to participate in politics are restricted, especially if these women do not come from traditional political families or clans,” clarifies Botero.



Sofía Carrerá Martínez studied an example of this [in her thesis of degree](#) for Universidad del Rosario, where she analyzed, among other things, the obstacles that hinder the access of women to the candidacies of the mayoralty of Cartagena between 2007 and 2019. Carrerá found that, to get the endorsement of the parties, women face much greater challenges for three reasons: “Parties are highly informal, women aspiring to the mayoralty lack experience in electoral politics, and local parties often operate as endorsement-producing brands inhabited by local powers, especially political houses (power groups with a strong family component).”

The second aspect related to gender is the existence of “an endemic machismo” – as defined by Professor Botero – which generates a clear discrimination against women and that limits their professional growth within political organizations.



“In times of low participation, fake news, and the resurgence of populist movements, both left and right, playful-pedagogical experiences such as “Election Party” become a powerful tool for engaging voters to address the complexity of the political system,” Ana Beatriz Franco Cuervo.

Foundation in alliance with UN Women, the UR and the Swedish Embassy.

The document starts from the premise that “the violence exercised in digital environments is based on gender (through stereotypes that deny their abilities because they are women; attack their privacy and their physical appearance or delegitimize their gender agenda) and in general affect them in a differential and disproportionate way in their right to participate, to access or to remain in the public sphere [...]. This reveals that there is a widespread and standardized VDCMP that refers to their bodies, appearance, race, the way they speak, their skills and their professional abilities.”

UN Women also found that this type of gender-based violence “affects their integrity, dignity and security, with an additional consequence: it limits their right to participate and, therefore, to democratic exercises.”

Examples of such violence include discrediting based on their abilities or intellect, online threats, extortion, identity theft, information manipulation, virtual harassment or cyberbullying, discriminatory expressions, negative reviews of their physical appearance, sexualization, insults related to their ethnic and ‘class’ origin, and attacks or belittling based on sexual orientation.

All of these constitute deep obstacles that prevent our democracy from consolidating. Promoting greater participation of women in politics is the most important path because until that number and the quality of female candidates increase, there will be no more women elected.

Data from the latest regional elections (29 October 2023) by the National Registry

And a third aspect that they have been able to distinguish from that first analysis of results prior to formal publication, is related to domestic and caregiving responsibilities at home: “There is a great difficulty in balancing work as candidates with the caregiving tasks for children or older relatives, something that traditionally falls disproportionately on women,” concludes the expert.

And on social media, is there discrimination against female candidates?

Social networks, which has liberated and enhanced the possibilities of connecting candidates with the population, also generate a differential treatment towards women. Botero and other researchers from the UR collaborated in the production of [a report on digital violence against women in politics \(VDCMP\) during the electoral campaign to the Congress of the Republic of Colombia in 2022](#), originated by the Karisma



show that 51.4 percent of the country's voters (around 20 million) are women, but the candidacies put forward by them are only 39 percent. In the 2022 legislative elections, out of 295 congressional seats, 85 were occupied by women (28.8 percent), only 30 (9.1 percent) more than in the previous 2018 legislature, according to [data from the Colombian office of the organization UN Women](#).

Although there has been progress compared to previous years and the data brings women's participation in political representation bodies closer to the average in the Caribbean region and Latin America (35.8 percent in 2023 according to the Inter-Parliamentary Union - IPU), much remains to be done.

Botero highlights that one of the tools that was initially believed to help strengthen women's participation in the political arena was the creation of the [Law 581 of 2000, called the Quota Act](#), which requires that at least 30 percent of high-ranking public officials must

be held by women. Unfortunately, this number has become the ceiling, since in neither chamber representation exceeds 30 percent, "and that considering that this is the Congress with the most women."

The way candidates are presented, the preferential vote, or open lists also do not help women participation more. In this case, discrimination is again present. So, until there is a closed 'zipper' list (an electoral list in which gender parity exists) that will not change.

For non-preferential voting, or closed list, there are a number of people who are preceded by a list head. The more votes that list gets, the more people from it will be chosen. The order of the list gives priority to the candidate. And the zipper type means that the gender of the candidate is interspersed to ensure fairness in representation.

"Colombian politicians would not do so well with the closed list, in which the order of the list is not chosen," continues Professor Botero. "However, if you want to take an institutional measure that does not put the weight on women to solve what is an institutional problem, it is very clear that the only thing that works is a closed list with a clear mandate of location, that is, it has to be a 'zipper list'. Otherwise, our

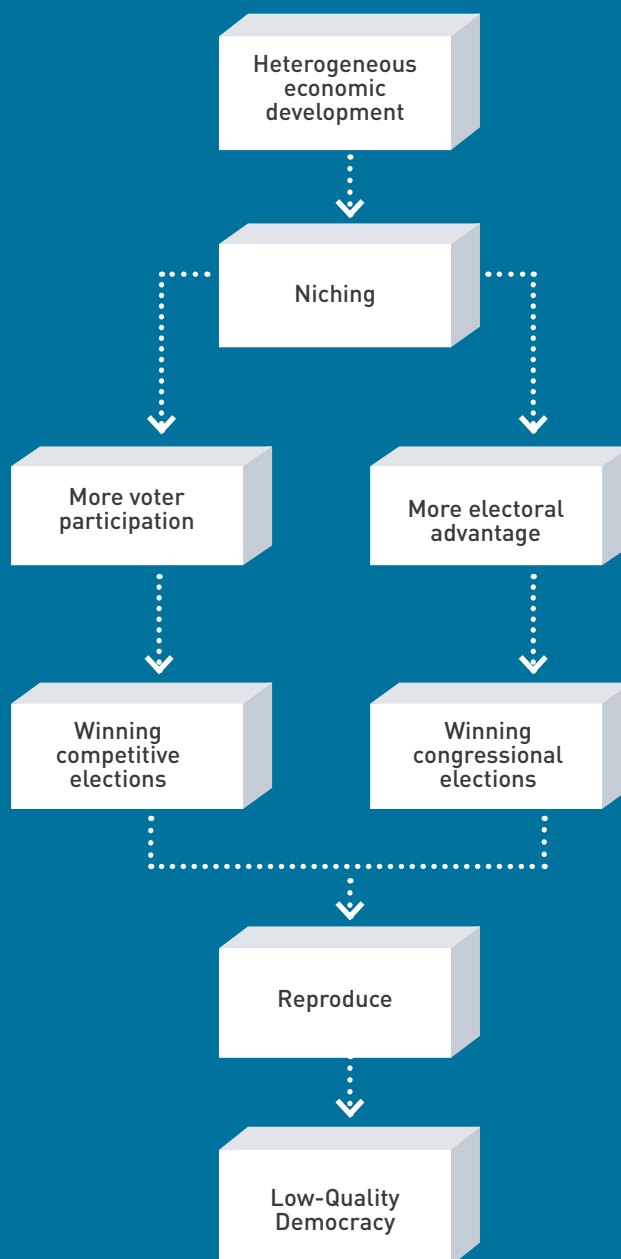


historical bias gets people to know more male candidates and so women will continue to be at a significant disadvantage.”

A perfect example is the lists submitted to the Bogotá Council for the regional elections of 2023. Among them, the Pacto Histórico list was the only one closed and zipped, and obtained four seats for women and three for men, while in the other lists there were fewer women: Alianza Verde and Nuevo Liberalismo each won eight seats, with seven men and one woman; Centro Democrático, seven (five men and two women); the Liberal Party, six (four men and two women); and the Cambio Radical and Mira Parties each won four seats, all for men.

“In terms of the design of the institutional structure for suffrage, the only known tool that can help fight for that parity is this list. This will encourage parties to focus on creating and supporting female leadership,” concludes the professor.

Gap between development and democracy at the subnational level. Santander case study.



Taken from the doctoral thesis in Political and International Studies de Sampayo, Andrés Miguel. 2023. Universidad del Rosario

Recommendations to Combat Violence Against Women in Politics

For the State and the Colombian government:

- Fulfill their constitutional obligations and their international commitments to guarantee women a life free of violence, including promoting the training and awareness of operators against violence towards women who are exercising their right to political-electoral participation.- Empower judicial authorities to deal in a timely manner with cases of Digital Violence Against Women in Politics (VDCMP).
- To contribute in the legislative processes that are processed in the Congress of the Republic, in such a way that the processes of prevention, care, sanction and reparation of the VDCMP are framed within the harmonious collaboration of institutions.
- Consider including as a variable within the different reporting systems that relating to the level of public exposure, leadership or political exercise of women victims of any VDCMP act.

For electoral authorities :

- Follow up on the commitments of the protocol formulated in [Resolution 8947 of 2021](#), so that joint inter-agency efforts can be made for the prevention, care, punishment and reparation of victims of VDCMP.
- Make diagnoses about VDCMP during electoral processes.
- Call on social media platforms to take measures to safeguard people's rights to a life free from gender-based violence online.
- Generate public transparency reports, with data on requests filed with the platforms that own social networks.
- Create a register of violence before the National Electoral Council (CNE) and other competent authorities to monitor the protection and care measures provided within the respective party or political movement.

Do We Vote for a Person or an Ideology? Who Has the Power in Colombian Politics?

The Intelligence Unit of The Economist magazine publishes an annual [Democracy Index](#), which ranks the democracy of 167 countries based on a rating. In 2022, Colombia was described as a “flawed democracy” and ranked 59th globally and 10th in Latin America (with Uruguay in first place). At its heart, this is not a bad position considering that we are located in one third of the most democratic countries on the planet. It should be noted that this index evaluates aspects such as electoral processes and pluralism, present civil liberties, the functioning of government and political participation and culture, in addition to economic and social achievements.

Democracy in Colombia is generally good, even if it is not perfect. “The data indicates that we are improving, and that we have had significant advances in the economic and social fields,” comments Professor Andrés Miguel Sampayo. So, why is democracy not consolidating? “There are positive things like the fact

that, although we have always had violence, an election has never been called off. Things get twisted when the elected candidates have close relationships with criminal organizations; this sets us back several steps on the path to a much more effective democracy,” he adds.

“The political heart of our democracy is the congressmen, and they are the ones who make the executives work well. Despite this, we mistakenly place power in the executive rather than in the congressmen. Developed countries, by contrast, are more aware of the importance of their legislators. Winning elections gives a lot of power, especially within a political party. And that power continues to be maintained mainly in the regions and in some cities, where it has been seen that many clans and chieftains are still key to winning,” says Professor Sampayo.

On the other hand, even if the congressmen exert a strong influence, it is not completely clear that the vote in Colombia is personalist. “Contrary to common perception, the election of mayors, presidents, governors, councilors, senators or representatives to the chamber, implies a process of internal party democracy. This dynamic influences the candidate's performance and can give the idea of personalism. The presence of strong leaders, like Uribe in the Centro Democrático, or Petro in the Pacto Histórico, has consolidated political parties that emerged apparently from nowhere,” he adds.

For political parties and movements

- Develop inclusive communications strategies with the express intention of making visible all women candidates, so as to ensure that their communication spaces do not reproduce historical power asymmetries.
- Distribute resources equitably among all its candidates for the management of social networks, taking into account criteria that address the digital divide.
- Develop strategies for handling VDCMP incidents that include activation of routes to the political party or movement, authorities and web platforms.
- Develop an institutional discourse of rejection of VDCMP, especially when personal attacks associated with the candidate's race, ethnicity, disability, sexual orientation, gender identity or socioeconomic level are identified.

Source: Report on Harassment, Solitude, and Discredit. March 2023.



Despite the fact that there are no visible or transformative changes yet,

new developments have been seen on the political scene over the past two years. The 2022 general election elected the first clearly left-wing candidate, thanks to the Pacto Histórico, a 12-party national coalition that won 50 congressmen. They were also the first post-pandemic elections, and because of this, they carried with them the blows of the economic crisis, the criticism of its management by the Duque government and the social outbreaks that took place from 2019 to 2021 in many territories of the country. All this got the [left-wing earn much more than the right and the center](#) in those elections.

Despite this step forward, it is true that in the last regional elections in November 2023, the electoral machinery once again exerted control over their territories. In this regard, political scientist, journalist and twice councilor of Bogotá (2003 and 2007), [Lariza Pizano](#), comments as follows: “We cannot say that democracy came out stronger in these recent elections. Traditional clientelism prevailed in several cities, many political clans regained strongholds, thanks to the electorate choosing the well-known candidate, and political endorsement campaigns were consolidated. It is worth remembering that 2019 was the stage for new political forces, something akin to a 1991 version 2.0. But now, the regression was total.”

“The barriers and obstacles that women face in campaigning are related to funding, with clearly sexist spaces, and with the historical allocation of childcare and elderly care work”: Sandra Botero Cabrera

Should we try new things?

So, if the election works moderately well, and if, overall, we are moving forward and making some improvements, what needs to change so that we can move forward?

The proposals are diverse. One is to reassess the territorial constituencies that paved the way for many candidates to find the votes

they needed far from their locality, which somehow transformed the way politics is done. “The single national constituency of the Senate, starting with the 1991 Constitution, allowed new national leaders to emerge. Consequently, figures emerged who had significant support but were limited to a specific sector. It also enabled candidates who could not win at the local or regional level to win at the national level. An example of this is the individual figures and Christian groups, who find it difficult to secure a seat at the regional or local level but can achieve something in a national constituency,” explains Yann Basset.

However, the national constituency has its criticisms and drawbacks. “It makes no sense for a Senate candidate to compete with the entire country to pick one of the 100 seats. If you are a senator from the Caribbean Coast, for example, one or two departments will vote for you, no more. So why go and compete for the vote across the country? That is where the power of traditional parties and chieftains, as well as the source of funding, come in to make their masterpiece.”

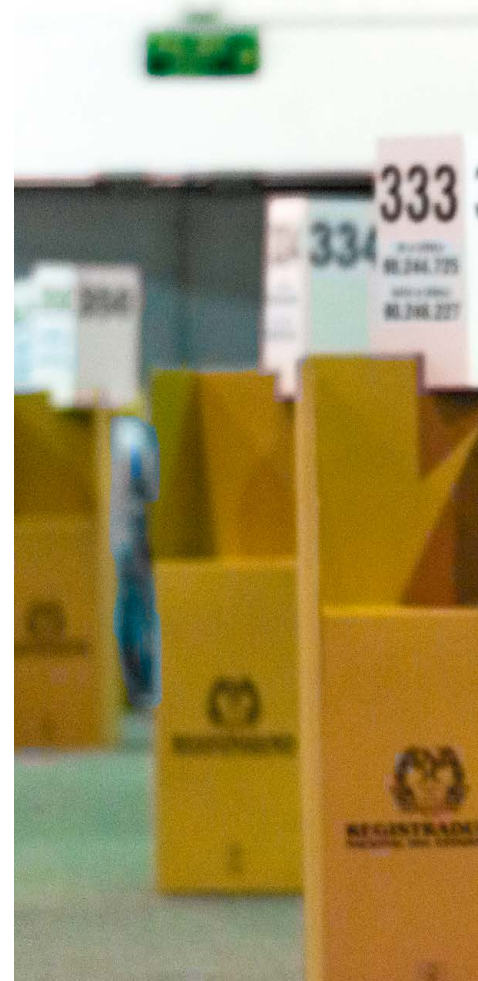
The importance of the constituency also has to do with the number of representatives that are elected for each department or province. Regarding this, Andrés Sampayo suggests that we should think more about the system: “On one hand, Bogotá has eight million inhabitants and elects 18 seats in the Chamber. Meanwhile, Antioquia, which has only six million, has 17. Santander, with two million one hundred thousand, has only seven, while Vichada, with one hundred thousand inhabitants, has two representatives. This is not proportional. These are questions that must be asked throughout the country in order to properly identify the person who will be elected to exercise power.”

Running for office costs money. Building a large, strategic network of contacts and managing finances intelligently is no easy task at all. However, there are still a lot of people who go into politics.

“One does not get rich by directly engaging in political campaigns. Unfortunately, in many regions of the country, the public budget is the main source of resources and jobs, and perhaps that explains why some regions are more involved in politics than others,” continues Sampayo.

So, if we have a lot of people eager to participate in politics, couldn't we force those eligible to vote to fulfill the duty of suffrage? The fact that there is little voter participation

“Regarding mandatory voting, I think it is more important to talk in terms of democratic ethics in its favor. When the vote is optional, as in the case of Colombia, and we see the composition of those who abstain, we realize that they are the most excluded, the poorest, the youngest, the urban low strata, the most abandoned groups. Because these people vote less, politicians respond less. With mandatory voting, each person's vote does count and politicians are more obligated to respond to those disadvantaged groups: Yann basset.



also creates ethical problems and illegal practices such as vote buying. As always, before imposing ideas that seem simple, it is enough to understand some aspects of our country to see that they are not so simple.

There is an economic rationale that supports mandatory voting. It is often said that when very few people vote, fewer votes are needed to win; that is when vote buying becomes ‘effective’, because in the end there are few votes that must be ‘bought’. However, if the vote is mandatory, the price to pay would be too high, as it would force a huge amount of capital to be paid out.

But there are several arguments against mandatory voting, mostly related to practical aspects, such as the characteristics of our geography that would make it difficult to easily access or move to polling stations, or poor access to electricity in many places in the country. This would imply a higher budget for the conduct of the elections, but above all, it would be quite unfair if those populations, which have historically been ignored by the state and ravaged by violence, were to receive a penalty in the form of a fine for not voting.



So there is nothing positive about mandatory voting? On the contrary, there are other equally valid reasons why it should be supported. Basset believes that the anti-corruption arguments of mandatory voting or those of the moralistic view that “voting is a duty” are not the most important thing. “I think it is more important to speak in terms of democratic ethics in favor of mandatory voting. When the vote is optional, as in the case of Colombia, and we see the composition of those who abstain, we realize that they are the most excluded, the poorest, the youngest, the urban low strata, the most abandoned groups. Because these people vote less, politicians respond less. With mandatory voting, everyone’s suffrage does count, and politicians are more obligated to respond to such unfavorable groups.

In any case, the worst scenario would be for something that often happens in the country to occur: to make voting mandatory but not enforce it, rendering it ineffective.

We need to change many things so that our elections produce results that positively affect the country and that help its development in all aspects.

We need more professional campaigns, with new and more transparent techniques, as well as understanding party strategies to be sure, whether or not there is a true answer to the needs of voters or whether these are just successful ways to stay in power.

Likewise, we urgently need to review how constituencies can really represent the voice of citizens and understand that if there is an influence of the social strata in the way we vote, this must be combated with credible actions that reduce social differences.

We need to untangle this political gibberish of the elections, educate ourselves thoroughly, not only at the school level but also in the higher education stage. We should all be educated about the political forms of representation available to us.

Above all, we need to combat obstacles to the representation of women in our political positions, which, although it involves education, requires more precise and realistic regulation. Intention is important, but actions are even more so. ■

A finding that could change what we know about dengue in Colombia

Dengue is an old global public health threat that lashes out stubbornly through cycles in tropical countries. It gives truce for a few years and then comes back stronger in specific seasons. 2023, for example, is one of those periods when this mosquito-borne disease has been unleashed in Colombia.

By Ronny Suárez

Photos by Ximena Serrano, Milagro Castro

DOI https://doi.org/10.12804/dvcn_10336.42340_num7

According to public data from the Instituto Nacional de Salud (INS) (National Institute of Health), every day this year, on average, 312 cases of dengue have been registered, a figure that represents almost double what was seen in 2022 and that will surely be located in the historical records for an outbreak that has had the vast majority of territorial entities on alert.

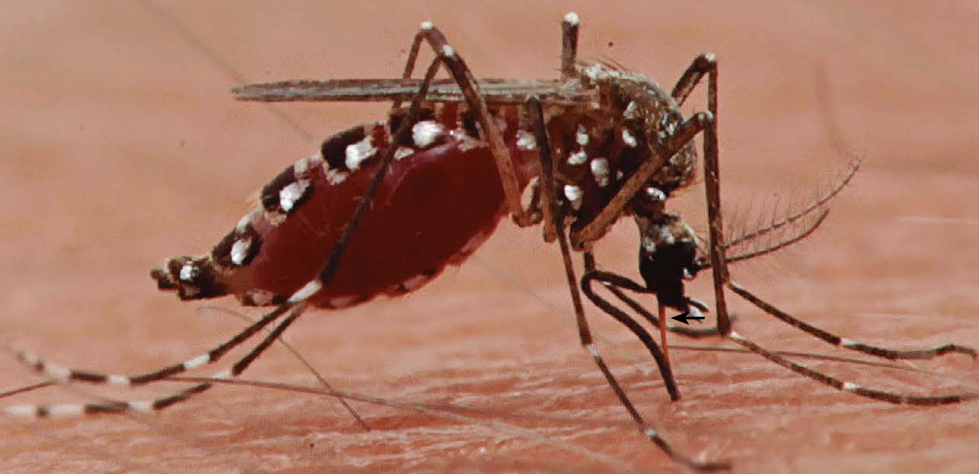
In such a complex and emergency scenario, a group of researchers of Universidad del Rosario has followed up on a finding that could change what we know about dengue in the country and that, without further ado, demands that we pay greater attention to the behavior of this disease.

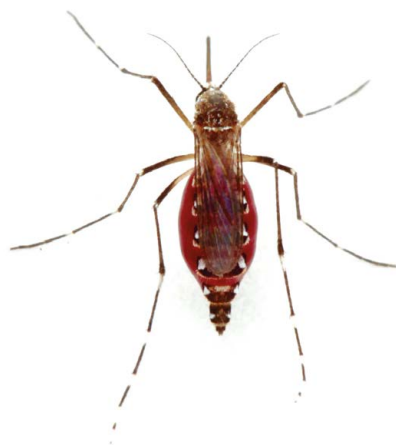
This is no less than the introduction and possible circulation of the Cosmopolitan genotype of dengue in Colombia, a variant that has been responsible for strong outbreaks in oth-

er latitudes and is still being studied if it has more severe clinical manifestations.

The *Aedes aegypti* mosquito inhabits almost the entire national geography, from the departments bathed by the Atlantic and Pacific oceans, through the immensity of the Eastern Plains, to deep in the lush jungles of the south. It could well be said that the tropical and humid characteristics of our country are ideal for this insect to reproduce and spread diseases such as dengue, Zika and chikungunya.

And while the fight against this vector of transmission adds decades of efforts, in recent years there have been recurrent outbreaks in three-year cycles, the most notable being those recorded in 2016 and 2019, when 80 111 and 74 898 cases were counted respectively. In 2023, according to INS data cut as of September 16, the number of patients exceeded those records: 80 461; 44.1 percent of them had warning signs and 1.4





Rosario researchers analyzed 120 dengue-positive samples.

percent had the most severe form of the disease.

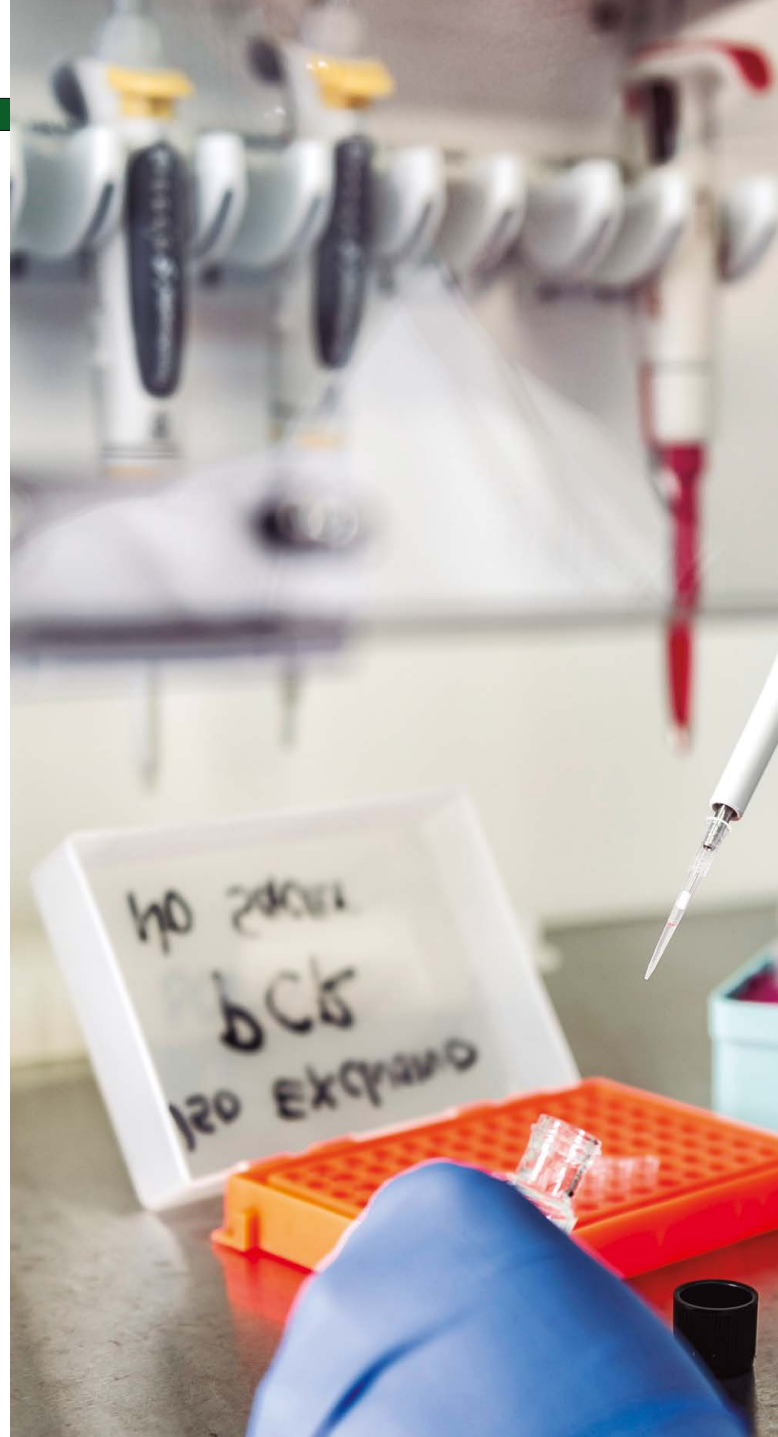
[Giovanni Rubiano](#), director of the National Institute of Health (INS), states that the alarming statistics this year can be explained by the cyclical behavior of this epidemic and also because “the intense climatic variability of recent periods, the El Niño phenomenon and other conditions typical of tropical climates such as ours make the proliferation of the transmitting mosquito more likely.”

In addition to these factors, there is a line of research that tries to establish if there have been changes in the dynamics of this [endemic](#) in the country following the arrival of a new variant of the virus, the Cosmopolitan, which was already detected in two departments and, as suggested by early studies, could potentially increase the severity of the disease or intensify its circulation in the territory.

Under this hypothesis the research developed in recent years has been led by [Juan David Ramírez González](#), PhD, associate professor at Universidad del Rosario and scientific director of the Centro de Investigaciones en Microbiología y Biotecnología in this institution ([Cimbiur](#)) (Center for Research in Microbiology and Biotechnology).

Ramírez and his team try to decipher dengue in Colombia by focusing on genomic surveillance of the virus, that is, by investigating, through laboratory tests, the origin of circulating serotypes and their possible genetic variations in mosquito and patient samples.

In September 2022, for example, they published in the scientific journal [Frontiers in Ecology and Evolution](#) a study in which they



analyzed mosquito vectors in several departments of the country and found, in addition to some cases of coinfection (insects carrying two or three serotypes of the virus at once), that there is already a transition in the prevalence of dengue serotypes circulating in Colombia, which goes from serotype 1 to serotype 2 as the most predominant in the mosquito population.

Ramírez explains that “dengue has four serotypes; the most dominant in our country are 1 and 2. The latter is frequently associated with more severe infections and epidemics. During 10 years of surveillance serotype 1 was responsible for 60 percent of cases and 2 for 40 percent, but we are currently observing the opposite and the dominance is serotype 2 in that same proportion. We do not know the reasons why this is happening because because



“We need a clear pathway for dengue prevention from vector control and monitoring, case surveillance, and genomic evaluation. However, it is also very important to raise awareness about the mechanisms of transmission and that people understand that it is a disease that can be prevented,” emphasizes researcher Juan David Ramírez.

of the pandemic we had three years in which there was no further information.”

Ramírez points out that this change could be explained by climatic, ecological or epidemiological variables. However, one of the potential hypotheses they explore is precisely whether the introduction of new variants – as in Covid-19 – of serotype 2 made it more transmissible and with greater development in the vector.

These variants are actually genotypes, and dengue serotype 2 has at least five, the INS technical release details. One of them, the variant named the Cosmopolitan, is now being targeted as the potential responsible for this transition.

The Cosmopolitan in Colombia

On 4 July, 2023 the INS [sent a technical statement](#) to the territorial entities through which it reported the identification of the

circulation of the Cosmopolitan dengue genotype in Colombia. Specifically, PCR analysis conducted between March and April found this genotype present in 11 samples collected in the Amazon. In that document, the INS acknowledges that between 2021 and 2022, the only identified dengue serotype 2 genotype in the country was one known as the Asian-American genotype.

According to the Institute, virological surveillance regarding this variant was activated by the history of Peru, Brazil and Ecuador, where, according to scientific research, the Cosmopolitan was responsible for the increase in dengue cases.

This variant is already circulating in different regions of the world, mainly in Asia, and the first case in South America was identified in 2019 in Peru. Subsequently, one case was reported in Brazil in November 2021. In all locations where it has been identified, it has caused specific increases in virus circulation.

And while the INS in the same July document said that the Cosmopolitan variant was not found in samples sent by 19 other depart-

ments between November 2022 and May 2023, the team led by Ramírez did manage to confirm it recently in patients from Meta, suggesting that this version of the virus has already spread to at least one other Colombian region apart from the Amazon.

Specifically, the researchers of Universidad del Rosario analyzed 120 dengue-positive samples collected between April and May in Meta and performed complete sequence of the virus genome. Most were of the Asian-American genotype, but two were of the Cosmopolitan variant, according to the study that was accepted for publication in the journal *Emerging Infectious Diseases*.

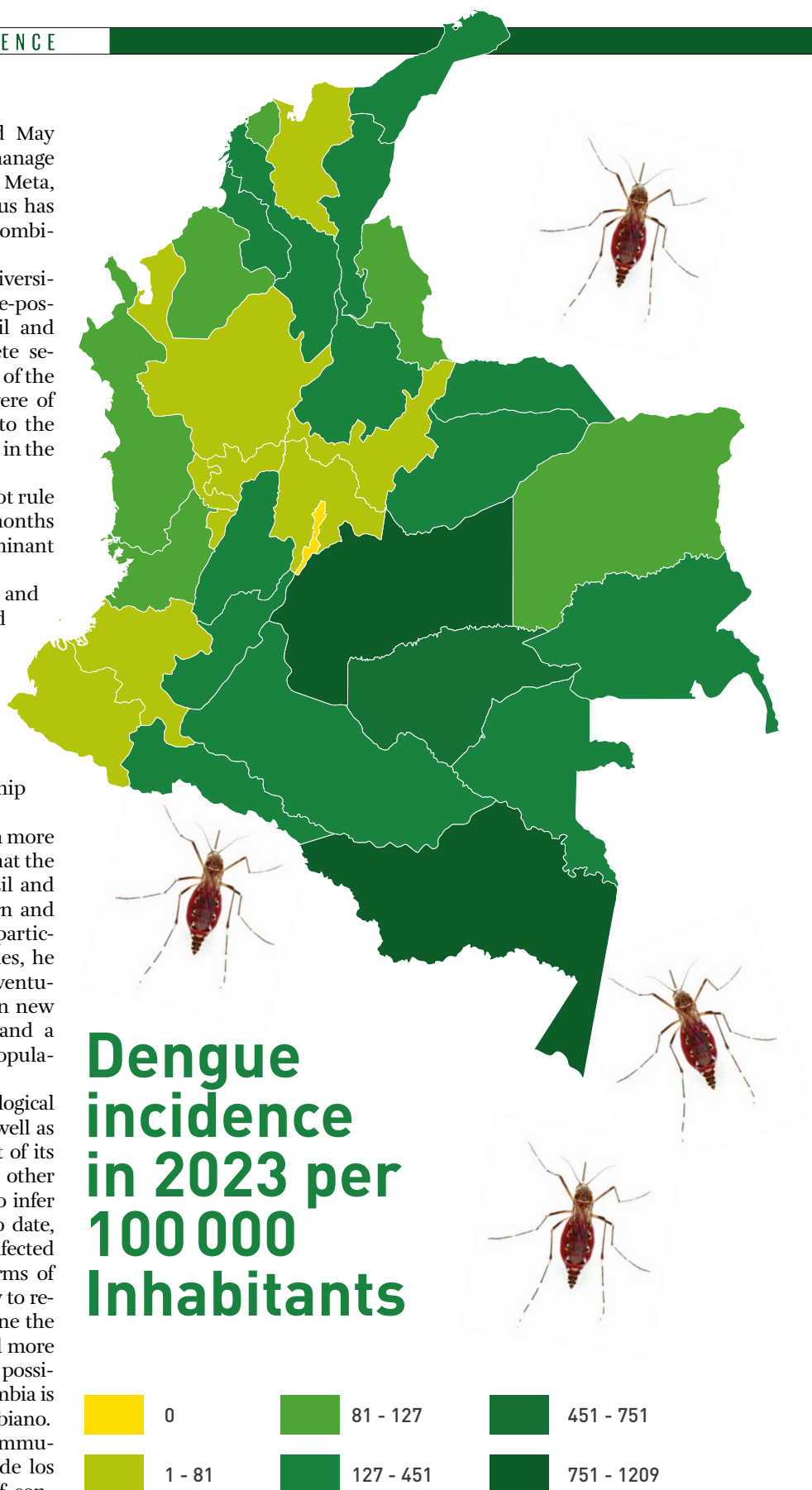
Ramírez prefers caution, but does not rule out a scenario where in the coming months the Cosmopolitan variant becomes dominant in the country.

[Félix Delgado](#), PhD in immunology, and associate researcher of Universidad El Bosque, confirms that “as seen in countries like Peru, there is an initial epidemiological association between the presence of this the Cosmopolitan variant and the increase in cases of severe dengue and even Guillain-Barré, although this relationship needs further investigation.”

Rubiano, on the other hand, is much more cautious and although he recognizes that the natural history of this variant in Brazil and Peru showed a more infectious pattern and that it can produce serious disease, in particular, in older adults with comorbidities, he points out that it is not known if an eventual expansion in Colombia “could mean new premature outbreaks in the future and a significant affection to vulnerable populations.”

“It can happen that, due to the biological conditions of humans and vectors, as well as small changes of the virus, it loses part of its characteristics. Evidence available in other countries suggests that it is too early to infer any significant change in Colombia. To date, the cases that have been confirmed infected with this genotype have had mild forms of the disease and therefore it is necessary to reiterate that it is not appropriate to define the impact of the virus in the country until more evidence is achieved elsewhere and its possible distribution and dispersion in Colombia is not known more thoroughly,” states Rubiano.

For [John Mario Gonzalez](#), PhD in Immunology and professor of Universidad de los Andes, there is an important point of consideration regarding the arrival of the Cosmopolitan variant in the country and it is the factor of antibodies. “When a person gets



Source: National Institute of Health, October 2023.



sick with dengue, regardless of the serotype it is, they develop immunity against it. Severe forms occur when we are infected by a serotype for which we have no defenses. And since the Cosmopolitan is a new variant, the immune response may be different,” she explains.

Eyes open

Dr. Ramírez points out that for the time being it is urgent to establish whether there may be a dominance of this variant in Colombia and therefore together with his team they continue to sequence virus from patients from months after May and in other departments. “We want to know if it has spread, because in less than a month it went from the Amazon to the Meta. It is very likely that in other departments of the country it is also present, but we must determine it and, from there, try to understand how these mutations can be involved in more infectivity, in more transmissibility or in more aggressiveness,” says the researcher.

Rubiano agrees on this need to continue virological surveillance and reports that “during 2022 and 2023, the largest number of dengue genome sequences have been obtained, taking into account the surveillance needs associated with outbreaks in the country and international alerts on circulation of new viral genotypes such as the Cosmopolitan.”

For this purpose, there is the permanent availability of 33 public health laboratories throughout the national territory, as well as the National Reference Laboratory (affiliated to the INS) of the country, where samples of cases with severe dengue or deaths from this cause are processed.



The research team tries to decipher dengue in Colombia by focusing on genomic surveillance of the virus, that is, by investigating, through laboratory tests, the origin of circulating serotypes and their possible genetic variations.

“This capacity can be expanded, as was done at the time for Covid-19, with the participation of service delivery institutions, research institutions or universities that, taking advantage of their installed capacity, could support genomic surveillance,” concludes the director of the INS.

While these investigations are progressing, the researcher Ramírez calls for prioritizing dengue as a public health problem and emphasizing its prevention and control in a comprehensive way. “We need a clear pathway for dengue prevention from vector control and monitoring, case surveillance, and genomic evaluation. However, it is also very important to raise awareness about the mechanisms of transmission and for people to understand that it is a disease that can be prevented,” emphasizes the professor of Universidad del Rosario.

As important as investigating the origins of circulating variants, Ramírez notes, is to educate people about the mechanisms of transmission and to raise awareness that dengue is a disease that can be prevented with self-care measures, such as proper vector and hatchery control, insect identification, the use of repellents, and more education on the subject in general. ■

Informality and gender:

Major absentees in the discussion on the right to work

The United Nations has proposed a human rights and business agenda as a framework for countries to take action to prevent human rights violations that some companies have committed throughout history. However, this initiative exemplifies the situation in developed countries, where labor informality, which is widely represented by women and predominates in developing countries, is not taken into account. To analyze the absence of this gender approach in the context of labor informality within the agenda, researchers of the Faculty of Law at Universidad del Rosario studied the informal mining in Colombia, a field historically related to violence and discrimination against women.

By Dalia C. Barragán Barrera

Photos by Alberto Sierra, Milagro Castro, UROSARIO

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*"This is a simple story, but it's not easy to tell.
As in a fable, there is pain, and as a fable, it is filled of
wonders and happiness."*

Roberto Benigni (*Life is Beautiful*, 1997)

It was 1928. The scene took place on a street in Macondo, where the army began shooting at workers who had been protesting for weeks for their labor rights in front of a fruit company. José Arcadio Segundo Buendía barely managed to hold his son to put him in a safe place in the middle of the revolt. The next day, José Arcadio woke up on a train on an unusually soft ground. They were all human remains.

It was 1945. The scene took place in a Nazi concentration camp in Italy, where thousands of detainees were forced to work in inhumane conditions. There, the Jewish Guido Orefice carries his son who sleeps in his arms, to discover with horror a mountain with a nauseating smell. They were all human remains.





Both scenes are fictional. The one from 1928, narrated by Colombian Nobel Prize winner Gabriel García Márquez in his book *One Hundred Years of Solitude*. The one from 1945, is told by Italian actor, screenwriter and director Roberto Benigni, in his film *Life is Beautiful*. However, both works horrifyingly depict historical facts of a crude reality of human death perpetuated by other humans.

Transforming them into memorable artistic and literary legacies is not the result of fortuitous selection, given that in both cases it was shown how companies can directly or indirectly influence human rights violations, as occurred in the banana massacre in Colombia (1928) or during the Holocaust in Nazi concentration camps in Europe (from 1933 to 1945).

↑ Many workers in the world live in poverty. This situation is more common in the so-called Global South, which is made up of the so-called underdeveloped or developing countries.

The company at the center of the [Banana massacre](#) was the now defunct American United Fruit Company, whose poor working conditions sparked a strike among workers. The directors of this company managed to exert influences in the national government, so the Colombian army intervened in the strike killing a number of workers, whose exact number is unknown, but which many scholars estimate in a wide range ranging from [13 to 2 000](#).

*Grave in the Banana Plantation
The air smells foul (...)
Bullet comes, bullet goes
You no longer know from where
The bullet will reach you...*

Lyrics from the song *El platanal* by the group 1280 Almas

During World War II several German companies benefited from the Holocaust by using detainees from Nazi con-

There has been a struggle to ensure that informality is not understood within the realms of illegality, especially given that it is women who, by supporting their children or caring for the family, are historically overrepresented in informal work.

centration camps as free labor. These people were forced to work under inhumane conditions, and in most cases almost all died in such conditions. Human rights violations were a constant, and mainly [women were subjected to different types of gender-based violence](#). For this reason, and as a way to guarantee the fundamental rights of the people, one of the consequences of the Second World War was the adoption, on December 10, 1948, of the [Universal Declaration of Human Rights](#) by the newly created United Nations General Assembly.

“However, this statement does not consider the role that companies can play in the violation of human rights,” states [Enrique Prieto Ríos](#), professor in the Faculty of Law at Universidad del Rosario.

Globally, millions of children are forced to work as victims of relatives or industries, and many workers around the world are in poverty. This situation is more common in the so-called [Global South](#), made up of the so-called underdeveloped or developing countries. In the sixties and seventies, 77 developing countries grouped under the name of [G-77](#) (also known as the “non-aligned”), used the United Nations General Assembly to demand and protect their rights. “These nations, led by Latin Americans like Argentina and Mexico, began the discussion at that time on the creation of an international treaty that established limits on international companies operating in the states classified as developing, in order to promote respect for sovereignty, territory and human rights. This initiative originated primarily in the face of the political influence that some multinational companies exerted on local governments to violate human rights in Latin America,” explains Prieto Ríos.

It was not until 2011 that the United Nations approved the [Guiding Principles on](#)

[Business and Human Rights](#). “These Principles are not a treaty, that is, they are not binding under international law and countries do not have legal obligations to comply with them, but they do provide a framework for countries to develop an agenda with regulations that require companies to respect human rights. Colombia was the first country in Latin America to have a [National Action Plan for Human Rights and Business](#), adopted in 2015, not as a law, but as a public policy document, which also serves as an input for taking specific actions,” clarifies the professor. Subsequently, in 2020, the government of the day published the [second National Plan](#).

Human rights, gender and informality agenda

Prieto Ríos adds that although it was the G-77 countries that began the discussion at the United Nations on the negative impact of multinational companies, which would be the first step in the construction of the Guiding Principles on Business and Human Rights, this final document was led mainly by developed countries (the so-called [Global North](#)).

“This is problematic in developing countries such as Colombia, since the human rights and business agenda established by the United Nations essentially reflects the labor situation of developed countries and does not offer a frame of reference regarding the labor informality that predominates in developing countries,” emphasizes Prieto Ríos.

“The dilemma with informality is that it generates discussions about whether it is an illegal activity. However, poverty cannot be criminalized. It has been fought not to be understood within the fields of illegality, especially considering that it is women who, to support their children or care for the family, are historically overrepresented within informal work,” adds [Lina María Céspedes](#), professor in the Faculty of Law at Universidad del Rosario.

According to the Departamento Administrativo Nacional de Estadística (Dane) (National Administrative Department of Statistics), for the third quarter of 2023, [the share of informal employment in the country was 56 percent](#); of them the [58 percent are men and 53 percent are women](#). Although current figures place more men than women in this type of work, a study carried out by María Cristina Bolívar Restrepo as part of her [Master's thesis in Economic Sciences](#) at Universidad Nacional de Colombia, revealed that women “find themselves in more precarious categories of informality, with wages below the poverty line and concentrated in activities of less recognition.” This same analysis found that women are more likely to stay in the informal than men (due to domestic burden, which does not allow them to adjust to a fixed working schedule), and gender and economic gaps expose them more to conditions of human rights violations and gender abuse.

Informality and gender in mining

“This is why it is essential to understand the gender gap in the human rights agenda, but from the context of



It is urgent to raise the issue of the informal economy and action plans especially in countries that still have deep gaps in their development. This is essential to protect the human rights of women in the workplace and to ensure gender equity in this universe to which we are all equally entitled .

informal work,” says Enrique Prieto. Under this premise, the professor, together with Céspedes and the former young researcher of Universidad del Rosario, [Juan Pontón Serra](#), reviewed the current situation of these issues within the context of mining in Colombia. “This industry was chosen because it is one of the most important economic activities in the country, even since colonial times,” clarifies Prieto. The work was published as an open access article in [Business and Human Rights Journal](#) as part of a special issue on business and human rights.

“It should be noted that in the implementation of Colombia’s first National Action Plan on Human Rights and Business,

a general mapping was made of the impacts of mining and gender-related issues, such as the risks of informality and gender-based violence. However, in the second National Plan the issue does not deepen,” says Céspedes. In addition, “the issue of informal work is not very well represented in this agenda, despite the high violation of human rights to which workers, especially women, may be exposed,” adds Prieto. That is why mining is an industry relevant to the study. It should be noted that

in Colombia [more than 50 percent of this activity is carried out informally](#).

The significant challenge, then, was to define informality in the mining context so that it can be understood globally. To simplify it, the authors categorized the concept as “all mining activity that does not develop in corporate environments, does not have mining titles when required by law, and develops in precarious conditions that are outside the structures of environmental regulation, marketing, employment, health and safety, techniques or employment.”

Informal miners generally do not have direct contracts with companies. In addition, in informality, women are not usually employed to carry out the activity, since there is a belief that the woman “dries the mine”, that is, that its presence in extraction or excavation sites makes the sought-after mineral disappear. “For this reason, women are located in the weakest and most precarious part of the mining value chain, including activities that involve the use of mercury to extract gold (even though it is prohibited in Colombia), putting their health at risk. And due to the lack of job opportunities, they are also exposed to sex work,” Cespedes reveals. “If women work in the informal sector, they are more exposed to risks of gender-based violence. Another factor that contributes to this phenomenon is that, traditionally, certain mining activities in the country have been concentrated in areas of armed conflict and with the presence or action of groups outside the law,” argues Professor Cespedes.

In the case of formal mining, women are also not adequately represented, nor is access to a job opportunity comparable to that of men. Data confirms this: the “Gender Equity Sector Study for the Mining-Energy Sector”, developed by the Ministry of Mines and Energy, revealed that by September 2020 women occupied only 8 percent of formal direct jobs in this field.

The study, which is part of the strategy to implement the [Human Rights Policy for the Mining and Energy Sector](#) and the [Gender Guidelines for the Mining-Energy Sector in the country](#), recommended further research on this topic, as there is some evidence that women face higher rates of gender-based violence in informal mining settings. “The interesting thing about these types of recommendations is that they somehow emerged from the first National Action Plan for Rights and

WOMEN AND MINING IN COLOMBIA

INFORMAL MINING FIGURES

These figures of women exposed to gender inequalities and violence are not included in the 2021 Ministry of Mines and Energy study

70%

of mining is represented by INFORMAL MINING. WOMEN ACCOUNT for 46 percent of informal mining.

60%

of ARTISANAL MINING is represented by WOMEN.

Data obtained from the DANE National Administrative Department of Statistics (November 2020) and the final report “[Gender Analysis and Assessment](#)” of USAID/COLOMBIA (May 2019).



Business, which was designed based on United Nations initiatives. So these international agendas do have some impact and therefore can generate positive change in society,” concludes Lina Céspedes.

Indeed, the Organización Internacional del Trabajo (OIT) ([International Labor Organization \(ILO\)](#)), the United Nations’ specialized agency dedicated to promoting opportunities for men and women to access decent and productive work in conditions of freedom, equity, security and human dignity, at its 2018 meeting recommended moving forward a study on gender equality in the global mining sector, the report of which [was published in 2021](#). This document also presents the role of

THE FORMAL MINING FIGURES

In 2021, a gender equity sector study for the mining – energy sector was published (led by the Ministry of Mines and Energy of Colombia with the support of the Inter-American Development Bank), in which 71 companies from the mining, energy and hydrocarbons subsectors evaluated their performance on gender equity. Twenty-three mining companies participated in this study.

56.5%

of the company's leaders know and show interest in the gender equity approach and empowerment, but only 24.8% have translated it into formal commitments and/or concrete actions.

70.4%

of companies has a gender diversity approach in recruitment processes but only 50.7% incorporate guidelines in this regard in their corporate policies.



18%

of women are represented in management positions in mining companies.



Professors Lina Céspedes and Enrique Prieto of Universidad del Rosario analyzed the human rights and business agenda in the context of mining, informality and gender. Although mining was taken as a frame of reference, this study can open doors to understanding gender issues arising from informality in other labor fields in Colombia.

women in artisanal mining. However, more research detailing gender issues arising from the informal work context is still lacking.

The research led by Céspedes and Prieto has been one of the few that has substantially analyzed the topic of the human rights and business agenda in the context of mining, informality and gender. Although mining was taken as a frame of reference, it can open doors to understanding gender issues arising from informality in other labor fields in Colombia.

The follow-up by the researchers of Universidad del Rosario identified informality as a major obstacle to guaranteeing human rights at work; however, human rights agendas and com-

panies are not comprehensively addressing this issue, although some efforts have been made in this regard. Therefore, it is urgent to raise the issue of the informal economy and the corresponding action plans in these agendas, especially in countries that still have deep gaps in their development. This is essential to protect the human rights of women in the workplace and to ensure gender equity in this universe to which we are all equally entitled. ■



Mixed pain:

A new paradigm for diagnosing and treating this Symptom

For some years now, there has been discussion of a new concept that reflects the complexity of feeling a seemingly inexplicable pain. And while there is still a lack of evidence to formalize it into medical practice, for many it has already become a different way to explore pain and treat patients who experience it.

By Aleida Rueda

Photos by Milagro Castro

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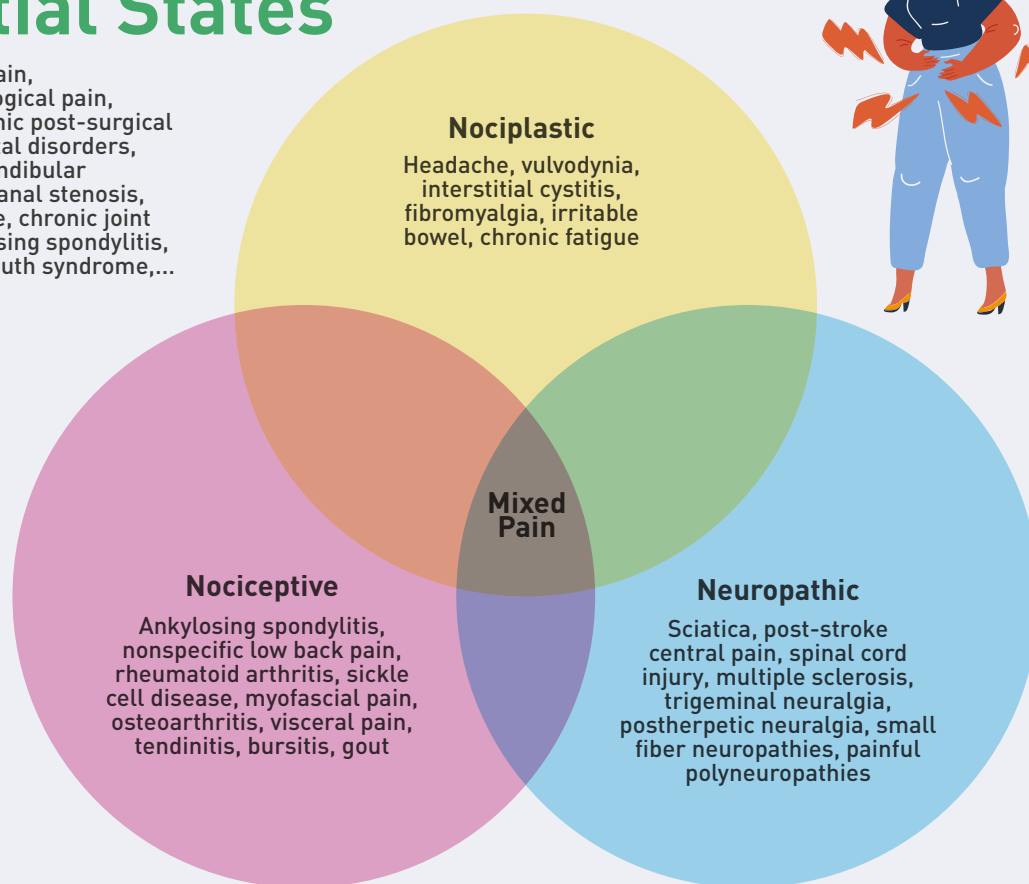
Some doctors and researchers have proposed a new concept of pain that does not correspond solely to tissue damage and is not the direct result of injury to the peripheral nervous system. It is, in fact, a combination of different types of pain whose origin could be found even in the central nervous system. This is now known as mixed pain.

There are few things as universal as pain. Regardless of origin, economic status, sex or education, millions of people live in pain around the world. If we did the experiment of asking five strangers if they feel pain, at least one would say yes, and that pain would be chronic in 1 in 10. Some already call it a “pandemic of pain.”

However, in this “pandemic,” no matter how egalitarian it may be, there are differences. There are very well-identified pains: those that result from an injury, such as when someone pricks a foot or burns a finger; or those that are produced by an infection, such as

Mixed Pain Potential States

Sciatica, low back pain, cervical pain, oncological pain, osteoarthritis, chronic post-surgical pain, musculoskeletal disorders, chronic temporomandibular disorders, lumbar canal stenosis, pain in fabry disease, chronic joint pain, painful ankylosing spondylitis, leprosy, burning mouth syndrome,...



Source: Current understanding of the mixed pain concept: a brief narrative review. Freynhagen et al. 2019 <https://doi.org/10.1080/03007995.2018.1552042>

when someone experiences a sore throat or feels the body weakened by a cold. However, there are other, much more complex and difficult-to-characterize pains that have gone unnoticed by much of the medical community for decades.

In the past, the study and treatment of pain focused on the peripheral part of the nervous system, that is, the set of nerves that extends from the spinal cord to all parts of the body. This tendency forced doctors to identify it from physical or nerve injuries, and thus excluded any other type of pain that had seemingly inexplicable or different symptoms.

A prime example was patients with fibromyalgia, mostly women. [Mariano Fernández Fairen](#), orthopedic surgeon, neuroscientist and professor of Bioengineering of Universidad Internacional de Cataluña, recalls that “for a long time, women with fibromyalgia



When you combine the three different types of pain defined by the International Association for the Study of Pain (IASP) in English) what R. Freynhagen et. al. define as “mixed pain” emerges.

were classified as neurotic. They came to the doctors saying that they hurt from their hair to their toenails. Who would believe that?”

“These patients were considered for a long time as the great simulators because they went to the clinic and everything was normal in them; nothing altered was detected in the clinical examinations,” adds, for his part, [Carlos Alberto Calderón Ospina](#), a pharmacologist and head of the Pharmacology Unit at Universidad del Rosario.

Today, it is more unanimously accepted that such pain is as real as that caused by a cut, but at the same time it is much more complex. To describe this complexity, some doctors and researchers have proposed a new concept of pain that does not correspond solely to tissue damage and is not the direct result of injury to the peripheral nervous system. It is, in fact, a combination of different types of pain whose origin could be found even in the central nervous system. This is now known as mixed pain.

Although the term has gained acceptance in the global medical community and has prompted more and more

research – there are about 88,400 articles on the web that mention the concept of mixed pain – many questions remain unanswered. Not even the International Asociación Internacional para el Estudio del Dolor ([Association for the Study of Pain](#)) (IASP), the scientific organization that promotes research, education, and policy on pain management, has officially recognized the term.

For this reason, specialists who are convinced that mixed pain exists have joined forces. Fernández Fairen and Calderón Ospina are part of a group of 16 authors from nine countries that published a few months ago the article entitled [A Latin American consensus meeting on the essentials of mixed pain](#) (*Meeting for the Latin American consensus on the foundations of mixed pain*) in the journal *Current Medical Research and Opinion* (2023). At that meeting, they sought to characterize what thousands of people struggle to describe: complex pain that requires complex treatment.

A combination of pains

To understand mixed pain we must know, first, that there are three types of pain, these are recognized by the IASP: nociceptive, neuropathic and nociplastic.

Probably the most common pain, and the easiest to recognize is the nociceptive. It is the “classic” that occurs when our pain receptors (nociceptors) are activated in response to a stimulus (injury, inflammation, infection).

“For example, someone who is playing a football game and suddenly dislocated an ankle. At the time of the injury the person will refer a lot of pain and on the physical examination what we will see is a very swollen ankle. In nociceptive pain there is a very strong correlation between the inflammatory process and the generation of pain; therefore, this type of pain usually responds well to anti-inflammatory drugs such as diclofenac or ibuprofen,” states Calderón Ospina.

The second type is neuropathic pain. It is a chronic symptom secondary to an injury or disease that affects the somatosensory system, that is, the part of the brain that is responsible for collecting information from the environment from stimuli such as touch, sound, light or temperature. This pain is caused by an injury to a nerve fiber that connects environmental signals with our nervous system. It is therefore much more difficult to detect than nociceptive.

“When we do the physical examination of the area that the patient refers to as painful, we do not see any alteration, but patients can refer to some very striking phenomena, such as burning, burning or the so-called allodynia (when we feel pain from stimuli that normally do not generate pain). For example, if you touch a patient's arm (without having an injury to the tissue or bone), just with the finger, it can cause terrible pain that can even make them cry,” explains Calderón.

One of the most common examples of neuropathic pain is that caused by [shingles](#), which is caused by infection with the varicella-shingles virus, the same virus that causes chickenpox and is commonly known as shingles because it causes a rash that follows the pattern of the same spinal nerve, similar to the shape of a snake. “That rash is very painful and can be debilitating. Patients describe it as



“For me, the most urgent thing is to disseminate this information, that more colleagues in Latin America start talking about mixed pain, that they propose research projects, diagnostic tools, preclinical models, ways to confirm that it really exists. Pharmaceutical research and development companies to propose valuable, effective and safe pharmacological alternatives for pain management. On the subject of mixed pain the last word is not said. We continue to learn,” asserts Professor Carlos Alberto Calderón from the School of Medicine and Health Sciences at Universidad del Rosario.

a burning sensation. Sometimes, even the respiratory movements of the rib cage can generate pain,” adds the specialist.

Finally, there is the **nociplastic pain**. It is the most difficult to recognize because it is basically the result of an alteration of the sensory pathways associated with pain. Unlike the neuropathic, where there is an affection to the somatosensory system, in this type there is no alteration in it. Everything seems normal. For IASP some of the examples of this pain are chronic fatigue, irritable bowel or fibromyalgia (although other specialists describe the discomfort of fibromyalgia as mixed pain).

Thus, mixed pain is one that encompasses components of nociceptive, neuropathic and nociplastic pain, and therefore until a decade ago it went unnoticed among the global medical community.

“The doctors dedicated to the management of pain had perfectly differentiated and separated the three types, but over time (...)

we understood that many painful syndromes, which we previously considered as purely nociceptive, neuropathic or nociplastic, can actually correspond to a picture of mixed pain,” says Calderón Ospina.

This revelation is not simply a change of language or concepts. For many, this is a new way to approach management, especially in Latin America, where 30 percent of the population, about 190 million people according to the [Latin American Federation of Associations for the Study of Pain](#), suffer from chronic pain.

Seeking consensus

For Uria Guevara, a pain management physician, palliative care specialist, and research professor in the Faculty of Medicine and Surgery at Universidad Autónoma Benito Juárez de Oaxaca (Mexico), recognizing that mixed pain exists is a paradigm shift. He was one of the first Latin Americans to publish an article on the subject, titled precisely *Mixed Pain. Changing paradigms*, January 2005. In his writing, he used this concept to describe pain that was neither strictly nociceptive nor neuropathic.

“At that time there weren't many articles or studies about it. The pain groups didn't believe in this idea, they were very orthodox. We dared, but unfortunately we published it in a local non-indexed magazine. And if it is not indexed, it does not exist,” says Guevara.

It took more than a decade for the concept of mixed pain to start gaining weight among the medical community. In 2019, at an international meeting in Cancun, Mexico, led by the German specialist in anesthesiology, intensive care and pain treatment, [Rainer Freynhagen](#), a committee was formed with the task of reaching a [consensus](#) about the concept of mixed pain. A year later, the community of Spanish-speaking doctors from Spain and Latin America met again to agree on essential points about mixed pain “from the perspective of the linguistic, cultural and social peculiarities of the population involved,” the authors wrote.

So after a literature review of nearly 600 articles on mixed pain and a face-to-face meeting in Mexico City, in February 2020 the Latin American consensus not only achieved the definition that is now known (the complex condition in which components of nociceptive, neuropathic and nociplastic pain are added), but also put on the table several of the key outstanding questions, including: How to make recommendations for doctors to identify whether or not a person has mixed pain or not?

How can this be achieved?

So far, identifying mixed pain is based on questioning the patient and the doctor's ability to find it. That is why one of the problems associated with this challenge is the fact that there are so few Latin American professionals specialized in pain. “This is a criticism I make of our university systems. The pain in the university is treated as an afterthought,” says Fernández Fairen.

“There is a deficit in pain education,” agrees Guevara. “In every country there are a few pain specialists. In medical schools, fields have been opening up for pain to be well explained and taught to students, but it is not enough. In addition, it must be done in other faculties such as nursing, dentistry or psychology, because all these colleagues have to do with pain, not just the doctor.”

“In medical schools we are trained to heal, not to relieve (in the sense of lightening or lightening) pain in patients. We are prepared to diagnose diseases and genetic conditions and see what studies need to be done, but we forget that it is equally or more important to relieve the patient. This is a cultural change in the training of doctors,” explains María Yazde, a pediatric physician [who specializes in palliative care at the Pedro de Elizalde Children's General Hospital](#), in Buenos Aires.

However, lack of vocational training is not the only challenge. Identifying pain is tremendously complex because it is subjective. Two people may have the same disease or injury and even describe it diametrically differently. For this reason, Carlos Alberto Calderón Ospina opines that “what is missing are the objective tests to confirm that indeed this pain exists and that the two or three pathophysiological mechanisms are occurring simultaneously, in the same body area of the patient and are due to the same cause.”

Some of these tests were proposed in the Latin American consensus, among them having questionnaires with very specific questions to identify if there is more than one type of pain in the patient's experience; using the Facial Action Coding System ([Facs, by its acronym in Spanish](#)), which consists of identifying facial expressions as pain signals, which have already been used in various [studies](#) to evaluate how people express each type of pain; or to use functional magnetic resonance imaging ([MRI](#)), which indirectly measures neuronal activity and can help differentiate and identify mixed pain. In fact, MRI has been used to observe how various parts of the brains of patients with fibromyalgia “light up” when they experience pain, allowing them to shed the label of “malingerers.”

However, there were no decisive answers in the consensus. It is not yet clear to specialists that there is enough evidence on the usefulness of these tests to be able to recommend them. They believe, however, that on the road to the formalization of mixed pain these tools should be used in conjunction with professionals from different disciplines, because a complex problem requires complex responses. And while that evidence is coming, they are sure of one thing: understanding mixed pain helps to better treat people.

The True Paradigm Shift: Listening to the Patient

It has been a couple of years since the international and Latin American consensus on mixed pain was held and the IASP still does not officially include the concept. Some specialists believe this is due to an orthodox and conservative view of the organization's Taxonomy Commission; others believe that it has to do with the difficulty that exists to identify it, as we have already seen.

For none of them, however, it matters much whether the IASP endorses it or not, because, they say, the important thing is in the clinic, in the way the concept is helping to treat patients. “If we have a patient with mixed pain because he has some kind of complex injury and we give him an anti-inflammatory with ibuprofen, we're probably not going to relieve his pain.



It is not that we are creating a new treatment, but rather a new approach strategy, and I think that is the substantial change,” explains Dr. Yazde.

Mixed pain does not respond to a single medication. “If we have a patient with oncological disease and with severe pain, it can be treated with an opioid, but since there is going to be a neuropathic component, you will also need an adjuvant, that is, a drug that was not strictly designed for the treatment of pain, but that acts in the pathways of modulation of pain, such as [gabapentin](#) or the [pregabalin](#) (both [antiepileptics](#)) or amitriptyline (for the treatment of mental illness). It is a strategy that complements the action of other drugs,” explains the Argentine doctor.

“I believe that the first benefit for society around knowing that mixed pain exists is that they have better care for their discomfort,” expresses Uría Guevara. “The more you identify and recognize, the more resources you have to take away their suffering through treatment with a multidimensional approach that not only looks at the physical part of the patient, but also at the psycho-affective and social dimensions.”

For Fernández Fairen, one of the changes that mixed pain has brought to the medical community is that it has made them listen more carefully to people. “I say this from the point of self-criticism. One of the flaws we had as doctors was that we decided whether the patient was in a lot of pain or not, the pain was interpreted by us. Now, by relying on the patient, we are much closer to their perception, that is, I am interpreting through what the patient tells me; I am interpreting their painful life experience.”

That is probably the most substantial change that the concept of mixed pain is bringing to medical practice, so far. It is a combination of pain that requires, as never before, a careful follow-up and description by the patient, and a true listening exercise by the doctor.

For Calderón Ospina, it is clear that this is just the beginning. “For me, the most urgent thing is to disseminate this information, that more colleagues in Latin America start talking about mixed pain, that they propose research projects, diagnostic tools, preclinical models, ways to confirm that it really exists. Pharmaceutical research and development companies to propose valuable, effective and safe pharmacological alternatives for pain management. The final word on mixed pain has not yet been spoken. We are still learning.” ■



How Life Skills Transform the University Experience?

'Skills to feel, live and enjoy' is the new proposal from the Dean's Office of the University Environment at Universidad del Rosario, aimed at transforming elective courses known as Humanities and the Wellfare (HM) into a space where students can develop social qualities that they can integrate into their professional lives.

By Stefany Hernández Arrieta

Photos by Milagro Castro, URSario

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Enology, or knowledge about wine making, is an [elective course](#) in the Humanities and the Environment ([HM, by its acronym in Spanish](#)) area, which, together with 48 others such as stress management, taekwondo and sexuality, are part of the current offer of academic training at Universidad del Rosario offered through the Wellfare Deanship ([DMU, by its acronym in Spanish](#)). of Universidad del Rosario These courses are just as important as the core courses, not only because they involve academic credits and qualifications, but also because they complement the professional and human profile of the student.

However, what contributions does enology offer, for example, to the study of medicine? For this Deanship, the answer is summarized in one sentence: to develop social skills for life.

"The HM electives have been at Universidad del Rosario for about 25 years, and were implemented with the purpose of ensuring that students obtain comprehensive training and at



the same time meet the requirements of the elective courses within the university curriculum, which is what the Ministry of Education demands,” explains [Nadia García Sicard](#), academic coordinator of the Deanship. “The university is committed to achieving a comprehensive education for students, grounded in the values and mission of the rosarista tradition,” she adds.

According to [Decree 2566 of 2003](#) of the Ministry of Education, “which establishes the minimum quality conditions and other requirements for the offering and development of higher education academic programs and dictates other provisions,” the importance of the institution having a strategic plan for university well-being is mentioned, for the individual and collective development of students, teachers and administrative staff.

Therefore, in the constant search to improve the quality of university education, Universidad del Rosario has strived to go beyond the transmission of theoretical and practical knowledge related to academic disciplines, through the specialized center in emotional education, [URemotion](#), which began operations in 2019 and is led by the dean of Wellfare [Ana María Restrepo Fallón](#). In this, the importance of preparing students to face the challenges of everyday life has been recognized, equipping them with strengths that transcend the classroom, such as skills to socialize, be creative, manage emotions and maintain good physical and mental health.

Transformative skills

For the URemotion center, social and emotional skills contribute to individual and collective well-being, and they not only work while learning, but are also applied throughout life. Nadia García shares with us that DMU chose to classify skills into three large groups, according to the three main qualities that the elective program seeks for the comprehensive development of the student profile:

- **Feel:** Skills focused on emotional management that are developed in the electives of emotional intelligence, the science of happiness and humor studies, among others.
- **Living:** Skills focused on the development of the mind and body that are developed in electives such as creative writing workshop, football and values, thinking with the body, etc.
- **Enjoy:** Skills focused on the ability to function in the social environment



↑
Universidad del Rosario has made efforts to go beyond the transmission of theoretical and practical knowledge related to academic disciplines, through the specialized center in emotional education, URemotion.

that are developed in electives such as feminism for beginners, climate change, and enology for example.

Nadia García explains that these courses are changing according to the environment and needs of the students. As an example, the career professor of the Wellfare Deanship, [Caleb Saldaña Medina](#), comments that currently the issues of sexuality, cybersecurity and psychoactive substance use are of short-term necessity and that the call for new elections will give priority to these issues.

These skills are carried out in the course of the semesters under the name of Electives of Humanities and the Wellfare with a value of two credits each, taking into account that a university credit equals 48 hours of academic work. “Students are expected to complete six credits from these courses throughout their career, and when they finish, they will have a suitcase full of theoretical and practical knowledge, but at the

same time he will take a suitcase full of skills that will allow them to develop and face their future lives better,” asserts García.

A Study of Perception

In 2021, García and Saldaña worked together with monitors [Sophia Salamanca Gómez](#), from the journalism career, and [Daniel Alejandro Jiménez Roa](#), from the social sciences teaching program, to conduct an investigation about the perception of skills that monitors, students and teachers have about HM electives and how they coincide with the objective of each group of skills in the three categories. The specific objectives of the research were:

- Explore the perception of key actors in the teaching-learning process.
- Define developed life skills in accordance with the perceptions explored.
- Select the skills in which participants agree according to their perceptions.

This study comprised four elective courses chosen by the monitors: enology (enjoy), stress management (feel), creative writing workshop (live) and map of the senses: reflections on living in Bogota (enjoy), and was carried out in three phases according to the study groups:

- Phase 1: Data collection from surveys designed for four professors (one for each course).
- Phase 2: Perception logs from the monitors who attended the aforementioned classes.
- Phase 3: Surveys designed for the 72 students who took these courses and voluntarily participated in this research.

The methodology used, specifies Professor Saldaña, was the coding of the keywords through a comparison in the responses of the three groups. For example, “in the case of enology, students responded that they had developed skills for social life and for expressing themselves in public, because they had to conduct a wine tasting and go to their knowledge of general culture to present them, since within the course they studied topics such as geography and history of both exporting and wine producing countries,” argues Saldaña. “Professor Catalina Rugeles Montoya is in charge of teaching general culture and knowledge about countries. It should be noted that the monitors agreed with these reflections. So, by collecting this information we encode the answers and unite them into a single perception: that the elective course develops the social ability of critical thinking.”

Although the results obtained from the three groups evaluated show that the proposed objectives were met, the research group concluded that the measurements of perceptions are very broad and that for the electives to really meet the mission and vision of the Welfare Deanship it is necessary to build a more standardized plan that allows to measure more accurately the relationship between the student with the skill and the objective of the course.



Professor Caleb Saldaña explains that “having a skill is the ability to do something and each person develops a skill with greater or lesser degree, that is, people who take the electives would be expected to have more developed some of the skills for life than those who have not taken them .”



“It is expected that students will complete six credits from these courses throughout their studies, and when they finish, they will have a suitcase full of theoretical and practical knowledge, but at the same time, they will carry a suitcase full of skills that will allow them to develop and face their future lives better,” asserts Nadia García, academic coordinator of the Welfare Deanship.

In Saldaña's words, "having skill is the ability to do something and each person develops a skill with greater or lesser degree, that is, people who take the electives would be expected to have more developed some of the skills for life than those who have not taken them." Under this premise, the DMU decided to build the protocol for measuring life skills with the aim of improving the method of evaluating the impact of electives on students.

The case of empathy

After the perception study, which was the beginning for the HM courses to be evaluated by skills, Nadia García and Caleb Saldaña developed a more precise methodology in their most recent study entitled "[The development of life skills from the elective curriculum in higher education: the case of measuring empathy.](#)" For its implementation they used psychometric techniques in order to evaluate the degree of ability that students obtain by course, throughout the semester. Psychometrics is the discipline responsible for measuring and quantifying human behavior, thinking, qualities, and other cognitive processes. In this case, the pilot study was for the elective of emotional intelligence and its ability to empathize; thus a 5-step protocol was created with the aim of being generalized for all courses of the branches to feel, live and enjoy.

The five steps of the pilot test were:

- 1- Theoretical and operational definition of the ability to develop in each elective.
- 2- Choosing (or creating) a questionnaire that measures the defined skill.
- 3- Assessment of the skill test at the beginning and end of each semester.
- 4- Analysis of differences in ability in students.
- 5- Feedback and improvement plan in the elective.

According to Saldaña, the emotional intelligence elective was chosen as a pilot test of the study because at the end of the semesters it has been the best valued by students, and they consider that the teaching topics coincide with the objectives proposed by the course. However, the skill that develops there, according to the teachers who teach it, is something complex to measure. How Can Empathy Be Measured?

"What could we do? Either we chose a questionnaire that was already validated and that existed in the scientific literature, or we



had to create our own questionnaire," the spokesperson notes. For the case of empathy and emotional intelligence, creating the questionnaire was a collaborative effort between the faculty teaching the course and the researchers directing the protocol. In this way an agreement was reached on the possible questions that could be asked to the student and measure the level of empathy acquired during the course.

At the beginning of the semester, 31 students participated in answering a questionnaire that measured the level of empathy they showed in their student life, which generated an average response of this skill in 3 (1 being low and 5 the highest). At the end of the semester, the same questionnaire was carried out to the same students and an average of 3.5 was obtained. The results were communicated to the faculty, so that they had new alternatives to improve this skill in class. Although there are different variables that affect the results, this constant measurement is a means to feedback the teaching work and have tools for future decision making.



“For us this 5-step protocol has no end, because we are always in constant evaluation of the skills,” emphasizes Saldaña, since the perception of skills varies with time and the needs of students constantly change. Therefore, to obtain the best possible information, this survey has been administered every semester since 2021. This year, began with the evaluation of seven courses, and to date 35 of the 49 courses belonging to the HM electives have been analyzed.

The pilot of the course of emotional intelligence obtained a favorable result by observing an increase in empathy among the students who attended the class. At the same time, it was favorable for the teacher of elective and co-author of the research [Karen Tautiva Ochoa](#), as this allowed her to improve her methodology and better understand the outcomes of her course.

“This greatly motivates the teacher; it invites them to engage in research and to periodically evaluate how we are

improving. Additionally, the good results open the door for us to invite them to participate in the dynamics of their class, and we can improve the methodology of other courses. This is how the pilot test began,” adds Saldaña.

On the other hand, the two researchers assure that evaluating skills is not in itself evaluating the theory of the course, but, beyond, analyzing the implicit content that forms the integrity of the student and that allows to see if what the university wants for its students is equivalent to the quality of education that it is teaching. Furthermore, it provides information on the application of skills in the students' daily lives and whether they benefit from the knowledge acquired.


A curious case was the course of stress management and negative results at the end of the semester. “This class is often taken by medical students, who have to deal with a very high stress burden,” Saldaña says. “When we evaluated it, we were surprised that the stress was higher at the end of the semester than at the time of the start. How can that be possible? Then we realized that the instrument we used measured the stress level and not the stress control. When they enter, students are more relaxed, still not having the workload associated with their career. Instead, at the end of the semester they are facing midterms and a thousand more topics, then they are more stressed. Stress is an emotional state that varies over time. Partials, for example, affect the student's stress level, and studying and measuring these levels makes us make new and better decisions.”

On the other hand, the researchers mention other skills implicit in their courses such as patience for embroidery class, the development of social qualities for enology, self-knowledge and personal branding for etiquette and protocol, among others. “It is what is usually called a hidden curriculum, in the sense that there is nothing explicit about patience, for example, but, hidden behind a class of embroidery is what you learn,” concludes Saldaña.

Currently, this evaluation method continues to be applied in HM electives to understand how skills influence the construction of the student's professional profile, while helping the teachers who teach the electives so that they can complement teaching with activities that can be seen in everyday life and in the same theoretical courses of the respective careers. ■

A person is crouching down, holding a leash. The person is wearing a brown jacket and blue sneakers. A dog's head is visible in the foreground, looking up at the person. The background is a blurred green field.

Pets Dress in Fashion



The old adage that says, “pets resemble their owners” has evolved into a new interpretation: owners express themselves through their faithful companions. This is what reveals a recent research carried out by Universidad del Rosario in collaboration with universities in Spain and Australia.

By Ximena Serrano Gil
Photos by 123RF, Mario Castro, Milagro castro
DOI https://doi.org/10.12804/dvcn_10336.42348_num7

In the age of social media and image worship, celebrity postings featuring their pets wearing the latest fashion trends are common pets, not their owners! When entrepreneur Paris Hilton broke into the haute couture events accompanied by her elegant chihuahua, these faithful companions climbed to the category of luxury accessories for celebrities and society in general. Thus, they practically became an extension of the style and personality of their owners.

The pet fashion industry has reached a surprising level of sophistication and profitability. Large houses such as Louis Vuitton, Gucci, Versace, Fendi, Hugo Boss, Moschino and Zara, among others, have launched lines of luxury garments and accessories designed exclusively for our pets to wear at all times the most *fashionable* trends. Hilton even launched her own clothing brand inspired by dresses paraded on the red carpet of the Academy Awards, in canine versions.



This trend of dressing pets, particularly dogs and cats, which may have started as an eccentricity of the so-called high society, has quickly gained ground in Colombia and the world. A report by the [Federación Nacional de Comerciantes \(Fenalco\)](#) indicates that the sale of pet clothing and accessories in the country showed a growth of 15 percent in the first half of 2023. This is not surprising considering that nowadays pets are usually considered as just another member of the family.

In the pet market, particularly for dogs and cats, you will find outfits and accessories for all occasions: gala, street, costumes, beach, winter, etc., ranging from the most common materials to the finest fibers and rhinestones. Surely, if the canines spoke they would say

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“The more the pet is perceived as an attachment figure, and the stronger the attachment, the greater the tendency to dress the pet as a human.”

wow before so many options; however, sometimes aesthetics quarrel with the comfort of four-legged friends.

According to data from the Departamento Administrativo Nacional de Estadística (Dane) ([National Administrative Department of Statistics](#)) (Dane, by its acronym in Spanish), 67 percent of Colombian households have at least one pet, whether they are dogs, cats, or even more exotic species such as pigs, birds, lizards, and rodents.

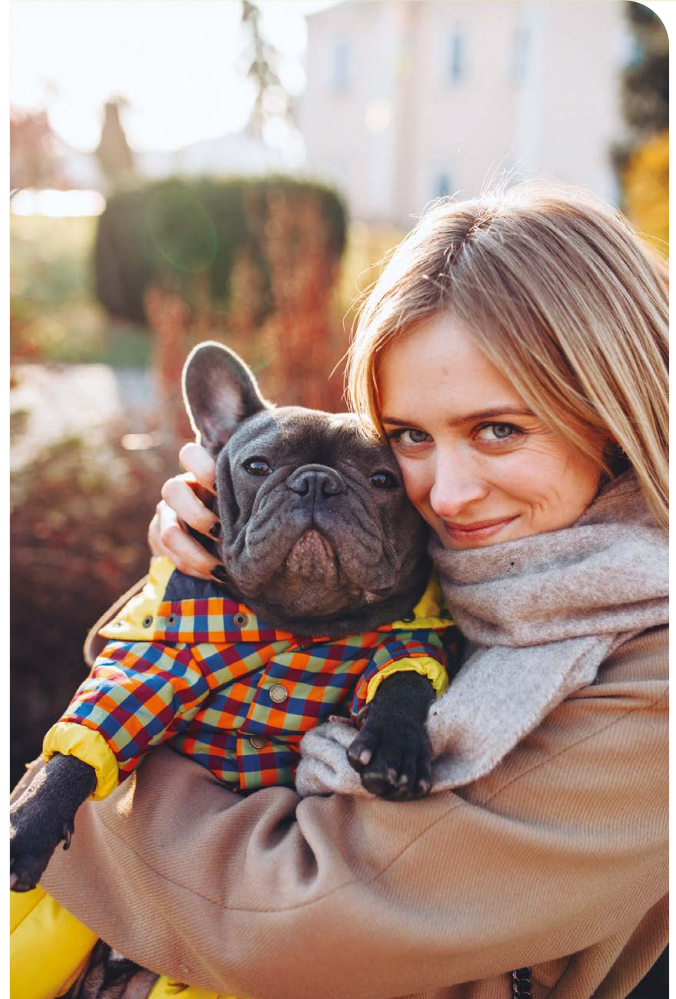
The figures of [Fenalco](#) specify that the pet market in Colombia has grown 84.9 percent in the last 5 years and ranks fourth in Latin America as a leader in the sector, behind Brazil, Mexico and Chile, in production and consumption of pet products with an annual growth of 13 percent. According to the newspaper [La República](#), during that same period, Colombians invested around \$3 trillion in food and pet items, and this figure is expected to reach \$5 trillion by the end of 2023.



"From a marketing perspective we use study variables such as emotional attachment, self-expression and anthropomorphism to build a model that can explain why people buy fashion clothes or some distinctive symbol for the pet; in addition, we try to explain a little our relationship with pets," explains Professor Mario Paredes from the School of Business Administration, an expert in consumer behavior .

To understand the motivations behind this global phenomenon, a group of researchers of [Universidad del País Vasco](#) and [La Trobe University](#) (Melbourne, Australia), in conjunction with the [School of Business Administration](#) at Universidad del Rosario [Mario Rolando Paredes Escobar](#), conducted the study *"What motivates consumers to buy fashionable clothing for pets? The role of attachment, the anthropomorphism of pets and self-expansion."*

This is a pioneering research on consumer behavior in pet fashion and for its development, 326 online surveys were applied to a representative sample composed of Australian pet owners, and an experimental evaluation was carried out with 203 university students. The publication on this qualitative analysis sheds light on the reasons that drive the growing demand for fashion products for pets, which contributes to strengthen the literature on consumption symbolism and the influence of attachment in this peculiar form of expression.



'Human friendly' trend

Some factors such as the pandemic or the tendency of new generations not to have children but pets have promoted the sale of products and services for them, for example veterinary consultations, hotels, shops, spa, schools, funeral services, hairdresser, exclusive parks, clinics with medical specialties (ocular, oncology, diabetes, dental, psychology, etc.). These new family members are now allocated a good portion of the budget to meet their needs, allowing the growth of this increasingly 'humanized' market. Today we speak of "multispecies families" where pets, according to the Chamber of the Superior Court of Bogotá, "ceased to be considered as things, but did not lose their property status within the legal system. Now they are also identified as sentient beings on whom it is obligatory to apply special protection duties." In summary, the trend of viewing these animals as "human friendly" has not only transformed the pet industry but has also redefined the very notion of what it means to be a family today .

The 'Fashionable' Universe of Pets and Their Owners

Regardless of the type of garments, an inevitable question arises: Do pets really need clothes and should they follow *fashion* trends? Paredes believes that pets do not need clothing, let alone fashion. He argues that the usefulness of garments is limited to specific climatic situations and in particular dog breeds, since the concept of fashion is exclusively human. "Although some garments may be uncomfortable, they usually do not affect the well-being of pets," she says.



"From the perspective of *marketing*, we use study variables such as emotional attachment, self-expression (image that is projected through the pet) and anthropomorphism (giving human characteristics to something that is not human) to build a model that can explain why people buy fashion clothes or some distinctive symbol for the pet; in addition, we try to explain a little our relationship with pets," explains the teacher, an expert in consumer behavior with a postdoctoral degree in Economic Sciences.

Understanding these variables and their interrelationships from a scientific perspective will allow a better use of knowledge.

With respect to the first mentioned variable, it has been shown that a high level of attachment entails greater emotional and monetary investments. Paredes emphasizes that "the strong [bond](#) between people and pets, it can be perceived as a source of unconditional love, acceptance and emotional support, even to the extent that pets can play the role of children, siblings, playmates and friends. The more the pet is perceived as an attachment figure, and the stronger it is, the greater the tendency to dress the pet as a human."

To measure this variable, approaches were analyzed such as: "I feel closer to my pet than many of my friends"; "I have a photograph of my pet in my wallet"; "I feel closer to my pet than some members of my family"; "my pet is my closest companion."

Self-expression through the pet is another variable explored in the study. The famous expression "pets resemble their owners" takes on a deeper meaning as assessed, considering how owners project their image through their pets. Paredes argues that choices of breed and clothing for pets are extensions of the owners' social behavior, of their lifestyle; it is a way to send messages about themselves. Additional studies, such as that of social psychologist [William J. Chopik](#), support this idea by stating that dogs tend to reflect the personality of their owners: "A quiet person will have a quiet dog."

Consequently, to determine the level of self-expression, the group analyzed instruments such as: "Can I project a good image of myself with my pet", "with my pet my friends perceive me as cooler," "with my pet I have more status"?

They also included whether there were plans to buy pet clothing in the coming

The World of Pets in Numbers

At least the **43 %** of Colombian households have a pet. The most common are dogs (70%), birds (15%) and cats (13%).

Colombians spend between **COP 190 000** and **COP 745 000** per month on their pets.

The value of the pet industry in the country was **3 billion COP** in 2016. By 2026, it will be **6,1 trillion COP**.

In 2022, the pet food category alone billed about **1,2 trillion COP**, up 23% from the previous year.



Sources:
Data taken
from Kantar
Ibope Media,
National
Federation
of Traders
(Fenalco),
Dane and
NielsenIQ .

Colombia is the fourth largest pet market in Latin America, behind Brazil, Mexico and Chile. This had a growth of 84.9% in the last five years .

months or whether there would be a willingness to buy it.

Anthropomorphization is the third key variable in the study. Have you ever engaged in a conversation with your pet in the hope that he understands you rationally? Do you consider him your “dog-child” or “gatchild”, or do you give him the status of brother, nephew, grandson? Did you see him in trendy clothes? Do you celebrate birthdays with cake and guests? These practices reveal the strong affective bonds between owner and pet, while diluting the line between human and animal behavior.

The teacher emphasizes that “the more the pet is perceived as an attachment figure, and the stronger this attachment is, the greater the tendency to dress it as a human; therefore, to buy fashionable clothing for pets.”

Practical Vision for Market Growth

From a marketing standpoint, these findings are critical to understanding consumer behavior and designing attractive and effective strategies in the growing pet fashion industry. “Highlighting concepts such as the family in which the pet is included, customizing garments that give it identity or organizing contests for the best-dressed or disguised pet are some powerful strategies for entrepreneurs to promote the consumption of these products, because this way people will feel greater identification and expression through their pet,” Paredes suggests. Clothing and accessories for pets at home have not only become consumer products, but also a form of expression and emotional connection for their owners. Far from being an extravagance, fashion for company species becomes a tangible expression of the love and connection we share with our furry faithful friends. ■



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**For an
ecologically
sustainable
environment**

**Student receives diploma from the director, José Vicente Castro Silva.
Author unknown. 1960s. Photograph. Album 6.2, photograph 006.
Historical Archive of Universidad del Rosario (AHUR)**



Innovation to Protect the Brains of Pollinators: Flavonoids May Help Bees Recover Their Memory

The number of bees on the planet is declining. To this critical situation, we must add that those who remain are losing their learning capabilities. Researchers of Universidad del Rosario have created a formula to protect and recover the brains of pollinators affected by exposure to pesticides.





By Ximena Serrano Gil

Photos by Andre Riveros, Milagro Castro

DOI <https://doi.org/10.12804/>

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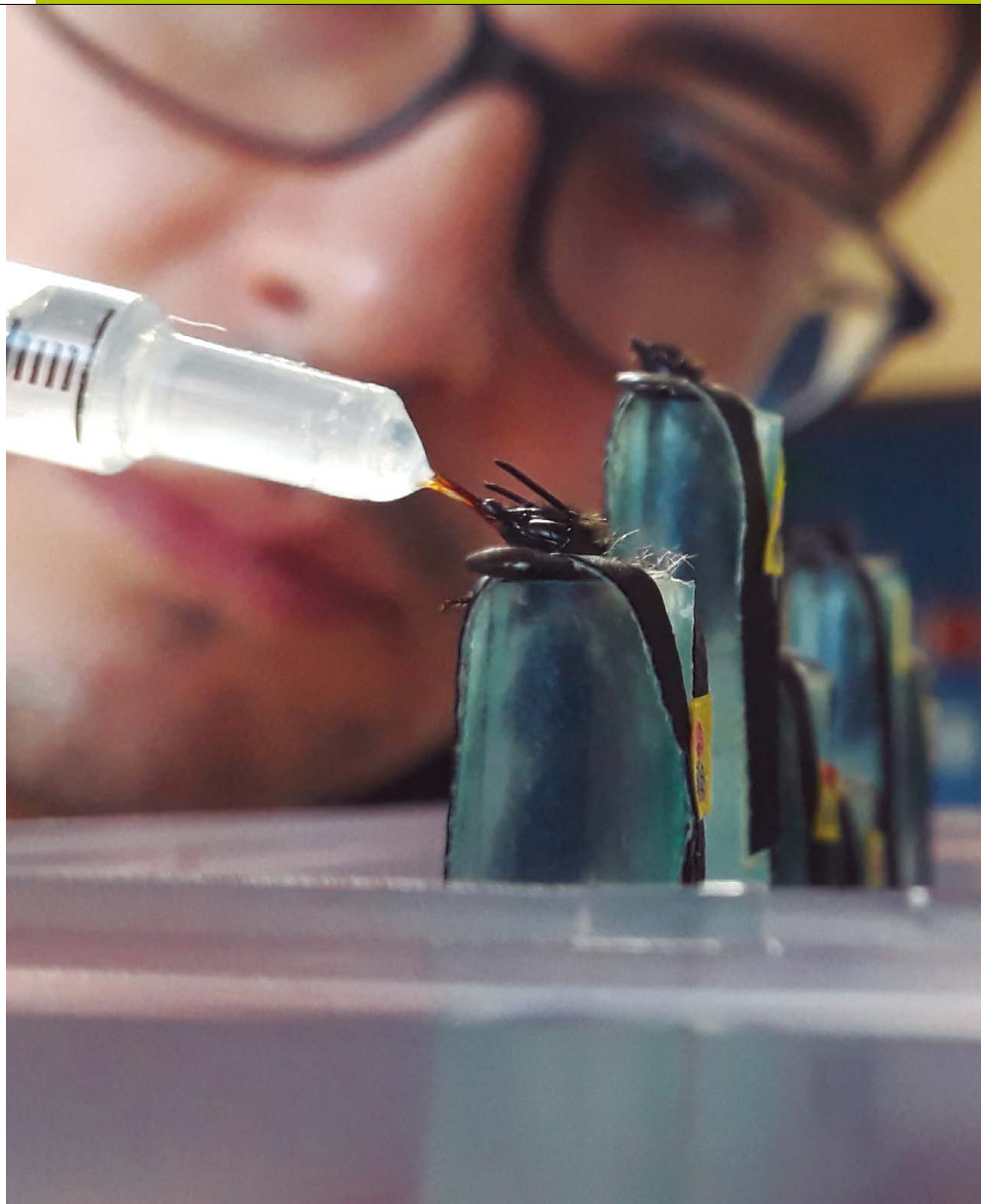
In a world where giants often grab attention, there are tiny heroes who perform feats that go far beyond their size. We are talking about bees, those little buzzers that with their brains the size of a pin's head play a vital role in maintaining the balance of natural ecosystems and in food production for humanity.

However, these winged heroines face a silent and lethal enemy: pesticides. Exposure to these chemicals causes them to have [sub-lethal effects](#), i.e. those that do not cause death, but affect their abilities and thus endanger their conservation. According to figures from the [Bee Informed Partnership](#), an NGO that groups researchers and university laboratories in the United States, between April 2022 and April 2023, beekeepers in the United States lost about 48.2 percent of their honey bee (honey bee) colonies.

Fortunately, science and nature come together to protect these tireless workers. Researchers from the [Faculty of Natural Sciences at Universidad del Rosario](#) in alliance with the [Department of Neuroscience at the University of Arizona](#) developed a formula that reduces these alterations. The results were published in the [Journal of Experimental Biology](#).

[Andre Josafat Riveros](#), biologist and doctor of Behavior and Neuroscience, as well as associate professor in the Department of Biology at URosario and who leads the research, explains that the alterations observed in bees—caused by several factors, among which are chemical synthesis pesticides—consist of memory loss and, therefore, learning difficulty, decreased capacity for decision-making, inhibition of motor skills and reduced capacity to cope with diseases. In other words: “You have a bee that doesn't know where the flowers are or that if it reaches them, it may not remember where the hive is. It may also not have enough strength to move between them efficiently and if it encounters viruses or other pathogens in the environment, it cannot be defended effectively,” he argues.

“Our results suggest that a food supplement designed from plant derivatives has a protective effect on some parts of the brain, which supports the use of these to counteract the harmful effects of pesticides,” Riveros says.



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Bees that consumed flavonoids experienced improvements in their ability to learn, make decisions and motor behavior, suggesting that these compounds may be key to preserving the cognitive health of these insects.

The Remedy is in the Plants

The growing need to supply a growing global population, according to the [OECD](#) report, has led to an increase in pesticide use in agriculture. However, this practice has a devastating impact on bee populations, a critical player in pollinating essential crops, as reported by the [Bee Informed Partnership](#).

For his part, entomologist [Edison Torrado-León](#), founder and general director of the [ENTOMA](#) Institute and a professor of Universidad Nacional de Colombia, he says that although pesticides play an important role in protecting crops against pests—which helps increase agricultural production and ensure food security—bee conservation is also crucial, as they are key pollinators to ensure sustainable food production.

Therefore, “it is important to find a balance between the responsible use of pesticides and the protection of bees,” he emphasizes.

The United Nations (UN) says that we depend on the survival of bees, since “almost 90 percent of flowering plants need pollination to reproduce; likewise, 75 percent of food crops and 35 percent of agricultural land in the world require this natural activity to develop and feed humanity. Pollinators not only directly contribute to food security, they are also indispensable for conserving biodiversity.”

The central problem is that the pesticides used do not distinguish between beneficial and harmful insects, and bees are particularly affected by this situation. According to Andre Riveros, “we have found that bees are not making good decisions, they are no longer learning.”

Two of the causes of these conditions are [fipronil](#) and [imidacloprid](#), the most common neurotoxins in agriculture. The former induces neuronal hyperexcitability and causes motor alterations, as well as loss of memory retention in bees. Meanwhile, the second is a neonicotinoid that damages the learning process, memory, motor control, and sensory capacity of these important pollinators, even if exposed to very low concentrations.

In order to counteract these deteriorations, the researchers looked for a solution to shield the bees and focused their attention on flavonoids, a series of secondary metabolites derived from plants that possess defensive, antioxidant and anti-inflammatory properties, among others. Riveros explains: “We have analyzed that if these metabolites are recognized as having physiological protective effects in humans, they could also be transferred to protection possibilities in bees.”

According to the results of the research, bees fed a diet rich in flavonoids showed remarkable protection against the harmful impact of pesticides. According to Riveros, “his memories were significantly better.” In addition, bees that consumed flavonoids experienced improvements in their ability to learn, make decisions and motor behavior, suggesting that these compounds may be key to preserving the cognitive health of these insects.

A Good Diet is Necessary

This research focused on two species of pollinators: the [Apis mellifera](#) (commonly known as the honey bee, the same as the famous animated character called the “Mayan bee”) and the bumblebees of the genus *Bombus*. Although these two insects are the protagonists, the development product of the research becomes a cornerstone for the conservation of the [nearly 20 000 species of bees](#) that exist in the world.

This dietary supplement, which has [protection records](#) Intellectual property, it has been specifically designed to safe-



The central problem is that the pesticides used do not distinguish between beneficial and harmful insects, and bees are particularly affected by this situation. According to Andre Riveros, professor in the Faculty of Natural Sciences at Universidad del Rosario and leader of the research, they have found that bees are not making good decisions, they are no longer learning.

guard pollinators. It is a precise mixture of molecules encapsulated in microdroplets. Once the bees consume it they begin to develop protection within a few days, which has a significant impact on their survival.

The immediate question is: What would happen if other pest insects, such as moth larvae, thrips, or red spiders, also consume this supplement? The neurobiologist Riveros points out that nutritional supplementation is carried out within the nests of these species, where pests are not present or have access. They use what beekeepers call “cakes,” a mixture of pollen, honey, or syrups combined with the supplement. “This strategy ensures that only the pollinators we consider benefit from this protection, while pests are excluded,” says the researcher.

An essential complement to this work is the strategy of urban gardens. Riveros and

First International Patent of The URosario

The number of bees on the planet is declining and those that remain are losing learning capabilities. Researchers of Universidad del Rosario and the University of Arizona have created a formula to protect and recover the brain from pollinators affected by exposure to pesticides. This is the first invention of Universidad del Rosario with protection of intellectual property abroad.

What is the invention that was patented?

It is called "Compositions and Methods for Cognitive Protection of Pollinators Against Pesticides", which are flavonoids to protect the brains of pollinators and help bees recover their memory.

What problem does the invention solve?

It is an alternative to two global problems, food security and the disappearance of pollinating insect populations.

Why these problems?

More than one-third of the world's food consumed requires pollination by bees and other insects.

Efforts to produce more food include the use of chemicals that favor plant growth, fruit production, and prevent pest attacks. The problem is that these chemicals affect beneficial insects, such as bees and other pollinators, even at very low doses that do not necessarily kill them but do affect them, producing damages that remind us of Parkinson's and Alzheimer's in humans.

Who are the inventors?

- Andre J. Riveros, associate professor of Universidad del Rosario and research associate of the University of Arizona (USA).
- Wilfila Gronenberg, full professor of the University of Arizona (USA).
- Carlos Morantes, PhD student (U. New York-Stony Brook)
- Lina García, doctoral student (Universidad del Rosario)

his team propose to identify the plants that in their pollen or nectar offer high quality food for bees. This translates into the planting of specific plant species in urban areas, with the purpose of developing strategically thought gardens to provide pollinating insects with the food they need to thrive. "It is not just about eating, but about eating well," he concludes.

Other scopes

Beyond the results on these bee populations, the studies carried out by Universidad del Rosario group led by Riveros have other scopes. For example, by exposing the fruit fly (*Drosophila melanogaster*) to some of these insecticides, the specimens showed symptoms similar to those seen in a patient with Parkinson's disease: involuntary movements and stiffness, mainly; a finding called "[Parkinsonian phenotype](#)." This particularity was studied by the group, together with researchers of Uni-

versidad Nacional, in both bees and fruit flies, and the results were also published in the [Journal Experimental Biology](#). They showed that the use of flavonoids protected fruit flies against such a phenotype.

Scientists used the fruit fly because it has a short life cycle (about 2 weeks), its reproductive capacity is fast, and its genome is well characterized. All this makes it an ideal model to study various biological and genetic processes, and therefore it is frequently used to evaluate drugs or chemical compounds.

The authors stress the importance of understanding the impact of pesticides on wildlife, but at the same time suggest possible implications for human health.

A [2022 World Health Organization \(WHO\)](#) report indicates that the prevalence (a measure of the number of total cases at any given time) of Parkinson's disease has doubled over the past 25 years. This is why Riveros points out that research on

What species
did we study?



The honeybee (*Apis mellifera*), the number one pollinator in the world.



Bumblebees (*Bombus impatiens*), the second most important pollinator in North America



The fruit fly (*Drosophila melanogaster*), a model in insect research

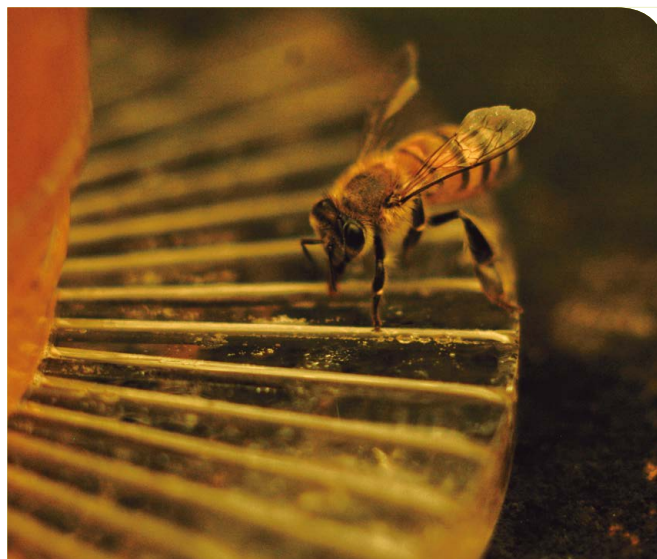
Where was it
patented?

The patent
was granted
by the United
Kingdom
Patent Office.

flies could lead to benefits for human health, as he believes that supplying these specific natural molecules to people, bees and flies would somehow contribute to the protection of living organisms and tissues.

This study reveals once again the interconnection between environmental health and human health, while highlighting the need to address the effects of pesticides more broadly and to consider the consequences of these substances on other living things.

The next phase of research is focused on confirming whether the formula designed can also function as an antidote to bees that have already been poisoned with pesticides, in order to recover them.



Regulations Regarding the Use of Fipronil

In response to the need to produce a greater quantity of food and to prevent crop loss, over 2 million tons of pesticides (herbicides, insecticides, fungicides, and bactericides, among others) were applied globally in 2019, according to a study published in the *Journal of Toxicology*.

The sublethal impairment associated with insecticide exposure, affecting individual and colony levels, has led to bans in some countries. In Colombia, a technical study conducted by the Corporación Colombiana de Investigación Agropecuaria (Agrosavia) Colombian Corporation for Agricultural Research revealed that the indiscriminate use of fipronil is intrinsically linked to bee deaths. Consequently, the Colombian Agricultural Institute (ICA) issued Resolution 740 of 2023, which seeks to prohibit the use of fipronil in the country and thus mitigate the harmful effects of this molecule. (2023)

The resolution outlines three main points:

- Prohibit the immediate import of fipronil as a raw material, as well as the import of the finished product.
- Cancel registers of chemical pesticides containing fipronil in their composition.
- Give 12 months to look for alternative replacements.

Hunger is an immediate global issue, and collaboration among scientists, farmers, and policymakers is essential to ensuring a sustainable future for the entire planet. Advances such as the one highlighted in this article, developed through the teamwork of researchers of Universidad del Rosario and the National Assembly, represent a fundamental step in the protection of bees and, therefore, in the preservation of biodiversity, global food production and public health. Flavonoids, transformed into dietary supplements, could be a valuable tool to reduce the negative impact of pesticides on bee populations and ultimately on human food security. ■

Tomogrande: Lessons on climate change from the highlands



Although it is rarely present in the public imagination and even in public policies, the Colombian highlands has much to say about climate change adaptation and carbon sequestration. The private reserve Tomogrande is a proof of this.

By Michelle Soto Méndez

Photos by Emon Corbertt, Juanita Escobar, Sergio Estrada

DOI https://doi.org/10.12804/dvncn_10336.42719_num7

Tomogrande is a reserve located in the southeastern end of the municipality of Santa Rosalía, in the department of Vichada. Its landscape is slightly undulating. On the banks of the rivers Tomo and Caño Grande –hence its name– there are flat areas that flood in some years.

In this reserve, the division between ecosystems is very pronounced: there is a transition between savanna and forest. The savanna is covered with grasses and other herbs, with a few small trees scattered throughout. The gallery forest surrounds all the small streams that rise in the savanna and, to the east, the floodplain forest borders several lagoons adjacent to the Tomo River.

Being so far from the Andes, the Vichada highland has no rivers that bring nutrient-rich sediments, which makes the soils of Tomogrande poor, very acidic and, sandy, causing water to filter quickly. “There is only forest in places where the water table (the upper limit of an underground water layer) is high enough, which is where water accumulates and tree vegetation can exist,” explains Sergio Estrada Villegas, an



ecologist who helps coordinate the reserve and scientific station Tomogrande, who is also a professor in the Faculty of Natural Sciences at Universidad del Rosario.

In terms of precipitation, Tomogrande receives between 2 000 and 2 500 millimeters of rain per year; for most of the year, there is sun and wind. The grasses, composed of graminoids and herbaceous plants, have evolved to survive drought conditions. “What grows in the highlands is because it fights hard and manages to survive and reproduce,” adds Estrada Villegas.

Then there is the fire. The savanna naturally burns from time to time, when thunderstorms occur without rain. “That is when a spark ignites. That spark sets the savanna ablaze and combusts the vegetation. These are fires that occur naturally, spontaneously, and consume the grass communities that survive the drought,” he states.

“Because of these fires, which have occurred for thousands of years, there are areas completely free of tree vegetation. Some small trees do grow because they can resist the fires, but for the most part, it is grasses and herbaceous plants,” he continues.

Understanding how these ecosystems have managed to survive under extreme conditions is what makes the highlands fascinating, especially in times of climate change. With this in mind, Estrada Villegas advocates for increased research efforts in the area.

“We need to understand what is going to happen to these ecosystems, because they may dry out more and begin to turn into xerophytic ecosystems (vegetation adapted to dry environments for various reasons) or deserts, something they have already been! During the Pleistocene, there were huge deserts in large parts of the Colombian Orinoquía, including the highplain. There has been a repeated cycle of desert, savanna, jungle, savanna, and desert...”, emphasizes the researcher.

However, there is a difference between what happened in the Pleistocene and what happens now. With the current climate change, which is anthropogenic in origin (due to the release of greenhouse gases –GHGs– from human activities), ecosystems have not had enough time to react and adapt.

How is the highlands coping with the temperature increase? Will fires increase? How quickly can species adapt to these changes? Will it become a desert again?

To find out, science is needed, and that is precisely what the group of biologists in charge of Tomogrande has been doing for the past 10 years.



Biodiversity inventories

Tomogrande is a private nature reserve that also serves as a station for scientific studies. It protects 2 500 hectares of well-drained savannas, as well as flooded and gallery forests. It is part of a group of nine properties that complement conservation efforts beyond the western boundary of the Reserva de la Biosfera de Tuparro (Tuparro Biosphere Reserve), a protected wilderness area.

For a decade biologists have used different research methodologies to know the biodiversity that inhabits or transits through this reserve. In this way, five plots have been established to study vegetation: three in dry land forests and two in floodplains.

Trails have also been established in the dry land forests to record the diversity of plants, birds and mammals, as well as to record the behavior of monkeys. Another of the tasks under-



taken is the trapping with cameras, that is, the installation of recording equipment with motion sensors in the trunks of the trees to record in video or photography what happens there. These were placed at sites far from the trails to maximize data acquisition.

In parallel, studies on birds and bats in the savannas have been conducted, as well as long-term research on the reproductive biology and behavior of migrant and resident populations of savanna kingbird (*Tyrannus savana*). Other projects are assessing the structural dynamics of the scarce woody vegetation growing in the savanna.

This initiative resulted in the [first species inventory](#), which was published in the journal *Biota Colombiana* (2022). As a result, Tomogrande is now known to contain 535 species of plants (299), birds (189) and mammals (47). Most species (around 220) have been observed on dry land and in savan-

na, followed by those found in flooded forests and on forest edges. However, as Professor Estrada comments, we know that there are many more species of these three taxonomic groups that biologists have not yet collected and identified.

“Our species list helps fill data gaps prevalent in the tropical biodiversity of the Orinoco basin and the reserve contributes to ongoing efforts to better understand and protect habitats around and beyond the Tuparro Biosphere Reserve,” the scientific article reads.

From this first inventory other questions of a scientific nature arise that must be answered by the research. Many birds, as well as mammals –such as bats and monkeys– func-

tion as seed dispersers, a task that is vital for the maintenance of tropical forests.

These species usually feed and sleep in different places. Through their excreta, these species move the seeds of trees from one side to another, thus favoring the forest to replace vegetation that has already completed its life cycle and even colonize new areas.

Some of the thesis projects that [Pablo Stevenson](#) –one of the authors of the inventory– is directing, focus on knowing what the monkeys are eating, with a view to, subsequently, understanding what type of seeds they are moving, what species, where they are depositing them and whether these seeds thrive or not.

This knowledge could help to understand the dynamics of maintaining forests in the highlands and even give way to answer other questions oriented to the role that biodiversity plays in the existence of carbon sinks, for example.

Carbon

At the current rate of GHG emissions, the planet is no warmer thanks to oceans and forests. In the case of forests, through photosynthesis, vegetation captures carbon dioxide (one of the GHGs that causes global warming) and stores it in its biomass (roots, leaves or woody bodies) and even in the soil. That already fixed carbon dioxide is known as carbon.

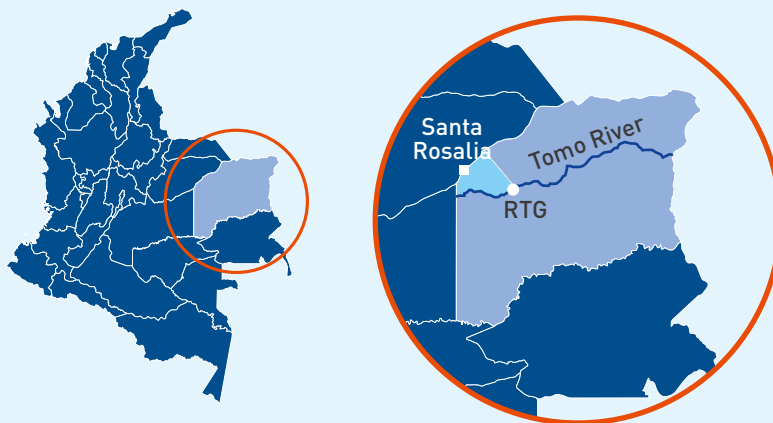
In the case of Tomogrande, it has been possible to quantify how much carbon their forest ecosystems store: the average rate of carbon accumulation in land forests is 0.33 tons per hectare per year (t/ha/year), while in flooded forests is 0.66 t/ha/year, according to a [study](#) published in the journal *Forests* (2021).

The researchers –including [Ana María Aldana](#), linked to Universidad del Rosario at the time of publication of the study– found that the amount of carbon in the flood forest is higher than in the dry land forest because the species are different and so is the density of its wood.

Since these trees remain submerged for part of the year, their roots and trunks must withstand very high flood levels and, therefore, their wood is denser; otherwise they would rot. Denser wood means more carbon captured and fixed as biomass. So, despite the fact that the floodplain has fewer trees, the trees that do exist sequester more carbon.

This carbon quantification allowed the reserve to enter an emissions compensation project managed by the [Cataruben Foundation](#). Tomogrande is currently receiving funding for conserving its forests.

Tomogrande Nature Reserve



Location

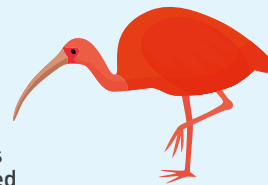
It is located at the southeastern end of the municipality of Santa Rosalía, Vichada department. It lies at 124 m.a.s.l., at the confluence of the Tomo River and the Caño Grande River.

There is a pronounced dry season from mid-December to early April. The heaviest rainfall occurs between June and July. The average annual rainfall is 2498 mm and has an average annual temperature of 26 °C.

Birds

The characteristic fauna and birdlife of Tomogrande reflects a transition between the flooded savannas of the Llano and the Amazon.

- 37.6% of all species have been observed in wooded habitats (dry land and flooded forests).
- 32.3% of the species have been seen in savannas.
- 15.9% of the species have been sighted on forest edges.
- 14.3% of species have been observed near rivers or lagoons.



Ecosystem

The ecosystem is characteristic of the highplain: a heavily drained seasonal savanna, crossed by dry-land gallery forests and seasonally flooded gallery forests. There are small areas of flooded savanna, especially around the Tomo River.



In total, Tomogrande covers 2 500 ha, of which approximately 1 978 are herbaceous savannas with sparse patches of small trees, while the remaining 522 ha correspond to flooded forests around the two main rivers and to other dry land (gallery forests) around the streams.

Researchers have recorded 535 species of plants, birds and mammals in Tomogrande.

299 species of plants.
189 species of birds.
47 mammal species.

Most species (220) have been seen on dry land and in savanna (49), followed by flooded forests and forest edges.

Mammals

The orders of mammals with the most species are chiroptera (bats, 26 species) and carnívora (5 species).



There are two species considered endangered by the IUCN: the pink dolphin ([Inia geoffrensis](#)) and the giant otter ([Pteronura brasiliensis](#)), two considered vulnerable, the anteater, or yurumí ([Myrmecophaga tridactyla](#)), and the tapir or common danta ([Tapirus terrestris](#)).

Where Have They Been Seen?

- 66% of all species have been observed in forest habitats.
- 23.4% of the species have been seen in savannas.
- 6.4% of the species have been sighted on forest edges.
- 4.3% of the species have been seen by rivers or lagoons.

The reserve is also home for the jaguar, the puma, the tayra or toluco, the crab-eating fox, the chigüiro or capybara, two species of monkeys and three of artiodactyls.

Plants

The plant community of Tomogrande includes elements typical of biogeographic areas such as the Amazon, the coast of arms of Guyana, the Andean region and the Caribbean. A total of 160 species are designated as of Least Concern by the International Union for Conservation of Nature (IUCN), and the rest have yet to be evaluated.



- The most emblematic species belong to the Amazonian-Guiana area:
- Arracacho or chupaya ([Montrichardia arborescens](#)), which is found in open wetlands.
- Moriche ([Mauritia flexuosa](#)), which is found in swamps at the headwaters of streams.
- Red saladillo ([Caraipa llanorum](#)), which forms a habitat called "saladillales" in flooded savannas.



Currently, the savanna is not part of the compensation project because its grasses are used to support livestock. The reserve has 40 cows that allow the people who live there to continue with the cultural legacy of being 'llaneros', a livelihood that has existed for 400 years in the area.

"You cannot tell a farmer to stop being a farmer and become a biologist and environmentalist. We understood that if we wanted support from locals, in such a remote place, we had to respect their livelihood," the professor says.

On the other hand, cattle there serve self-sustaining, non-commercial functions. Thanks to popular knowledge, "we get used to cows coming to sleep at paddocks that we create around the house. There, the manure mixes with the ground. Thus, we have cassava, plantains, guava, vegetables, etc. They are bringing nutrients from a place, they leave it next to the house and ... well you go and take advantage of that cassava," he adds.

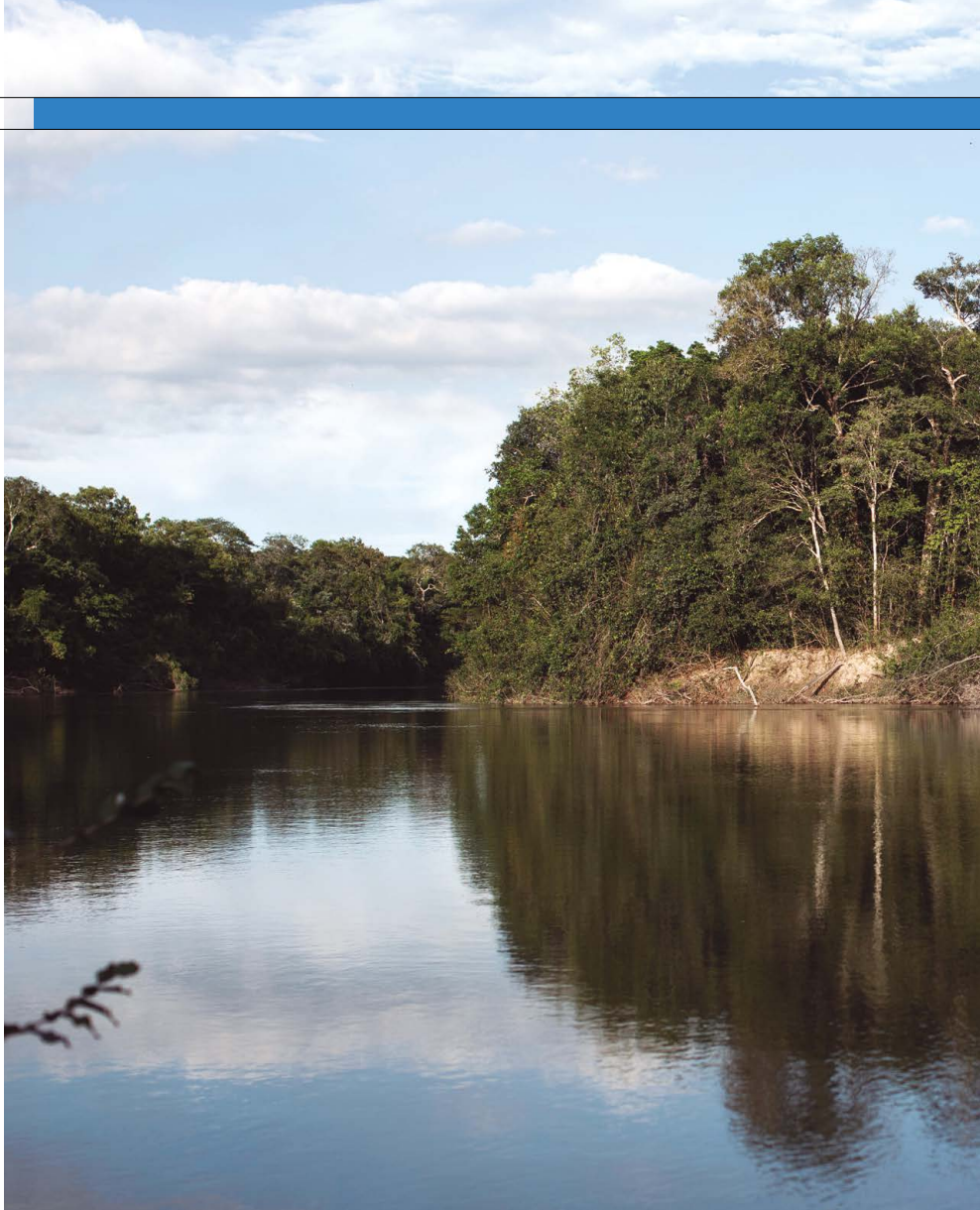
The researcher then states that "another type of dynamic is generated where one understands that the cow is not only to sell it for meat or for breeding, but is also helping to create a moderately closed system to have products for the house."

However, the question of how much carbon the savanna captures is intriguing to Tomogrande's biologists. "My next dream is to do some experiments to see how much carbon is in the soil and how much is in the roots of the pastures," Estrada Villegas admits.

Perhaps carbon, in such a unique ecosystem, can make the highplain more valuable in terms of making it visible to promote its conservation. "It is a carbon issue. It is a biodiversity issue and it is also a cultural landscape issue. We must not forget that indigenous and 'llaneros' groups live there," he emphasizes.

Opportunity

Colombia has set a target of a [51 percent reduction in emissions](#) in order to comply with the provisions in the [Paris Agreement](#). For the update of [Nationally Determined Contribution](#) (NDC), which synthesizes climate change commitments, the country plans to include the contribution of ecosystems such as mangroves, wetlands and savannas beyond forests. "In the NDC update, for the next period we will explore issues associated with biodiversity and ecosystems other than forests. The [Climate Action Law](#), aims to create emission baselines to clarify what to account for and how to do it. Specifically, it is about determining what the country can realistically commit to," emphasizes María Alejandra



Garzón, an official from the Directorate of Climate Change of the Ministry of Environment and Sustainable Development.

"It will take many years to achieve all of these emission baselines by ecosystem. One of the strategies that has worked for us, and that could be replicated, is the [pay-for-success](#) programs provided by the Green Climate Fund (GCF). Through this funding, the enabling conditions of the Institute of Hydrology, Meteorology and Environmental Studies (in charge of Ideam) would be worked on. Also, academia is one of the key players in this exercise. Other research institutions have already begun to make progress on some points, and that will improve our national inventories," she adds.

For Garzón, carbon accounting can be advanced both in natural ecosystems and in agroforestry structures where agricultural activities are combined with arborization and forest conservation. Such efforts, framed in a landscape-sensitive territorial vision, can support low-emission development. "Personally, I think that a comprehensive view of the landscape is much more strategic and at the same time allows the actions that will be carried out in the territory to take into account that there are other ecosystems that should not be harmed," she states.



“We need to understand what is going to happen to these ecosystems, because they may dry out more and begin to turn into xerophytic ecosystems (vegetation adapted to dry environments for various reasons) or deserts, something they have already been! During the Pleistocene, there were huge deserts in large parts of the Colombian Orinoquía, including the highplain. There has been a repeated cycle of transitioning from desert to savanna to jungle to savanna to desert...”, emphasizes the researcher Sergio Estrada Villegas, an ecologist who helps coordinate the Tomogrande reserve and scientific station, professor in the Faculty of Natural Sciences at Universidad del Rosario.

With this she refers specifically to the highplain. The challenge focuses on designing management measures that avoid intervening in the savannas for carbon capture (for example, by promoting afforestation with exotic species), respecting the dynamics of the ecosystem.

“It is, in short, to prevent measures from becoming a perverse mechanism for the savannas to be intervened; it is necessary to start from the fact that they are an environmental determinant, that they are strategic ecosystems in the regional structure, which must be protected,” highlights the official.

This is where the efforts to comply with two international conventions –climate change and biodiversity– must be harmonized. Colombia included nature-based solutions in its [National Development Plan](#). The projects are intended to link actions against the ravages of climate change with measures to protect biodiversity. However, that is not enough. There is also a need to work on minimizing threats.

Like other savanna ecosystems around the world, the highplain is threatened by the desire to convert it into arable land, especially for extensive monocultures. “If the transformation of the land of the Colombian Llanos remains unregulated, the integrity of the ecosystem may be lost due to irreversible

changes in the composition of its biodiversity,” warned the biologists of Tomogrande in the article that presented the inventory.

In this sense, Estrada Villegas and his colleagues advocate for better landscape planning and for making sustainable practices mandatory in the area, in order to protect both biodiversity and the livelihoods of the people who inhabit this region.

“The economic growth of the highlands must be planned to benefit not only agro-industry, but also the multiple stakeholders in an equitable manner. It is urgent to establish a regional plan to preserve large areas of savanna and most riparian forests, with the aim of avoiding a catastrophic loss of biodiversity,” the study states. ■



Sugarcane: Between the air and the mule

Panela was introduced to Colombia in the 16th century and its development was due to the effort of muleteers and their mules. Today, the most productive region for panela sugarcane in the country is located in the middle basin of the Suárez River. However, despite its importance, the product is still transported on the back of the mules. The Corporación Colombiana de Investigación Agropecuaria (Agrosavia) (Colombian Corporation for Agricultural Research) led the design of a cabling system that optimizes the transport of sugarcane in the area, but its implementation is not applicable to all panela producers, so the help of this loyal animal remains indispensable for them.

By Dalia Barragán

Photos by Alberto Sierra, Alfonso Cubillos, Milagro Castro

DOI https://doi.org/10.12804/dvcn_10336.42341_num7

One afternoon in September 1980, a man made the world turn its eyes to Colombia. That day, the cyclist from Bucaramanga [Alfonso Flórez Ortiz](#) became the first non-European rider to win the Tour de l'Avenir, and upon receiving the award he said a phrase that resonated in the imagination of all of Colombia: “Behind that triumph are also two boxes of panela.”

With this expression began to consolidate an identity of the country within the framework of cycling competitions, and strengthened the link we have with the precious food derived from the processing of sugarcane. Thus, the power of Colombian “beetles” who pedaled incessantly and began to win titles on the mountain routes of international competitions, began to be attributed to the energy provided by the consumption of the panela.



→
With the implementation of the system of mobilization by air wiring the performance increases to achieve the transport of 2 600 kg of sugarcane per hour, about ten times more than what was achieved with the mules alone.



It is not surprising, then, that Flórez, being from Santander and member of a team mostly composed of riders from Boyacá, credited his victory to this product from his region, given that between these two departments extend the municipalities of the [middle basin of the Suárez River](#), the flagship territory of the panela sector of the country.

In the departments of Boyacá and Santander, the highest percentage of national panela production is concentrated, accounting for a total of 28 percent ([Boyacá, 13.07 percent](#); and [Santander, 14.96 percent](#)) according to data from the Sistema de Información Panelera (Panela Information System, Sipa) of the Federación Nacional de Productores de Panela (Fedepanela). Therefore, and according to a study developed by Jorge An-

dersson Ahumada González, as part of his [master's thesis](#) in Environment and Development at Universidad Nacional de Colombia, the production of sugarcane in the Suárez River basin has been technified to achieve greater yield per unit area. And one of the factors that allows to optimize this performance is associated with the way this sugarcane is transported.

There is an old saying, “It is older than panela.” Perhaps this refers not only to the origin of this precious food, but also to the fact that in that area of our geography the transport of

sugarcane as a raw material for the production of panela is still based on a very old method: the use of mules.

The origin of sugarcane as a “domesticated plant” for agriculture dates back 6000 years before Christ, in [New Guinea](#) (an island in the Indo-Pacific), later spreading through Asia and the Mediterranean Europe. It was the Arabs who introduced it to Spain during the 9th century, and later the Spanish took it to America during the colonial era, at the end of the 15th century. Specifically, in the department of Santander, according to the data collected in the [Manual of Sugarcane for Panela Production](#), the sugarcane was integrated into the “new lands” from Venezuela, thanks to the movements of the muleteers and their mules through horseshoe trails. The continued reliance on this mode of transportation persists due to the rugged geography of the region; for this reason, the difficulties for the mobilization of the stalks from the sugarcane fields clearly slow down the production of panela in the area.

The Colombian Corporation for Agricultural Research ([Agrosavia](#)) has studied various technologies to optimize the transport of sugarcane between the mountainous regions of the Suárez River basin, and that is why [Alfonso Cubillos Varela](#), mechanical engineer and researcher of the Corporation, led the design of a cable transport system that facilitates transport from one point to another across the complex geography of the panela-producing area. Two types of systems have been considered for this location: one that uses pulleys and gravity force, and another that uses a 15 horsepower engine to move the load. The purpose is to take advantage of both alternatives, in addition to mules, to optimize the production of panela there.

The cultivation and all the production processes of sugarcane panela in the Suárez River basin generate a carbon footprint that it is expected not increase with the use of these technologies. [Didier Camilo Sierra](#), director of the Territorial School of Water ([ETA](#)) at Universidad Antonio Nariño and a doctoral candidate of Universidad Jorge Tadeo Lozano de Bogotá, carried out a study—as part of the first chapter of his doctoral thesis—to determine the environmental impact of sugarcane transport systems on the production of panela in the region. Sierra, along with Cubillos and [Carlos Alberto Franco](#), professor in the School of Business Administration at Universidad del Rosario, measured the impact of both types of cable transport and mule-mediated transport to determine whether greater efficiency in product mobilization also



↑
Aerial sugarcane transport system designed by Agrosavia, used in the middle basin of the Suárez River. This system allows for the transportation of a greater amount of sugarcane per unit of time.

implied a greater environmental impact. The study was published in the journal [Clean Technologies and Environmental Policy](#).

The results showed that this is not the case and that the three systems cause very similar environmental loads, so their implementation in the Suárez River basin can be promoted among local producers, which, undoubtedly, will help to obtain greater efficiency in this activity.

However, not all producers can benefit from these initiatives. Why do some benefit while others do not? Professor Franco explains: “We evaluated the impact that these technical methodologies can have on a sugarcane producer, so that a decision-maker can determine whether it is good or not for their region. Although new systems can provide positive aspects for optimizing production—among other advantages, they save costs associated with the use of mules and improve mobilization—they can lead



"We evaluate the impact that these technical methodologies can have on a sugarcane producer, so that a decision-maker can determine whether it is good or not for their region...", explains Professor Carlos Alberto Franco from the School of Business Administration at Universidad del Rosario.

to additional costs resulting, for example, from the maintenance of the cable system in the long term. For this reason, it may not be beneficial for all sugarcane and panel producers to invest in such technologies."

To reach this conclusion, the team used multicriteria statistics in order to run a multivariate hierarchical model that comprised different environmental, economic, financial, logistic, social and technical variables (of cultivation), among others. Thus, the variables were crossed to obtain a statistical profile of each producer and determine whether it can be benefited by the use of cable-mediated transport technology. "In this way, it was determined that not all sugarcane producers are eligible to implement it," Franco says.

However, some farms have already benefited from these new practices. Data from Agrosavia indicate that mule-mediated transport in the Suárez River basin has a yield of [52 percent, as a mule loads an average of 141.5 kg of sugarcane per trip, with an av-](#)

[erage yield of 4.1 kg per minute](#) (approximately 246 kg per hour). With the implementation of the system of mobilization by air wiring the performance increases to achieve the transportation of 2600 kg of sugarcane per hour, about ten times more than what was achieved with the mules alone.

"However, it is key to understand that while a technology can be good for improving the industry, not all producers benefit from a particular one. Therefore, these models are effective in determining who are the real favors of a technology, in the long term", adds Franco.

Although technology is currently optimizing the production of panela in the Suárez River basin, the mules that carry the sugarcane on their backs will continue to move along the mountainous slopes of this region, serving as a reminder of the Colombian "beetles" who also travel the area on their steel horses with the illusion of reaching a title someday. An illusion fueled by a delicious and energizing 'pocillado' (cup) of panela water or a good piece of the sweet fruit of the sugarcane. ■



'The Ciénaga Grande de Santa Marta (Great Swamp of Santa Marta) urgently needs a right that considers the relationships between people and nature'



Moving from protecting resources to making visible the relationships that people have with their environment. That is the proposal made by researchers Andrés Gómez Rey, Gloria Amparo Rodríguez and Álvaro José Henao to try to reduce conflicts and ensure a dignified life for all.

By Michelle Soto Méndez

Photos by Milagro Castro, Andrés Gómez

DOI https://doi.org/10.12804/dvcn_10336.42363_num7

In the Caribbean, just to the north of the country, the intersection of fresh and salt waters leads to a very particular wetland, which is even considered to be of global importance. There, in the Ciénaga Grande de Santa Marta (Great Swamp of Santa Marta), life is possible thanks to that ecosystem dynamic that shapes people.

“People have very particular relationships that they have built over time with the swamp. They have a relationship with fauna and flora that goes beyond just food; it is a relationship of conservation, but at the same time of recreation and protection. Of course, it is not environmental protectionism; I am talking about a way in which the daily lives of people seek to conserve an environment while also having a dignified life”, says [Andrés Gómez Rey](#), environmental lawyer and professor of Universidad del Rosario.

“Law does not understand that. The law understands that there is an ecosystem and a person; then it protects them, it creates a regulated scheme to protect the two things, but it

does not see that there is a relationship between them. Hence, the law splits the elements, but does not show that everything is interconnected, that we are all part of a network. That is the big problem with the swamp,” he continues.

Many things happen in the swamp, all at once. The different categories of environmental protection and management (such as being a Ramsar wetland –an internationally important wetland included in the [Ramsar Convention list](#)– and [UNESCO's biosphere](#) reserve, among others) overlap with the ancestral and traditional uses (such as fishing and sacred sites) of the communities in the area. Moreover, because everything is interconnected by water dynamics, actions carried out in a certain part of the territory may infringe upon another community's right to a healthy environment.

Andrés Gómez and Gloria Amparo Rodríguez, researchers and professors in the Faculty of Law at Universidad del Rosario, together with Álvaro José Henao, lawyer and legal adviser on environmental issues, wrote an article published in the journal [CIBOD d'Afers internacionales](#) (2022), in which they analyze the legal tools that have been used for the protection of the Great Swamp of Santa Marta. Researchers found that the application of these laws has generated tensions associated with guaranteeing human rights, the well-being of people and the preservation or rights of ecosystems.

“What the Court orders is ‘do this to curb pollution and do this to do something else’; but those orders, anyway, are fractional, have conservationist logics, harm people and encourage struggles,” comments Gómez. “The article shows a little bit the anguish of how judges sometimes do not understand what people are going through and take action for what is called resources, not territory, or in favor of the people. And they always prioritize what has discriminatory effects or privilege other species or other actors (often economic ones). Thus, judges may end up accentuating or exacerbating the conflict,” the academic added.

In an interview with the *Advances in Science Magazine*, environmental lawyer Andrés Gómez clarifies the choice and shares the most relevant concepts about the initiative that he and his co-authors are proposing as a solution.

DC. This vision centered on the natural resource that, seeing it from the historical perspective, could have been valid at the time, falls short of the present we live in. Are we moving towards a more comprehensive view of the landscape?

Rights of nature

Although many countries have raised the right to a healthy and ecologically balanced environment to constitutional status, this is focused on one of the subjects – the human being – and leaves it to the interpretation of the operators of justice whether this right also extends to other species (for example, the jaguar) and even to ecosystems (a river or a mountain).

One of the first to put the issue on the table was Christopher D. Stone, professor of Law at the University of Southern California (USA), when in 1972 he wrote the essay *Should trees be legitimized? Towards the legal rights of natural objects*.

Likewise, in the 1970s in South America, Godofredo Stutzin already spoke of how “recognizing nature as an entity endowed with rights is legally possible, takes into account a real situation and responds to a practical need.”

This is how a new paradigm in law begins to take shape, one that encompasses nature in its entirety and is opposed to the classic anthropocentric vision, in which, although there is supposed environmental protection, this is based on utilitarian reasons.

Precisely, with this desire to modify the anthropocentric paradigm, recent initiatives have been developed in Latin America to grant rights to nature, among them, a *habeas corpus* to an orangutan (as happened with “Sandra” in Argentina) or a bear (“Chucho” in Colombia). There have also been movements to recognize an ecosystem as a subject of law; as happened with the *Quindío River* in Colombia. Others have gone a step further. In 2008, Ecuador granted rights to nature in its Political Constitution, whose article 71 says: “Nature or Pacha Mama, where life is reproduced and carried out, has the right to have its existence and the maintenance and regeneration of its vital cycles, structure, functions and evolutionary processes fully respected.”

Although the examples given above are from Latin America, the rights of nature have also been made official in other countries such as Australia, New Zealand and India.

AG. Environmental Law failed profoundly for many reasons, but above all because by fracturing the components and because of the existence of other problems derived from the legal architecture, we have not been able to halt the planetary crisis. That fractional logic has caused Colombia to destroy one part, while protecting another. Now, a place has a lot of things and around those elements, relationships are woven.

I think that there is a necessary shift in the transformation of what is called Environmental Law, and that change seeks precisely to understand these relationships. I think that recognizing that everything is interconnected, that there are interrelationships, assemblages and respect for the networks that are built naturally is something very beautiful.

Of course, transformation involves new categories. For example, in Colombia, we must conceive of the territory as a more complex relational environment; that would serve to show that the planet is claiming to be an actor in the debates.

Ecosystem services

People benefit from a range of services provided by this ecoregion, including:

- **Environmental regulation services:** protection from natural phenomena, water purification, sediment and nutrient retention, aquifer recharge, and carbon dioxide capture.
- **Provisioning services:** fishing resources for food, production of goods and natural fibers, crops of some foods, and small livestock, which are exchanged in local and regional markets.
- **Cultural services:** gastronomic variety, such as mote de guineo, carimañolas, empanadas, arepas, buñuelos, or sancocho de costilla and mondongo; tourist activities in search of palafitte cities, such as Nueva Venecia; collective stories and narratives, such as that of the “house of the devil” in the municipality of Ciénaga; or the interest of social scientists in the appropriation and creation of indigenous technologies, such as the “bongaducto”, a small boat that transports fresh water for human consumption, from the mangroves to the saltwater areas.

The people of the swamp

This is an ancestral territory where four indigenous peoples live: Arhuaco, Kogui, Wiwa and Kankuamo. According to their worldview, they are called to be guardians of nature and for this reason they promote the protection of the “black line” in their ancestral territory, known as Umunukuno, which means the heart of the world.

There are also peasants living there, whose relationship with flora and fauna has fostered a series of local and traditional knowledge. There is a cultural interdependence with the ecosystem to the point that, without the swamp, they would be destined to disappear.

So, the judges have to argue that the river and the mountain are actors in the judicial debates and that they have a force that can modify the situations; that this is not a matter of technically doing things, but that science has a political component and the norms have an intention that is sometimes hidden.

I believe there is a loud call for a reformulation, and the article we published is going somewhat in that direction. The article aims to make visible that the Law prevents us from seeing the political content of science and the agendas that are behind the norms and technical production, among other aspects. A case like that of the Great Swamp cannot continue under that logic; there is a lot of pollution there, people are suffering a lot, species are dying. So, if there is no change in logic, then this will not work...

DC. Is there a possibility of conceiving of territory as a space to make visible these relationships that exist between ecosystems and people, where both the rights of nature and human rights are respected? At the end of the day, our



“If there are no democratic consolidations around how to manage our own culturally appropriate territories, then these legal rules in the abstract are not going to work. And every place is different. Each is an absolutely different world and creates different relationships.”

worldview –as people– is very much tied to those relationships we establish with the environment.

AG. I totally agree. I think Colombia is seeking, at least from academia and social sectors, to rethink the traditional categories; to stop talking about resources and start talking about territory, because, in addition, the word resource implies a use and that obeys a very commercial vision, as if we were talking only about raw materials.

A beautiful initiative that Colombia has embraced the [rights of nature](#), which have tried to break the limits of law and other disciplines in order to understand a territorial vision and a world located in the space in which it exists to understand these dynamics. Although that is the goal, sometimes it is very

difficult to fight against the law, because the challenges are not necessarily legal.

To include the territory as a category, a lawsuit is not filed, rather, a multitude of extralegal strategies are used to insert it into the legal system or begin to convince operators of the importance of breaking the traditional categories. And those processes are historically long. Of course, that is why Colombia has many opponents of the rights of nature. There are always people who find it absurd or simply do not understand the dangers, and that is why they want to halt it.

DC. If the territory gives visibility to both ecosystems and people, as well as to their interrelationships, that could also help reduce tensions. It could even relieve the state of some weight regarding conflict resolution, right?

AG. Sure, that is the crux of the matter. When I talk about ecosystems, I mean all the intersectional species that bet on their own survival and a dignified life. However, when talking about the human being, it is often decontextualized and this makes judicial and legal decisions very problematic. Now in Colombia, all regulations have an immense democratic deficit, which causes that when this is transferred to cultural places, the norm is rejected.

If there are no democratic consolidations around how to manage our own culturally appropriate territories, then these legal rules in the abstract will not work. And every place is different. Each is an absolutely different world and creates different relationships.

DC. However, by dignifying people and ecosystems, we are empowering people to take ownership of, and thus have a relationship with it. In the end, that relationship with the territory is what leads to its care.

AG. And we take care of each other. The beautiful thing is that the people in those places understand how important it is that everything exists so that we all can exist. The sociologist [Norbert Elias](#) speaks of “figurations.” He states that figuration is the relationship that we have historically built with everything around us and that together we try to protect; he argues that they are “relative relations” because we want to be better relatives.

DC. Listening to you reminds me of the concept of [collective care](#) used by feminist collectives and environmental defenders. I think that we also have this care with nature: as a human being, I take care of her and she takes care of me through ecosystem services.

Great Swamp of Santa Marta

This ecoregion is formed by a complex of wetlands that develops on the floodplain and the delta of the Magdalena River, which is composed of the alluviums formed by the rivers of the slope of the Sierra Nevada de Santa Marta.



It is one of the most important wetlands since there is the largest coastal lagoon in Colombia. In addition, it has a great biodiversity in its different swamps and other types of wetlands (saltmarshes, swamps and pipes), as well as in the rivers that cross it and mangrove areas.

It is an absolutely interconnected place: the waters that feed the swamp travel from the source of the Magdalena River, passing through five more rivers that descend from the Sierra Nevada de Santa Marta, to the coast.



The threats

The Great Swamp is not exempt from environmental problems:

- It still bears the consequences of a series of historical impacts, such as the construction of roads in the late 1950s, which led to the reduction of the exchange between the lagoon system and the sea, as well as between the Magdalena River and its delta.
- High levels of pollution resulting from local anthropic activities and those generated in other parts of the territory, although, due to water dynamics, they are concentrated in this ecoregion.
- Siltation of the canal system due to deforestation, the blocking of caños to control emissions, and the draining of smaller wetlands, with the consequent effort to prevent the salinization of crops, has resulted in a decrease in the supply of freshwater that the wetland previously provided.
- Low coverage of basic services, especially aqueduct and sewerage, which means that solid and liquid waste from coastal municipalities have as final destination the Magdalena River and even the swamp itself.

"The degradation is not only ecological, but also social, as the human settlements there suffer a precarious situation in terms of well-being, which is paradoxically aggravated by the ecosystem deterioration that affects fishing, food production (food security) and access to drinking water."

Excerpt from the article written by Andrés Gómez, Gloria Amparo and Álvaro José Henao and published in the magazine Cidob d'Afers Internacionals (2022).

AG. I have two personal commitments. One is a community and popular right that has to be built between state and social bases so that effectively all rationalities and ways of seeing the world that can be present. The other is the existence of a relational constitutional right. These concepts can expand our understanding of democratic and relational needs, at least in environmental matters.

DC. In the Worldviews and Governance of Indigenous Peoples, Could We Find Elements That Enrich This Relational Vision We Are Discussing?

AG. I think they are the ones who have invested the most on that. What happens is that we have not been able to understand it. The indigenous peoples in Colombia are the ones who have told us the most, and for a long time, that this is not a matter of subject-object, but of relationship, of history, of construction between all. I think indigenous contribution is vital, and we need humility, respect, to understand what they are really communicating to us for a long time.



↑
A beautiful initiative that Colombia has embraced is the rights of nature, which have tried to break the limits of law and other disciplines around understanding a territorial vision and a world located in the space in which we are to understand these dynamics, says Professor Andrés Gómez Rey from Faculty of Law.

DC. While we are discussing about the Great Swamp of Santa Marta, I feel that, equally, we could be talking about any landscape of Costa Rica, Ecuador or Peru. In other words, this is a Latin American issue as such.

AG. I consider it that way as well. This is much broader than what we are currently observing. I believe that this commitment to have a Latin American relational manifesto that has a political strength is still under construction. However, I also believe that we do not believe it. The strength is there, but we lack confidence.

DC. It seems to me that this article is definitely an invitation to talk.

AG. The article is written to engage with formalists and uses that language extensively; however, it is designed to plant a seed as an idea. Let's see if we can suddenly transform a little bit of traditional Colombian environmentalism, at least. ■

3

Thinking about national agenda issues

Offering from the Scholar Pedro Pradilla y Silva. Author: Joaquín Gutiérrez (attributed). 18th century. Oil on canvas, 109.4 x 79.4 cm. Universidad del Rosario Collection.







Challenges Facing Colombia in the Post-Peace Agreement Era



The signing of the Peace Agreement with the Farc in October 2016 began a variety of changes in many regions of the country, with stark contrasts: several communities are now facing the presence of dissidents and other armed actors, while in some areas important social processes involving ex-combatants and civil society have developed. This is reflected in the book 'The post-agreement in Colombia', an initiative of Universidad del Rosario supported by the Fritz Thyssen Foundation of Germany.

← The construction of peace is a long-term process that naturally entails challenges.

By Magda Páez Torres

Photos by Presidencia, Alberto Sierra, Juan Ramírez, Milagro Castro, Luisa Fernanda Vargas (Colectivo Artístico y Cultural Claudicantes).

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Since the age of 13, Óscar Salazar has worked tirelessly for peace in Colombia. He was born in Urabá, a thriving region but sadly besieged by violence, like many Colombian territories. Throughout this journey, he has personally endured the harsh realities of war. He was a witness and part of different peace agreements, such as the one signed with the M-19 in 1990, and participated in the Havana dialogs as a delegate of the Social Bureau of Victims, to make his contribution in the construction of the [Peace Agreement with the Farc](#) signed in October 2016.

Today, seven years after the start of the implementation of the six points of the Agreement, this social leader who has traveled inch by inch the northwest of the country, makes a bittersweet balance. He recognizes significant achievements such as transitional justice, but regrets that points such as reparation for victims are still lagging behind.

"We have reached today the staggering number of nearly 10 million victims of the armed conflict, of which only 1.6 million have been repaired, according to the Unidad de Víctimas (Victims Unit). This is because there hasn't been enough budget. Sadly, this repair would last for around 80 years. However, more important than a pecuniary reparation, it is a comprehensive reparation that allows us to know the truth," he says. In this period of implementing what has been agreed, there are numerous nuances and contrasts that have been presented, which has attracted the attention of many academics who have followed this stage. Researchers of Universidad del Rosario and other institutions of the country, put the magnifying glass to this issue from an interdisciplinary approach, in order to analyze the different scenarios that were erected once the Peace Agreement was signed. This led to the development of an important research project condensed into a book entitled ["The Post-agreement in Colombia: situational processes, temporality, territory and materiality."](#)

The book explores the history of the conflict, the transition of the Farc, the Territorial Spaces of Training and Reincorporation (ETCR, by its acronym in Spanish), the supply chains and the construction of peace, among others. However, beyond evaluating the points of the Agreement, this publication contains a series of reflections and analyzes on the processes that have been lived around the subject.

The Challenges of Reintegration

One of the pillars of the Peace Agreement with the Farc is the reincorporation of the guerrilla members into civilian life, taking into account that it was the largest guerrilla in the history of Colombia, which came to have about 30,000 combatants, as recorded by Mario Aguilera Peña in his article *The Farc: rise and fall of the war model*. More than 13,000 guerrilla members reintegrated after peace was sealed with the former Farc; of them, 94.9 percent continue to comply with their process of returning to normalcy, according to data from the [Truth Commission](#).

"I believe that there has been an effort by various institutions to articulate a policy of multidimensional reincorporation in social, economic and psychosocial issues," says [Jairo Baquero](#), professor in the School of Human Sciences at Universidad del Rosario and academic editor of the book.

However, this path has not been without thorns. While most ex-combatants gradually managed to adapt to a new way of life in [the Territorial Training and Reincorporation Spaces](#) the *status quo* was altered by the emergence of some dissidents, shielded by alleged breaches by the government of the day.

In August 2019, the "second Marquetalia" was born, composed of the largest faction of dissidents of the former Farc and commanded by alias Iván Márquez, which seeks to retake its former control areas and dispute other territories. In addition, new terrorist groups began to emerge and alliances began to be generated in areas such as the Amazon and Putumayo, historically marginalized and where the coca economy took hold.

"The space that Farc left in some areas is beginning to be filled by new armed groups, given that the state did not fill it at the time, as many analysts have expressed. Other groups, such as the ELN and the Gaitanist Self-Defense Forces (also known as the [Clan del Golfo](#)), entered to fight for control, along with the so-called dissidents," Baquero says.

As a result, the territories are beginning to face new dynamics that constitute a great challenge for the State. This situation makes it difficult to speak of a peace achieved today, when a territorially differentiated post-agreement is in sight.

A turning point in forms of violence

[Andrés Restrepo](#), a researcher at the Center for Regional Studies of the South (Cersur, by its acronym in Spanish), and [Jhenny Amaya](#), a member of the International Law and Peace Research Group in the Faculty of Legal and



The land tenure process needs to be addressed more broadly, in a way that responds to current challenges.



Political Sciences at [Universidad Surcolombiana](#), joined in the construction of the book with the chapter "The Farc Transition: The Last Days of the Southern Bloc." They have been key witnesses of the transition in Huila and Caquetá, departments heavily besieged by violence, which are again battlegrounds for other actors.

"What we are seeing today is not a guerrilla war like the one we experienced with the Farc. What we are seeing is an armed group that murders social leaders, kills reintegrated people, extorts money, and does not confront the state or the security forces. Recruiting and trading marijuana... There is a reconfiguration of armed actors with other types of interests," Restrepo says.

In the case of the south of the country, he says, it involves the control of the marijuana trafficking corridors that go from Cauca, through Huila, Caquetá and arrive in Brazil, framed within a war economy. "One of the main interests of the new guerrillas is the control of drug trafficking and the rents of the illegal economy, which became the main reason for many guerrillas not to accept the agreement, since it involved renouncing the income derived from their activity."

Researcher Amaya adds that there are not only favorable scenarios in crime and illegality that attract ex-combatants, but also a breeding ground for the divergences of the current rulers. "Since peace is not a nation-state project, but a project of different political leaders, there are too many uncertainties for the sustainability of a process and the Agreement," she adds.



Along with these realities live other problems. “It is important to talk about multiple forms of violence. Gender-based violence persists in many parts of the country. In some regions conflicts coexist over the use of natural resources, over water, as in the case of southern Tolima, which is outlined in our publication,” says Baquero.

However, the three researchers agree that building peace is a long-term process that naturally involves challenges, and emphasize that signing an agreement does not mean that violence automatically ends, but rather represents a substantial step forward on that path.

Peace with a Territorial Emphasis

The Peace Agreement with the Farc conceives of the territories as its backbone, so much so that it identifies and prioritizes, due to its high indicators of poverty, exclusion and inequality, 170 municipalities historically affected by violence. These social gaps have meant that the implementation of the Agreement is not a uniform or homogeneous process.

This is what researcher Baquero calls “multiple temporalities in the regions of Colombia.” He states that while some territories are highly integrated into the normalized and legal market, with optimal education and health services, others have remained stagnant, lack health facilities and offer very few economic opportunities.

“Although there has been an emphasis on issues such as small infrastructure projects, parks and sidewalks, attention has been lacking on tertiary roads,” Baquero continues, adding that “this is a problem that impacts elements of the Peace Agreement, such as

Steps Towards Peace: Productive Projects

- The “From the Root” (Desde la Raíz) program of the Agency for Reincorporation and Standardization (RNA, by its acronym in Spanish) aims to highlight some of the initiatives of those who left the weapons. Here are just a few:
- Association of Marquetalian Women Producers (Planadas, Tolima).
- Prints Álix Sofía (Granada, Meta).
- Poultry Santa Teresa (Icononzo, Tolima).
- Corporación Trabajo Dignidad y Solidaridad-TRADSÓ (Bogotá, D.C.).
- Marquetalia Cooperative Coffee Threshing for a Better Future - Coomumarfu (Planadas, Tolima).
- Trochas Marketing Cooperative (which groups 23 cooperatives or associations from several regions).

What Lies Ahead for Colombia?

To attempt to explain what is happening in Colombia in the framework of the post-agreement, Professor Jairo Baquero cites the concepts of positive peace and negative peace of the Norwegian sociologist Johan Galtung. “Negative peace is the laying down of arms. Positive peace involves reducing the structural causes that generated violence: poverty, exclusion, stigmatization... A series of deeper problems. There has been significant progress in negative peace with the signing of the Agreement, with the laying down of arms. This is also true regarding the Special Jurisdiction for Peace (JEP, by its acronym in Spanish), the Truth Commission, and the body addressing cases of missing persons,” he notes.

Researcher Jhenny Amaya adds to this perspective: “To the detonated munitions, we could add the hundreds of productive projects, the initiatives that have signatories of peace articulated with civil society; even housing projects with victims of the armed conflict and reconciliation processes through community projects from gastronomy, art and culture. Moreover, the academy has also devoted itself to studying the issue of peace from various perspectives,” she states.



← For most of his life, Óscar Salazar, a social leader from Urabá, has worked for peace in Colombia. His main motto has been the comprehensive reparation of the victims.

the [Comprehensive Rural Reform \(RR\)](#) and the [National Integral Program for the Substitution of Illicit Crops \(PNIS\)](#). If there are no roads or exits for agricultural products, how do we ask people to live off agriculture? How can we move forward on other crops that replace coca if structural problems persist?”

Furthermore, it stresses that the land tenure process needs to be addressed more broadly, in a way that responds to current challenges. It must start, from her point of view, from the new trends in food, agroecological and production types, “for which it is essential to analyze in depth how new demands are articulated with the old problem of land redistribution that remains in force.”

She also highlights the instability and uncertainty that fluctuating prices of products such as cocoa, coffee, and avocado create for many farming families—crops with which the state seeks to compete against the economies of coca and marijuana.

“The participation of the peasants in these chains is not linear; people enter them but are also expelled, win and lose. Latin American countries specialized as commodity producers, but more recent political-economy analyzes emphasize the need to add value. As is being done in some cases, we must form companies that can generate value for these products and review how to better articulate the development processes in these regions.”

In this context, Professor Baquero underscores the urgency of proposing a broader concept of territories of peace, which includes all the aspects contemplated in the Agreement and which provides a comprehensive opportunity for populations historically bankrupted not only by war, but also by exclusion. This approach would help prevent the reproduction of the causes that have commonly triggered violence in numerous regions.

Productive Bets: A Step Towards Integration

Even with the difficulties that the implementation of the Agreement has faced, it has been possible to weave valuable social and entrepreneurial processes that link the signatories



↑ “I believe that there has been an effort by various institutions to articulate a policy of multidimensional reincorporation in social, economic and psychosocial issues,” says Jairo Baquero, professor in the School of Human Sciences at Universidad del Rosario.

and local communities. For example, around coffee, initiatives have emerged in southern Tolima involving the Nasa indigenous community and local farmers from the Gaitania district in the municipality of Planadas, leading to the creation of brands such as *Tercer Acuerdo* and *Café Marquetalia*.

“Productive, individual, cooperative and collective bets were initiated, which today face many challenges, but in that first part of the history of the transition generated a lot of expectation and meant the hope and motivation to which many were attached to continue,” emphasizes researcher Amaya.

Women have played a leading role in some of these projects around the Agreement. They lead several peasant associations that are booming today and one of the best examples is given precisely around coffee.

“Women's participation in coffee-growing economies starts from rethinking the roles of the household, since land tenure is in the name of men. To the extent that women have land titles, they can own the coffee plantation and generate their own brands,” Baquero says.

Another example of success is the participation of indigenous women as guardians of native and creole seeds of corn, cassava, banana, beans and vegetables in Tolima. They



have combined traditional knowledge with knowledge from agroecology, and have applied techniques such as water harvesting, which consists of a rainwater harvesting system for domestic and agricultural use. This leadership has allowed them to empower themselves within their communities.

Even inside the ETCR spaces, the role of the former guerrillas was also reviewed. There is an awareness of these leaders, a need to rethink these roles and put peace in the face of women as synonymous with transformation and entrepreneurship.

While it is true that Colombia faces a panorama of contrasts and challenges around peace, there is also a political transition with the Government of Gustavo Petro, a situation that generates expectation in the different sectors involved in the Agreement, whose implementation reaches 30 percent according to the Kroc Institute of International Peace Studies in its [report of the Barometer Initiative of the Matrix of Peace Agreements, in the sixth year of the Agreement](#)

Although the anxiety is felt in some regions, there is still hope that one day the bullets may be completely silenced and that peace may be spoken of without hesitation.

As new political winds wave, Óscar Salazar, the social leader of Urabá who has pursued peace all his life as one who seeks an oasis, continues with his oars to the fullest. While he feels the implementation is moving slowly, his momentum is unwavering and he exorcizes his doubts with a phrase that is perhaps his life mantra to persevere in the social leadership he assumed as a teenager: "We cannot remain a country that refuses to live in peace." ■

Farc chess

One of the relevant aspects in the framework of the post-agreement in Colombia has to do with materialities, in other words, those tangible elements that make explicit the end of the conflict with the Farc.

This symbolism highlights an initiative by the researcher Andrés Restrepo, who was an active part of the monitoring mechanism and the process of disarming this guerrilla in the southwest of the country. He says that one night, while they were destroying more than 80 covets that the southern bloc in Caquetá gave up, he noticed that the detonations showed interesting figures: "The bullets melted into each other and took very nice shapes."

From there came an idea that could be realized: "I managed to get my colleagues to allow me to keep 32 pieces. At that time I was very inspired by the works of Goya during the Spanish Civil War, by the beauty of that art despite being motivated by such cruel images." With Colombian and foreign military personnel, as well as guerrillas involved in this mission, Restrepo began to play with those 32 bullets as they told stories related to the conflict. This is how the so-called "Postwar Chess" emerged, which, more than a game, is proof that Colombia began a transition to peace; it is a sign that despite the shortcomings and the ups and downs, an agreement was signed with the oldest guerrillas in the world, a process of laying down arms was carried out and an important step was taken to start writing a new history. Researcher Restrepo describes this moment as "the hinge of history", since it could be said that the country is in the dilemma of transition and repetition. "Either we innovate or we fail, as the great educator Simón Rodríguez said. We transform ourselves or repeat history. We go straight or we fall off the tightrope. The latter would mean lasting another 50 years in an armed conflict. We are in the hinge of history," he says, paraphrasing the sociologist María Teresa Uribe.

An aerial night photograph of a densely populated city. The streets are illuminated with warm yellow lights, and numerous buildings are lit up. A prominent skyscraper on the right side of the image features a colorful, illuminated facade with vertical bands of blue, purple, and pink light. The overall scene depicts a vibrant, sprawling urban environment.

The Urban Sprawl in Colombia Continues to Expand



A study carried out by an interdisciplinary group of researchers, convened by Fedesarrollo, reveals details of how the growth of Colombian cities has occurred in the last 30 years. Although they grow less quickly than those of the rest of the world, their progress has not always been under the guidelines of territorial planning.

By María Alejandra López Plazas

Photos by Milagro Castro, Archivo

DOI https://doi.org/10.12804/dvncn_10336.42588_num7

During the last century Colombia has transformed from a rural country to an urban one in an accelerated way. [Statistics compiled](#) by the National Administrative Department of Statistics (Dane, by its acronym in Spanish) say that the country's major capitals already exceed 90 percent of the level of urbanization, a pattern that consolidated from the second half of the 20th century to the first two decades of the 21st and point out, in addition, that while in cities such as Bogotá, Medellín, Cali, Barranquilla, the number of homes in urban areas increased by more than 100,000 between the censuses of 2005 and 2018, growth in rural areas was less than 30,000 homes.

Behind these figures are endless stories, such as those of the youngest members of peasant families who decided to leave the farms and go to urban centers in search of new ways to earn a living. There are also grandparents who in their youth released the hoe to participate – without any training – in the construction of the infrastructure that today supports large cities; young people who went to study or entire families who have been displaced as a result of violence.

“Between 2005 and 2018, the level of urbanization of municipalities such as Jamundí, Madrid and Fusagasugá increased by more than seven percentage points, while municipalities such as Mosquera, Facativá, Piedecuesta, Aguachica, Valledupar, Rionegro and Tumaco increased this indicator by more than two percentage points during the same period,” says Dane in his 2021 report [Patterns and Trends of Urban Transition in Colombia](#).

This is a global trend since the industrial revolution: humanity is piling up in cities. The projection, according to [Fedesarrollo](#), is that by 2050 70 percent of the Colombian population will live in urban areas, while in the world the UN

← The researchers analyzed a total of 96 municipalities, mostly with a total population of more than 100,000 inhabitants, although some that do not meet this requirement were included, but that have similar dynamics to those cities in issues such as mobility or services.

forecasts that by 2050 there will be 2.5 billion more people residing in urban areas (today the urban inhabitants are around 4.4 billion, and of them, almost 90 percent will live in cities in Asia and Africa).

This way of inhabiting the planet makes cities play an important role in global warming and climate change, the effects of which are evident and are felt with great harshness at this time. [NASA](#) confirmed, for example, that in 2023 the average temperature of the Earth's surface was the warmest on record.

[Cities consume](#) 78 percent of the world's energy and produce more than 60 percent of greenhouse gas (GHG) emissions, according to the United Nations Human Settlements Program ([UN-Habitat](#)). Yet they cover less than 2% of the Earth's surface and are hubs with tight green spaces where life's turmoil is mostly driven by fossil fuels.

The [Special report on the impacts of global warming](#) of the 2018 Intergovernmental Panel on Climate Change (IPCC), warns that to ensure limiting global warming to below the 1.5 °C target set in the Paris Agreement, "a rapid and far-reaching transition is required regarding the use of energy, land, urban spaces and infrastructure, including transportation, buildings and industrial systems." UN-Habitat recognizes that while cities are already making efforts to transform themselves, decision-makers must adopt more and better policies, the implementation and enforcement of which will effectively combat climate change and the dizzying pace of population growth.

How is Colombia in this picture? In order to evaluate how organized this urban growth has been in the country, an interdisciplinary group of researchers from Fedesarrollo and the [Marron Institute](#) of New York University, funded by cooperation resources from the United Kingdom through the *UK Partnering for Accelerated Climate Transitions* ([UK-Pact](#)), carried out a diagnostic review on the implementation of Colombia's territorial and environmental planning policy and its role in the generation of greenhouse gases (GHG).

The results and conclusions were published in a book entitled [Diagnosis and recommendations on land use planning in Colombia](#), in which a series of recommendations for regulatory adjustment to the country's land use planning and the programs that develop it were also compiled.

"The big question is, what is the role of land use planning in reducing emissions? We have legislation related to this issue that clearly requires revision in the light of the international commitments that have been acquired," says professor in the Faculty of Political Sciences,

Composition of large cities

City Core
Municipalities in the agglomeration (*italics*)

Medellín
Medellín, Bello, Copacabana, La Estrella, Girardota, Itagüí

Manizales
Manizales, Villamaría

Armenia
Armenia, Calarcá

Pereira
Pereira, Dosquebradas

Cartago
Cartago, Pereira

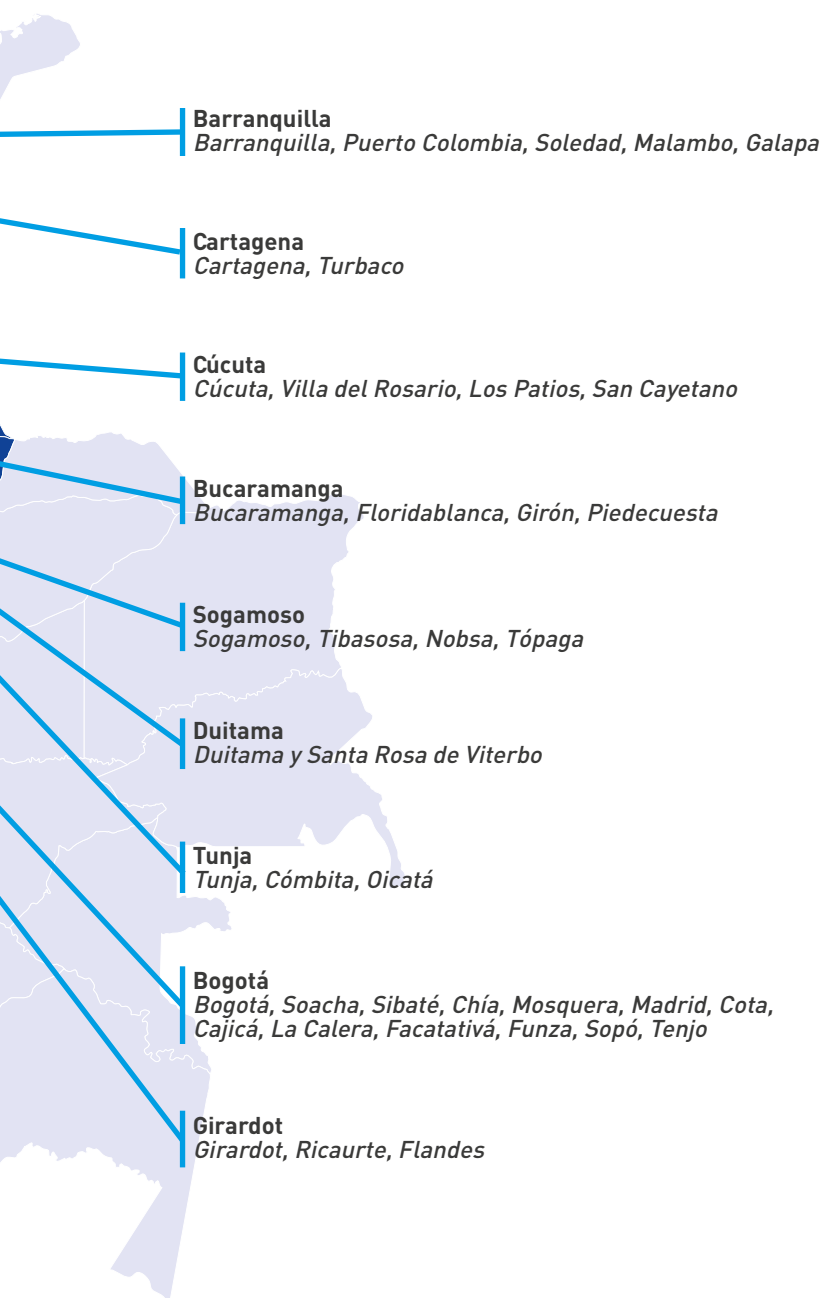
Cali
Cali, Yumbo, Jamundí, Palmira, Candelaria

Government and International Relations at Universidad del Rosario [Fernando Carriazo](#), one of the researchers participating in this Fedesarrollo project.

Organized growth?

The researchers analyzed a total of 96 municipalities, mostly with a total population of more than 100 000 inhabitants, although some that do not meet this requirement were included, but have similar dynamics to those cities in issues such as mobility or services. In addition, five municipalities with less than 100 000 inhabitants were studied as case studies for deforestation phenomena.

Among the results of the analysis is, for example, that Colombian cities have had slower than average growth in the rest of the world. In the last 30 years, the country's average population growth rate has been 2.22 percent (in cities with more than 100 000 inhabitants), while worldwide it was 3.42 percent. Regarding to the growth of the urban footprint (the built-up area of a human settlement),

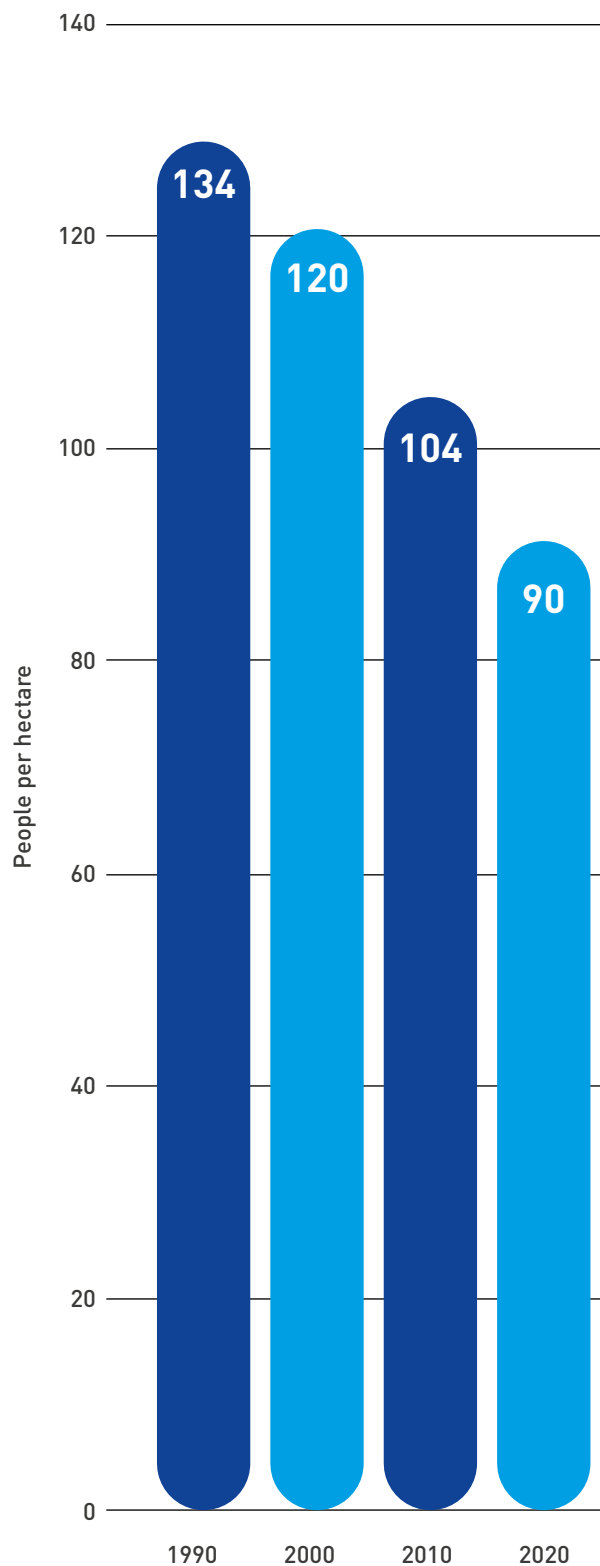


while in Colombia it is at 2.98 percent, the global average is at 4.84 percent.

However, although slowly, the urban blob in Colombia continues to expand (according to [the 2017 Atlas of Urban Expansion](#), conducted by the Planning Department and the Marron Institute, Colombia has cities above the average density of the planet). This result is worrying because, as Professor Carriazo explains, a large part of the reasons why cities have a high impact on GHG emissions correspond to the way they are organized and their densification. These two factors influence, on the one hand, the number of kilometers that a person must travel to move from home to work, and vice versa, and, on the other hand, the size of the ecological footprint that could potentially generate models of dispersed and disordered urban expansion.

Densification is a measure that seeks to explain the intensity of the agglomeration of people in a space. In simpler terms, it

Average annual density of cities studied for the period 1990 - 2020



Source: Fedesarrollo report, 2022.

tells us how we are making better use of space to occupy it with more people in urban areas, without expanding our impact into spaces that had not been inhabited.

According to Fedesarrollo's study, instead of increasing, the density of the cities analyzed has decreased by 33 percent in the last 30 years. This means that while in 1990 Colombian cities had a density in the urban footprint of 134 people per hectare, by 2020 this was 90 people per hectare. However, despite the steady decline in density, Colombian cities are still above the global average of 72 people per hectare.

“When we look at the growth dynamics of the urban blob with data and images, clearly what we can infer is that there has been no densification model for most cities. We are seeing a very accelerated expansion of urban sprawl that leads to very different models from those adopted by cities that aim to be properly densified to reduce the negative environmental impact,” says Professor Carriazo.

In addition, the analysis showed that, on average, for cities with more than 100 000 inhabitants, 74 percent of urban growth occurred on land that was projected for development. That is, of the 132 000 hectares that were added to the urban landscape in these cities, 97 000 are located on urban or sprawling land. Despite this, the experts highlight that an alarming figure of 35 000 hectares is located on land not planned to host this type of development.

“Going forward, the challenges of job creation in Colombian cities, the lack of development of expansion areas and partial renovation plans must be overcome through the consolidation of massive transport systems and the provision of infrastructure and public services that allow the formation of compact and efficient cities. The consolidation of effective coordination mechanisms between municipalities for the achievement of these challenges is also important,” the experts recommend in the technical report.

The problem of deforestation

As a special chapter of the publication, the researchers included a subsection with the analysis of the relationship between deforestation trends and territorial and environmental planning instruments in five municipalities with a high incidence of this phenomenon.

Deforestation, as well as the expansion of the urban patch, is another worrying issue in the fight against climate change: the existence of tropical forests is vital because, among other things, it allows the protection of a vast



biodiversity and has a fundamental role in the processes of climate and water regulation and carbon cycles.

The report notes that forest loss rates between 2000 and 2020 were, in terms of total forest area in the five municipalities, 20.6 percent in Cartagena del Chairá, 11.3 percent in Florence, 17.1 percent in San Vicente del Caguán and 18.6 percent in Tumaco. In contrast, researchers estimated a 7.5 percent forest area gain in Yopal.

These figures reflect a characteristic dynamic of these municipalities, since they are places with a significant growth of the agricultural frontier, due, among others, “to the historical processes of colonization, to the presence of extensive livestock, to the convergence of legal and illegal activities fighting for the territory, and to the growth of urban spots.”

As Professor Carriazo explains it, among the findings of the evaluation of deforestation trends in the last 30 years, in addition to agricultural expansion, the conversion of forests to pastures or illicit crops, it was identified that in some cities accelerated urban expansion also begins to have an impact on deforestation. However, the expert notes that in each of the municipalities the problem responds to particular causes that must be analyzed individually.

Urban development understood from the big cities

Cities with more than 100 000 inhabitants account for 77% of the country's urban population, and of these there are 15 agglomerations that account for 62% (see list below). The individual conditions of these agglomerations are important for understanding how the urban majority of the country lives and what challenges it faces for future planning. Fedesarrollo's study identified that 25% of Colombia's urban population lives in the "urban footprint of the great Bogotá" (a designation that includes the municipalities of the conurbation), and another 25% lives in the urban footprints of "great Medellín", "great Cali" and "great Barranquilla." This means that 50% of Colombia's urban population lives in the conurbations of the country's four largest cities. Therefore, "urban and population growth concentrated in the largest cities is of great impact on the way territorial relations are articulated and, therefore, on the way of understanding and planning sustainable growth."

"We realized, for example, that when the population centers are very small, there can be more deforestation in the vicinity; whereas in large, consolidated cities, deforestation moves to more remote areas because what is near their urban settlements is already deforested. In other distant municipalities, the loss of vegetation cover is also linked to the proximity to water sources, such as rivers, particularly in municipalities on the agricultural border with the Amazon," adds Carriazo.

The study also highlights that, in general, the environmental management figures associated with the National System of Protected Areas (Sinap, by its acronym in Spanish) have contributed to keeping deforestation at bay, except in the "[Second Law Forest Reserves of 1959](#)." In these areas, aimed at the development of the forest economy, a greater susceptibility to this problem was identified. The experts' recommendation is to strengthen successful strategies and take on conservation models that involve the communities that inhabit these spaces.

Whether from large cities or small urban centers, the challenges to face climate change are large and diverse, and in the face of this the territorial order of the country has fallen short, as the researchers show.



"When we look at the growth dynamics of the urban blob with data and images, clearly what we can infer is that there has been no densification model for most cities. We are seeing a very accelerated expansion of urban sprawl that leads to very different models from those adopted by cities that aim to be adequately densified to reduce the negative environmental impact," says Professor Fernando Carriazo of Universidad del Rosario.

"The city model cannot be generalized to all departments and cities. There are very large gaps in the capacities to formulate and implement spatial planning ([POT](#)), especially between capital cities and smaller urban centers in rural areas. For the most part, municipalities – especially those located in remote areas and with few technical capabilities – have not incorporated key concepts for the conservation of the territory such as the '[main ecological structure](#)' (a tool for different decision-makers to incorporate and manage the ecosystem dynamics that support the development of territories in the processes of monitoring, management and planning of natural resources and territorial planning"). This also implies that the implementation of POTs in municipalities with low technical capacities is very unorganized and in many cases does not respect the limits of ecosystems," concludes Carriazo. ■



The art of looking to the economic future



For 20 years, the Banco de la República has been consulting with the main economic actors about its forecasts regarding what will happen to the Colombian economy. These predictions have become a key element in shaping the country's monetary policy.

By David Mayorga

Photos by Alberto Sierra, Milagro Castro, Archivo

DOI https://doi.org/10.12804/dvcn_10336.42361_num7

The first few days of each month are busy. The routine repeats itself with the same pattern: mark the fifth business day on the calendar, look for the most relevant data of the moment (the behavior of the exchange rate, the price of food in wholesale power plants, the variations in interest rates)... Everything is important, even the news that describes disorder or alterations, major projects and reforms. The numbers obtained are systematized, graphed, analyzed. Of course, there is also room to answer the big question, the one that begins to be drawn with the sound of a WhatsApp notification: “Hello Caro. How's the dollar going to be?”

“It is a fairly narrow period in which economists have to make decisions, run statistical models very fast,” Carolina Monzón, manager of Economic Research at Bank Itaú Colombia, describes about the start of her monthly routine. She and her team have internalized this ritual because of one particular event: Dane releases its official inflation data on the fifth business day of each month. It is the special ingredient with which the country's statistical research institute defines its forecast on the health of the economy and its main components: the price of the dollar, monetary policy, the behavior of stocks, commodities and those of state financing instruments, among others.

The adrenaline rush increases the next day, when the formal request of the Banco de la República arrives. This is the [Monthly Survey of Economic Analysts' Expectations](#), better known as EMEs, a crucial instrument by which banks, insurers, broker-dealers, pension and severance funds, among various financial and economic actors, are asked to give their opinion on the direction inflation –and with it the entire economy– will take in the immediate and medium-term future. Or punctually, how they see the course of economic activities for

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Just as people adapt to unexpected changes in the economy, so do economists who predict the future.

that same month, for 12 and 24 months from now, for next December and Christmas next year.

In a week, that vision for the economic future will be discussed, even more closely, by its leaders in Brazil and Chile, who, in turn, will provide their respective predictions. They will compare figures, review economic policy measures, discuss the next step to follow until they reach a consensus: a final figure to be sent to the Banco de la República and, later, a contextualized explanation to their clients.

Month after month, since September 2003, that routine has been repeated in thirty economic actors with the same style of 'futurology'. Or, in technical terms, [analysis of economic expectations](#), since its impact is vital among investors, entrepreneurs, managers and even ordinary people with a specific need to acquire a good or hire a service. "For companies, it is essential to have information when making investment decisions: how they are going to finance themselves, whether they are going to keep those financing open, whether they are going to use some type of coverage, look at the deadlines, etc. It is also essential for natural people to plan their investments depending on their risk aversion," explains Monzón.

The responses obtained by the central bank are a valuable input that allow it to set its intervention policies: increase or decrease the interest rate, buy or sell more dollars to stabilize the exchange rate and, in particular, provide baseline information to motivate investments in the country. In this way, confidence is created among economic actors so that the economy remains dynamic.

"When the Bank adopts some kind of policy, its effects tend to endure over time," says [Jesús Otero](#), a doctor of economics, professor of Universidad del Rosario and researcher who is an expert in time series, or the analysis of information and variables that allow predicting the direction the economy will take.

In 2020, together with [Ana María Iregui](#), a researcher of Banco de la República, and [Héctor Mauricio Núñez](#), a professor of the Center for Economic Research and Teaching in Mexico ([CIDE](#)), Otero carried out research to identify the data and, in particular, the variables that professional forecasters use in their predictions to the Issuer. "We believed that this information was underused and that we could review the efficiency of forecasting," he says. His work was included in [Essays on Economic Policy](#), the central bank's 100th specialized publication on inflation policy surveys, and was published in the pages of the [Journal of Economic Behavior and Organization](#)

→ The study conducted focused specifically on identifying the variables that professional forecasters use in both their forecasts and revisions. To achieve this, the researchers analyzed the expectations surveys published by the Banco de la República between 2003 and 2019 and compared them with the economic information available during the same period.



under the title "Testing the efficiency of inflation and Exchange rate forecast revisions in a changing economic environment."

His intention was not only to advance the empirical evidence on this topic, but also to describe in the most precise way the instrument that has helped define the course of Colombian economic policy in the last 20 years.

Between magic and mathematics

The future has always haunted societies. In Ancient Greece, for example, kings were heading to a cave on Mount Parnassus, near the village of Delphi, where an old woman predicted her fate (and that of her nations) in the form of a riddle. This divinatory power was also celebrated by the so-called prophets of Jewish origin, who used it from the interpretation of dreams to the prediction of a messiah who would lead his people to the glory of their god. He was even present in the last days of the Middle Ages with the



publication of the prophecies of St Malachy, an Irish archbishop who saw clearly the fate of each of the future popes of the Catholic Church.

However, with the advent of modernity and the establishment of capitalism, this exercise fell into disuse. As the German sociologist Max Weber described it, prophecies went from magical to rational terrain to give rise to a reality explained by science, technology, and especially economics. Thus, in the 19th century, mathematical and statistical methods such as linear regressions and time series models appeared, which, through the analysis of historical data, defined a trend.

That is, the past was consulted to predict the future.

Already in the 20th century, in the years leading up to World War II, expectations surveys were implemented, with which informed economists, experts in data modeling, were consulted on the identification and interpretation of variables with which changes in economic activity could be anticipated.

Forecasts built with tweets

Virtual searches, social media activities, and any activity we do on the Internet are incredibly valuable data to build forecasts about the future of the economy. This is possible thanks to textual analysis, a technique originated in the social sciences that has allowed to establish political and ideological positions of the authors of written texts, public speeches or media interventions. These textual inputs can also be analyzed with statistical methods used to process high-dimensional information, such as machine learning processes (used mainly in artificial intelligence) and computational biology.

Thus, analysts use a text (it can be a news story, a political discourse and even a set of tweets) to which they apply certain restrictions to identify common words, and assigning values to find causal relationships when comparing them. This is such a useful and day-to-day procedure that it allows, among other applications, an email provider to determine which messages are or are not going to the spam tray.

This procedure is also used to construct economic forecasts: in macroeconomics, news searches help to identify variations in inflation or unemployment or doubts about the implementation of an economic policy, while in marketing and business administration advertising and reviews of products on networks can help to predict consumption trends.

When it comes to political economy, the speeches of election candidates identify partisan agendas and their effects on the electorate. And, of course, financial analysts often monitor news media and Internet users' behavior to predict the future price of a stock market share.

“According to John F. Muth, one can think of an expectation as an informed forecast,” notes Otero, who describes that these predictive readings are based on an econometric model, an equation or an economic theory that allows predicting with less or more certainty what will happen to a variable such as inflation, the price of coffee and food production, among many more.

When the Banco de la República conducts its survey of expectations among the main economic actors, it usually asks two types of questions: what will happen to variable X in the next 12 months? (known as a fixed horizon or forecast with a set date); similarly, what will happen to variable X in a given period, such as the end of the year, or in a fixed event?

And this is where the predictive skills of each professional forecaster come in, setting for the first scenario a long-term trend, but, in view of the second, you need to adjust your calculations as you approach the event in question. As this exercise is done on a month-by-month basis, the real difference is made by anyone who can correct their original forecast with the most relevant information available.

In fact, what would seem like a real-life contradiction (for one to correct what so much work it took to establish) can become a sign of trust.

“I always keep in mind the teaching that a boss left me, who said to me: ‘It helps me that you change my inflation forecast a day or two before the publication of the official data, because this way I can position my investments much better’, recalls Carolina Monzón.

Indeed, her experience has become a key factor in defining what kind of information can lead her to revise her calculations: “Sometimes we weigh the reasons why forecasts are adjusted. If there is a big data coming up, like the closure of the Bogotá-Villavicencio road, I think we have to incorporate it; but it would not be so much the case of a taxi drivers strike that lasts a day.”

A question of variables

The study carried out by Otero and his colleagues focused precisely on identifying the variables that professional forecasters use both in their forecasts and in their reviews. To do this, they used the expectations surveys published by the Banco de la República between 2003 and 2019, and contrasted them with the economic information available during the same period.

Their analysis, based on statistical models and the use of machine learning (an artificial intelligence technique to process existing information), allowed them to confirm what

the economic literature on economic predictions states: that forecasters do not usually review their predictions in periods of macroeconomic stability and cling to the variable itself in their analyzes. For example, the Consumer Price Index (CPI) for inflation, the Representative Market Rate (TRM) for the exchange rate, the interest rates for the variation in the cost of credits, and so on...

The most interesting finding, however, came when the economy suffers from so-called “shocks” – unexpected events, such as natural phenomena, social outbreaks, or external economic contagion that alter the usual course of economic activity.



“To the extent that the economy faces more shocks, forecasters use more variables. We identified more than 30”, says Otero. Examples include the effects of the El Niño or La Niña phenomenon, changes in oil prices or industrial production in other countries. They even considered the potential use of variables obtained with text analysis: “For social demonstrations, Google Trends searched the number of queries for terms such as “strike,” “protest,” or “rally” (see box).

The strict lockdown and the measures adopted during the Covid-19 pandemic also led Carolina Monzón and her team to contemplate new variables that emerged precisely from the analysis of texts: “In those days we were following in Google a local mobility indicator that was published day by day and



“According to John F. Muth, one can think of an expectation as an informed forecast,” notes Jesús Otero, professor in the Faculty of Economics, who describes that these predictive readings are based on an econometric model, an equation or an economic theory that allows predicting with less or more certainty what will happen to a variable such as inflation, the price of coffee and food production, among many more.

that allowed us to project how economic activity, production, retail sales and so on was evolving, even unemployment...”.

The return to normalcy and the economic revival left that indicator, built from Google Maps images, in disuse. Today, Monzón’s lead analysts use other inputs, such as climate data, to estimate the impact that changes, for example, in rainfall patterns and global temperatures, can have on food crops and thus on future inflation data.

For his part, this learning has allowed Otero to explore the potential of the variables obtained through text analysis in the formation of forecasts for the price of energy raw materials, as in the case of oil. In short, just as people adapt to unexpected changes in the economy, so do economists who predict the future: “When you as an economist make theoretical models, sometimes you simplify by saying that we are all the same, that we all use the same methods. However, it is not really like that. We do not all use the same variables in our analysis,” Otero says. ■



A portrait of José Celestino Mutis, an elderly man with white hair, wearing a dark clerical garment. He is holding a quill pen in his right hand. The background is a warm, brownish-gold color.

4

Adding
disciplines
to improve
quality of life

José Celestino Mutis. Author: Pablo Antonio García del Campo (inscription on poster).
19th century. Oil on canvas, 198 x 134,5 cm. Universidad del Rosario Collection



In Colombia, the virulence of toxoplasmosis threatens vision

In our territory there is a perfect storm for this disease: circulation of more aggressive varieties of the microorganism and population with genetic factors that can lead to a more negative response are part of the formula. A study from the Universidad del Rosario reviews how the relationship between the parasite and Colombians makes its infection more violent.



By María Alejandra López Plazas
Photos by Alejandra de la Torre, Alberto Sierra
DOI https://doi.org/10.12804/dvcm_10336.42347_num7

Five years ago, a team led by researcher Daniel Ajzenberg from the Faculty of Medicine at the Universidad de Limoges (France) made a groundbreaking discovery about the history of the evolution of the *Toxoplasma gondii*, a unicellular parasite that causes toxoplasmosis: the strains of this organism that currently exist would have evolved from a South American ancestor that originated around 1.5 million years ago and from there would have spread throughout the world.

That discovery marked in this part of the planet, and especially in Colombia, the place of origin of modern varieties of the parasite that has spread widely throughout the world, turning 33 percent of the world's population into its carriers, most of them completely asymptomatic; nevertheless, 18 percent experience serious damage in their eyes when the

parasite infects the inner tissue of this organ and generates serious scars that in the most severe cases can cause blindness.

The same year this study was published in the journal [Infection, Genetics and Evolution](#) (2017), Ajzenberg was in Colombia conducting a research at Universidad del Rosario with MD. [Alejandra de la Torre](#), full professor and coordinator of Immunology at the [Neurovi-tae-UR Neuroscience Center](#). “He said to me: ‘Today is a very happy day for me because this study was published and I am in the very same place where this parasite originated,’” recalls the ophthalmologist, who points out that this type of discovery has set the eyes of researchers around the world on our country.

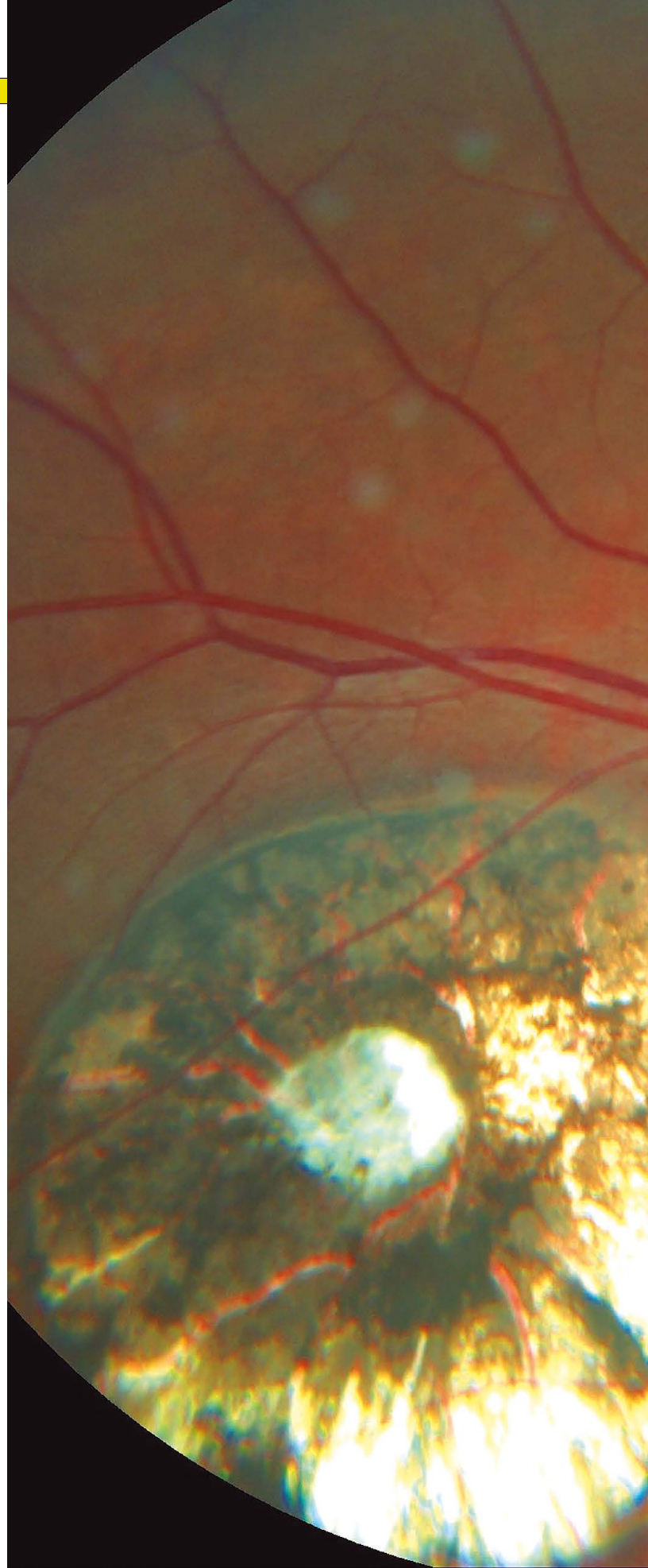
They have been wondering for several years why on this side of the world this disease, which mainly impacts the brain, lymph nodes and eyes, is particularly fierce. A study published in the [Bulletin of the World Health Organization \(WHO\)](#) notes that while the incidence rate in the rest of the world is approximately 1.5 cases of congenital toxoplasmosis per 1000 live births, in South America it is 3.4.

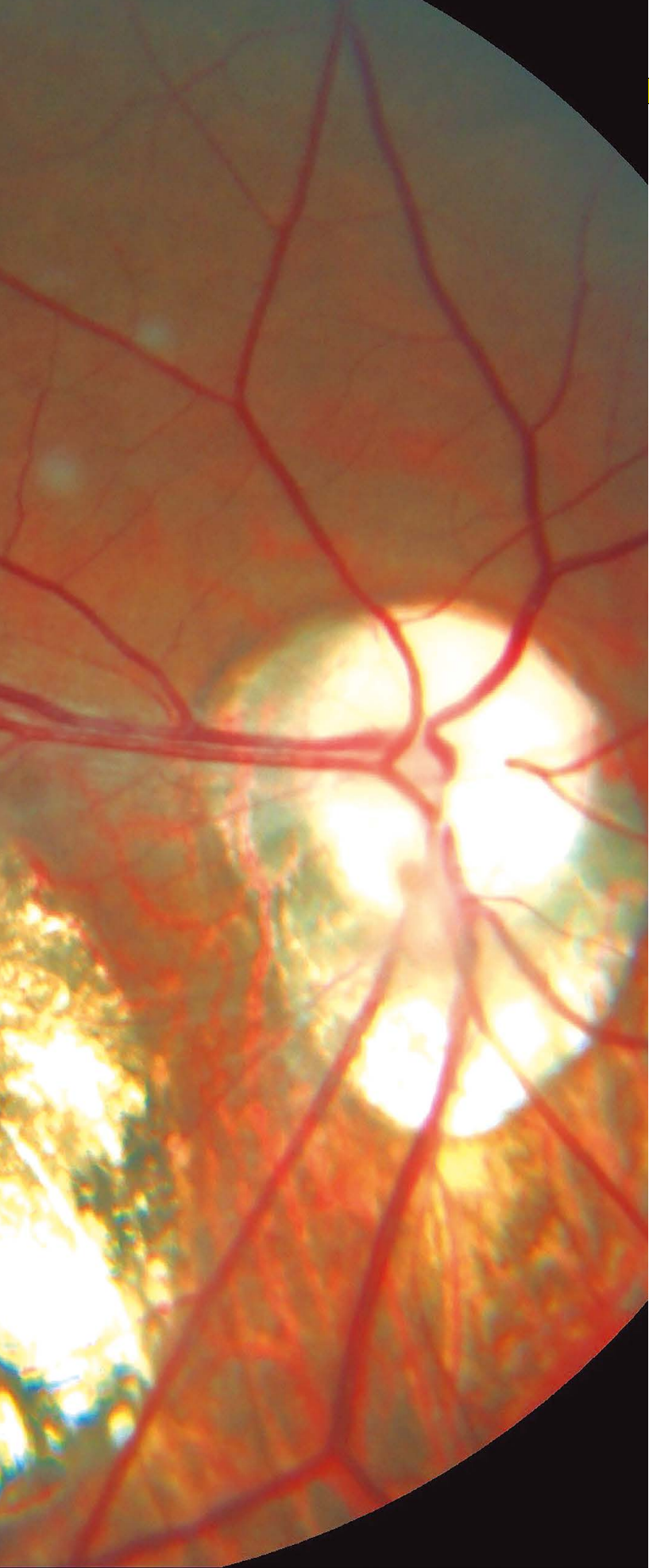
As MD. de la Torre explains, another important fact that scientific studies have provided in the region is the identification in Colombia –a country where the clinical presentation of the disease is usually even more serious– of the circulation of the “atypical strains” of *Toxoplasma gondii*. To put it in simple terms, the researcher De La Torre proposes an analogy: the traditional varieties would be equivalent to a *french poodle* breed dog, while the parasites that attack the Colombian population are so aggressive that they can be compared to wolves, which are the most common type of dog in the world.

This is a possible cause of some studies in our country [estimating](#), for example, that retinochoroidal scars caused by the effects of the parasite when attacking the eyes could be present in one million people and cause unilateral blindness in approximately 200 000 Colombians. However, experts argue that the incidence of ocular toxoplasmosis in the general population is still unknown.

With the intention of continuing to fill these gaps, and driven by the important findings on the history of the parasite revealed in recent years, researchers from the Universidad del Rosario, the Faculty of Medicine of the Universidad de Ioannina (Greece) and the Department of Ophthalmology of the Birmingham and Midland Eye Center (United Kingdom), led by MD. De la Torre, decided to make a comprehensive review of these and other factors that could be influencing to

→ Despite the ocular barriers, once the parasite reaches the eye, it remains encysted within the retina for life.





"The important thing is not to let the parasite activate so that it damages the retina, and if it does, control it quickly so that the damage is not more severe," explains Dr. Alejandra de la Torre, a professor at the School of Medicine and Health Sciences at the Universidad del Rosario.

make this relationship between parasite and host, a more complex one in our territory.

Results published in 2021 in the journal [Ocular Immunology and Inflammation](#) revealed details about host-parasite interaction during infection. It is an effort to improve the diagnosis and management of the disease, under the particularities of its development in our country.

Like Trojan horses

However, how do you get this particular parasite? As defined by the American Academy of Ophthalmology, there are two types of toxoplasmosis, acquired and congenital. Acquired toxoplasmosis requires ingestion of the parasite, which can occur when eating contaminated food, such as undercooked meat or poorly washed vegetables, drinking contaminated water, or coming into direct contact with the organism.

The *T. gondii* is usually present in the feces of cats, and it can happen that when cleaning the litter box of our pets later we take our hands to the mouth without having washed them properly.

Congenital toxoplasmosis, on the other hand, occurs when transmission occurs from an infected mother to her baby during pregnancy, if she contracts the parasite just before or during pregnancy. This can trigger miscarriages or, if the pregnancy is complete, it can lead to low birth weight, brain involvement, an enlarged liver or spleen, jaundice (yellowing of the skin and eyes), or retinochoroiditis, which refers to the inflammation of the retina and its adjacent layer, the choroid, leading to the formation of scars that deteriorate vision.

Indeed, this inflammation is one of the great concerns of doctors around the development of toxoplasmosis in a patient. “The important thing is not to let the parasite activate so that it damages the retina, and if it does, control it quickly so that the damage is not more severe,” explains MD. De la Torre. Therefore, for health specialists it is key to advance the understanding of the details of how *T. gondii* acts within affected patients, what causes it to be activated and how the immune system responds to its incursion into the human body.

“We study how the dendritic cells of the intestine, which initially recognize this parasite, are used as a kind of Trojan horse: the parasite gets inside them and they enter a hypermigratory state,” De la Torre explains. This causes them to start traveling: “They go to the lymph nodes, they present that parasite, that foreign antigen to other cells that have memory – the lymphocytes – and these are activated and continue to migrate everywhere. They go through the eye and even try to reach the brain.”

This review, for which an exhaustive bibliographic search was made in the PubMed database and in Google Scholar, is like reviewing previous matches of an adversary to analyze their way of playing, in such a way that better strategies can be drawn to face it or, in this case, a better treatment to manage a disease for which there is still no definitive cure.

Despite the ocular barriers, when the parasite reaches the eye, it remains encysted throughout life inside the retina. According to what the authors of the study indicate, among the factors that can contribute to the successful action of this parasite is the genetic predisposition, immune status and age; to which are added characteristics of the microorganism such as the diversity of strains, its virulence, phylogenetic origin and geographical distribution.

“The atypical strains that we have in our territory –the wolves– cause a different im-



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“Eating undercooked foods, such as vegetables and meat, or drinking contaminated water are the most common ways the *T.gondii* microorganism enters our bodies.”

mune reaction to that produced by the french poodle, or the European and American strains,” De la Torre says. “The cells that are infected begin to activate and send messages through cytokines, proteins that are very important in cell signaling. Soon, they activate others, but when they are infected by the atypical strains, the released cytokines are different and make the immune system inside the eye respond differently.”

The findings of the research provide a basis for reviewing what type of response a virulent strain produces and one that is not, and thus be able to propose mechanisms to block the inflammatory pathways that produce damage to the retina, that is, block the cytokines (the messengers) or try to convert them into something that does not do so much damage.

It was also found that pregnancy, eating behavior and other environmental, social and cultural factors can contribute to maintaining or not maintaining the complex balance that prevents the parasite from becoming active.

Currently, treatment alternatives consist of a management with antibiotics and antiparasitics that fail to eradicate



the microorganism once it enters the tissues. “This article is important because we are betting on whether in the future we can manipulate the immune system to prevent that parasite encysted in the tissues of the retina from causing trouble,” de la Torre explains.

The disease in Colombia

In Colombia, epidemiological data on toxoplasmosis are limited. According to the National Institute of Health (INS), this disease is not within which epidemiological monitoring is carried out in the country, so there are no bulletins with specific figures on the number of infected patients. This gap is clear evidence of how little importance is given to the disease as a public health problem.

A [study published in 2014](#), in which a review was made of the 70 immediately previous years dedicated to research on this specific topic, is one of the references of data on prevalence in the country used by experts of the entity.

The research, which was led by the expert [William Alberto Cañón-Franco](#), indicates that although there are several re-

ports on the seroprevalence of *T. gondii* in the general population –in one of them a global prevalence of 47.1 percent was found, with similar proportions in men (47.9 percent) and women (46.3 percent)– the data are difficult to interpret because in most cases the number of subjects studied is not indicated.

On the ocular effects of the disease, the report, carried out by the Department of Preventive Veterinary Medicine and Animal Health of the University of São Paulo, with the Center for Biomedical Research of the Universidad del Quindío, provides data that serve to give an idea of the context of the disease in the country. For example, in 2005 in Cali, the disease was classified as the second cause of congenital blindness and in Quindío, there were three cases of ocular toxoplasmosis per 100 000 inhabitants (2009).

The document provides some indications about the alerts around the virulence of the strains of the parasite circulating in the country, which also review De la Torre and her team. “It was also found that the cytokine profile in Colombian patients with ocular toxoplasmosis was diverted to a Th2 profile; instead, French patients had a Th1 preferential response,” they conclude within the study and add that these results reveal that some Colombian strains cause more severe ocular toxoplasmosis due to the inhibition of the protective function of the body.

In more recent figures, according to data provided by the Ministerio de Salud y Protección Social (Ministry of Health and Social Protection), a total of 12 751 cases of people treated in health services for a main diagnosis of toxoplasmosis were reported in 2020, 14 038 in 2021, 12 453 in 2022 (although these data are preliminary), and so far in 2023, 3 804 have been recorded. An average of 13 000 people per year seek medical services for this infection, which corresponds to 0.02 percent of the national population.

However, it is not just about numbers. Behind the statistics are people who currently have a cure for their disease and who face prophylactic treatment with antibiotics, which although it prevents the parasite from activating to cause more damage, has an impact on the liver that must be monitored. Studies such as that of MD. De la Torre are steps on the way to finding a therapy that improves the quality of life of patients and that responds to the particularities that this pathology has in the country. ■



Colombian Exoskeletons: The Beginning of a Revolution

Wearable robotic devices to increase people's strength or improve the quality of life of workers and patients? Yeah, and it is not science fiction. Researchers from the Universidad del Rosario are pioneers in this field of research that already shows its first results in real life.

By Ronny Suárez

Photos by Alberto Sierra

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Imagine for a second about the daily work of a coffee picker in Colombia: long and demanding days, outdoors, in the sun or rain, going back and forth through mountainous terrain in search of ripe fruits, carrying baskets or cloth bags to collect coffee beans by hand. Now think about your back, which involves a crouched posture and repeated movements for hours.

The thousands of workers in this important productive sector –the Coffee Information System (Sica) estimates that there [are 48 000 families dedicated to coffee production in the country](#)– are exposed to an imminent risk of developing musculoskeletal disorders in the back, shoulders and wrists due to the constant physical load and the use of tools and materials that are not ergonomic to carry out their tasks.

Professor [Juan Alberto Castillo Martínez](#), from the School of Medicine and Health Sciences (EMCS) of the Universidad del Rosario, has studied for several years how to improve the quality of life of workers like them, from the area of ergonomics and movement sciences. In fact, his first steps in the academy, when he was based in Manizales, he dedicated them to trying to provide solutions to the challenges of the process of collecting the national product par excellence, while advancing his scientific studies in the Coffee Research Center ([Cenicafé](#)). There, together with other researchers and students of



Researchers highlight the challenges of designing landing devices to the needs and characteristics of national workers.



the Agricultural Engineering Unit, he began to develop basic and accessible technologies to improve the harvesting process and the conditions of the collectors.

At the beginning, these were basic assistance tools, such as hand extensions to optimize the taking of the fruit, innovations without much technology yet, as Castillo himself acknowledges. However, it was the beginning of a path that could very possibly create real-life solutions for thousands of workers in different productive sectors, and even for people with mobility disorders or limitations.

Those solutions materialized into wearable exoskeletons with electronic and mechanical

structures that to many might look like the stuff of 1980s science fiction movies or gadgets used by modern superheroes.

Castillo, who holds a master's degree in Ergonomics and a doctorate in Cognitive Psychology, from Lumière University (Lyon, France) and postdoctoral studies in motion sciences in Italy, describes exoskeletons as wearable robotic devices that can improve productive capacity and protect people's health. In simpler words, they make it easier to do tasks and prevent future injuries.

His co-teammate during the last years has been [Mario Fernando Jiménez Hernández](#), professor and director of Research of the [School of Engineering, Science and Technology \(EICT\)](#) of the Universidad del Rosario. Jiménez is a bit more pragmatic than Castillo when it comes to defin-



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Diego Fernando Casas Bocanegra, a PhD student in Engineering, Science and Technology, is working on his project to create exoskeletons.

ing exoskeletons: “It is wearable technology that supports and assists the movement for the sake of the well-being and health of those who use it.”

From the lab to real life

The Castillo laboratory, in which Jiménez works hard, has so far developed 10 software programs and five technologies aimed at improving and protecting the health of workers. Of the latter, two are already patented and the other three are on track to be patented.

Today both projects work in parallel in order to accelerate the incorporation of exoskeletons developed in Colombia into the working lives of thousands of workers. One of them, for example, advanced in partnership with the researcher [Carlos Andrés Cifuentes](#) of the Bristol Robotics

Musculoskeletal disorders a major burden for the country

According to a report by the Federation of Colombian Insurers (Fasecolda), diseases of the musculoskeletal system and connective tissue were the most registered in the general system of occupational risks between 2015 and 2017, with 51.9 percent, well ahead of other causes such as nervous system ailments, injuries or mental disorders.

This is undoubtedly a public health problem, given that Fasecolda rated 31 562 occupational diseases in 2022. 48.7 percent of the cases were caused by forced postures and repetitive movements, according to a 2020 estimate by Martha Mendiñeta Martínez, a professor at Simón Bolívar University. Most worryingly, in one in four cases, some form of permanent disability is generated. Juan Vicente Conde Sierra, specialist in Occupational Medicine and member of the board of directors of the Colombian society of that specialty, explains that “some of these diseases are tendinitis, tenosynovitis, bursitis and carpal tunnel syndrome” and warns about the considerable underdiagnosis of these occupational diseases, which makes it difficult to recognize and treat them properly. “Many times, deaths from diseases like cancer and respiratory diseases are not related to working conditions, which leads to underreporting,” he concludes. Conde Sierra highlights the importance of exoskeletons as a tool to prevent and treat these diseases, whether those that help to rest in a semi-seated position, those that increase the strength and resistance of the worker or motorized ones that can help people with disabilities to recover lost functions.

Laboratory, seeks to create an elbow exoskeleton to increase the strength in the lifting and transport of heavy objects.

This development is in the testing and configuration stage of the concept for its effective manufacture.

To get to this point they carried out a study with workers of a parcel and goods transport company, whose main objective was to record the musculoskeletal problems they experienced in their daily lives, especially in their elbows and upper limbs. They used wearable devices and inertial technology (which acts by returning the force it generates to the individual) to quantitatively measure variables of movement and fatigue.

This specific exoskeleton uses non-rigid technology, which means it does not limit the degrees of freedom of human movement, as some devices already on the market do. The goal is for them to assist and not limit people's natural movements, which could delay the onset of fatigue by performing repetitive movements.

Although the project originated with an industrial focus, researchers recognize that the device has applications beyond of labor assistance.

"The first two causes of loss of life years that can be lived with a disability are related to musculoskeletal injuries. This means that it is a field where many contributions and technological solutions are required and that are accessible to help people stay functional and operational," says Professor Castillo.

Jiménez, who initially focused on the agricultural and agro-industrial field, and after her PhD focused on robotics, assistance and rehabilitation, is clear in saying that "these devices have potential applications in everyday life and even in clinics, taking into account the enormous burden of the disease that disorders of the type mentioned above cause in Colombia and in the world (see box)."

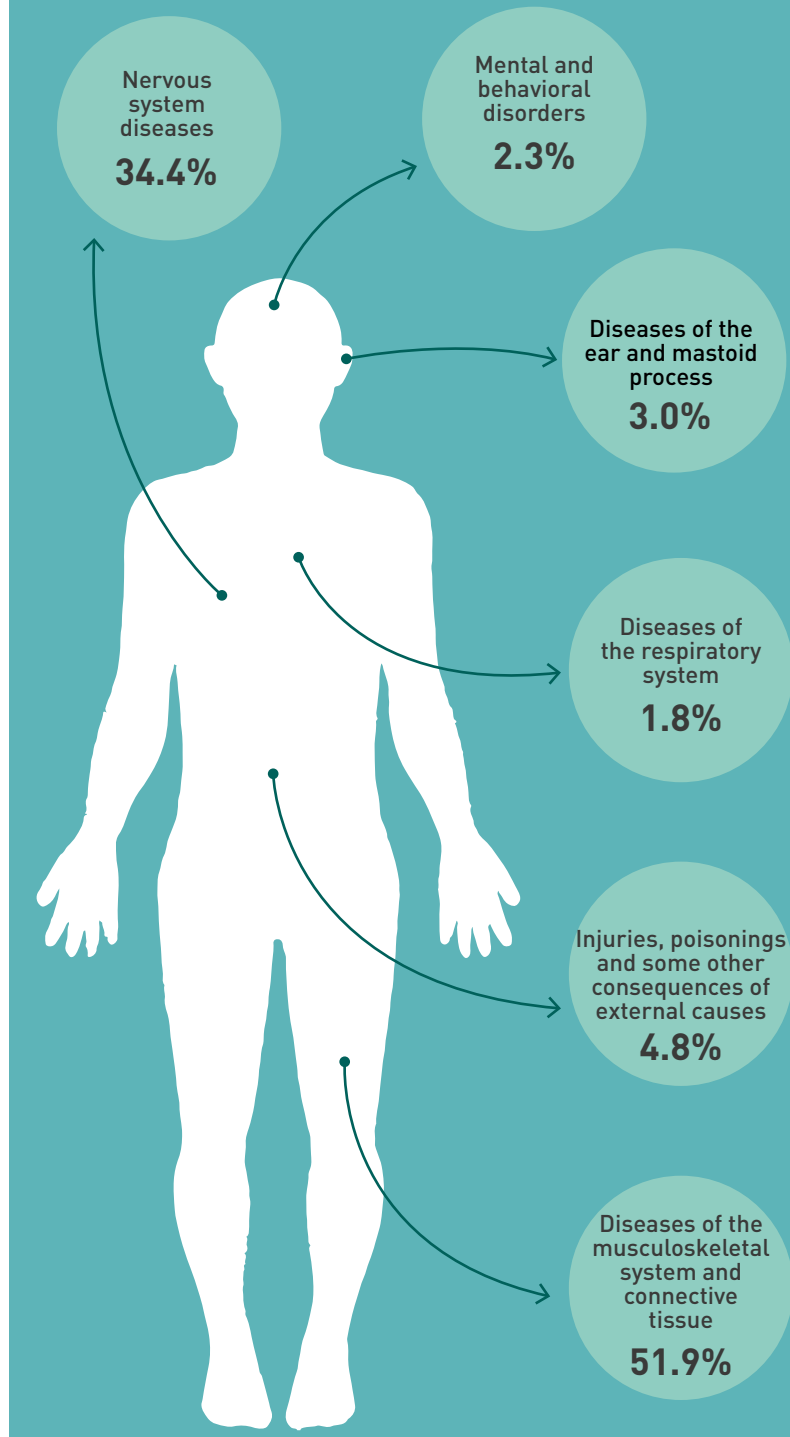
A long way

Are we, then, far from seeing these robotic exoskeletons applied in daily life? Researchers are cautious and prefer to be optimistic in estimating the potential of these devices. In fact, they point out that there are already robust exoskeletons that can assist those in need on the march and in other activities, although, of course, not in a generalized way.

And at this point they set out the difficulties they have identified in making this not a reality. The main one, they claim, is the difference in time-management logic

Types of diseases

Participation of the types of diseases in the cases attended by the General System of Occupational Risks of Colombia (SGLR) during 2015-2017



between academia and industry; that is, the gap between the need to carefully validate the functioning of devices from the scientific method –something that necessarily takes time– and the solutions –usually of an immediate nature– that companies demand. In short, and as usual, the times of science are not the times of the market.

“Companies want ‘for now’ development (and several have taken an interest in our exoskeletons), but we are going at a different speed academically. We have validation phases that we must comply with to ensure that the devices do fulfill their purpose,” says Professor Jiménez.

In their opinion, the costs of technologies, access to financial resources and the challenges they have encountered in the face of the usability of imported exoskeletons are also very important, especially in terms of comfort and adaptation to climatic conditions and the intensity of work in Colombia.

“In Colombia there have already been some cases of importation of exoskeletons that end up archived in a corner just because they are not adapted to our particular needs, especially in the aspects of comfort and sensitivity. It is like the jean, which was born for fishermen and when it arrived to the workers they complained that the fabric was rigid, heavy and produced discomfort in the skin. Over time they softened it and it could be integrated and used by other audiences. Broadly speaking, this happens with exoskeletons: we have to reach a point where with materials we can have versions that are not only adapted to people, but also allow adapting, among other factors, to weather conditions,” explains Castillo.

In this sense, they highlight the challenges of designing landing devices to the needs and characteristics of national workers and the importance of raising awareness about what exoskeletons really are and their real usefulness for people.

It is clear that despite their initial focus on the industry, exoskeletons have wider applications in daily life, such as in carrying tasks and common movements that generate joint fatigue. That is why researchers Castillo and Jiménez highlight the preponderance of developing technologies accessible to all people, especially in an aging population.

“In 2050, half of the population in Colombia will be over 50 years old and will need aid and assistance. That is a field that we are aiming for in the long term,” Castillo says.

As for the elbow exoskeleton project, it is at an early stage and although so far researchers have not published their results in specialized journals, they are already creating a first version of the device based on real measurements and plan to validate its operation with wearable devices and biomechanical tests with patients. These could be brought forward to the end of 2023 and project the equipment to start marketing in 2025 or 2026.

Teachers are confident that this Colombian development will allow lower costs so that Latin American countries can have access to this type of technology, something that, undoubtedly, would represent a revolution in favor of workers and patients. ■



“Businesses want development ‘right now’... but we are going at a different speed academically. We have validation phases that we must comply with to ensure that the devices do fulfill their purpose,” says Professor Mario Fernando Jiménez, from the School of Engineering, Science and Technology of the Universidad del Rosario.



“The first two causes of loss of life years that can be lived with a disability are related to musculoskeletal injuries. This means that it is a field where many contributions and technological solutions are required and that are accessible to help people stay functional and operational,” highlights Professor Juan Alberto Castillo, from the School of Medicine and Health Sciences of the Universidad del Rosario.

Colombian Schools Renew to Welcome Venezuelan Migrant Children and Adolescents

Colombia is the main recipient of people from the neighboring country, and, beyond the isolated efforts of heroes without capes, such as rectors and teachers, public policies are required that promote integration and counter phenomena such as xenophobia.





By Lina María Leal Villamizar

Photos by Alberto Sierra, Milagro Castro

DOI https://doi.org/10.12804/dvcn_10336.42349_num7

“They left him like a liver,” Andreina Gutiérrez says of her 13-year-old son Ángel, who was bullied at a district school in Bogotá last year. As he remembers it, the boy remained silent and distressed that afternoon until his older sister, as she hugged him, noticed a bruise on his neck. This would be the zero point of a map of bruises along the back up to the legs, caused by real days of ‘kicking’ that a group of sixth graders had been giving the child.

Andreina and Ángel arrived in Bogotá during the pandemic. They came from Ureña, a city of 38 000 inhabitants located in the border area of the state of Táchira, from where hundreds of people migrate every day in difficult economic situations and where, in addition, there are frequent clashes over the dispute of the territory between guerrillas and paramilitaries. “The children were growing up in a place where they suddenly put an explosive. That’s why we came ... and my brother just arrived with his son, because very close to the house where we lived they put a grenade and a whole family died,” Gutiérrez says.

In Bogotá, the father of Andreina’s children had managed to set up a plastic bags micro-enterprise, so the family saw the opportunity to work and settle in the city. In a short time they obtained a place for Ángel in one of the 386 public schools, but the child had difficulty adapting as he presented attention deficits and short-term memory issue. In addition, almost everything was different: accents, flavors, smells, sounds and landscapes that mixed in the cold ‘concrete jungle’ with almost eight million inhabitants, so far from their hometown.

Without paying attention to it, Ángel went every morning to the institution, confident that he would soon be accepted by the sixth grade group, while asking that they no longer call him “veneco”, as many refer to him and other comrades from the border country in a derogatory way. One day, in the midst of a heated discussion, the beatings began among the children of the course, which ended with several bruises, silences and the subsequent expulsion of two of the aggressors.



“Then they decided to close and close the case,” Andreina says, adding that after the episode her son has required support from psychologists, teachers and family members. One of Ángel’s counselors, Martha Vilamizar, says that although bullying occurs in school among all types of children, it is true that Venezuelans are victims of the practice more frequently: “Some of the migrant children are not at the same academic level and therefore find it difficult to adapt; others are very introverted or on the defensive. That is, any situation or condition serves as an excuse to increase rivalries. In these cases we imple-



The study found that at the first level, that of the Ministry of Education, the magnitude of the migratory phenomenon is recognized, but at the same time it is assumed that it can be responded without major changes...

ment restorative practices through which we work on socio-emotional education and competences such as empathy, key to understanding the situations that these migrant children go through and welcoming them more easily.”

WHAT IS BEING DONE IN THE COUNTRY TO WELCOME CHILDREN LIKE ÁNGEL?

Colombia has become the world’s largest recipient of Venezuelans, opening doors – whether as a crossing or residence – to more than 5 million Venezuelan migrants between 2012 and 2022, according to [data Reported](#) by Migration Colombia. By September 2021, there were about 1.8 million Venezuelan migrants based in the country. Of these, about [36.3 percent were children and adolescents](#).



In 2021, sociologist and doctor [Nathalia Urbano Canal](#), from the School of Human Sciences of the Universidad del Rosario, joined the project “School and Migration: Responses to the Educational Needs of Venezuelan Migrants in Three Subnational Governments of Colombia”, led by Professor [Claudia Díaz Ríos](#), from the University of Toronto (Canada) and who focused on the issue of Venezuelan migrant minors by asking about the ways in which their educational needs were understood, interpreted, and addressed in Colombia. This inter-institutional partnership has expanded the scope and resources for research.

“We wanted to find out several things: how do actors in the education system interpret and implement the integration of Venezuelan migrants into the regular education system? What factors shape these interpretations and applications? And how do



Professor Nathalia Urbano, from the School of Human Sciences of the Universidad del Rosario, concludes that “in general, there is a great sense of isolation among schools, especially teachers, to generate responses that integrate this population into the educational system. Ultimately, it is the teachers who are challenged to integrate the migrant population adequately into the education system. For me they are the heroes and heroines of this situation.”

What about education?

According to an ICBF study (2022), based on data from the Dane, this population has a school lag rate of more than 72.9%. The maximum age of the group, which is 17 years, was 2.6 years below educational attainment for the age. 27.5 percent of girls, boys and adolescents are outside the education system, and 20 percent of those who are not studying said that the reason for the lack of attendance was because they had to move from their usual place of residence. In addition, during the pandemic, more than 90% of migrant children and adolescents did not use devices such as a desktop, laptop or tablet computer, and 35% did not have access to the internet.

Source: Characterization of Venezuelan migrant children and adolescents in Colombia. Colombian Institute of Family Welfare (ICBF), 2022.

different actors' interpretations affect the responses migrants receive from the education system?" explains Urbano and Díaz, adding that the variations and difficulties generated by Covid-19 added to these questions.

The team contacted various actors from entities working with the Colombian education system where the majority of Venezuelan migrants were based, that is, the capital district and the border areas of the departments of Norte de Santander and La Guajira. They also selected schools in each location, taking into account the five schools with the highest number of Venezuelan children enrolled. "The pandemic gave us the opportunity to have many people to want to talk, so there were no problems in getting the selected entities and directors to talk to us," Dr. Díaz says.

The researchers conducted more than 200 virtual interviews with Ministry decision-makers and Education secretariats, representatives of cooperation organizations, managers, teachers, counselors, family members and students. The word about what they were doing was spreading and growing like a "snowball" and more people interested in participating in the project was attracted.

Professor Urbano recalls that "we had difficulties, above all, to carry out the interviews with the children (none under 13 years old and always with the consent of their clients), because some felt embarrassed, were unsure about the purpose of the investigation or the reason for the contact, and many did not have mobile data or the internet access to conduct the interviews. We invested resources so that they could have what they needed."

In this regard, Dr. Díaz acknowledges that there may be a bias in the responses of minors as they are suggested by teachers, and "we know that these tend to recommend outstanding students. Even so, we collected very rich information and found stories of great resilience."

THE CHALLENGE OF CLASSIFYING DIVERSE AND DISARTICULATED RESPONSES

The teams from Colombia and Canada systematized and analyzed the interviews conducted in what is called a 'vertical study', identifying three levels of influence in the process of building-developing responses to meet the educational needs of Venezuelan children and adolescents. At the top of the structure is the national level, that is, the Ministry of Education; the second is the territorial level, with the secretariats of Education of Cúcuta, La Guajira and Bogotá; and in the third level are the schools. This classification

also took into account an important actor: multilateral and International Cooperation organizations.

The study found that at the first level, that of the Ministry of Education, the magnitude of the migration phenomenon is recognized, but at the same time it is assumed that it can be responded without major changes, given the decreasing demographic trend of the national population of school age that has left a remnant of capacity and, consequently, a good part of the migration is considered temporary. "Although the right to education is guaranteed, there is the idea that the integration of the Venezuelan population into the education system is equivalent only to giving them access to it," says researcher Urbano, who emphasizes that access constitutes only part of integration, but is not enough.

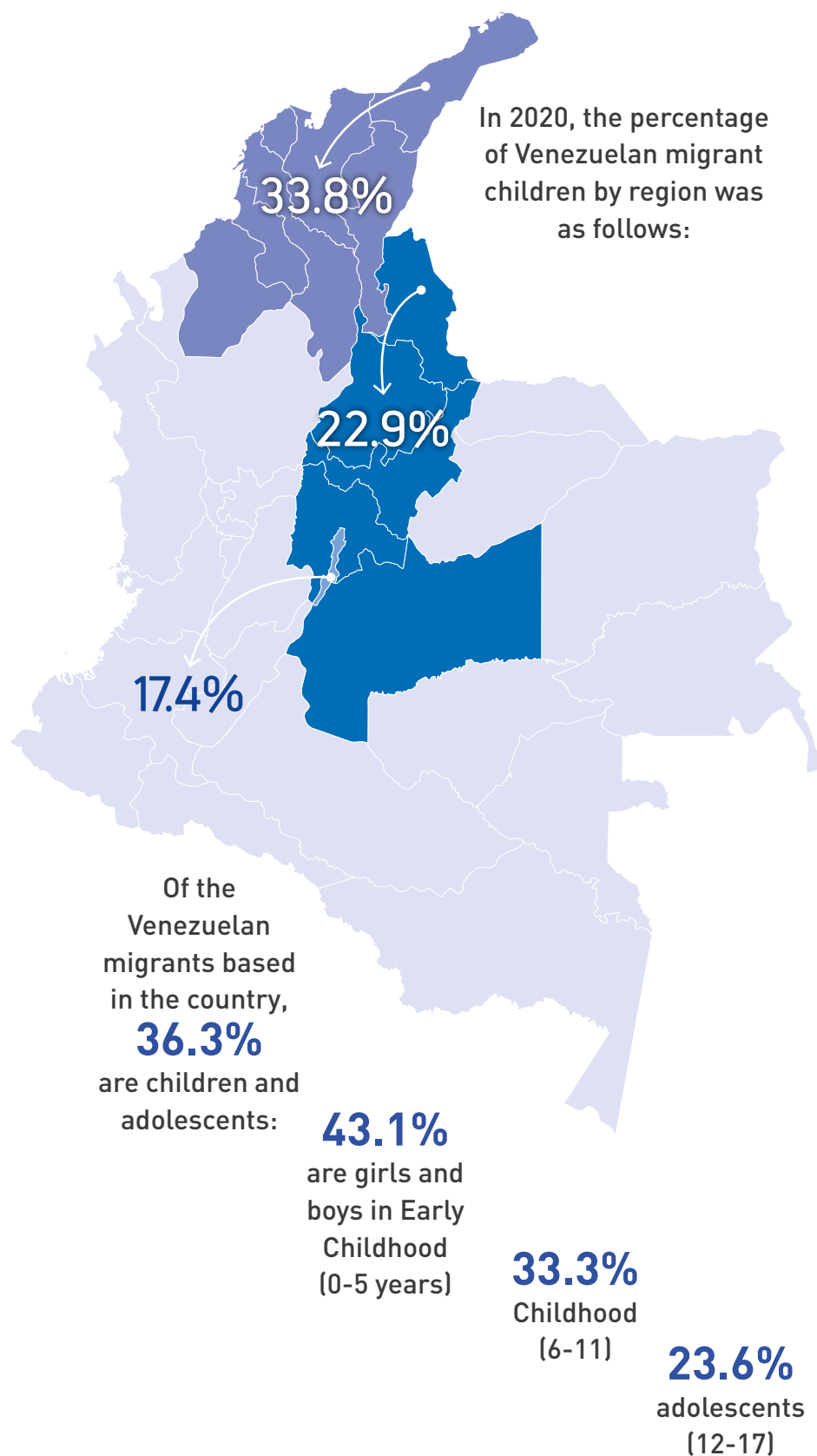
At the next level, that of the secretaries, they found variations in how the educational needs of this population are met. In Bogota, the territorial entity that receives the largest number of migrants operates, but at the same time the one that has the most school quotas. "The capital had no problem providing access to this population. They had sufficient conditions to counteract the risk of overuse of children in a classroom," says Urbano, adding that no additional strategies for integration were generated, nor was there a close work with international cooperation agencies.

In La Guajira and Cúcuta, the secretariats have limited capacity to attend to Venezuelan migrants, and international organizations play a significant role, providing aid such as food and school supplies. There is also an interest on the part of the secretariats and schools to know the subject, as well as more familiarity with the travelers, since when living in border areas the dynamics of close relationship are part of the day to day.

In La Guajira, there are still so many problems associated with education that receiving Venezuelans is not a priority. In fact, the local population perceives migrants as a 'threat', believing that they compete with them for access to resources and benefits, which are extremely scarce and restricted in the region. "In this part of the country, the Colombian population that receives children and adolescents is in similar conditions, so they wonder why Venezuelan migrants receive aid that nationals do not," they say.

At the last level –that of schools– it was found that although in the capital of the country educational institutions receive Venezuelan children, they do not generate particular actions to integrate them into the student community because they consider that doing so would be a form of discrimination. "We treat them as equals," they argue, while Urbano explains, "xenophobia is not recognized in the face of these children: "In Bogota schools, the answer was that their classrooms do not have cases of discrimination when in fact they do, although they consider them insignificant." The researcher emphasizes that the low or nonexistent perception of xenophobia that is observed in Bogotá is also reflected in the other areas studied, leading to the conclusion that no actions are being taken in any of the three levels to detect and counteract it.

One example is that in La Guajira, to refer to Venezuelan girls, many use expressions such as "white plates," referring to the plates used by Venezuelan vehicles. Likewise, the community is full of the imaginary that Colombia is doing



Source: *Characterization of Venezuelan Migrant Childhood and Adolescence in Colombia: The Study*. Colombian Institute of Family Welfare (ICBF), 2022.

them ‘a favor’ by allowing them to enter our territory, which should imply ‘gratitude and silence’.

“This shows that there are problems of ‘microxenophobia’ that are not evident to school actors,” Díaz says.

In border areas, Venezuelan children and adolescents often enter, and the familiarity of cultural exchange facilitates the processes of inclusion and adaptation. During flag raising, for example, and as has been the case for decades, it is possible to listen to the anthems of both nationalities and there are some initiatives – still timid and insufficient – to apply curricular adjustments that facilitate the integration of migrants, based on issues related to the culture or sciences of the neighboring country. In contrast, in the country’s capital, only one of the five schools evaluated carried out this type of action to integrate Venezuelan migrant children who made up an important group of students.

“In Cúcuta we also identified strong educational leadership from the principals, who are excellent managers,” the researchers highlight. This is the case of a principal who during the pandemic organized his entire community, including parents, to get educational guides to enrolled children who were in Venezuela and who, due to lockdowns and border closures, could not attend class or connect to the internet. Likewise, there were cases of school directives that sought support from international organizations to build a dining room in which they could give snacks to migrant children.

Professor Urbano concludes that “in general, there is a great loneliness of schools, especially teachers, to generate responses that integrate this population into the education system. Ultimately, it is the teachers who are challenged to integrate the migrant population adequately into the education system. For me they are the heroes and heroines of this situation.”

Beyond these particular initiatives, there are no clear guidelines aimed at integrating the entire educational community in terms of curricular transformations. “It is important to build a more intercultural environment, understood not as the leveling of standards, but as an enrichment of the curriculum and pedagogical practices, which recognize the identities of Venezuelans in the same way as we should recognize the identities of indigenous people, Afro-descendants and other groups that make up the territory. We want to bring this to policymakers to contribute to the right to quality education for migrants,” Díaz concludes. ■

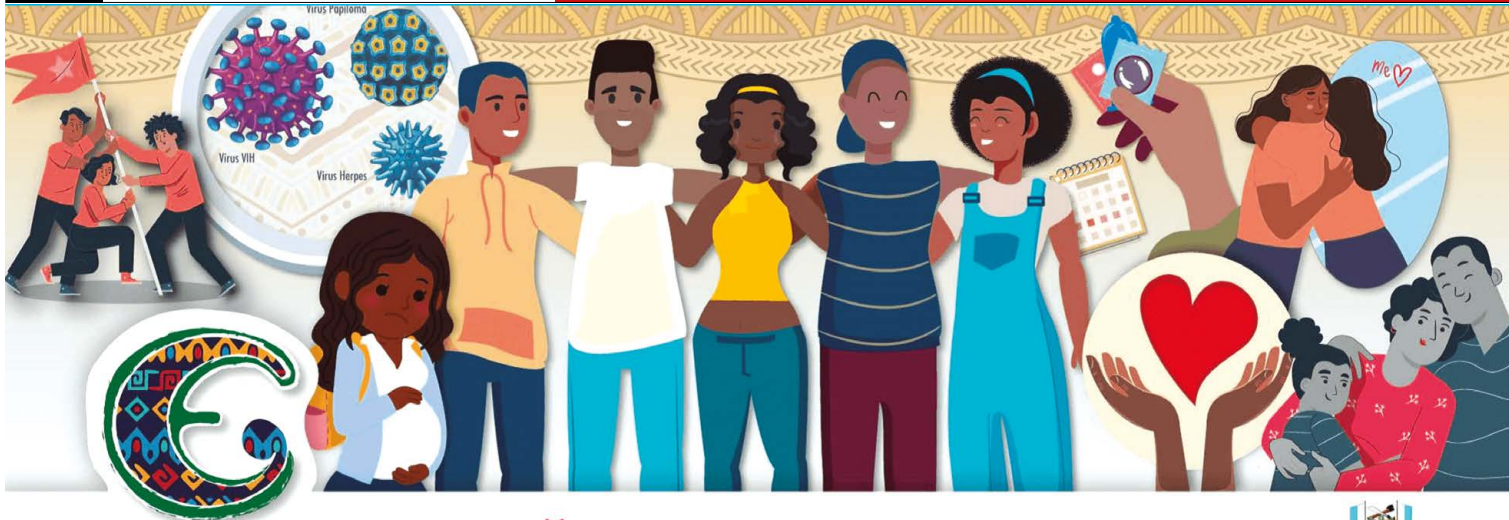


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Digital innovation

Fray Cristóbal de Torres y Motones. Author: Gaspar de Figueroa. 17th century.
Oil on canvas, 106 x 81,1 / 117 x 92,5 cm. Universidad del Rosario Collection.





EduGuapi
Al ritmo joven de mi salud

 **Universidad del
Rosario**

En convenio con

 **UNIVERSIDAD
NACIONAL
DE COLOMBIA**

Con el apoyo de

 **ALCALDÍA DE GUAPI**
GUAPI SOMOS TODOS

An Offline App Could Improve Sexual Health in Communities of the Colombian Pacific

In one of the poorest areas affected by violence in Colombia, a group of researchers utilized digital technologies to share information about sexual health among young people in the Colombian Pacific. Their main goal is to generate health education strategies through something obvious, but rare: listening to the community.



← With EduGuapi, young people can access sexual health information to demystify misconceptions and make informed decisions.

By Aleida Rueda

Photos by UROSario, Eduguapi

DOI https://doi.org/10.12804/dvcn_10336.42748_num7

It was in 2009 when [Yenny Barreto](#), now a researcher and professor in the School of Medicine and Health Sciences at Universidad del Rosario, came to work in [Guapi](#), a municipality located on the Pacific coast of Cauca, Colombia. There, Yenny devoted herself to developing research and extension projects, thus initiating a deep bond that would unite her to the people of Guapi to this day.

With just over 28 000 inhabitants, 98 percent of Afro-Colombian descent and 2 percent of indigenous origin, Guapi is considered one of the poorest municipalities in the country. Data from the Ministerio de Hacienda ([Ministry of Finance](#)) indicates that 68.9 percent of the population is in poverty, while 28.8 percent is illiterate and labor informality reaches 93.4 percent. In addition to poverty, this municipality has been severely impacted by the armed conflict between groups linked to organized crime and narcotrafficking, which has increased the confinement, [forced displacement, and homicides](#).

Despite this, Guapi is a community full of life and deeply rooted in its traditions and ancestral music, including marimba songs, lullabies and currulaos. “They are very happy people, they may not have something to wear, but they have some-

thing to celebrate and share with the family and the community.

They produce their typical drinks, such as the [viche](#), the [tumbacatre](#) and tomaseca, most of them prepared with medicinal herbs (...). Women are often the heads of households and support each other to meet the needs of their children and families. It is a very feminine solidarity,” says Professor Barreto.

Among the many challenges that the residents of Guapi face, one of the most relevant is the one related to sexual health. According to data from the [2020 baseline strengthening report of the public gender policy in Guapi \(Cauca\)](#), prepared by the Observatory for Women's Equity (OEM), “a minimum of 30 percent of women aged 15 to 19 years in the municipality are pregnant or have already experienced pregnancy.”

“The incidence of teenage pregnancy and sexually transmitted diseases (STDs) is quite

high in the municipality and continues to increase,” explains Sandra Portocarrero, Secretary of Health of Guapi. Other data provided by the official indicate that the pregnancy rate among girls aged 10 to 14 years increased from 3 percent in 2019 to 6 percent in 2020 and 8 percent in 2021.

One of the main causes of this growth is the lack of a comprehensive sexual education policy aimed at children. “Many girls are starting to have sex at a very young age and do not have enough knowledge about their sexual and reproductive rights to make conscious decisions, which makes them vulnerable. Therefore, as soon as they have their menarche (first menstruation) they risk becoming pregnant,” explains the Secretary of Health.

Researcher Yenny Barreto observed the critical situation during the 10 years she worked in Guapi, as she went back and forth seasonally: “There are a lot of teenage pregnancies, a lot of sexually transmitted infections. In addition, many women suffer from gender-based violence, whether psychological, physical or sexual, but a large number of them have normalized it.”

When the COVID-19 pandemic arrived, the situation worsened. “The disruption of in-person classes limited the provision of sex education to adolescents. The community lost its fear of diseases of this type and, despite all the communication and education campaigns, young people refused to continue using prevention measures. One of the problems we identified was the difficulty in raising awareness in the community, both in urban and rural areas,” says Portocarrero.

It was then that MD. [Giovanny Apraéz](#), from the Cauca Department of Health, introduced Yenny and Sandra to seek solutions. “In the pandemic, young people were not going to school, nor had access to other services and only had a cell phone at hand, while they were locked in their homes (...). They told me, then, that they wanted to use information and communication technologies (ICT) to get closer to them and see what their health education needs were,” Barreto recalls.

That was the beginning of [EduGuapi](#), the project of “Health Education for Afro-Colombian people in rural and urban areas of the municipality of Guapi-Cauca through a digital app” which developed the groups [Public Health Research](#) and [GiBiome](#), from Universidad del Rosario, and the research group [Policies, Human Resources, and Health Outcomes](#), from Universidad Nacional de Colombia. The objective, according to Barreto, is to

↑
“The sex education project in Guapi is different from others in vulnerable communities because it puts the community, its particularities and its needs at the center.”



generate health education strategies that allow contributing to the construction of a life project and the experience of a healthy sexuality, which at the same time leads to the reduction of unwanted pregnancies, sexually transmitted diseases and gender violence among young people.

A free app created by and for Guapi

EduGuapi is a completely free application and website that offers information on sexuality, family planning, sexually transmitted diseases, teenage pregnancy, violence prevention, and self-esteem enhancement.

“From the beginning, we envisioned spreading these contents through digital channels, because, although in these remote populations, they usually use the brochure or the booklet a lot, that does not last, the information is lost or it cannot be updated,” says the engineer behind the application, [Pedro Antonio Aya](#), of the School of Medicine and Health Sciences at Universidad del Rosario. “We then proposed a digital alternative that would be appealing to young people, as they use a mobile phone all the time.”

EduGuapi is specially designed for the children, teenagers and youth of Guapi, but the most remarkable thing is that most of the contents are created precisely by themselves: from the videos with harmonic melodies of drums, rattles and percussions, to the interviews and audio capsules with neighbors of the community. It also contains games and other interactive activities aimed at generating a digital dialog with users. The team developed a simple and intuitive interface for people to see the information as a series of steps or modules, and move naturally through all the content.



Even though Guapi has internet services, they are not free. In most rural areas, people must purchase plans in order to connect. Therefore, one of the most remarkable aspects of EduGuapi is that it is an offline application, that is to say that no connection to the network is required to access it. “For their first use, they have to connect to the internet in order to download the application, but once installed on the mobile device, young people can use it without having to have a mobile internet plan,” explains Aya Parra.

Another feature of the app is that it was designed based on the input from the residents of Guapi “We were looking to create an educational application that highlighted the feelings and thoughts of the locals, but at the same time gave answers to many needs of the community,” adds, for her part, [Carolina Lucero Enríquez Guerrero](#), associate professor in the Faculty of Nursing at Universidad Nacional de Colombia and co-researcher of the project.

“We did a first phase of diagnosis, in which we asked the general population, the leaders of the urban and rural community, people from the health service institutions of the sector, both public and private, about various topics. We also interviewed health professionals and nursing assistants. We wanted to have a vision of the needs of the community, but also of those who provide health services. Thus we were able to characterize the main requirements of health education. And it was the community itself that answered what demands should be prioritized,” adds the professional.

With this exploration, the group of researchers realized that teenage pregnancies and sexually transmitted diseases, which are often the “highlighted” issues in health reports, are not isolated issues. They were just the tip of the iceberg of a complex web of variables that include, for example, the absence of professional and job opportunities, domestic and economic violence against women, and low self-esteem.



Jenny Barreto, a professor in the School of Medicine and Health Sciences at Universidad del Rosario, understands that an app is not enough to solve the lack of opportunities in Guapi, but she is convinced that timely and appropriate education can pave the way for lifestyles and activities that positively impact their future and that of their families.



“From the beginning, we contemplated spreading these contents through digital channels, because, although in these remote populations, they usually use the brochure or the booklet a lot, that does not last, the information is lost or it cannot be updated,” says the engineer behind the application, Pedro Antonio Aya, of the School of Medicine and Health Sciences at Universidad del Rosario.

Other possible paths

In Guapi, according to the [data](#) as of 2022 from the Departamento Administrativo Nacional de Estadística (National Administrative Department of Statistics - Dane, by its acronym in Spanish), there are 3717 adolescents, aged between 12 and 17 years. Portocarrero comments that the adolescents who reside in the municipality are mainly engaged in informal work and domestic work.

"The opportunities they have are very few (...). Most prefer to migrate to other cities because employment opportunities in the municipality are very limited. To this, we must add that the public order situation is not good due to the presence of groups outside the law and their activity of recruiting minors to link them to their criminal organizations," says Portocarrero.

Yenny Barreto knows that an app is not enough to solve the lack of opportunities in Guapi, but she is convinced that timely and adequate education can open paths to ways of life and activities that affect their future and that of their families in a positive way. EduGuapi includes, for example, a "tree of life"; it is a scheme with specific questions designed for young people to reflect on themselves and their future: What is my beginning, what have been my achievements, what nice things do I have to give, what are my desires?

"Creating the [tree of life](#) has allowed them to discover that there are other options. Perhaps these boys are still in school, but they can start looking for an alternative to their higher education. In the same app we offer complementary links to the information or where they could communicate to establish support networks according to their needs," says Barreto.

"What we saw in the interviews is that the most normal life plan in Guapi is to reach a certain age and seek to start a family. With the app, we are somehow telling them: there are more options, there are other life projects," says Aya Parra.

The app also provides substantial information on more complex topics such as [family planning](#). Given that Guapi is a community where phenomena such as machismo, gender roles and domestic violence are ingrained, the researchers sought to share information that did not necessarily focus on sex, but on sexuality as a natural and healthy component of all human beings. "Sexuality should be seen as a way to share and take charge of our lives, have loving relationships and make healthy, safe and informed decisions," EduGuapi reads.



Guapi is considered one of the poorest municipalities in the country. Data from the Ministerio de Hacienda (Ministry of Finance) indicate that 68.9 percent of the population is in poverty, while 28.8 percent is illiterate and labor informality reaches 93.4 percent.



The results

EduGuapi is in the process of quantitative evaluation to know the number of downloads and the level of usability of the app in the municipality. However, the team already has a qualitative assessment in which the community has highlighted how useful this tool has been in accessing new information and addressing sexual health issues among young people.

"Although EduGuapi is not yet well known in the community, a socialization was already carried out with the 11th grade students at [La Inmaculada Normal School](#). The teenagers found it very good, and we have been able to observe that some teenagers are better informed about the issues of sexuality, as a result of using the application," says Portocarrero.

The same opinion is shared by Yamile Riascos, a 46-year-old nursing assistant, who supported the project by contacting community action leaders to tell them about EduGuapi: "The app has helped many people. What I liked the most was the whole process that took place. I liked it because you learn new things, each person contributes knowledge and from each person you learn something new. Projects like this help benefit the community and our children."

For Barreto, these interventions through free-to-access technology have enormous potential. "They allow the municipality's health system to approach the community, develop health promotion and disease prevention actions, while making it easier for young people to seek help in a timely manner in the support networks provided to them, and this applies to both rural and urban areas."

On the other hand, researchers believe that EduGuapi provides information from a perspective that does not judge



the residents of Guapi, but, on the contrary, accompanies them in their decision-making. “One family told us that the app allowed them to learn about and access family planning methods. The son told us that when he read the information his mother also understood what was necessary to create a life project. So, in that particular family, the app led to mitigate, or perhaps prevent, the risk of adolescence pregnancy; also, to the mother to consider the possibility of a different life project,” Barreto emphasizes.

Although the evaluation has not been completed, there are already signs that the content offered by the EduGuapi platform, available to all the residents of Guapi, and especially the fact that the community has actively participated in its creation, had a highly positive impact on both the population and the research team.

Listen to what the community wants

Despite the lack of education, health, housing and services faced by the people of Guapi, and being known in the rest of the country as a red, troubled and violent area, for Jenny Barreto having known her fellow residents for so many years has allowed her to exalt all the value and beauty that the municipality has.

For her, the sex education project in Guapi is different from others that are done in vulnerable communities because it puts the community, its particularities and its needs at the center.

“We, academics, often work hard for what we want, but not for what the community wants. To go and help people, first of all you have to listen to them. That is the starting point and it is something I have learned from them (the people of Guapi), it is better to first listen and then act, and not act alone, but with them.”

The professor also criticizes the so-called parachute science: academics who come to communities like Guapi to develop projects or obtain information to make publications and expand their curriculum, without making any kind of recognition and without working with and for the community.

“Gaining recognition, maybe affection, or getting people to listen to you in these particular types of populations is much more difficult because they already have a history of violence;



“We were looking to create an educational application that exalted the feelings and thoughts of the locals, but at the same time gave answers to many needs of the community,” says Carolina Enríquez Guerrero, associate professor in the Faculty of Nursing at Universidad Nacional de Colombia and co-researcher of the project.

they tell you: ‘You only come to extract information from me; you only come because you want things, you want to publish at our expense and say things about us without telling us,’ says the researcher.

For her, EduGuapi goes beyond the application. It shows that academic projects that aim to help a community must include, from the outset, the same population.

“There are projects that may be interesting for the scientific community, but not for the people who inhabit the territories to be studied. It is clear that there are different ways to investigate, but if you want to build on the results of an investigation, I believe the best way is to do it from what people want; with and for them,” she concludes. ■

'Fintech' in Colombia: The bet on financial technologies accessible to all

Making transfers via electronic devices, applying for loans, and even investing in crowdfunding projects have become common digital practices and represent a technological disruption. However, is there a legal framework that regulates the activity of companies offering these services? Keys to understanding the regulatory development of the national fintech ecosystem.

By Felipe Gaitán García

Photos by 123rf, Alberto Sierra

DOI https://doi.org/10.12804/dvcm_10336.42563_num7

A profound and gradual transformation is taking place in Colombia. Until at least five years ago, individuals –natural or legal– were often forced to carry out transactions or monetary movements through the intermediation of conventional banking institutions, which inherently implied the existence of exclusive logics for sectors of society that were not linked to these institutions. That scenario has been changing dramatically with the accelerated emergence of di-

gital tools that enable greater access to various financial services.

This set of tools is known as financial technologies or Fintech, a concept that alludes to the development of business models that have as support the use of electronic or digital platforms, which reconfigure traditional financial products and services. Innovation, technology, and transformation are the key



elements that shape the industry's disruptive landscape.

In Colombia, nine segments of such an ecosystem have been classified: digital payments; digital credit; collaborative financing (crowdfunding); regulatory technologies (regtech); business finance and e-factoring; insurance (insurtech); trading and stock market; blockchain and crypto-assets, and electronic money (e-money) and neobanks.

According to the "[report Finnovista Fintech Colombia 2023](#)," during the first quarter of this 2023, the existence of 369 fintech companies was reported in the country, while in 2019 there were 180 and in 2022 the figure of 341 was reached. This represents an annual growth rate of 19.7 percent composed of *startups* over the past five years. With this, the national fintech ecosystem is consolidated as the third most prosperous in Latin America, only behind Brazil and Mexico.

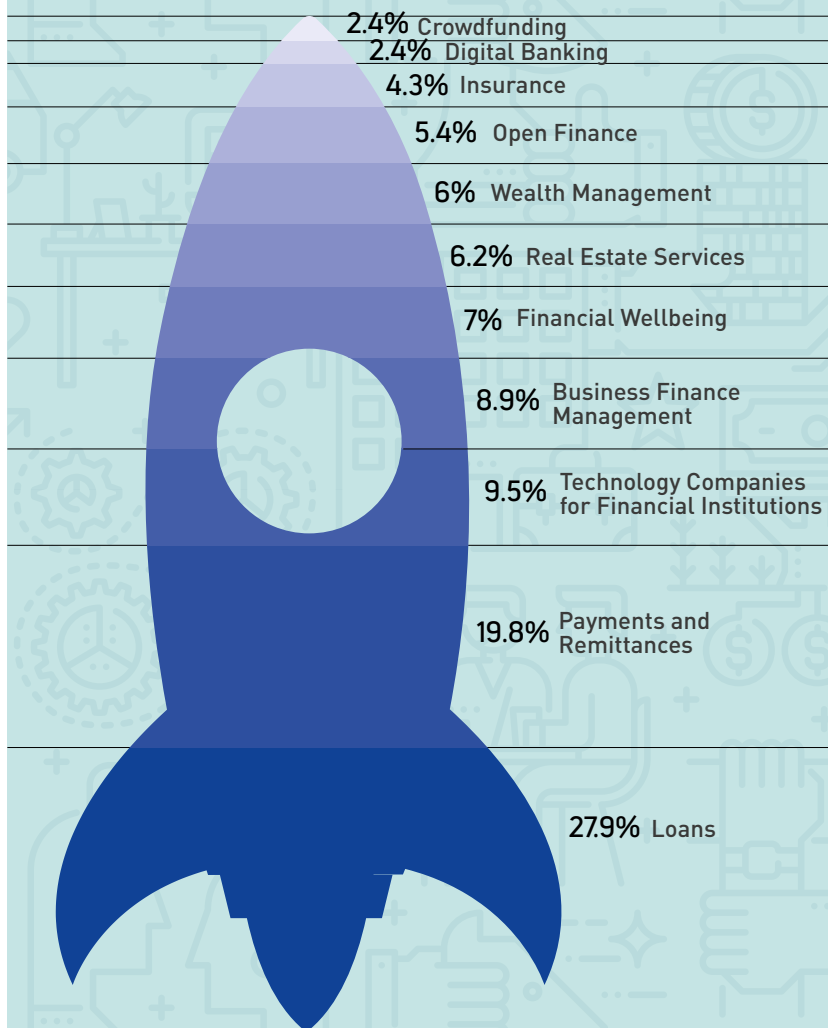
Despite the diversity of technologies and services that converge in the Colombian fintech environment, there are still concerns about the regulatory framework from which these companies can carry out their financial activities in the country. An imaginary that has some acceptance within collective thinking suggests that such companies operate without clear regulation and adequate oversight.

With the premise that this paradigm is wrong, the work [The legal development of fintech was created](#), written by [Erick Rincón Cárdenas](#), a lawyer in Universidad del Rosario and an associate professor in the Faculty of Law at this educational institution. It was published in two volumes by the publisher Tirant lo Blanch. The author aims to dismantle this assumption from an explanatory exercise of each segment, its regulatory contexts, the identification of good practices and the analysis of comparative law against the legislation of other States.

"The book provides elements to debunk an urban myth: that fintech *companies* are unregulated in Colombia and that there are no applicable rules in their activities. It is quite the opposite, because each of the segments consists of a regulatory framework that allows the full development of the industry," explains the author, who was also president of Colombia Fintech (2018-2021), an association in which most of the companies in this sector are affiliated.

According to Rincón Cárdenas, the regulatory framework has a uniqueness in Colombia. Unlike Mexico or Ecuador, which have a fintech law that covers the regulatory

Percentage of fintech by segment



Source: Own development with internal Finnovista databases.

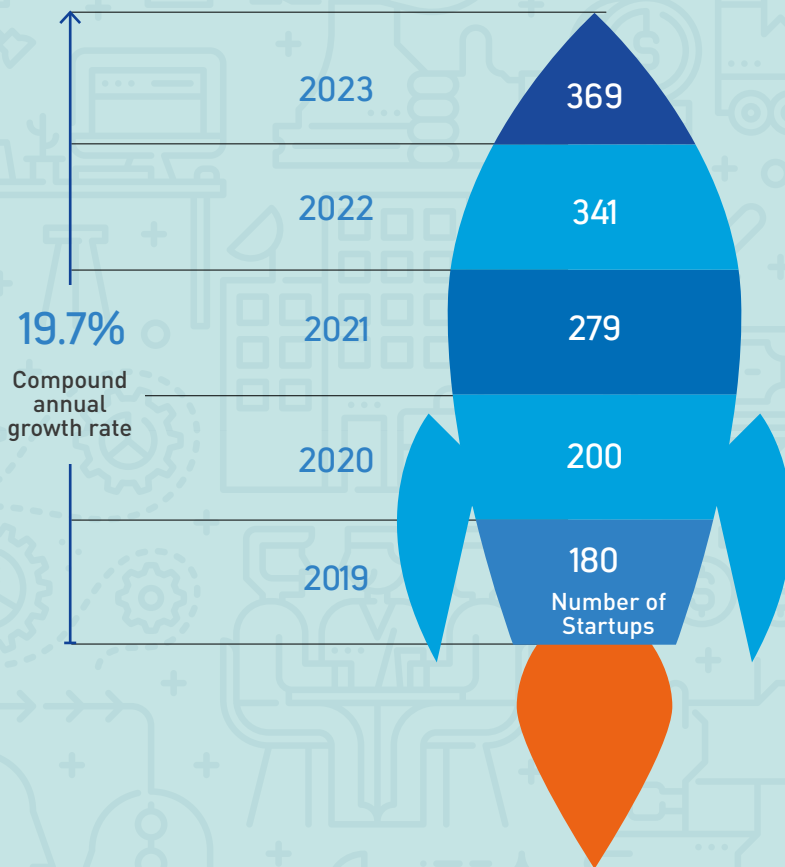
development of all segments, in the national context an ecosystem has been created in which each sector has its own rules of the game.

"The model of a general fintech law remains in ambiguities that can be complicated from the operational point of view. Our legal development must be different. I think the regulatory framework for each of the segments of the industry is a wise decision," he adds.

In the same vein, Sergio García Ferreira, a lawyer from Pontificia Universidad Javeriana and a master's degree in Fintech and Financial Innovation from the OBS Business School (Spain), believes that a fintech law is not necessary

A consolidating ecosystem

The number of local Fintech companies in Colombia rose to 369 in the first quarter of 2023.



Data collected up to April 2023

Source: Own development with internal Finnovista databases.

in Colombia since it can be counterproductive for the industry as there must be a debate in Congress, which may not have the specialized and technical elements. This fintech law *is not necessary* in Colombia, since it can be counterproductive for the industry as there must be a debate in Congress, which may not have the specialized and technical elements.

With these perspectives, the last five years have been a turning point in terms of advances and regulatory enablers that strengthen the ecosystem in the country. Nevertheless, within the legal analysis of regulations there are gaps to address and opportunities for improvement to continue expanding the universe of the national fintech sector.



Erick Rincón Cárdenas, a lawyer in Universidad del Rosario and an associate professor in the Faculty of Law. Author of *The Legal Development of Fintech* (2023, Tirant lo Blanch).

Milestones of fintech legal development in Colombia

Although the first fintech standards in the country were conceived more than a decade ago, regulation for the activity of the segments deepened between 2019 and 2021. The turning point was the realization of the document [Conpes 4005 of 2020](#), which formulated the public policy of inclusion and economic and financial education. From there, related technologies gained more relevance at the state level in order to encourage innovation processes and ensure that more people and companies have access to financial products and services.

Throughout his work, Rincón Cárdenas identifies some of the legal bases that have allowed the regulatory advancement of the segments, although he warns that regulatory development – which implies the permanent appearance of new digital technologies – requires constant updating. Fintechs constitute a heterogeneous universe, and in Colombia some sectors have strengthened more than others.

The most mature segments of the Colombian fintech universe are digital credit and digital payments, which account for 27.9 percent and 19.8 percent, respectively, constituting almost half of the entire national ecosystem and are supported by a solid regulatory framework. The former have payment

gateways, electronic wallets and peer-to-peer payments as the most important instruments. The latter focus not on raising money from the public, but on raising private resources and lending them through technology platforms. Their goal is to democratize access to credit. There are currently approximately 90 companies specializing in this activity.

The rest of the sectors remain in full development. This is how crowdfunding, which is a common fund for investment projects, has tended to resolve the tension that companies in this sector maintain with illegal recruitment, based on the surveillance of the Financial Superintendence of Colombia. Regtech, e-factoring, and insurtech also have a specific regulatory framework that allows their implementation based on the regulation of their activities.

The segments that complete the fintech *ecosystem* are trading (portfolios of investment in the stock market, with small amounts, through the use of mobile applications) and neobanks, institutions that carry out the same activities of traditional banking, but that do not have a physical branch, so they carry out operations of acquisition and placement through electronic means.

The case of crypto assets continues to be discussed around the world. Colombia is among the top 10 nations that move these digital assets on the planet (Bitcoin has 37 ATMs distributed in eight cities). Around the debate, Rincón Cárdenas comments that there are states such as El Salvador where Bitcoin has been classified as a currency, while in others such as China the circulation of cryptocurrencies is prohibited.

At the local level, Colombia has established concepts of state entities (Banco de la República, Superintendencia de Sociedades and Superintendencia Financiera), in which, although their use is not prevented, it is determined that they are not financial instruments and do not constitute a legal tender, so they do not have liberatory power against obligations in the country. This means that no one is forced to receive cryptocurrencies as a means of payment.

"We need rules to regulate the deposit and withdrawal relationship in supervised financial institutions and digital asset traders. The market is pending the approval of a regulation for these operations," says Rincón Cárdenas. Meanwhile, García Ferreira argues that "in 2014 Colombia did not understand what crypto assets were. We now understand how the market works, but the circular letter limiting regulation of this segment needs to be discussed and updated."

The challenge of deepening financial inclusion

Colombia has been the scene of historic gaps in access to the financial system. An estimated 70 percent of the population is underbanked or underbanked. This means that a majority of sectors in the country are excluded from making bank movements or have limitations in their financial services, such as when applying for a credit.

The bet of the fintech is to break these barriers and strengthen innovation processes that deepen financial inclusion. According to the report "[Fintech in Latin America and the Caribbean: A Consolidated Ecosystem for Recovery](#)," published in 2022 by Finnovista and the Inter-American Development Bank, Colombia leads the share of financial technologies focused on inclusion, with 41.6 percent of *startups* and 45.8 percent of the population with access to bank accounts.

The COVID-19 pandemic accelerated the dynamics of inclusion of Colombians in technological and financial services, given that social distancing led to the need for the digitalization of money movements. The payments segment was the gateway for a good part of the populations and communities to the fintech, with the added value that these have allowed

Milestones of fintech legal development in Colombia

Digital Payments

Regulatory Enablers:

- 2018 External Circular
- Law 1735 of 2015 (Financial Inclusion Law, creation of the Companies Specialized in Electronic Deposits and Payments, Sedpe).
- Decree 1692 of 2020

Digital Credits

Regulatory Enablers:

- Commercial Code
- Law 1480 of 2011
- Single Legal Circular of the Superintendency of Industry and Societies.

Crowdfunding

Regulatory Enablers:

- Decrees 1357 of 2018 and 1235 of 2020.

Regulation (Regtech)

Regulatory Enablers:

- External Circular 029 of 2014.
- External Circular 029 of 2019.
- External Circular 027 of 2020 (Asset Risk Management or Terrorist Financing Systems, or Sarlaft).

operations to be more efficient and faster than conventional tools, as well as to be able to access the fintech services and services offered by the financial sector.

Thus, in 2020, according to the National Planning Department and the Banking of Opportunities, nearly 800 000 adults benefited from the government's Solidarity Income subsidy through digital transfers and activated accounts or financial technology products.

Rincón Cárdenas believes that, in principle, traditional banking saw in the emergence of fintech a threat that would affect their own markets. The conventional financial system would soon understand that its articulation with these new business models would strengthen its ability to attract previously neglected populations. Still, financial inclusion gaps remain a challenge.

"Fintechs are not enemies of banking," says Rincón Cárdenas, adding that two of Colombia's most important new technologies are Daviplata and Nequi, which have more than 15 million users and go hand in hand with traditional financial institutions. "The fundamental issue is to overcome the barriers to access. Most fintech companies, -and this is a structural

issue- reach the urban perimeters of Colombia. 65 percent are incorporated in Bogotá, while 25 percent are located in Medellín. The remaining percentage in other regions. We must fight to reach the sectors that need them most."

Experts believe that an adequate regulatory framework is the clearest path to financial inclusion in Colombia; moreover, access to the financial system for as many people as possible contributes not only to the growth and dynamization of the economy, but is also an effective weapon against informality and some illegal practices. Similarly, García Ferreira refers to it when indicating how digital credits become an alternative to the fight against 'payday' or express loans.

There are other implicit challenges to achieving greater financial inclusion. For example, regulators need to balance legal and operational certainty with innovation and technology processes. "It is necessary that there is a differential regulation for fintech compared to that of the conventional financial system, one that protects the interests of the consumer and personal data, but without having the same regulatory conditions of the financial system," argues Rincón Cárdenas.

The goal is to ensure that financial inclusion is widespread and that users receive products and services tailored to their needs. In this context, the experts emphasize that one of the biggest bets of the national fintech sector is to reduce the use of cash, since its circulation encourages tax evasion and other bad practices related to illicit purposes.

"One of the scourges that Colombian society has is that we continue to use a lot of cash. One prefers to pay a high sum of money in physical than to do it by electronic means because it will save the 4x1000 tax. Some tax and regulatory asymmetries need to be overcome. The payment scheme needs to be improved. It is something that the Banco de la República has very clear in the system of immediate payments," concludes the author.

The Colombian fintech industry aims to strengthen financial inclusion initiatives with the certainty that this path will lead, gradually, to such technologies being available to all, which would lead to economic growth. Therefore, as long as there is a regulation that tends to deepen to facilitate innovation processes at the core of the ecosystem, there will be greater opportunities for improvement and competition. In the words of Rincón Cárdenas, "fintech are the future of the financial system." ■

E-factoring

Regulatory Enablers:

- Act No. 223 of 1995.
- Economic Growth Act.
- Decree 1154 of 2020 (creation of the electronic sales invoice register as security, through the Radian platform).

Insurance (Insurtech)

Regulatory Enablers:

- Commercial Code.
- Law 527 of 1999.
- Organic Statute of the Financial System.

Trading

Regulatory Enablers:

- Law 527 of 1999.
- Law 964 of 2005 (Securities Market Law).
- Decree 661 of 2018.

Crypto-assets

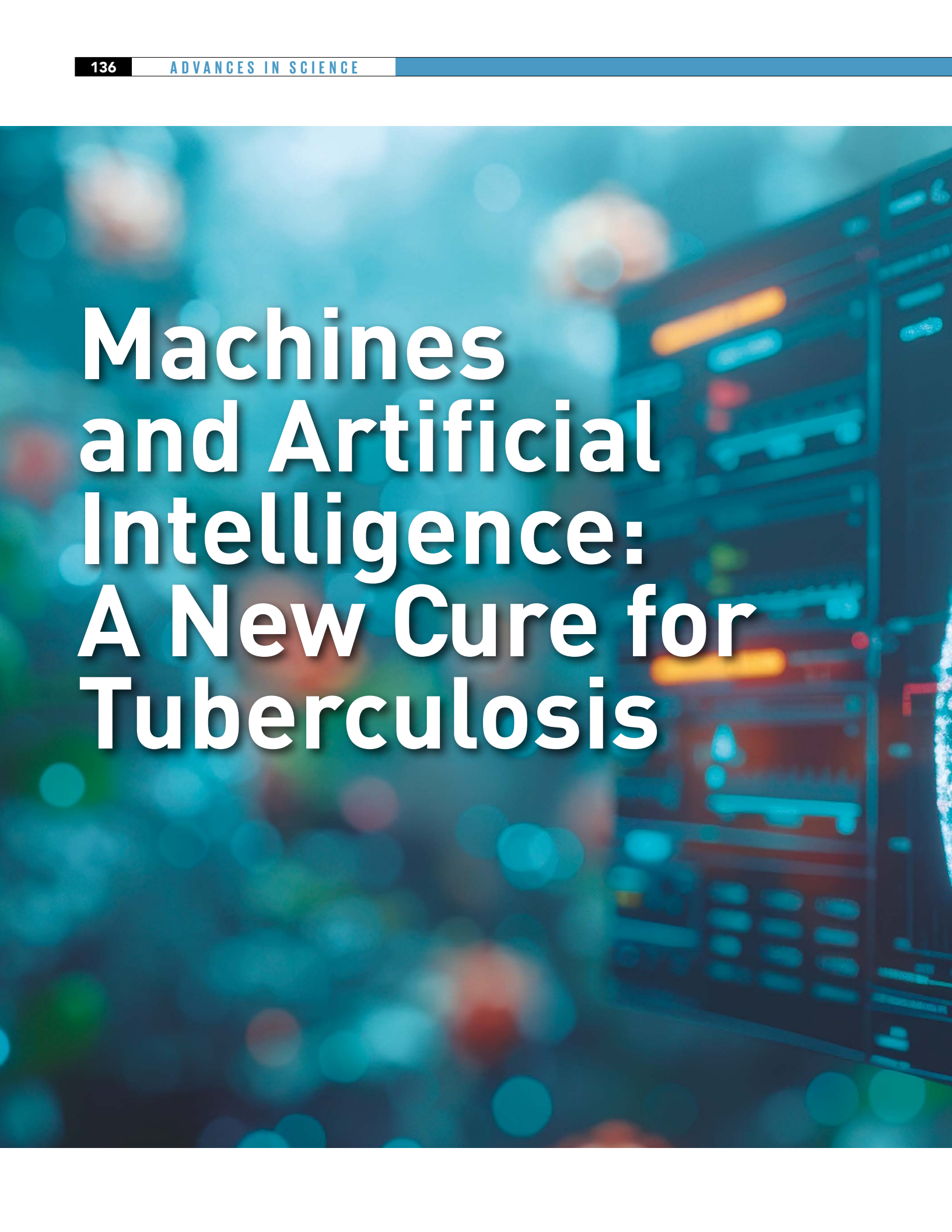
Regulatory Enablers:

- Unified concept of October 17, 2023 (Directorate of National Taxes and Customs, Dian).
- Circular Letter 029 of 2014 (Financial Superintendence).

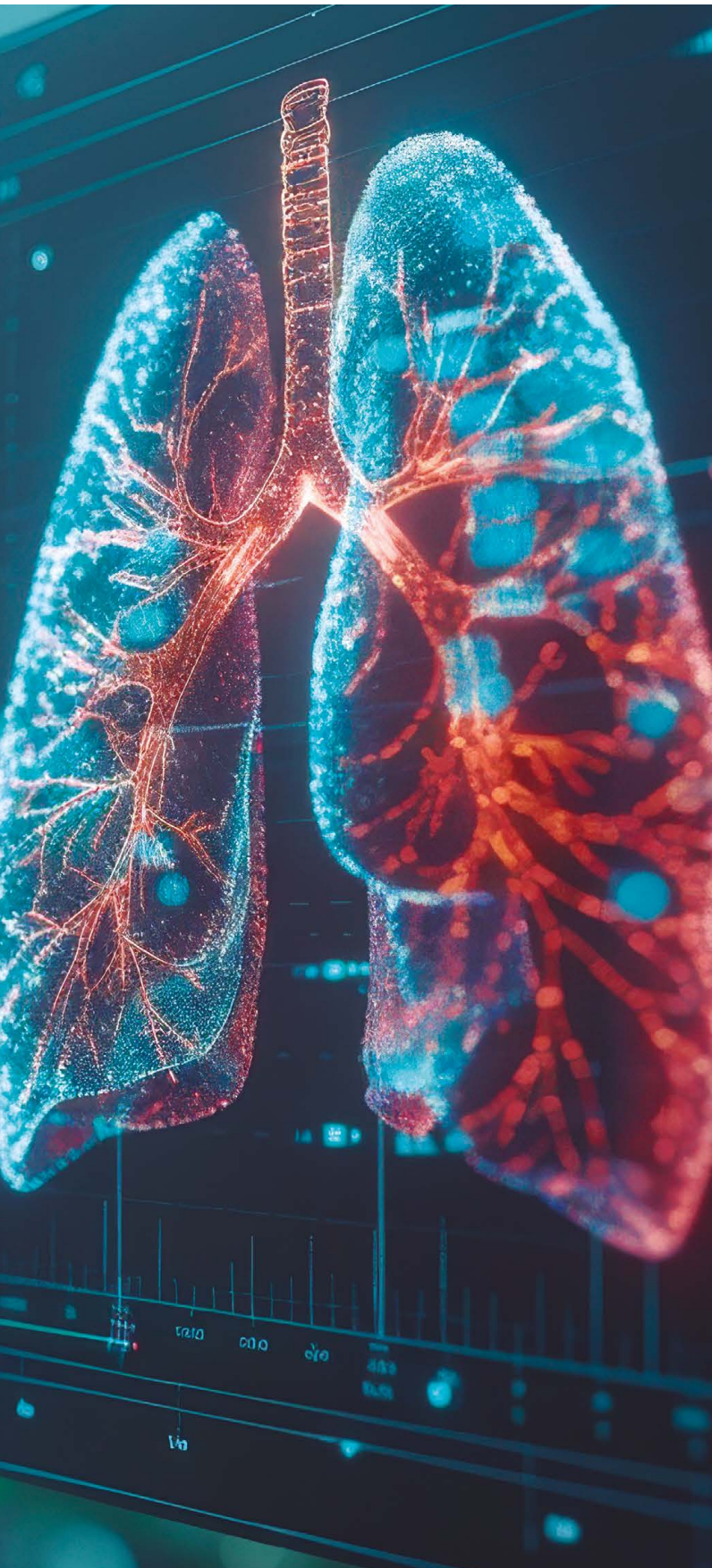
Neobanks

Regulatory Enablers:

- Organic Statute of the Financial System.
- Decree 1234 of 2020.



Machines and Artificial Intelligence: A New Cure for Tuberculosis



A group of doctors and engineers uses data analysis models, machine learning and artificial intelligence to combat pulmonary tuberculosis in the most needy places in Colombia.

By David Mayorga

Photos by 123RF, Milagro Castro

DOI https://doi.org/10.12804/dvcn_10336.425621_num7

The discomfort starts in the hypopharynx, the lower part of the throat. It is a tickling that goes up -sometimes causes dryness- and spreads through the walls of the area and becomes a cough: a slight contraction, followed by a guttural sound that only seeks to clear the tract between the lungs and mouth.

As the days go by, that cough becomes persistent. It appears in the early hours of the morning, before entering the shower, and persists throughout the day, when the feeling of thirst increases and chest pains appear. At night, the cough increases in intensity and even withstands the calming effect of hot drinks, herbal infusions and other home remedies with which you try to close the passage. And it is still there, as the person tries to fall asleep... Over the days or weeks, the cough intensifies to become a general discomfort that forces the person to go to the doctor.

Already in the office, sitting in front of the doctor, the questions begin: how old you are, where you live, with whom, for how long you have been feeling the discomfort ...

all are answered between small episodes of coughing. Then, with his stethoscope in hand, the doctor begins the usual check-up and as he listens, his suspicions become more solid. He goes to the closet and returns with a bag and two plastic jars: he orders the patient to cough with all his strength and spit inside one of them; he recommends repeating the action the next day. Both bottles will be sent to the lab for testing.

However, time passes and there is no news of the results. The cough becomes much more persistent and shocking. Now, even more, it hurts to cough. And around them new episodes of coughing arise within the family and among the closest friends. The despair and persistence of pain force the patient to return to the office. And then came the unexpected news: there were transport problems, the samples were contaminated and their analysis was not possible.

The evolution of these symptoms confirms the doctor's suspicions, but the high cost of molecular testing does not allow him to corroborate it immediately. Based on your experience, your doctor prescribes antibiotics, takes new samples, and orders a thorough care routine. Months and a half later the results are ready, and with them the doctor reconfirms his suspicions that the patient suffers from tuberculosis. However, there is something much worse: by that time, the close circle of the patient also suffers from uncomfortable and repetitive episodes of coughing.

All have been infected with the bacillus *Mycobacterium tuberculosis*.

It seems surreal, but it is a scene that occurs in different populations of Colombia. According to data compiled by the Instituto Nacional de Salud (National Institute of Health) (INS, by its acronym in Spanish) in the [Sivigila](#) registration system, as of the first week of October 2023, exactly 17 754 cases of tuberculosis had been recorded across the territory. That sounds like a small number, given that Colombia's population exceeds 50 million –indeed, in 2022, the incidence rate of pulmonary tuberculosis, the most common type, was 29.39 per 100 000 population in 2022-. However, these numbers attract the attention of expert doctors such as pulmonologist Carlos Awad, who has been studying the disease for more than 35 years and recording its findings in detail.

“Tuberculosis is a preventable, treatable, curable disease, which is related to some special risk factors, which are likely to be nega-



tive facts. So, getting sick with TB would indicate that there is something wrong with the health system or the socio-economic side. This is why it is an important disease in the field of public health, such as leprosy, tetanus or measles. For the country, TB is a priority disease,” Dr. Awad explains.

Although retired, the specialist remains linked to the Santa Clara Hospital in Bogotá, after a life as coordinator of the Lung Laboratory of the institution, member of its ethics committee and even as deputy director of Research. Throughout his career he has witnessed the evolution of the figures of contagion of this disease, but, above all, he has treated his patients.

Sivigila's figures show that tuberculosis is present throughout the Colombian territory: from 10 cases in the archipelago of San Andrés, Providencia and Santa Catalina, to 3599 in the department of Antioquia. However, analysis of these numbers shows that their background is entirely sociodemographic, with 80.29% of confirmed cases located in strata 1 and 2. Going further allows us to see the face of this disease, because the most affected populations correspond to those living in overcrowded prisons (1120 registries), migrants (876, a figure that includes displaced persons due to the internal conflict) and indigenous people (720).

The journey of artificial intelligence

A simple Excel sheet. Is the beginning, a new tool to treat tuberculosis in Colombia began to be built. This is a patient registry that pulmonologist Awad had been compiling while performing his duties at the Santa Clara Hospital (according to his consultation and from the data collected during the health brigades that the institution conducts in vulnerable populations). This was a valuable exercise, but it showed that there was a long way to go.

“The differences in data disposition are abysmal. For example, China, with its cities of millions of inhabitants, always studies very easily. Here we have to dig a little deeper into the data,” says Álvaro David Orjuela Cañón, an electronic engineer, PhD. of Electrical Energy (focused on computational intelligence in health) at the Federal University of Rio de Janeiro, and associate professor in the School of Medicine and Health Sciences at Universidad del Rosario.

In 2015, after completing his doctoral research with tuberculosis cases in several hospitals from Brazil ([the World Health Organization](#) –WHO– estimated 104 000 infections in the neighboring country during 2021), Orjuela landed in Colombia with the aim of researching and finding solutions for the treatment of the disease. And to do so, it brought not only the results of its trials in Brazil, but also an unexpected ally: artificial intelligence (AI).

His idea consisted of an instrument that would allow the doctor at the first consultation, and from the sociodemographic information provided by the patient (neighborhood of residence, conditions of his home, number of people with whom he lived and possibilities of access to the health system, among other data), as well as the description of his symptoms, determine with the help of statistical models and data processing the probability of whether or not he suffered from tuberculosis.



Álvaro David Orjuela Cañón, associate professor in the School of Medicine and Health Sciences at Universidad del Rosario, explains that it would be ideal to include this artificial intelligence-based analysis model in a mobile application that allows doctors to prioritize the limited resources at their disposal when deciding what treatment to apply to a patient with symptoms of tuberculosis.

It would be a preliminary step before the application of bacilloscopy or, in certain cases, other tests such as mycobacterial culture, a molecular test or, for extreme cases, a puncture that determines whether tuberculosis has affected the pleura of the lung. This would allow treatment to be started immediately, reduce the risk of infection, and, in extreme cases such as those in remote regions of Colombia with restricted health coverage, avoid patient cost overruns.

However, to build it first, everything needed data. And although he found a good harvest in the databases of the Sivigila, Orjuela soon ran into a difficulty: “The system compiles the cases already confirmed, but to train the AI models we needed to show them the discarded ones as well.”

When he tried to access the latter, he received many refusals from various health institutions in Bogotá. Until it aroused the interest of the pulmonologist Awad and the Hospital Santa Clara, reference in Colombia in the treatment of tuberculosis if you con-

sider that [It was opened in 1942](#) as a national tuberculosis sanatorium. The innovative AI-based analysis proposal began to be built, then, with the Excel file in which, for several years, Awad had been recording data about the patients he treated, a job in which Dr. Orjuela also collaborated.

The project itself would take a radical turn in 2018. Orjuela, who at the time worked at Universidad Antonio Nariño, received along with his colleague [Andrés Jutínico](#), the pulmonologist Awad and the [Integrated Sub-network of Health Services](#) Centro Oriente E.S.E. -to which the Santa Clara belongs- a grant from the Ministry of Science, Technology and Innovation to implement its idea,

called [“Generation of alternative models based on computational intelligence for screening and diagnosis of pulmonary tuberculosis.”](#) This support provided access to the institutional databases that were crucial for advancing to the next phase: training the AI tool through machine learning.

For this, it was necessary to implement up to five different models of information analysis (see box) necessary to debug the data and process them according to six variables within the context of Santa Clara, all inquiring about the socioeconomic and demographic reality of the patient: biological sex,

Of Trees, Neurons, and Other Models of Artificial Intelligence (AI)

To construct artificial intelligence models, scientists have relied on various techniques. These include:

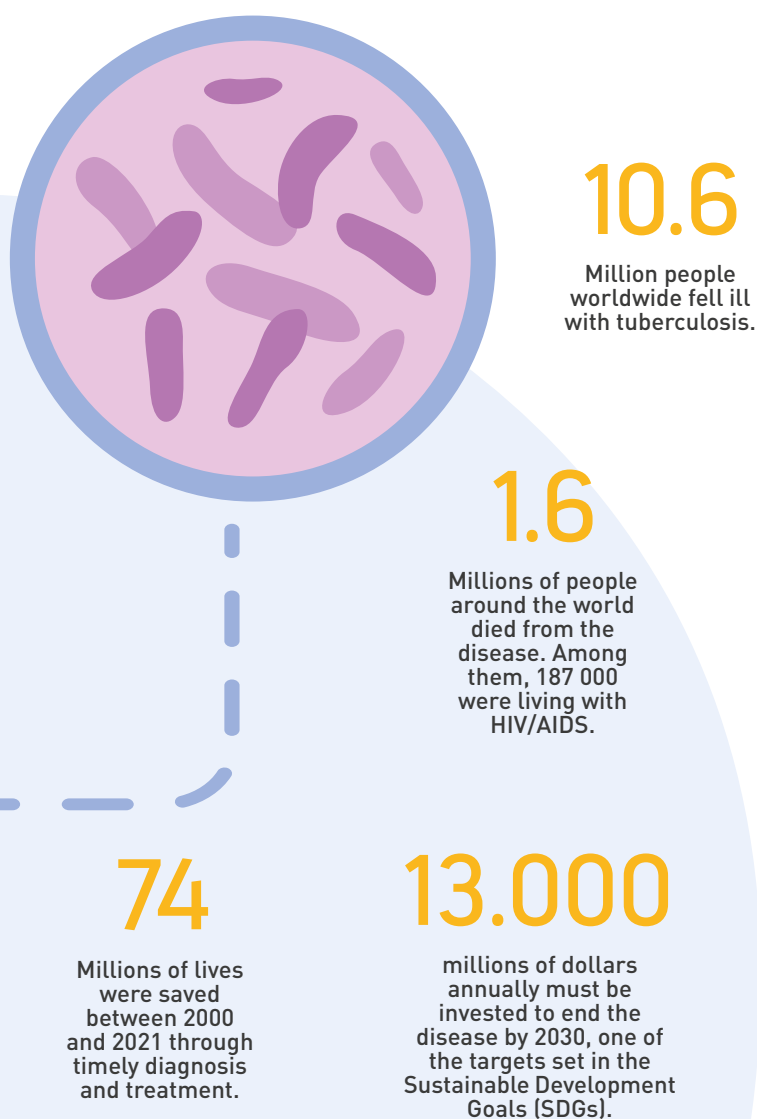
- **Decision Trees:** This method is used to solve problems in data classification. It is typically represented as a flowchart constructed with internal nodes that reflect the characteristics of a dataset; its branches constitute the decision rules, and each leaf (node) represents an outcome.
- **Random Forests:** Algorithms built from decision trees. This technique allows for ensemble learning by combining multiple classifiers to address a complex problem and improve the performance of the employed model.
- **Support Vector Machines:** Also used for classification tasks, these allow for the construction of the optimal line (or boundary) of decision to establish the opposition values between two categories of data and, through probability rules, predict their recurrence in the future.
- **Neural Networks:** Based on the model of brain organization and connectivity, this algorithm links decision nodes and enables the deciphering and identification of the processing path of a given data point.
- **Logistic Regression:** One of the most widely used algorithm. It is employed to predict the dominant variant of a group of independent variables, thereby forecasting an outcome.

WHO figures on tuberculosis (2021)



age, population group to which it belongs, Bogota locality of residence, suffering or not of HIV-AIDS and whether they had received retroviral treatment. Subsequently, the results obtained in the company of medical personnel were analyzed.

“It was difficult to establish which data were useful and which were not, because there was a lack of information,” Orjuela explains. “We detected several inconsistencies, such as people who had started treatment long before they entered the hospital records. In those cases we turned directly to the doctors. They knew the details of the data acquisition, which served quite well.”



The research, which was expected to be concluded in 2020, also suffered from the consequences of the COVID-19 pandemic, as movement restrictions conditioned the phase of prospective studies that the research team had designed and forced the researchers to focus on retrospective calculations. However, in 2021 they concluded their implementation and a year later they shared their findings: first, in a forum with INS where they received interest from different scientific communities to expand the scope of their analysis, and second, in the article “[Machine learning in the loop for tuberculosis diagnosis support](#),” published in the specialized journal *Frontiers in Public Health*.

However, more work is still needed to make the research clearly practical. In Orjuela's opinion, it would be ideal to include this analysis model, along with the technology it employs, in a mobile application that allows doctors to prioritize the limited resources at their disposal when deciding what treatment to apply to a patient with symptoms of tuberculosis: “It is not a lie that the health infrastructure in the country is poor or insufficient. In some areas there is only one health post, not specialized medical staff or laboratories. That is why with this development we are looking to give a hand to that doctor who is in those areas so that he, depending on his expertise, knows what he can do with his patients.”

For Awad, however, this implementation is a milestone. His memory is very clear about all the efforts that have been made to make tuberculosis just a bad memory: from the first sanitariums of the early 20th century, copied from European models to combat the disease, through the coordinated global actions in the time of the explosion of HIV-AIDS (which weakens the defense system of patients and increases their vulnerability to the tuberculous bacillus), until the current moment, when the [National Plan for its eradication](#) contemplates coordinated protocols and actions to mitigate the resistance of the microorganism to medicines.

His years of experience allow him to elucidate that these efforts will overcome the reality of the Colombian health system and one of its main obstacles: limited resources. “This is an absolutely lucid investigation. Here what we are doing is trying to select a little better which patient to treat and with which procedure”, concludes the expert. “It is certainly an important step against TB, because AI is going to keep going and so is scientific research.” ■



How academics perceive publishers in Colombia



The results of scientific research are usually published in indexed journals, but the role of academic books and book chapters as indicators of the performance of scientific activity is rarely mentioned. To understand their true role, a study, in which researchers of Universidad del Rosario participated, analyzes the prestige of Colombian and foreign academic publishers among the country's academics.

By Felipe Abondano

Photos by UROsario

DOI https://doi.org/10.12804/dvcn_10336.42751_num7

Publishing and being read is difficult. It is even more so in the universe of scientific research, especially in the social sciences. Months or years of research that aims to shed light on the challenges facing the country, including the world, may end up archived in shelves and basements where others will never look. Which factors influence whether research is considered valuable, of good quality and relevant?

How much of this corresponds to a perception of academic quality?

To understand this phenomenon in depth, researchers [Juan Felipe Córdoba-Restrepo](#), director of the Editorial Universidad del Rosario; Elea Giménez Toledo and Jorge Mañana Rodríguez, of the Research Group on the Academic Book ([Ilia](#)) of the Consejo Superior de Investigaciones Científicas de España (CSIC); and [Esteban Giraldo González](#), of

Universidad Carlos III de Madrid, conducted a study entitled “Quality and prestige of the academic edition. The Colombian case,” published in the journal *Signo y Pensamiento* of Universidad Javeriana.

Draw the Colombian editorial map

The objective of this study was to define the landscape of the academic publishing sector in Colombia with an emphasis on identifying those publishers recognized by the academy. It was sought not only to determine which are the most prestigious national and international publishers in this context, but also to evaluate the relationship between prestige and quality in the exercise of disseminating knowledge.

To respond to their approaches, the study group made a detailed analysis of the typology and geographical origin of these outstanding academic publishers. Likewise, it carried out a comparative study with the results of surveys carried out in Spain, with the purpose of identifying some aspects related to the circulation and recognition of books in Spanish, in order to generate a broader and contextualized vision of the academic editorial panorama in the field of the Spanish language.

The results of the study show that in the imagination of Colombian researchers there are only 167 national publishers specialized in the publication of their research or academic works, although in reality there are more than 300, and of these only a few are considered to have prestige and quality.

On the other hand, the analysis of the authors concludes that the predominant format in Colombia to disseminate the human and social sciences is the book, while databases and journals are the main format for the basic and applied sciences. This, in their concept, limits the scope of dissemination of the humanities and social sciences, and may prevent the Colombian academy from multiplying its publications.

In addition, in Colombia, academic publications are limited to university work, while in the international landscape private or commercial publishers usually have an academic line that facilitates the dissemination of knowledge. Therefore, if prestige and quality go hand in hand and only universities publish, the number of recognized or trusted spaces to showcase research is reduced.

The methodological challenge

The study was based on a survey sent to 2426 Colombian academics, which investigated the researcher's profile, his knowledge about Colombian academic collections and



publishers, foreign academic publishers, and Colombian academic collections. Finally, they were asked about the characteristics that they considered identifying the prestige and quality of a publisher.

The researchers created lists of Colombian and foreign publishers, integrated them into the questionnaire, and were able to explore which of them were known to the academics. They also asked respondents to sort them according to their own prestige rating.

Thus, they obtained 408 responses from the academics linked to the study, characterized by being professionals and teachers specialized in human and social sciences, with solid trajectories in different institutions of higher education in the country. These participants were identi-

Gross accumulated prestige and percentage of total prestige accumulated by publishers in different countries

ICEE: quality indicator of publishers. Source: Table 4 of the original study.

* ICEE added
** % of total ICEE



International
* 316 ** 3.4
Under this heading are grouped multinational publishers, based in several countries, which have been mentioned by academics

note that certain reputable publishers show lower ratings when the evaluation is limited to the perspective of researchers in general. Conversely, there are editorials that obtain a more favorable position when the opinion of those who have previously published on their platforms is taken into account. This finding highlights the importance of considering diverse perspectives and experiences when assessing the prestige and quality of publishers in the academic context.

The figures obtained allow us to identify from which countries the most recognized publications by Colombian academics come. The list is topped by Spain, the United States and the United Kingdom, and closed by Israel, Portugal and conglomerates of indistinct countries.

Likewise, to explore the concept of prestige, academics were asked to indicate which factors are more or less important to configure the prestige of a publisher. The most voted was "scientific quality of published books", while the least voted was "awards received by the publisher."

A Future Commitment

The study concludes that it is possible to propose a first approach to the Colombian edito-

rial-academic landscape. Although the methodology and results allow to create a map of the publishers, the actors and the forms of publication most welcomed and active in the production of knowledge at national level, the work also opens the door to the recognition of forms of publication that sometimes remain outside the international rankings and do not receive the same attention as the publications of the indexed journals.

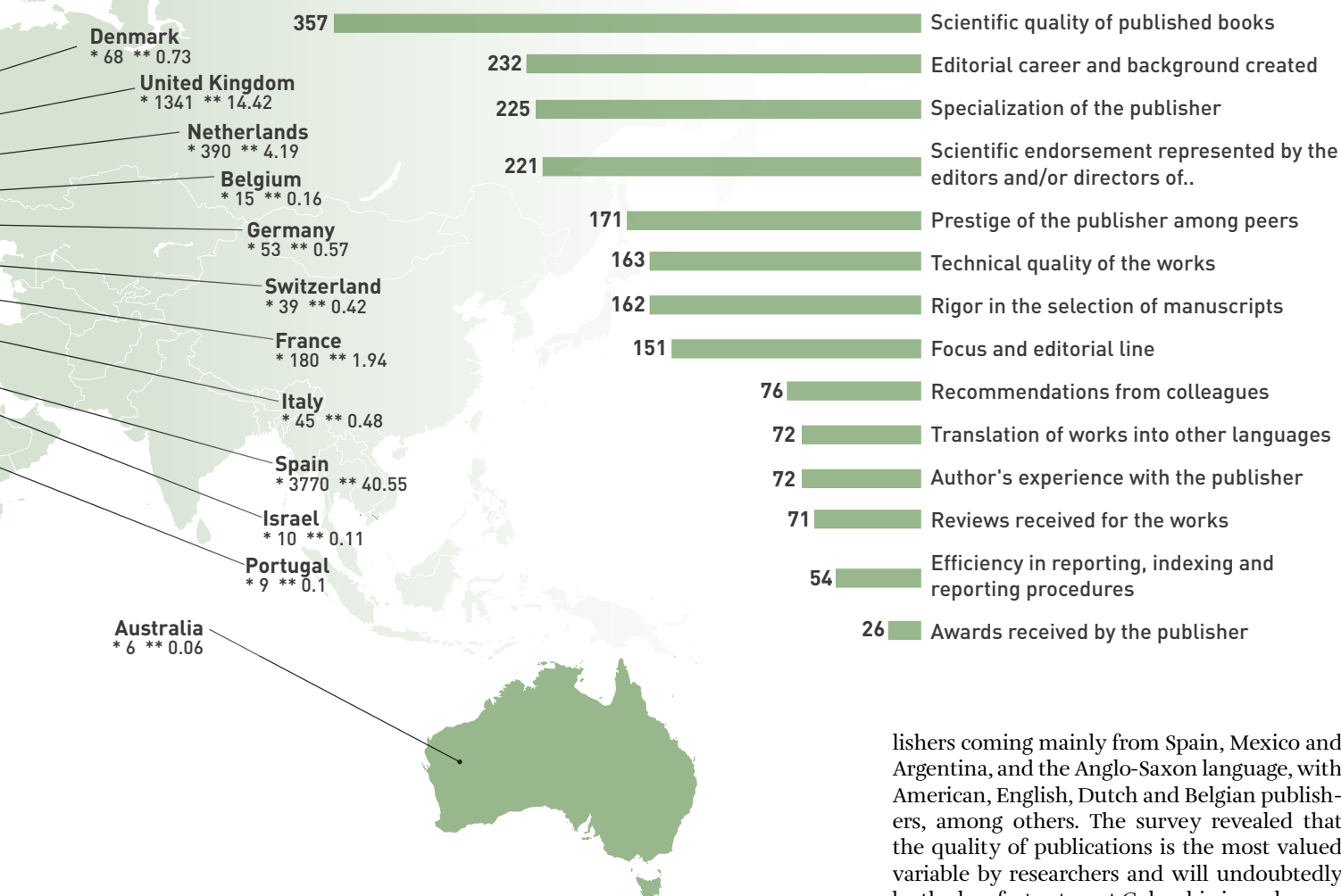
Researchers reflect on their medium to understand not only who publishes and where, but also how the same academic medium evaluates and rates channels of disclosure of scientific production.

In this way they conclude that in order to have recognition and visibility it is necessary to standardize the forms of evaluation of the publications and thus allowing for discussions of quality beyond prestige.

Component of the “prestige” concept of the publisher

Here you can see the components that make up the prestige from the answers of the interviewed academics.

Source: Figure 1 of the original study, Giménez Toledo, et al. Quality and prestige of the academic edition. The Colombian case. Signo y Pensamiento, 2021, 40(78).



The study team states that “developing complete data sources on the edition of academic books in Spanish is a relevant task to make visible and recognized the scientific activity of researchers who write about their research results, as well as that of the editors who transform these texts into books.”

With this in mind, two things become evident: first, that the study not only aims to make visible an editorial and academic practice that transcends the international trend of publishing articles in databases (such as Web of Science by Clarivate Analytics, and Scopus by Elsevier) but also to utilize books as a means of knowledge dissemination. Second, the research highlights the importance of promoting high-quality publishing platforms to reduce the gap between Spanish and Latin American publishers, as well as between these and English publications. Likewise, this type of studies helps to combat the dispersion of information and allow us to understand the world of publishing in Colombia, especially in relation to the academic universe.

For example, the most prestigious publishers come from two distinct backgrounds: the Spanish language, with pub-

lishers coming mainly from Spain, Mexico and Argentina, and the Anglo-Saxon language, with American, English, Dutch and Belgian publishers, among others. The survey revealed that the quality of publications is the most valued variable by researchers and will undoubtedly be the key factor to put Colombia in a place on that list of those rated as prestigious.

In the opinion of the consensus of the study, only with the construction of information systems based on context and evidence can we favor the quality of the edition of knowledge in Spanish and other languages. Efforts like this one, which allows us to know what exists in the country and how it is valued, are a very important first step to create new national models of evaluation and production of knowledge. Another inspiring example is given by the Latin American Council of Social Sciences (CLACSO), which since 2019 has organized the Latin American Forum on Scientific Evaluation (FOLEC-CLACSO) and is already in its third version, always with the support, among others, of the National Council of Science and Technology (CONACYT) of Mexico and the National Council of Scientific and Technical Research (CONICET) of Argentina. ■

A large, bold, white number '6' is positioned on the left side of the image, partially overlapping the background photograph. The background is a dark, grainy photograph of a street scene. A group of people, mostly men in suits, are standing in a line on the sidewalk. In the foreground, a person is walking towards the camera. A banner is visible in the background with a logo and the text 'COL' and 'SE'. A street sign above a lamppost reads 'Paradero'.

6

Leadership and social innovation

Students from Universidad del Rosario participate in the Silence March. Author unknown. 1989. Photograph. Album 08, photograph 022. Historical Archive of Universidad del Rosario (AHUR)



SEIKO

ORIENT

REGIO MAYOR DE NUESTRA
ÑORA DEL ROSARIO

EN
SILENCIO
PEDIMOS
GRITOS





Women from Universidad del Rosario motivated by research

These two researchers, coming from different fields, show that the path of research is permeated by curiosity, as well as by the appetite for knowledge and generosity. Their stories contribute to the strengthening of their respective professional areas and are leaving an enduring mark on the academic environment.

By Lina María Leal Villamizar

Photos by Alberto Sierra, URosario

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Forty-four percent of those engaged in scientific research are women, even though they constitute the majority of those who complete their undergraduate and master's degrees in Latin America, according to a [2023 Ibero-American Observatory of Science, Technology and Society \(OES\) study](#). In the case of Colombia, the report indicates that 27 percent of women access higher education; however, [the National Information System of Higher Education](#) highlights that for postgraduate levels in 2022 it is possible to reduce the gap with 49 percent of women who manage to finish their studies.

“This lower participation of women is an important factor at a key level for their subsequent insertion into the scientific

system,” warns the OEI in the report. It also adds that proof of this is that less than half of the publications of Ibero-American scientific articles had female authors.

Two researchers of Universidad del Rosario, undergraduate and graduate, stand out for their contribution to the growth of research in their respective fields of interest: the environment in criminal law and *marketing* in higher education.

[María José García Prada](#), a sixth-semester student in the Faculty of Law, and PhD. Marelby Amado Mateus, from the School of Business Administration, are examples of inquisitive minds that are changing the way we perceive and understand the world around us and that with their contributions to academic publications manage to reduce the gender gap in the vast field of research. Both demonstrate that curiosity and a desire for knowledge can lead to discoveries that transcend borders and cultures.

Studying the Role of the Environment in Jurisprudence

María José remembers how, as her classes were taking place, questions began to arise that often had no answer. This is how in the corridors of the university, when she spoke with the professors at the end of the classes, she met the PhD. [María Camila Correa](#), who became her mentor in the world of research and invited her to participate in the [Criminal Law Research Group](#). Since then, they have addressed issues related to gender and the environment. García Prada points out that this exercise broadened her perspective, her mentality and her way of seeing life and jurisprudence. All of this led her to fall in love with research and criminal law.

When the opportunity arose to participate in the [XIII Edition of the 2023 National Seedbeds Competition](#), focused on the interdisciplinarity of the environment, she joined fellow program student Alejandra Milena Oviedo. Together, they took on the challenge of investigating the limits, challenges, and scope of the crime known as “ecocide” in Colombian law. This refers to the destruction, incapacitation, disappearance or generation of a “serious environmental impact” that damages natural resources, in violation of existing regulations.

According to what the young researcher explains, this is a relatively new crime in Colombia, since it takes effect in [2021 with Law 2111](#) and has not been widely discussed in the legal field. However, legal protection of the environment has boomed in recent years, giving it a leading role at the national and interna-



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According to a report by the OEI in 2023, 'less than half of the publications of Ibero-American scientific articles had female authors.'

tional level in academic debate. “Considering that crimes against nature are recent, there are still gaps regarding the application of the norm to counter them. That is why we wonder if the sanctions established in criminal law are the best tool to guarantee the protection of the environment or if public policies or other measures are required,” he warns.

For a month, the students searched the existing legislation in the country, looking for the background that has led to the legal protection of the environment and its



subsequent relevance in the criminal field. They also identified the criminalization of ecocide in Colombia, from the scope of criminal protection and its interpretative difficulties. And from the above they reflected on the implications of ecocide from an "ecocentric" and not anthropocentric perspective, where the reason for protecting ecosystems and biodiversity is given by its own value and not by the utility it generates to humans.

"The environment has been recognized as a subject and object of rights, since its protection is a measure that allows the guarantee of the right to a healthy environment and the fulfillment

Model for posterity

The analysis of the study data included a structural equation model. What it actually shows is that the factors that make up each of the variables (perceived value, student experience and reputation) are related and can influence the reputation of universities. Therefore, it is suggested that managers of higher education institutions can manage these variables to achieve better performance and achieve higher reputation standards.

of state obligations to ensure the sustainable development and conservation of natural resources," the researchers maintain. In this sense, the care of the environment constitutes a joint responsibility of all in society and legislation must ensure its protection.

Research reveals that criminal law is a necessity to protect ecosystems. And, although it is effective in many cases, it is insufficient, since so far the legislation has a limited character given its difficulties in determining the extent of the damage, those responsible and those affected, and is solely focused on punishing harmful actions, without really having clarified what a "serious environmental impact" is. It must therefore be complemented by a comprehensive plan of action that includes measures to prevent, mitigate and repair damage to natural resources to strengthen the legal framework and achieve real protection of nature that guarantees the right to a healthy environment, sustainable development, conservation of resources and the survival of humanity.

Last June, the students presented their results in the university's seedbed competition, which received 20 papers from territorial entities such as Medellín, Cartagena and Cauca. García and Oviedo won the first place in the competition, and as a reward, their research results will be published in a book produced by UR.

"It is a support for us as students and empowers us to see that not only graduated individuals have a voice in the academic debate, but we can take our questions far beyond the topics covered in class. This has been an expression of curiosity, a desire to continue research-



María José García, a student in the Faculty of Law, entered the world of research as a member of the Criminal Law Research Group where they address issues related to gender and environment.

ing... and to take on the world with questions. And while many of them cannot be answered, what is valuable in research is the journey, not just the result," concludes María José.

The Importance of Considering Students in the Reputation of Universities and Research Centers

[Marelby Amado Mateus](#) is now a Doctor of Science in Management of the School of Business Administration of the UROSARIO. During her 13 years of teaching experience in the field of business administration she has focused her research on strategic marketing management. In the framework of her doctoral thesis in 2018, she focused on a topic that she not only taught, but also observed in the classrooms and university corridors: the relationship between the perceived value of students of the educational service from their experiences in an educational institution and the reputation that this can generate for the university.

The reputation of higher education institutions is obtained through various assessments from stakeholders over a period. It is usually evaluated by indicators that cover research results, innovation, rankings and performance in knowledge tests, among oth-



er parameters. Because of their importance, universities allocate significant resources to strengthen their prestige and seek high-quality accreditation. However, is this acknowledged and meaningful to students?

PhD. Amado's thesis proposed to analyze the role of university student perception in the impact of universities' reputation. For this, she began by recognizing that within the multiple stakeholders that an institution has, the student plays a leading role in their role as clients and co-creators of the education service. Amado emphasizes that the university student is classified as a client only at the time of enrollment, and from there emerge roles that require specific management or administration during each of the stages that goes through its training process.

To advance this study, the researcher surveyed 385 students from two private universities: one accredited in high quality, according to the standards established by the Ministry of National Education, and another that had not achieved this recognition. She wondered: What is the relationship between perceived value, customer experience and reputation in accredited and unaccredited private universities, from the student's perspective?



The conclusion of her study states that, although high quality accreditation is a relevant element, it does not stand out in the perception of students of both types of the universities evaluated. This can occur to the extent that students tend to assume that all institutions have some level of accreditation and do not differentiate high-quality from qualified registration. On the contrary, the researcher emphasizes that what really makes the difference and adds value is the experience of the university student in his or her educational process, as well as the accumulation of opinions that make up a solid reputation, among other relevant aspects.

“To give the best experience to the student is to train them in what they require and need to develop learnings and skills that allow them to perform in a particular sector. In this way, he or she is the forerunner of the brand, that is, of the reputation of the university. The same thing that would be done in other types of sectors applies to the field of education,” says Amado Mateus, who with the results of his research work validated a tool or model that allows evaluating performance from the perspective of the student, so that university institutions can manage their reputation.



Marelby Amado Mateus, from the School of Business Administration, explains that “giving the best experience to the student is to train them in what they require and need to develop learning and skills that allow them to perform in a particular sector. In this way, he or she is the forerunner of the brand, that is, of the reputation of the university...”.

The study attracted the attention of teachers of Universidad de Alicante, Spain, where it was replicated with a sample of 333 students from that educational institution.

“I was surprised that the structural model behaves in a similar way, which indicates that it transcends the cultural and shows its solidity,” Amado says. Even a researcher from Australia has expressed his motivation to apply the model in Australia. In this regard, Professor Marelby emphasizes that these connections interweave and enrich research.

“I am delighted that someone can and wants to use my research, which was divided into seven specialized articles, [most of which were published](#) in high-impact international academic journals, such as *PLOS One*. I hold nothing back, so anyone can download the data ([see link](#)), the instruments and do their own analyzes. Everything will be available for use for academic purposes. Knowledge is for sharing, and that is what researchers do,” says the academic whose questions and ‘appetite for knowledge’ now represent a model that promises to leave a mark on different scenarios in Colombia and the world. ■

Rhapsodies: A Journey of Resilience and Transformation Post-COVID

The Covid-19 pandemic has left both physical and mental health repercussions in society. For this reason, occupational therapist Karim del Rocío Garzón, along with singer and songwriter Patricia Moncayo, created the project "Rhapsodies of Recovery in post-COVID key" in order to improve the integral health of patients who recovered after going through the ICU.



By Stefany Hernández

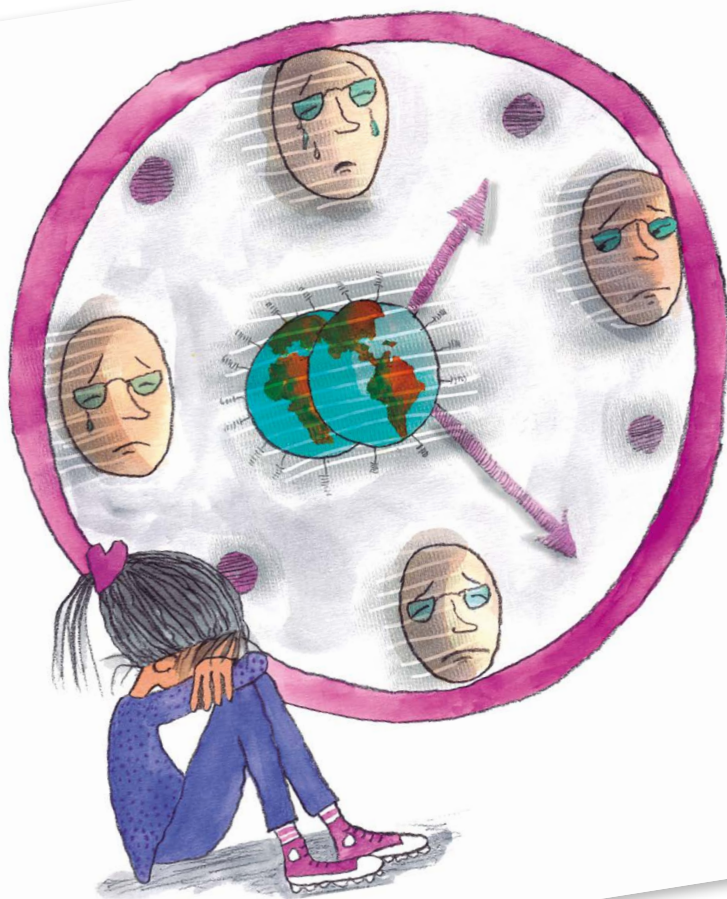
Photos by Alberto Sierra, U Rosario

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“Nothing comes out of nothing” is a phrase attributed to the Greek philosopher Parmenides, and what better example for this premise than to talk about the creation of the project [Rhapsodies of recovery in post-COVID key](#). The story begins in early 2021. Ana Garzón, or “Anita” to her family, a wife, mother of two teenagers and sister of the occupational therapist in the School of Medicine and Health Sciences at Universidad del Rosario, [Karim del Rocío Garzón](#) was admitted to the intensive care unit of the Shaio Clinic (Clínica Shaio) in Bogotá, due to Covid-19. There were weeks of anxiety and worry for family and friends, as they could only receive news of her through a video call from the doctors who treated her.

“She was discharged and returned to home. At that time she had to do the pulmonary rehabilitation sessions through the virtual platform Zoom, as her cardiopulmonary system had been severely affected,” recalls Professor Karim. “She started to participate and I managed to accompany her in some sessions. Suddenly I realized that she was starting to get tired and feel





exhausted, both physically, by the aftermath of the disease, and mentally, due to the confinement and monotonous sessions.” Karim says that her mood began to decline, not only because she was infected, but also due to the forced doctor-patient relationship established through virtual means. Therapies like blowing a ball and holding her breath were treatments that felt did not need accompaniment. At the same time, the clinical examinations and surveys she underwent as a patient of a virus, that was still quite unknown made her feel more like an object of study than a normal person, one who felt fear, anguish and stress, and who needed the medical staff to be more empathetic with her situation.

From Karim's vision as an occupational therapist, Anita's situation is no stranger to a post-COVID reality for other patients and their families. The “objectification” of the patient, as she calls it, gave her the opportunity to consider the creation of a comprehensive therapeutic program that unites physical and mental health, so that the person diagnosed does not give up medical treatment and at the

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The results of the project were more than just teamwork: a poem was created, the unpublished song *Time to Dream*, an illustrated book and a virtual interactive module were created.



same time feels that their emotions are validated during the process.

“I looked for a different alternative that would complement the therapies from a more human perspective; something that would happen through art,” Karim explains. “I have no knowledge of art, but I am a fan of all types of its expressions. So, I checked, I researched and I found that singing is a very nice opportunity to work all that cardiopulmonary aspect of individuals. That is, it is not merely an instrumental activity that only makes you hold and release your breath, but it has an emotional and spiritual complement for people. I reviewed the scientific literature, not precisely with references to Covid-19, but on the articulation between singing and cardiopulmonary health. Then I thought that this would be a wonderful tool for people who suffered from the disease to achieve, through singing, another type of well-being,” adds the specialist.

The circle of singing

The idea of comprehensive respiratory therapy had to be built together. [Karim del Rocío](#), in addition to being an occupational therapist, is a doctor and an associate professor in the School of Medicine and Health Sciences at Universidad del Rosario, where she sought support to develop her project from the [Faculty of Creative Studies](#). There she met



the composer and professor of Musical Theater, [Patricia Moncayo](#), who after listening to the idea of a comprehensive post-covid program, contributed her knowledge in musical creation, breathing and composition to carry out Karim's goal.

"Patricia tells me: 'Karim, in the world of singing there is a figure called the circle of singing, which has different nuances and different developments, but all framed in this objective.' So we proceeded to give an identity to that circle," Karim says. The singing circle is a narrative interconnection resource that is separated by modules to help improve, step by step, breathing, voice management and group harmony.

Likewise, Universidad del Rosario, within the framework of the [RUTA 2025](#) vision, launched the first edition of the [Innovation 2021 program: "Training teachers for teaching-learning in the STEAM model in times of transformation,"](#) which promotes the participation of teachers in strategies and projects that generate agents of change, for the social good and the university community. The agents of change are people trained by these teachers who promote the knowledge obtained in the community where they live. There, Karim and Patricia presented the proposal "Rhapsodies of recovery in post-covid key."

This initiative aimed to work with student volunteers from different faculties of the university and prepare them as agents of change for post-covid patients. "The idea in developing this project was not that we were all respiratory therapists, but that



For the professor of Universidad del Rosario, Karim del Rocío Garzón, the "objectification" of the patient, as she calls it, gave her the opportunity to consider the creation of a comprehensive therapeutic program that unites physical and mental health, so that the person diagnosed does not give up medical treatment and at the same time feels that their emotions are validated during the process.



After listening to the idea of a comprehensive post-covid program, Patricia Moncayo, composer and professor of Musical Theater in the Faculty of Creative Studies at URosario, contributed her knowledge in musical creation, breathing and composition to carry out the project.



it became a civic commitment, that is, that any citizen could generate an accompaniment, an understanding of the reality that these patients live, whether an urban designer, a psychologist, a journalist, etc.”, she emphasizes. In addition, Karim narrates how she began to receive support from other programs at the university; such is the case of the Psychology program, through Professor [Ximena Palacios](#), who contributed knowledge from the concept of salutogenesis, which is the relationship between the well-being of people and the management of emotions under adverse circumstances, such as stress, and that can trigger some physical illness.

Agents of change

Professor and composer Patricia Moncayo says that this project was built with six modules or “acts”, as they called it during the activity: start and purpose; exploration; discovery; achievement; assembly and performance. Each module had two sessions of one hour each. However, when the project started, face-to-face care

was not yet an option, given the restrictive measures of the pandemic. That is why they implemented the program and their call to action through virtual meetings. One aspect that surprised its creators was that the final team was made up entirely of women from different programs and faculties: musical theater, psychology, physiotherapy, speech therapy and urban design. Patricia knew that the biggest challenge in the program was the different levels of knowledge about singing that the participants had. However, again, Karim was surprised: he found that there were no judgments, criticisms, or rivalry between them; on the contrary, the activity promoted trust and security in what they were doing. “For them,” says Karim, “it was more important to know that their contributions were recognized in a space, and that was what we wanted to achieve with our agents of change. That we feel like makers or builders of lives working as a team for the benefit of others.”

Furthermore, the results of the project were more than just teamwork: a poem was created, work of the psychologist, assistant professor and co-author of the project [Ángela Vera](#); the unpublished song *Tiempo de soñar*, already registered with copyright, in which the teachers and students participated during the activity; an illustrated book whose drawings were elaborated by Professor Olga Cuéllar; and a virtual interactive module by the team of the Resource [Center for Learning and](#)



[Research of Universidad del Rosario](#), thanks to which they captured in themselves a life experience while sharing their post-covid stories. From all this a great friendship arose.

Humanity was present

Although Anita, the sister of Professor Karim del Rocío, is not linked to the university project, she was always present in the process of creating, executing and evaluating the results. The authors had the opportunity to interview her as a patient for the development of the themes that the circle of singing would address.

"I think Anita is really the backbone of the start of this project," Patricia says. "Being able to work with her made us see a much bigger spectrum about how really a person who has been in such a vulnerable, at-risk condition can be so resilient, so responsive, and can generate so much cohesion from their painful experience. It really became a kind of pre-teaching at the start of our project, and in large part all the design we achieved of the work sessions for the students, considering that the students are agents of change. Anita embodies this as well."

Karim shares that when Patricia learned Anita's story she was moved and volunteered to help her continue in the respiratory therapy sessions through singing, to which Anita efusively replied: "Karim, this is something else," meaning the therapy pro-

It is 'Time to Dream'

The song *Tiempo de soñar* (Time to Dream) was composed by the students who participated in the project, supported by Patricia Moncayo, as a singing coach. The melody, vocals and accompaniments were a team effort between the students, Patricia and the music teacher Oscar Cuesta from the Faculty of Creative Studies. "For the song we did all the paperwork before the Ministry of the Interior to obtain the corresponding copyright. This way, students can put into their resumes that they are the authors of a song," Karim says.

Therefore, *Tiempo de soñar* also has a video performance that shows the students singing. And if it is the picture book, you can access it for free through the following QR codes.

ILLUSTRATED BOOK



VIDEO RHAPSODIES



duced a sense of well-being that was very different and better than what she had previously experienced.

However, it is not only Anita who testifies to the excellence in the results of the hard work of the team led by Karim. On November 3, the Colombian [Association of Faculties of Psychology \(Ascofapsi\)](#) awarded them with the 2023 Teaching Innovation Award in the group modality: "We were honored with first place after submitting our experience in a call for training programs in Psychology," concludes Karim.

The call for these awards for teaching innovation was made at the national level with the aim of highlighting the contribution of teachers to training in the field of psychology, and their contribution to knowledge through innovation and the creation of programs that contribute to the mental health and well-being of the population. ■

Lilia del Riesgo: “Everything can be improved in this world.”

Professor Lilia del Riesgo Prendes is Colombian by adoption, she has been in the country for 28 years and says she has never felt foreign. As a physician and specialist in clinical biochemistry, she has dedicated herself to studying topics such as metabolic markers of perinatal hypoxia, in search of achieving the survival of newborns. At Universidad del Rosario, where he has built a solid career spanning two decades, students and professors gratefully recognize his valuable academic and research contribution.

By Magda Páez Torres

Photos by URSario

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Between the warm lullaby of the island breezes of Havana and the cozy embrace of the eastern hills of Bogotá, the life of the teacher and researcher [Lilia del Riesgo](#) has unfolded. She has learned to enjoy the contrasts of the two lands she loves, Cuba and Colombia. The first gave her birth and the tools to train as a professional in the field of medicine; the second has allowed her to build a robust career in academia and research, with a range of achievements that have made her a benchmark for her colleagues and students.

For 18 years, she has been walking the corridors and classrooms of Universidad del Rosario, seeking to sow the seed of knowledge in hundreds of young people who happily nourish themselves from her classes.





"When I arrived in Colombia I felt in a very welcoming environment and I was able to develop in all aspects: in teaching, but also in research. When you emigrate, it feels strange initially, but I always felt very embraced, that makes me very happy," she says.

The first impact when arriving in a strange land was the intense cold accompanied by the dense clouds that frequently dress the Bogota sky, but as with everything in life, she ended up getting used to it and already feels fully adapted or "flattened", as they say in Cuba.

Before moving to Colombia she worked as a doctor in Cuba; there she specialized in Clinical Biochemistry and ventured as a researcher in the field of neurosciences. Then came the great leap: she emigrated in 1995 to Bogotá, where she began to work in research, in projects related to nervous system disorders and metabolic diseases of people of different ages. "I like that this specialty I chose has the three main areas: I have been able to dedicate myself to healthcare work with patients, as I did for some time, also research work and teaching," she says.

And that longing became a reality in Colombia, where she has been able to practice in different areas. She performed her social service in the Unit of Biology of Procreation of the Maternal and Child Institute; there she participated in metabolic studies of newborns and their mothers.

She ventured into teaching at Universidad Nacional and after a year she arrived to Universidad Distrital where she left her mark for almost a decade. By these strange coincidences of life, in 2005 she learned that there was a vacancy at Universidad del Rosario, where the echoes of his good work with students came and gave her the yes to start writing a new story.

"From the beginning it was very satisfying, a very smooth transition," says the teacher, who has taught biochemistry to medical, rehabilitation and graduate students. At first it was part of the Faculty of Medicine and Health Sciences but later it was linked to the Faculty of Natural Sciences.

In the [Méderi University Hospital](#) she continued with the study of metabolic markers of perinatal hypoxia in newborns, a crucial topic in her professional career. But what is the purpose of these studies, and why has Professor Lilia dedicated a significant part of her life to them? In summary, her research helps identify factors that may influence the development of disorders that mothers and newborns have during the perinatal period.

"Working with students greatly fulfills me, more than anything else. The close relationship I establish with them contributes significantly to improving the learning strategy and teaching methods."

"When I arrived in Colombia I felt in a very welcoming environment and I was able to develop in all aspects: in teaching, but also in research. When you emigrate you feel strange initially, but I always felt very embraced; that makes me very happy."



Lilia del Riesgo Prendes,
professor in the School of
Medicine and Health Sciences,
Universidad del Rosario.

The primary goal is to achieve the survival of the baby and have proper neurodevelopment.

"Biomarkers are molecules, compounds that are detected in blood and that can give us an approximation of the level of neurological damage that the child is suffering. Based on this, a decision can be made so that the child has frequent medical monitoring during the first years and thus achieves the best possible development," she explains.

One of the health problems that newborns can present is [perinatal asphyxia](#), aggression caused to the fetus or the newborn by the lack of oxygen and/or the lack of an adequate tissue perfusion (definition of the Therapeutic Diagnostic Protocols of the Spanish Pediatric Association) very common at that stage of life. "The child can suffer metabolic alterations due to a decrease in oxygen supply at the time of delivery, which can cause neurological damage that sometimes manifests itself in their school stage," she notes.



Currently, Professor Lilia intends to investigate, together with the team of the Méderi University Hospital, the impact of Covid-19 on pregnant women who suffered from the disease, how it manifested in children and whether complications occurred in the perinatal period (from 2020 to date).

She emphasizes that research is essential for humanity; that is why she insists on the need to expand knowledge about the great problems that prevail in a society.

“There are many environmental factors that are permanently affecting the development of populations: migration, displacement, poverty and its consequences, malnutrition or malnutrition. All of this impacts the progress of society. That is why we need to start with research at all levels. We have to do a multidisciplinary study that covers all aspects,” he emphasizes.

Her work is widely recognized by her colleagues. Professor [Alejandro Ondo](#), who considers her a mentor, attests to this. He shares that when he came to work at Universidad del Rosario and faced the challenge of teaching biochemistry to medical students, being a biologist by profession, “Teacher Lilia” helped him identify his teaching potential and adjust his knowledge to the needs of students. “She is a person who is always willing to collaborate; who is curious and creative, and who is constantly considering how the work we do at the teaching and research level can be improved.”

In this way, she has earned the respect of an entire academic community that recognizes the valuable contribution of the outstanding and beloved teacher during that path worked at Universidad del Rosario.

“The teacher is always motivated”

Throughout that time, Professor Lilia has enjoyed the appreciation and recognition of her students, who, in return for her teaching and dedication in classes, have repeatedly chosen her as one of the best teachers in the Faculty. The secret: “The teacher is always motivated,” she sums it up herself.

Not surprisingly, she has received several awards for his pedagogical work in Colombia: Juan Agustín Uricoechea y Navarro Teaching Excellence Award 2011; Distinguished Professor at Universidad del Rosario 2010; Recognition of Academic Excellence for the evaluation of teaching performance from the first semester of 2003 to the first semester of 2005; and Recognition of the Scientific and Investigative Work of the teachers of the School of Medicine and Health Sciences, among others.

In addition to her clinical research, she has devoted much of his time to improving pedagogical models, working hard on methodological improvement.

“The work with the students gratifies me enormously, more than anything else. This close relationship that I establish with them contributes a lot to improving the learning strategy and teaching methods,” she says.

As Professor Ondo says, she is a person who is always considering what the student needs to learn according to their professional profile and the disciplinary area they have chosen, to adapt the classes to these needs. “I think she does a very outstanding teaching job to get students to identify and value the importance of biochemistry in the professional field they have chosen for their future.”

And he adds that for that and much more the students profess enormous respect and affection. “They see her as a very warm, approachable person whom they can rely on, someone for whom they easily develop fondness and empathy. She has fought hard to make biochemistry a course that is taught with love and that students find their taste and learn it also with love,” she adds.

And that affection is clearly mutual, as the researcher shows, who expresses that the students with whom she interacts daily manage to transmit all their vitality and enthusiasm. “They are young people, with their whole lives in their eyes and in their hearts. That inspires you a lot.”

A Physician by Conviction

Although she was born in one of the epicenters of medicine in the region, Professor Lilia confesses that her choice was one of conviction. “I studied medicine for a very personal motivation. It is an inclination I had since I was a child, and thank God I’ve been able to walk this path. I am fortunate because I studied the career that I like and I have developed my whole life and my profession in that career,” she says enthusiastically.

Today, from the classrooms of Universidad del Rosario, she looks back with gratitude and continues to see the future with hope. Now she is not only a doctor by conviction dedicated to her professional mission, but also a complete part of Universidad del Rosario in every sense of the word: “I have been very honored since the first day I set foot here. The atmosphere is very familiar, supportive; it makes you feel at home. And when you sit in the house, you feel good. That is the spirit of the University at all venues and at all levels. You do not feel any different with the directives or with your close classmates, or with



the students... with anyone. Everyone is in an attitude of great collaboration, of finding solutions,” she emphasizes.

It should also be noted that she is Colombian, not only legally, but also with heart and soul; an island and Andean woman, who is debated before two nostalgias: “When I’m in Cuba I miss the dynamism of Bogotá much more than I miss Havana being here. However, here I always remember Havana a lot. It is a mixture of sensations that has enriched my spirituality.”

However, there is something that no one will ever be able to get out of his DNA: her love for the sea, the memory of the port of her hometown, where she watched daily the playfulness of the waves. “I missed that a lot, and I still miss it, because when you’re an islander, it’s hard to start getting used to the mainland.”

And although Bogotá has no sea, it has given her a career full of gratification and satisfaction. She knows that, like the



waves, life is in constant motion and, in the end, she will always be able to visit Cuba when the soul longs for the soft singing of the warm waters of the Caribbean. Therefore, once a year, she tries to return to her roots.

Her personality could also be considered a mixture of both places. Although she considers herself demanding, responsible and disciplined in all aspects of her life, an enthusiastic spirit emerges in her. “I see things from a good point of view, with that face with which I think you have to see things in life. Enjoy all the moments. The everyday is what fills you the most. If one is living with all the fullness and possibilities, age is a secondary issue.”

This is corroborated by Professor Alejandro Ondo: “She is a cheerful person, who, in general, always seeks to see the best of every moment and be in a good disposition. She is a very tender woman, with a strong vocation of mom, that is

why she is always aware and in the care of other people.”

Professor Lilia is convinced that “everything can be improved in this world”, that nothing is completely done. This is why she cares every day, not only about being a better person, but also about improving her pedagogical and investigative work.

For this reason she continues to travel between the classrooms and clinics, where she has been able to weave his dreams and contribute a great fee to improve the quality of life of patients; where she has been able to pay for the vocation of her students; where she has managed to build bonds with colleagues who admire and honor her legacy; where she has left an indelible imprint of love for knowledge. ■



7

Efforts that transcend research

Colonial courtyard in the Colegio Mayor del Rosario. Postal
photo. Anonymous. Ca. 1920 - 1932. AHUR, Alb 01 Fot057.





Historical monuments: Neither as still nor as silent as stones

Based on a broad research interest in how memory is built and how history is told to the country, Sebastián Vargas Álvarez, professor of History in the School of Human Sciences at Universidad del Rosario, led an interdisciplinary work around the historical monuments of Colombia. These reflections are compiled into two printed publications.

By Camilo Calderón Acero

Photos by Investigadores ECH, Milagro Castro

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"Bolívar passed through here" is a phrase repeated in stone in many of the municipalities of our geography. It is reiterated so much that it has even lost significant value. However, this simple reminder points out the importance of monuments for peoples and their memory. They are not only relevant for what they honor, but also for the sense that people give them over time.

Cases like the previous one allow to speak of a 'historicity' of the monuments, in contrast to that static and immobile conception with which it could be linked to the statues, obelisks, plates, pedestals, sculptures and other commemorative sites. This is the perspective that guided the research work led by the historian [Sebastián Vargas Álvarez](#), associate professor of History in the School of Human Sciences at Universidad del Rosario.

“The coined concept is that of historicity, specifically the one that links it with the study of monuments,” Vargas explains. “Thus, the central idea that motivates the research project is to think of monuments as specific historical objects, but at the same time they are contingent. They change over time, so they can be rescued, interpreted and reused in different ways and at different times. That is what the concept of historicity seeks to highlight,” he adds.

From this approach, since 2018 a broad research project was developed that included not only Professor Vargas, but also a research group, a seedbed and several experts from different universities and academic levels (between teachers and graduates). That hard work culminated in 2023 with two written works that compiled this complex investigative work.

These are the books *La materialización del pasado: monumentalización, memoria y espacio público en Colombia* (The Materialization of the Past: Monumentalization, Memory, and Public Space in Colombia) and *Mutaciones de la piedra: pensar el monumento desde Colombia* (Mutations of Stone: Thinking the Monument from Colombia), published by Universidad del Rosario. The first of these titles corresponds to a work in which different cases of study are recorded and detailed; many of them product of the work carried out in spaces such as the research group [Social studies of memory and heritage and Public history](#). This is a space coordinated by Professor Vargas together with teachers [Ana Guglielmucci](#) and [Héctor García](#), from the Anthropology program.

In this collective work, the interdisciplinary and critical approach to history, led and proposed by Vargas, materializes: “My experience has been focused on different objects, discourses and practices about the past, but that do not necessarily start from professional historiography or academia. That is why I was very interested to see how people, in different contexts and types of social agreements, interpret history and what they use it for.”

In 2018, this exploration of monuments begins, in which a critical analysis that values their magnitude prevails, while they are not only considered as objects placed in public space, but, in agreement, rescues their symbolic component. “Much of what exists is limited to inventories that only describe these works and that do not go beyond. That is why it is important to point out that monumentalization in our country has been exclusive and has generated that the representation of the national past in the public space is full of



Consular Commission to the Putumayo River and its Affluents, Peruvian Consul, Mr. Rey de Castro, Commissioner Mr. Lores, Commander Castro et al. [Photograph/16.5 x 11.8 cm], 1912, La Chorrera. Source: Photo Album. Taken in Journey of the Consular Commission to the Putumayo River and its Affluents (August to October 1912), Lima: Task, 2013, p. 66.

gaps. This invites us to think about how to build memory in the public space so that in reality they are plural memories and the diversity of this country is recognized through these representations in view: historical diversity,” says Vargas.

This is demonstrated by the destruction of statues that have occurred in recent years in various places in Colombia and the world: in Popayán (2020) and Cali (2021) with the demolition of the statues of [Sebastián de Belalcázar](#), in Bogotá (2021) with the statue [Gonzalo Jiménez de Quesada](#) in the plaza del Rosario; or those that have fallen in the United States and other countries in Latin America against Christopher Columbus or recognized slaveholders.

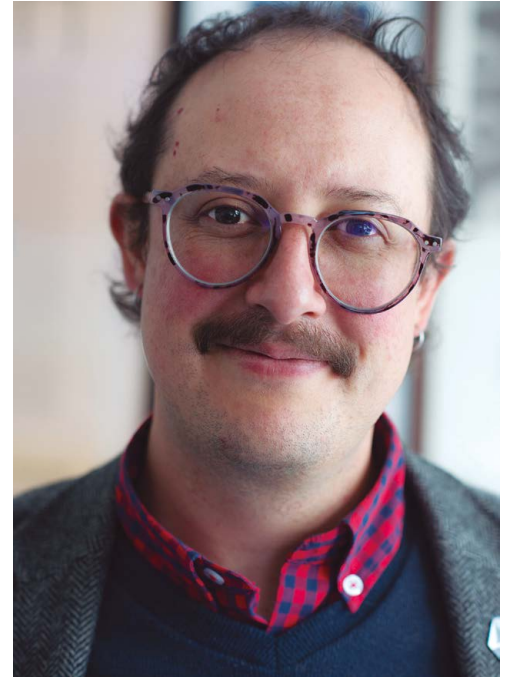
For this master's degree in Cultural Studies from the Pontificia Universidad Javeriana, these events are disputes over memory in the public space, since it is in the monuments where the historical story materializes. Hence, oppressed or underrepresented social sectors, or



groups that claim gender, ethnic or social issues, among many others, find in these actions a mechanism to be visible.

This focus is the one that guides the book *The materialization of the past*, where several cases are collected in 13 chapters through the gaze and the deep analysis of 18 different authors. Notable examples include monuments located in Bogotá, Cali, Ibagué, Cartagena, Leticia and Funza, among others. This gives an account of the various possibilities that exist to approach this object of study, not only from its material value, but also from its symbolic resignifications. It is a work with a broad methodological design that, in the words of its editor, aims to make a significant contribution to the cultural history of Colombian monuments, in an integral way.

To cite an example of the above, it is worth mentioning the case study on the monument to Los Héroes in Bogotá and its role in the recent 'social outburst', which Vargas conducted along with the fellow historian [Marcela Randazzo Ruiz](#), specialist in Museology and Management of Cultural Heritage of Universidad de Barcelona and PhD in Society and Culture of the same educational institution.



"The central idea that motivates the research project is to think of monuments as specific historical objects, but at the same time they are contingent. They change over time, so they can be rescued, interpreted and reused in different ways and at different times...", explains Professor Sebastián Vargas from the School of Human Sciences at Universidad del Rosario.

For the co-author this work is valuable because it allows to approach the monument in connection with the urban space. "This one seems indispensable to me because often the monument is analyzed in isolation, without its different links. The city in the end is alive, it is constantly changing, and I think that is in line with the resignifications, the appropriation of space and the construction of memory," he says.

'Los Héroes' and the history of 'changing monuments'

Although it is easy for many passers-by to relate the name of the Los Héroes sector in Bogotá to the monument that until 2022 was located at the junction of the North Highway with 80th Street, it is not known to everyone that its main element, the equestrian statue, was not always there. The building was completed only in 1963, while the statue was erected in 1910, as part of the centenary commemoration of the 'Cry of Independence'.

In its journey this sculpture, 3.3 meters high and sculpted by the French artist Emanuel Fremiet, was originally located in Inde-



pendence Park, very close to where today is the District Planetarium. It was then kept in a warehouse due to the expansion of El Dorado Avenue (or 26th Street) until 1962 when it was joined to the Monument to Los Héroes, where it remained until it was removed to give rise to the future first metro line of Bogotá. As a “swan song”, before its disappearance the monument witnessed the citizen congregations from 2019 to 2021, which rekindled attention to this representative place of the city.

In addition to the short-term events of the National Strike at that time, the work that Professor Vargas had been developing with Marcela Randazzo on this monument was added. “We combined what was found in the archives with an ethnographic observation on the ground. We review some characteristics of the materiality of the monument, such as its size and shapes; likewise, the historical representations that project not only this monument, but also its entire surrounding space. For example, we analyze what practices and social relations exist or not around them or what social actors interact with them,” Vargas explains.

For this reason, the first thing was to look to primary sources, such as the Bogotá Archive, the District Institute of Cultural Heritage (IDPC) and the National Library, to look for maps and plans of that time, as well as all the legislation related to the life of the monument. This also includes consulting the press and photographic archive.

“With the review of primary sources, you can know about the entire historical process, from the gestation of the monument to the meanings given to it by citizenship,” says Randazzo. “However, it does not stay there, we also study how they are resignifying in time and are forming a “[palimpsest](#)” of memory. In the 70s of the last century a shopping center with the same name was built next to it and later the Transmilenio station was built. It is given at the same time a spatial overwrite and a disappearance. This is what allows us to speak of ‘monumentalization’.”

Peripheral monumentalization processes

Both in Los Héroes and in other monuments you can talk about a changing flow that varies with time. This is the case of the chapter on the processes of monumentalization in the center of Leticia (Amazonas), by [Paulo Córdoba](#), historian and master's degree in Philosophy from Universidad del Rosario and currently on his doctoral degree in Am-

→ The Statue of Pedro Romero in Getsemani. Laura De la Rosa Solano (2011). This monument is one of the few sites in Colombia that deal with the country's Afro-descendant history, beyond the issue of slavery. Clearly, it constitutes a sample of those diverse memories that can emanate from the monuments.



azonian Studies from the Universidad Nacional de Colombia, Amazon campus.

At the beginning of his research, Professor Córdoba found that there was no adequate organization, protection, classification and access to documentation about the monuments in the city, so it was essential to go beyond the archives of the local library or what the authorities of the place told him. He had to go to primary sources, from the community, to give his testimony from the close knowledge of the territory, which even allowed to summon inhabitants in search of the photographic shots of the monuments.

“Beyond just drawing attention to the existence of a process of monumentalization, which took place in the middle of the Amazon rainforest, what I was looking for was to circulate some stories that I had read and heard in my daily life in Leticia,” explains Córdoba. “With that, I wanted to pay tribute to sources and voices that daily transmit knowledge in written or oral form to younger generations.”

In front of the traditional monuments, [Francisco de Paula Santander](#) (Santander Park), Francisco de Orellana (Orellana Park) and the anonymous soldier of the Colombian-Peruvi-



an war, new places and memory practices associated with indigenous cultures are contrasted. Examples of this are the resignifications that these communities give to the still materialized presence of the [Casa Arana](#) building, in the area of La Chorrera, place of multiple tortures to the indigenous population of the Amazon during the time of the exploitation of rubber in the first third of the 20th century.

Thus new readings arise not only about what these spaces are and represent, but also about the prevalence and omission of discourses around them. “The different case studies offered by the book allow us to see how the narrated history has excluded different historical subjects, different moments, different experiences and trajectories,” Vargas explains. “We see that in these stories there is a very strong imbalance in elements of race and social stratum, among others.”

Interest in the processes of monumentalization in the Amazon has recently attracted the interest of other scholars. In 2021, an article about monuments to the settlers was published, written by the professor and anthropologist of Universidad Nacional, Gabriel Cabrera, who focused on case studies of Vaupés, Guaviare and Caquetá.

↑
Photo by
Oswaldo
Vargas, 2021.

A cornerstone for talking about monuments

The sample collected in the compilation book *La Materialización del pasado* “The Materialization of the past” would not have been possible without a powerful theoretical and methodological support, which was worked by Professor Vargas since 2018 after completing his doctoral studies in History at Universidad Iberoamericana in Mexico City.

Likewise, all the archival and bibliographic research, including the legal framework, carried out by Vargas allowed him to construct the theoretical definitions about the monuments, which would be the basis of his field work that at the same time allowed him to address the subject within all its complexity. This framework was materialized in the book *Mutaciones de piedra* “Stone mutations,” which could become a reference on the subject of monuments.

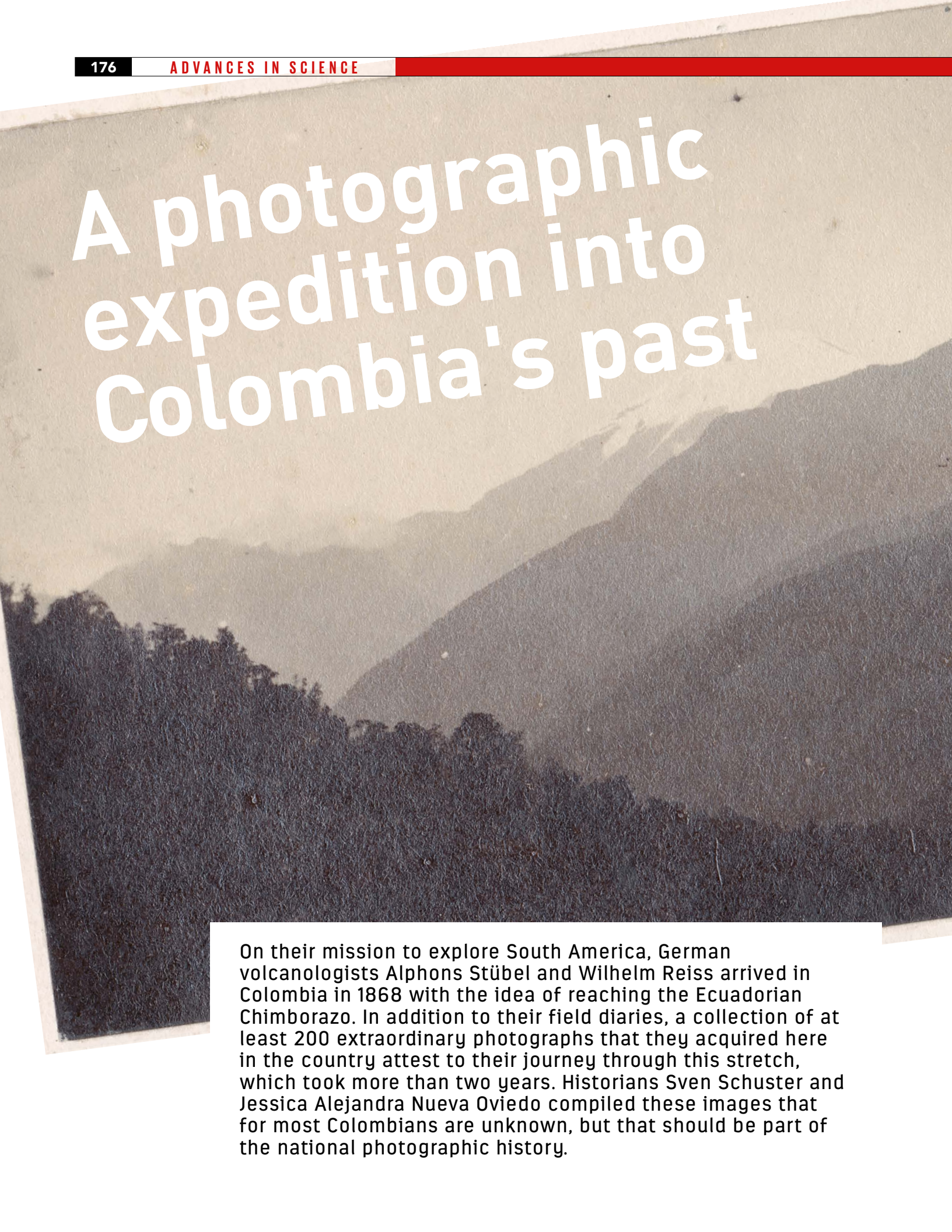
“I did a thorough review to build a historiographical balance on the case studies and everything that has been studied and written in the area since the late 18th century, the whole 19th century and up to the present. It is a profound work that offers a series of theoretical definitions of the monument, which allow us to understand it from its different variables: its materiality, its spatiality; from memory or from the political, to mention a few”, the author explains.

This makes the text a useful reference work for students and researchers, as well as an instrument for considering public policies related to cultural heritage. Based on their approaches, the possibility of approaching monuments with a greater number of variables and better analysis tools is opened. In particular, at a time when they have been the target of attacks, demolitions and resignifications by various social groups.

In addition, the work initiated by Professor Vargas and the other researchers not only reveals the written works, but in the future processes of socialization with the communities in Bogotá and in the regions that were nuclei of field work to develop the content of the books are advanced, something that is considered essential for this critical approach proposed in them. For example, discussions will be scheduled with the communities of Leticia and Cartagena.

For his part, this historian continues to look for new crosses like the one that links art and public space. Among his next works is one related to posters and interventions in the public space that circulated at the time of the social outbreak, which aims to make visible the contemporary resignifications and appropriations that currently live the monuments. ■

A photographic expedition into Colombia's past



On their mission to explore South America, German volcanologists Alphons Stübel and Wilhelm Reiss arrived in Colombia in 1868 with the idea of reaching the Ecuadorian Chimborazo. In addition to their field diaries, a collection of at least 200 extraordinary photographs that they acquired here in the country attest to their journey through this stretch, which took more than two years. Historians Sven Schuster and Jessica Alejandra Nueva Oviedo compiled these images that for most Colombians are unknown, but that should be part of the national photographic history.



↑
 “The Tolima volcano, valley of the Combeima River.” Original source: Alphons Stübel Collection, Leibniz Institute for Regional Geography, Leipzig (Germany).

By Felipe Abondano

Photos by Investigadores ECH - Archivos

DOI https://doi.org/10.12804/dvcn_10336.42343_num7

In the background, a curtain that simulates a European forest. On the ground some prop plants and straw trying to look like a meadow. They, with bare torso and feet, have hanging breasts and noses. As if mesmerized, their gazes turn to a camera that has captured the moment forever. The caption says that they are indigenous *Cumics* from Antioquia and that they wear pre-Colombian finds. Every detail of this photograph was designed to respond to the curiosity of those who have never seen an indigenous Colombian.

Like this one, more than 2500 images make up the collection that volcanologists [Alphons Stübel](#) and [Wilhelm Reiss](#) acquired during their voyage through South America from early 1868 to 1877. A tour in which they intended to follow in the footsteps of the great explorer [Alexander von Humboldt](#). The researchers toured the country with the intention of reaching the Chimborazo volcano (Ecuador) and on the trip acquired the photographs that are now part of the Alphons Stübel Collection of the Leibniz Institute of Regional Geography in Leipzig and the Reiss Collection that rests in the Reiss-Engelhorn Museum in Mannheim (both in Germany).

Recently historians [Sven Benjamín Schuster](#) and Alejandra Neva Oviedo, professors in the School of Human Sciences at Universidad del Rosario, managed to collect in digital format the more than 200 images from these collections that were acquired by travelers in Colombia between 1868 and 1870, but also later. For

example, the collection includes a series of images of the stone statues of St. Augustine taken by the Antioquia photographer Emiliano Jaramillo that were acquired in 1891, that is, about 14 years after the end of the trip through South America.

It is worth mentioning that some of the images belonging to the Stübel Collection were already exhibited at the Luis Ángel Arango Library in 1996 in the framework of the exhibition “[Behind the Traces: Two German Travelers in Latin American Lands](#)”, while the photographs of the Reiss Collection have never been presented in the country.

Both collections are little known by the academic community and most of their originals do not yet belong to the national historical heritage. However, today they can be seen in one of the virtual exhibitions offered by Universidad del Rosario (<https://urosario.edu.co/exposiciones/coleccion-alphons-stubel>) or in the pages of the book *Colombia:*

un viaje fotográfico. Las colecciones de Stübel y Reiss (siglo XIX), (Colombia: a photographic journey. The collections of Stübel and Reiss (19th century)), a beautiful editorial testimony of this academic exercise.

Historians were struck by the fact that these images have been ignored or unknown to the country for so long. "In recent years Colombia is making a great effort to build memory, but not to build history. These images reflect a nation that does not yet know itself and that should value photographic archives as a reference, not only of who we are now, but also of what we have been," says Schuster.

Motivated by this reflection, the researchers managed to collect the collection that the German adventurers put together during that trip together with the notes they wrote in their journals, in an effort to 'relook' these photographs taken in a period of the country characterized by civil wars, territorial disputes and the construction of a national identity.

The book *Colombia: a photographic journey*. The collections of Stübel and Reiss (19th century) has attracted the attention of the Colombian academy and the general public, and have become a fundamental piece to understand the socioeconomic, political and cultural reality of the second half of the 19th century of Colombia. Historians insist that research into the country's photographic past is just beginning and that images collected by volcanologists can be a new source of knowledge about the country's graphic past.

Searching for El Dorado in volcanoes

Alphons Stübel and Wilhelm Reiss came to Colombia for many reasons. At that time, volcanology was an attractive science with a large field of study, and the Germans considered the Andes and their final trifurcation in Colombia as a kind of treasure; a large number of geographical accidents hardly documented and could mean, simply, the transcendence in their research universe. They thought it would take three months in the country, [but they lived and studied its geography for more than two years](#).

Reiss was a German geologist and explorer, born in the Grand Duchy of Baden. In 1872 he became, together with his Colombian servant Ángel María Escobar, the first person to successfully climb the summit of the Cotopaxi volcano (north of Ecuador). For his part, Stübel, born in the Kingdom of Saxony, studied chemistry and mineralogy at the University of Leipzig, and together with Reiss was the first



↑
"Cartagena: Palace of the Inquisition." Original source: Alphons Stübel Collection, Leibniz Institute for Regional Geography, Leipzig (Germany).

to crown the summit of the Tungurahua volcano (equally, on Ecuadorian soil), in 1873. Both came from families of successful businessmen, so they had enough sources of financing to cover the requirements and demands of their expedition, whose final destination was the Chimborazo. In Colombia, they climbed and measured the volcanoes of Tolima and Huila, among others.

During the tour they discovered, among many finds, that much of the height measurements that Humboldt had made official were wrong and that existing topographic maps, such as those made by the Choreographic Commission in the middle of the century, were unreliable. In his expeditionary transfer, the photos accumulated along with the measuring instruments. Perhaps at first they were souvenirs, but later they became important pieces of the journey and a way to show fragments of a country unknown to their European peers.

A journey into the 19th century

The mountain curves of the Central Mountain Range repeat themselves, some darker than the others. The photographic technique of that time does not allow to detail the



"In recent years, Colombia is making a great effort to build memory, but not to build history," summed up Sven Benjamin Schuster, professor in the School of Human Sciences at Universidad del Rosario in dialog with this publication, noting that these images aim to show fragments of this nation that still does not know itself and that should value photographic archives as a reference, not only of who we are now, but of what we have been.

sky that is observed in the totally white image; but in the background you can guess the Nevado del Tolima volcano, still white, still stunning. The researchers of Universidad del Rosario discovered that the photo was commissioned by Stübel; he wanted to remember this point of his journey and the roads outside Honda, where Humboldt also passed.

The photograph, then, was taken in 1873, as the caption below the image recalls, five years after the start of the two explorers' journey. Between the Port of Santa Marta and the city of Honda there are 863 kilometers. Their journey seemed to them endless. Later, the photograph was used as the basis for a large-format painting. It was exhibited at the Museum of Comparative Geography in Leipzig from 1905, since at that time Stübel considered that photography failed to capture the beauty of the landscape, nor the odyssey of the journey:

"Landscape photography can never reproduce the particularities of a mountain's structure as sharply as a geologist does with pencil on paper."

The pose behind the photo

The first thing you see is the waterfall that breaks the landscape. Its strength when crashing into the rocks, the speed of the waters cannot be documented with the cameras of the time so in the image it seems just a white spot in the middle of the texture of the mountains. In the center of the image, at the top, a group of people organized in lines pose for a distant camera. The orders should have been clear: these people try not to move for a few minutes

so that the camera captures them in detail. There are 75 people used to moving between cliffs and the darkness of mine tunnels. They pose for a photographer allegedly hired by businessman Gustave Lehmann, who at the time controlled the emerald mines in Muzo (Boyacá) and who gave this photograph to the volcanologists.

Reiss and Stübel made small excursions to places near the original route, among them, the mines of Muzo. Reiss' field diaries describe the behind-the-scenes aspect of the image, the sense that Muzo was a dilapidated town and that the mining concession did not benefit state coffers or local development:

"On the first day of our stay, the harvest was huge, as several hundred crystals were found, among which were many small, but also two the size of a fist. Lehmann assured us more than once that days like these were the absolute exception and asked us not to talk about this in Bogota. To mention this character one last time, I would like to note that Lehmann's executive talent boils



down to pocketing even the smallest granite of emerald with remarkable greed.”

The work of professors Schuster and Neva allowed us to conclude that the images of the mines of Muzo were taken on commission by Lehmann himself, who gave a copy to the volcanologists so that they could publish the mining concession.

By carefully analyzing the images and Stübel's notes on them, the researchers were able to see that the working conditions of the mine differed from those documented in the photographs. This also makes us think on the documentary uses of this material in which all the components of the scene are intentionally placed and where the photographer's vision of reality is imposed.

The publication of the researchers of Universidad del Rosario includes a judicious selection of engravings and illustrations with which the volcanologists documented part of their experiences or observations during the tour; those occasions when they preferred to trust their pencil, instead of staying only with what the eye of the local photographers of the time captured through their cameras.

↑
“St. Augustine”,
drawing by
Alphons Stübel.
Original source:
Alphons Stübel
Collection,
Leibniz Institute
for Regional
Geography,
Leipzig
(Germany).

“Our eye gets much less tired when observing individual drawings, compared to the monotonous brown of mediocre photographs. In these hard-to-reach regions, only a traveler who spends a lot of time and dedication could take photographs of great perfection, systematically.”

St. Augustine, the forest gods

In the middle of palms and trees there is an anthropomorphic sculpture of triangular appearance. Its eyes, nose and teeth are highlighted with fangs. In the background there is another sculpture, this one full-length; in his hands he holds some objects that seem sacred. The detail in the representation of the fauna and sculptures in the illustration drawn by Stübel gives clues to his interest in these areas of study, and perhaps it was here that his passion for archeology was aroused.

Leaving Bogotá to the southern Colombia, the travelers recognized that their scientific interests were different and for this reason they agreed to take a break to meet again later in Popayán. During this segment of the tour Stübel decided to deviate towards the Eastern Plains, despite multiple recommendations not to do so by Reiss and other notable Bogotans, due to the fearsome endemic fevers that plagued the region during those days.

Stübel ignored the advice and set off for the vast area, where he would witness an attempted coup d'état, which he would later recount in his diaries; but he also caught a tropical fever that would accompany him for the rest of his days. Once he was relieved, he crossed Ibagué to the south of the country, crossed the Huila and in San Agustín he found traces of some pre-Colombian cultures.



*Cumics - Indianer. Antioquia.
Geschmückt mit altindianischen Grabsteinen.*

Fascinated by the sculptures of the ancient peoples of St. Augustine, Stübel hired some inhabitants of the region to help him unearth what he called “forest gods.” Upon unearthing one of the figures discovered that it was actually a stone sculpture [about 4.5 meters high](#). He also found other pre-Colombian archeological pieces whose illustrations and photographs were part of the objects exhibited in his museum in Leipzig.

An excerpt from his blog Stübel explains what the place was like:

“In the ravines the water falls in wonderful waterfalls on the masses of dark lava. On a small highland, the fields of the indigenous people are spread, which are remarkably well cared for. The beauty of the wild scenery cannot be described in words.”

All the photographs and illustrations that they accumulated during the trip were a way to carry with them much of their adventure when they returned home and to support the measurements they were making, although they were very aware that there was no way to count with fidelity what they had seen and experienced.

The German gaze, the Colombian photographs

Together again in Popayan, the Germans visited multiple photographers who had settled in the city. They were truly surprised by the number of photographic studios present in the city and by the greatness of the photographic series that were marketed there.

To identify the origin of the images, Schuster and Neva Oviedo often relied on the captions of photos, usually signed by authors such as [Demetrio Paredes](#), photographers from Cauca such as [Mariano Cobo Rincón](#), Mariano Ramírez and José María Fernández (Asociación Ramírez & Fernández). However, in other cases the photos seemed to be a commission, as if Stübel and Reiss were traveling accompanied by a photographer who recorded with his camera what they discovered or found interesting. Such are the examples of the images of a banana plantation in Tolima or of the house they shared in Bogotá in 1868.

These photos were taken with different techniques and formats, from landscape photographs or panoramas of cities that showed the frames of the square, to portraits made in studios where businessmen, intellectuals, politicians and also indigenous and peasant posed.

This fantastic collection resembles what the [Choreographic Commission of the New Granada](#), led by Agustín Codazzi in 1850, tried to be: a way of defining what Colombia is and the people who inhabit it.

Upon his return, all photographs, illustrations, and even some objects, would be exhibited in Leipzig. It took just under a century, in 1996, for those acquired or commissioned by Stübel to return to Colombia. This publication by Universidad del Rosario aims that the images of Stübel and Reiss, which are presented and analyzed for the first time as a whole, return to their country of origin, that are seen by new audiences and that are a symbolic and popular part of the history of Colombian photography.

To this end an agreement was reached with the Leibniz Institute of Regional Geography, where the original photographs of the [Stübel Collection](#) rest. Thanks to this agreement, which had the support of the former director of the Cultural and Historical Heritage Unit of the UROSARIO, Dr. Luis Enrique Nieto (1947-2020), the historical archive of the University has digital copies in high resolution in view of all those interested in the virtual exhibition. ■

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“Indigenous Cumics, Antioquia.”
Original source:
Alphons Stübel Collection,
Leibniz Institute for Regional Geography, Leipzig (Germany).





Young talent for prevention in electrical systems

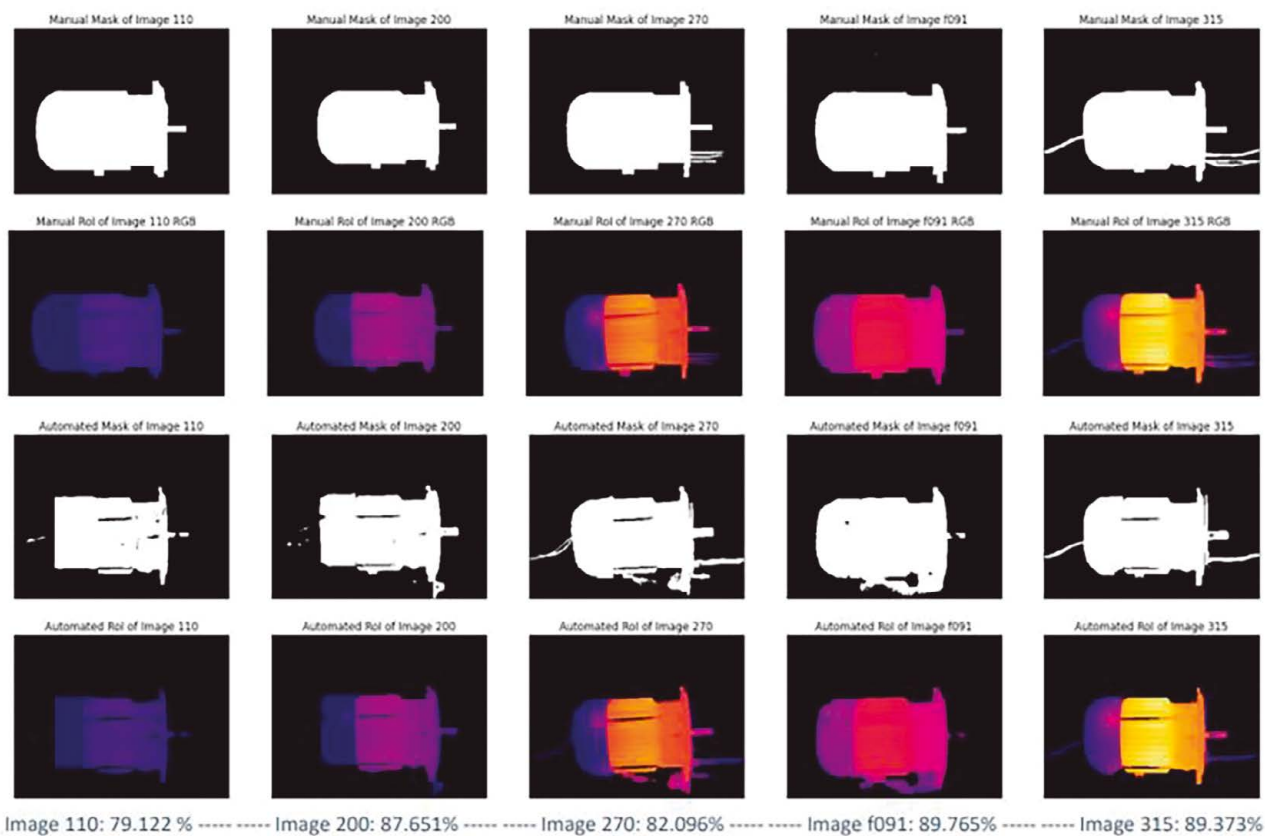
The Renewable Energy Laboratory of Universidad del Rosario is the epicenter of scientific research in which undergraduate students from various areas have a leading role. His work for the classification and intelligent identification of failures in energy systems from the use of infrared cameras has been recognized in international scenarios and glimpses promising prospects.

By Felipe Gaitán García

Photos by EICT-URosario

DOI https://doi.org/10.12804/dvcon_10336.42691_num7

When [David Celeita Rodríguez](#), former director of the Energy Systems Engineering Program, promoted by the School of Engineering, Science and Technology at Universidad del Rosario, began to conceive his research, he recalled Marie Curie. The Polish scientist, a pioneer in the study and description of radioactivity, was the first woman to receive a Nobel Prize and the only person to date to win it in two different categories of science: physics (1903) and chemistry (1911). Thanks to their findings, the development of x-rays was achieved. Celeita Rodríguez evoked that revolutionary scientist because, if with electromagnetic waves it was possible to see the deepest part of human anatomy, her study allowed her to listen inside energy systems, as if it were an x-ray to electrical equipment to examine its state and diagnose or forecast possible damage.



At the beginning of 2023, while working as a professor of Universidad del Rosario, Ce-leita Rodríguez gathered an interdisciplinary group of undergraduate students in Applied Mathematics and Computer Science, as well as in Energy Systems Engineering, with the purpose of exploring the field of classification and intelligent detection of faults in electrical equipment by taking thermographic images, that is, photographs taken at a distance that allow the temperature of energy systems to identify defective functions. In his role as leader during that year, he guided students to be an essential part of the process of observation, analysis and disclosure, in an area of study that has gained relevance in the world.

The idea to forge this project arose from a call from the [Institute of Electrical and Electronic Engineers](#) (IEEE), an organization based in New York (United States), that promotes scientific advances and innovations within these fields of knowledge. The primary requirement demanded by the American entity was that students should play a stellar role within the process.



Thermographic images of engines organized in five groups, analyzed with grayscale and corresponding Jaccard index, taken from the scientific paper Smart equipment failure detection with machine learning applied to thermography inspection data in modern power systems.

In addition, the research team had the scientific backing of the assistant professor of Electronic Engineering and researcher of the French university Centrale Supélec, [Trung Dung Le](#). This is how students Ana María Garzón, Natalia Laiton and Víctor Sicachá dared to contribute from their knowledge with the purpose of the study.

Soon the work deployed would begin to provide rewards for his still new academic life. The findings of his research activity were initially published in the IEEE indexed journal, through an article called “[Smart equipment failure detection with machine learning applied to thermography inspection data in modern power systems](#).”

One more will be released, two others have already been accepted and one remains under review. With this, the socialization stage of the project is in full consolidation and seeks a high impact within the industry in the short, medium and long term.

However, what is the research about, and why is it so relevant? As a first step, the team built a state of the art from which they were able to identify those similar studies that have been carried out around the world. From these works a database and images were set up.

Then came the experimental stage, which consisted of using infrared cameras to measure the temperature of electrical and electronic equipment, such as transformers

and motors, in enclosed spaces. Once the thermographic images were achieved, artificial intelligence and machine learning techniques were used, with the intention of processing these photographs and introducing an algorithm that allowed their classification into clusters.

Within the study sample, 624 thermographic images were obtained (369 of induction motors and 255 of transformers). From an unsupervised machine learning method called vector support machine it was possible to classify the photographs of electrical equipment into two categories: hot and cold, which allowed to determine abnormal temperatures in the systems.

By using a grayscale, in addition to observing the pixels, it was possible to establish what type of damage could be identified. After that, the images were segmented to find the regions of interest. There, when removing the background of the photos obtained and focusing on a specific area of the devices, those that presented defects became evident; likewise, the characteristics found according to the grayscale configured elements to anticipate and predict eventual failures.

As a result of the procedure, defects were found in the systems with an accuracy of 90 percent, according to the Jacard index, which measures the rate of similarity between two data sets. According to experts, this achievement contributes to the prediction of errors in electrical systems long before they occur and allows decisions to be made towards the future.

Celeita Rodríguez, who holds a master's degree and doctorate in Electrical Engineering, explains that the research is born from the idea of contributing to the development of the "internet of things" (a concept used to define a system of electronic devices interconnected through a wireless network and that allows sharing data or information) within power plants, especially in sectors such as industry and commerce, whose operation depends in large part on devices vulnerable to different types of disruptions.

"Many decades ago we worked only with analogous electrical signals, such as the use of thermostats to regulate temperature. Today, with the conjuncture of industry 4.0 (also called the fourth industrial revolution), which involves the use of artificial intelligence, digitalization, interconnectivity and data capture in real time, we can take infrared photographs and see how the equipment is inside, which allows us to obtain valuable information," explains the researcher. Therefore, it is no longer just a question of capturing images of the present, but it is also possible to predict defects, in order to make proactive decisions, one of the main objectives of the project that he leads.

The value of detection and prediction

Humans have built a contemporary civilization that is based on electrical systems. In order for the dynamics of society to continue to develop smoothly, its proper functioning must be monitored and regular maintenance carried out. In this scenario, an inconsistency in any device, derived, for exam-



Ana María Garzón, a student of Applied Mathematics and Computer Science at UROSario and member of the team that presented the research advances at the conference held in France, argues that "we are doing cutting-edge things, not only for Colombia and Latin America, but for the world..."



Víctor Sicachá, a student of Applied Mathematics and Computer Science, adds that his contribution to the project has constituted a breaking point in his professional perspectives. "If I was not a researcher before, I may now have an open door to be one later. This team has given me that possibility."

ple, from an abnormal condition that alters the voltage or current, is capable of generating serious disturbances at large economic, social and human scales. A fire caused by a defect in a factory's equipment not only leads to material losses, but also to a risk to workers' lives.

According to Professor Celeita, the conventional maintenance of electrical systems means the interruption in about 45 percent of operations, which also implies an economic investment in the evaluation of equipment. This has become a constant concern for the industrial sector. Therefore, the classification and detection of faults by thermal imaging are an effective and non-invasive option as a predictive method and prevention of defects that can scale and cause major damage.

When it comes to protection and inspection in the safety of operators, "human life is what prevails in the face of a possible alteration that can generate explosions of transformers and large volumes of energy," Celeita emphasizes. Second is the team: "If we can protect it before catastrophe strikes, so much the better." Identifying defects from thermal imaging thus helps to avoid disruption to essential electrical systems, such as housing, retail and hospital infrastructure. "By analyzing the photographs and exploring the inside of the devices, we become a kind of physician of the energy systems, to make preventive and proactive decisions," he complements.

For [Camilo Salazar Palacio](#), an electronic engineer from the Julio Garavito Colombian School of Engineering and a professor in the School of Exact Sciences and Engineering at Universidad Sergio Arboleda, "a system for predicting and detecting breakdowns early through the use of thermographic images, and with an adequate level of training, can substantially reduce accidents in any scenario." It highlights that, for example, high temperatures can cause incidents such as short circuits and explosions, so being able to identify these anomalies in the operating ranges of the devices allows to reduce the occurrence of possible thermal accidents.

The impact of research

Although the exploration of thermographic images as a method of classifying and detecting faults in electrical equipment has gained space in various research centers around the world, in Colombia this approach has only just begun to occupy a preponderant place in energy systems engineering laboratories. It is



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Applied Mathematics and Computer Science students Ana María Garzón and Natalia Laiton received the Outstanding Young Scientist Award for their research at the Smart Grid 2023 in Paris, France.

for this reason that the study led by Universidad del Rosario has aroused the interest of academic institutions in Europe and the United States.

The project was driven by the [Paris Electronic Engineering Group \(GeePs\)](#) of the Centrale Supélec University, and co-funded by the [Zucker Faculty Grant of the IEEE](#), as well as by the [School of Engineering, Science and Technology of Universidad del Rosario](#), the [Society of Industry Applications \(IAS\)](#) of the IEEE, and the [IEEE Foundation](#), and the IEEE Foundation.

The awards for this team have not been long in coming. In June 2023, they received the *Outstanding Young Scientist Award*, as part of the *11th International Conference on Smart Grid (icSmart Grid)* held in Paris.

"It is a milestone that undergraduate students achieve a certain prominence or visualization in international recognition," Celeita Rodríguez highlights while sharing that academics and doctoral candidates from French engineering institutions were surprised to learn about the level of scientific work that is being developed at Universidad del Rosario. "It is very significant to realize that these industry interests can be linked from very early on during undergraduate training, in courses, in nurseries and in research groups," he emphasizes.



On her part, [Ana María Garzón](#), a student of Applied Mathematics and Computer Science at the institution and member of the team that presented the advances of research at the congress held in France, argues that “we are doing cutting-edge things, not only for Colombia and Latin America, but for the world. I believe that high-level research is being done at Universidad del Rosario. Being able to participate in the conference I learned a lot from the industry.” In addition, she notes that thermographic imaging is relatively new, so finding datasets that show faults and the information required is not so straightforward. All this, in her opinion, is a great reward for the work ahead.

Meanwhile, [Víctor Sicachá](#), also a student of Applied Mathematics and Computer Science, adds that his contribution to the project has constituted a breaking point in his professional perspectives. “If I was not a researcher before, I may now have an open door to be one later. This team has given me that possibility.”

Prospects for the future

One of the objectives of the project is to extend its focus of study towards energy systems in open spaces, such as photovoltaic solar panels, which are currently in vogue today due to



Natalia Laiton, student of Applied Mathematics and Computer Science, was also part of the research team and decided to contribute from her knowledge for the purpose of the study.

the imminent energy transition. This implies an effort in terms of exploration, but also an economic challenge.

Replicating the project's thermal imaging model in open space systems means greater investment in research and technology. Drones and thermal cameras are needed, among other tools that are relatively expensive. Today, says Professor Celeita Rodríguez, those who develop thermography have enough infrastructure to monitor equipment in closed spaces, but the field of action is migrating to open areas. “We are going there, we are in the process of acquiring the thermal camera and thus being able to work with our own equipment,” he concludes.

In October of last year, the team was invited to a conference in Nashville (United States) to present the progress of their project and socialize a new publication that describes their scientific findings, with which the scope of the study continues to expand. Meanwhile, in the [URosario Renewable Energy Laboratory](#), which operates with solar panels and a wind turbine located on the building's roof, students continue to debate and build the course of their research together. ■

Universidad del Rosario, committed to excellence

Universidad del Rosario is an institution with **global recognition** that values tradition and innovation through its academic offer, quality of the teaching team, with 11 academic units, 8 campuses and strategic alliances in more than 54 countries.

A university committed to excellence in **research, teaching and extension** as strategic pillars that make it a reference to academic peers, students, graduates, business and government sector, as well as in the university rankings, which constitute an independent opinion of the reputation of the best universities in the world.

Rankings as an independent opinion

- The rankings are ordered lists of universities according to criteria established by the international agencies that promote them, including QS and THE.
- They are a tool for visibility and positioning of universities.
- Each agency has its own methodology for determining the list of the best universities in the world.

Excellence in teaching

We offer a relevant, disruptive, flexible and timely academic program, reflected in successful graduates with a high employability rate, as well as the consolidation of a faculty body according to educational trends.

MOOCs, now considered as one of the quality, agile and flexible training options, are for Universidad del Rosario a means through which institutional visibility, the recognition of teachers, academic quality and the knowledge of the students of Universidad del Rosario has been strengthened.

With a broad portfolio of more than 130 published courses, in 174 countries, the University has benefited 686 149 students from around the world.



**What
makes us
a global
reference?**

11

research centers that
contribute to scientific
and creative knowledge
with integrity.

16

observatories that
impact the country's
development.

53

research groups and 265
researchers recognized by
MinCiencias that strengthen
formative research.

Excellence in research

Research plays a fundamental role in the excellence of the teaching team and in the training of students and graduates. It provides skills, knowledge and opportunities in the labor market that train people in a collaborative, innovative environment with impact results that transcend the frontier of knowledge.

What Are the Results of Positioning in University Rankings?

#1 among private universities of the country in the area of life sciences.

#2 in laws according to THE (Times Higher Education) ranking by subject.

#3 in the country's leading private universities in research at the SCImago Institutions Ranking.

5 areas of knowledge according to THE ranking by Topics in which Universidad del Rosario stands out among the best universities in the world: life sciences, law, social sciences, clinical & health, business and economics.

7 areas of knowledge in which the university excels among the best universities in the world according to the QS (Quacquarelli Symonds) ranking by subject: social sciences, political and international studies, law, economics, business, biological sciences, and medicine.

Institutional Funding that allows transparency in the articulation with the funding opportunities of research projects.

Second university in the country with the highest percentage of citable publications in the Top 1% of the best magazines in the world in Scopus, according to the SJR indicator.

More than 90 laboratories as spaces that enhance practical learning and experimentation.

What makes us a global reference?

212
active programs according to labor market needs.

Promotion of **experiential learning** based on the incorporation and practice of innovative pedagogies that respond to the transformations and needs of the labor market.

Peer Support Program GuiARTE for strengthening and adapting to university life.

What are the results of positioning in university rankings?

International five-star quality label, top grade in **QS STARS**, recognition as world-class university in:

- Teaching
- Employability
- Internationalization
- Inclusion
- Art & culture
- Online learning

#32
best university in Latin America

#17
best university in the region in the reputation of graduates according to QS Latin America and the Caribbean.

Excellence in extension

It is about promoting the relationship University-Company-State. It is the commitment of the university to promote the management of social projects, establishing strategic alliances and initiatives focused on the development of the country. This makes us a strategic actor that facilitates transformative experiences to society.

What makes us a global benchmark?

Different projects in which we participate with social impact.

Center for Studies for Regional Competitiveness (SCORE) which publishes the departmental and city competitiveness index together with the Private Competitiveness Council, as an objective tool to guide the management of local governments and boost competitiveness in the regions.

The Dialog Center of Universidad del Rosario is a meeting place for the academic examination of the major issues of the public and private agenda of Colombia.



Mentors for Diversity, a program to promote a culture of respect for diversity.

More than 100 agreements for internationalization between double degrees, exchange, research stays, among other options.

Rosarista Excellence Awards for innovative and inspiring students and professors, recognizing their outstanding teaching careers.

UR Emotion - Rosarista Center for Emotional Education that seeks the development of socio-emotional skills for life.

A Portfolio of scholarships, discounts and financial support to promote education.

Internships, internships and immersion activities to the labor market that guarantee **high employability rate**.

#1

university in the country in open innovation and relationship with entrepreneurs according to the TOP OPEN CORPS ranking.

In THE's impact ranking it lists the best universities worldwide contributing to the achievement of the UN Sustainable Development Goals (SDGs). **Universidad del Rosario is among the top 400 worldwide in the contribution to the SDGs.**

In the **QS Sustainability** ranking that lists the best universities worldwide in environmental, social and governance sustainability, Universidad del Rosario:

- **#1 of the country in governance**
- **#1 of the country in inclusion**
- **#18 in Latin America**

In the **UIGreenMetric** ranking, which lists the best universities worldwide in environmental sustainability, Universidad del Rosario:

- **#1 of the country**
- **#2 in South America**
- **#32 worldwide**

Source: Department of Planning and Institutional Effectiveness (DPEI) - Universidad del Rosario.

The conjuncture forums are regular meetings in which we invite leaders from Colombia and the world to contribute from the debate of ideas to the solution of the country's problems.

Project Ruta País aimed at raising awareness among citizens of the regions about challenges such as corruption, misrule, narcotrafficking and violence. The purpose is to study solutions and be part of the promotion of the regions.

Rosarista Volunteering: Volunteers have the possibility to carry out their social actions in the lines of social transformers and peacebuilders, training for inclusion and social research.

URosario, disclosure and scientific visibility

THE MATERIALIZATION OF THE PAST MONUMENTALIZATION, MEMORY AND PUBLIC SPACE IN COLOMBIA

Sebastián Vargas Álvarez (Academic Editor)

With the publication of this collective work we want to contribute to the understanding of the processes of configuration of social memory in Colombia, from a cultural history of monuments focused on the way in which the historical representations and appropriations of these works have been transformed and resignified over time. From different case studies, corresponding to different territories and historical moments, the authors investigate about the representations about the nation and its history that are inscribed in the monuments; what they make visible and what they hide; what are the inclusions and exclusions in the monumentalization; what actors dispute the senses inscribed in the monuments in different historical contexts and how they do it and, what policies of memory, and forgetfulness, underlie the history of memorials in Colombia. Likewise, this text makes an important contribution to the Colombian historiography about monuments, gives an account of how research has been carried out about these cultural objects in our country and offers new interpretations and explanations.

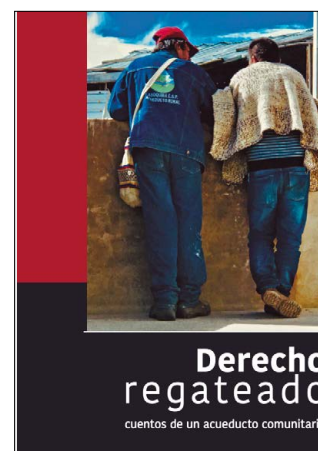


Page 171*

BARGAINED LAW: TALES OF A COMMUNITY AQUEDUCT

Andrés Gómez Rey

This paper offers a series of reflections on bargaining as a practice of daily legal dispute that occurs outside the margins of maneuver of law provided by the state in its regulated scheme. Bargaining intervenes and reconfigures water in the community and contrasts the textual impulse of the bureaucratic operation with the oral experiences and experiences of the frameworks Water regulations and from there, highlights how they produce legal realities, even if they are not textualized or obey the disciplinary rationality of the law. A bargained law, as a Community administrative right for water. Andrés Gómez Rey is a lawyer from Universidad de La Sabana, a specialist in environmental law, holds a master's degree in administrative law, and a doctorate in law from Universidad del Rosario. He is a full professor in the Faculty of Law at the same university. His work focuses on the experience of law in the environmental, public utility, and mining services.



Page 76*



Page 176*

COLOMBIA A PHOTOGRAPHIC JOURNEY. THE COLLECTIONS OF STÜBEL AND REISS (19TH CENTURY)

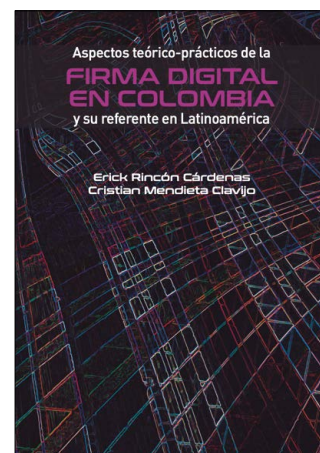
Sven Schuster and Jessica Alejandra Neva Oviedo

In early 1868, German volcanologists Alphons Stübel and Wilhelm Reiss arrived on Colombia's Atlantic coast, the first season of their stay in South America, which lasted until 1877. Over the course of the trip, they bought thousands of photographs, mainly of cities, landscapes and "popular types." These images constitute the most important collection of South American photographs from the mid-19th century. In this pioneering study, historians Sven Schuster and Jessica Alejandra Neva Oviedo present the collections of Stübel and Reiss for the first time together and focus on photographs from Colombia. From this, the reader will learn about how German travelers used photography in their scientific work and to document their trip through the United States of Colombia and, in addition, will see who were the photographers in charge, how they worked and what were their professional networks. In this sense, the purpose of Colombia's photographic journey is to return the images to the context in which they were made, and therefore includes not only 160 high-quality photographs, but also drawings, lithographs, maps and paintings. Thus, this is constituted as a fundamental work for the study of the Colombian visual culture of the 19th century.

THEORETICAL AND PRACTICAL ASPECTS OF THE DIGITAL SIGNATURE IN COLOMBIA AND ITS REFERENCE IN LATIN AMERICA

Cristian Mendieta Clavijo and Erick Rincón Cárdenas

Around electronic and digital signatures, multiple intrinsic and extrinsic concepts have been formed, which are addressed in this book, from concerns such as the following: What is the difference between a digital signature and a digital certificate? Why do digital certification authorities offer digital signature certificates and not just the digital signature? Does Latin America use the same type of digital signature? Can a digital signature be used for other purposes? Is a simple electronic signature equally valid to a digital signature? What should I verify when I receive a digitally signed document? These and other questions are necessary to help society in general, as well as the public sectors, to understand clearly what digital signatures mean. In this sense, this book makes an approach to the different legal concepts that develop around digital signatures in order to make a contribution to society to appropriate them. The authors present a regional legislative comparison, including Spain and the United States, that seeks to find the common and dissimilar points, and how each regulation has allowed to a greater or lesser extent the use of electronic and digital signatures; likewise, it is intended to establish bridges that allow the exchange of signatures by electronic means from different countries that facilitate the different relationships in which they are used.



Page 130*

YOUNG PEOPLE HAVE A VOICE FOR INTERGENERATIONAL CITIZEN DIALOGUE

Freddy Gonçalves Da Silva
(Academic Editor)

More than a book, this collection of theoretical texts is an exercise in reflection on the concept of youth at a social, cultural and political level in Latin America. The reading of this book proposes an intergenerational dialog between specialized academics and other young researchers in training who navigate through criticism, historicist thought, sociological analysis, literature and chronicle. We seek to analyze this concept from different variants, focusing on our territory and universities. Fourteen unpublished texts are interspersed with six interviews with young Latin American innovators. A piece in construction of our history that seeks to explore young voices, with a citizen sense, in this conversation that also belongs to them



Page 116*

GUSTAVO PETRO VS. RODOLFO HERNANDEZ. TWO CONFRONTING POPULISMS?

Rodrigo Barrenechea, Yann Basset, Sandra Botero, Guibor Camargo, Fredy Cante Maldonado, Uriel A. Cárdenas A., Mery Castillo, Sara Fonseca Ana Beatriz Franco-Cuervo, Mauricio Jaramillo Jassir, Sebastián Londoño, Silvia Otero Bahamón, Andrés Miguel Sampayo and Lisa Zanotti

The second round of the presidential election on June 19, 2022, opposed two personalities against each other who were distanced from the traditional elites of the country and the major political parties. On one side Gustavo Petro was the leader of a left that had never reached the highest functions in Colombia and seemed condemned to the eternal exercise of the opposition, on the other, Rodolfo Hernández was a new figure in national politics who jumped from the mayor of Bucaramanga to the presidential candidacy based on a speech of rejection of the political class in general. The unusual profile of the two opponents prompted many comments about the rise of populism in the country against a background of crisis of political representation and strong social conflict. This book aims to discuss through various contributions what the concept of populism can teach us about the new political scenario shaped by this electoral confrontation.

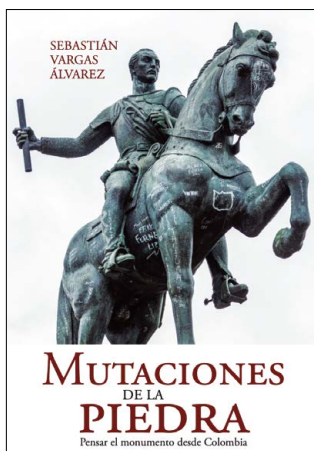


Page 10*

MUTACIONES DE LA PIEDRA: THINKING ABOUT THE MONUMENT FROM COLOMBIA

Sebastián Vargas Álvarez

The book 'Mutaciones de la piedra' approaches memorials and monumentalization processes in the country as an object of study from a triple perspective: theoretical, historiographical and legislative. In this way, it is expected to contribute to the construction of a cultural history of Colombian monuments at a time when the common notions of history, heritage and nation are in constant debate and redefinition.



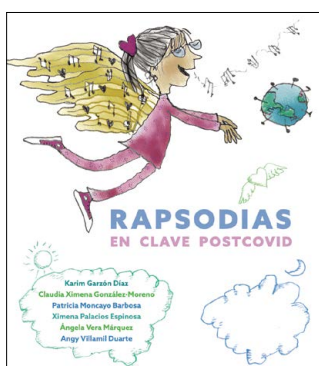
Page 171*

RHAPSODIES IN POST-COVID KEY

Karim Garzón Díaz, Claudia Ximena, González-Moreno, Patricia Moncayo Barbosa, Ximena Palacios Espinosa, Ángela Vera Márquez and Angy Villamil Duarte

Rhapsodies in postcovid key is one of the products presented by an innovation and research project titled *Singing as a practice of human cohesion, recovery rhapsodies in postcovid key* led by the School of Medicine and Health Sciences, and by the Faculty of Creation of Universidad del Rosario.

This book narrates the life experiences of a student and a professor during the time of confinement due to Covid-19. The stories are intertwined through a song and its score composed by young university students and two professors who were part of the project. The narrative of the book, in general, was woven from the shared emotional experiences produced by the training program as agents of change. Dialogue, singing, journals, situated reflections and the sense of community were the beacon that motivated the co-creation.



Page 156*

Toxoplasmosis ocular

¡No coma cuento, ni carne cruda!

Alejandra de-la-Torre
William Andrés Rojas-Carabali
Editores académicos



Page 104*

OCULAR TOXOPLASMOSIS: DON'T FALL FOR MYTHS OR EAT RAW MEAT!

**Alejandra de la Torre and
William Andrés Rojas
Carabali**

Ocular toxoplasmosis: Don't Fall for Myths or Eat Raw Meat! is a book that fills a gap in the process of social transfer of knowledge for the topic of toxoplasmosis, one of the infections of greater prevalence in the world population and with consequences in human health that seem to be increasingly significant, particularly in relation to mental health. The Neuroimmunophthalmology group of Universidad del Rosario has achieved a remarkable work, notable for the quality of the information it offers, which is developed in a practical, well explained and illustrated way. Those who explore this book will find solid information based on scientific knowledge, but in a clear language that debunks myth -many of which stem from common sense- while science has managed to decipher and illuminate true scopes and meanings.

EDUCATION FOR LIFE. A COMMITMENT TO WELL-BEING FOR THE MIND AND HEART OF UNIVERSITY STUDENTS

Laura Catalina García Mera and David Roberto González Rodríguez

Is there any real reflection on how to contribute to the formation of the human being in educational proposals? This is an essential question that worries the feet, which becomes even more relevant and urgent, in the middle of the twenty-first century, in a changing, globalized society that faces challenges of a planetary order. The Office of University Well-Being at Universidad del Rosario has taken on the challenge of supporting for 25 years the generations of students in professional training and in the discovery of their personal identity, in the strengthening of their relationships with others, their ways of expressing themselves and the acquisition of habits of self-care. The proposal Live, Feel, and Enjoy from the Office of University Well-Being guides them in charting a life project with meaning and purpose, allowing them to act from their chosen profession with a maximum sense of responsibility, thereby providing responses that benefit the society and world in which they live. This book shares proposals, reflections and learnings about the transcendental value of conceptualizing an educational project, that goes beyond academic qualifications, and invites young people, teachers, school counselors and families to build a comprehensive educational process committed to the well-being of the mind and heart of university students.

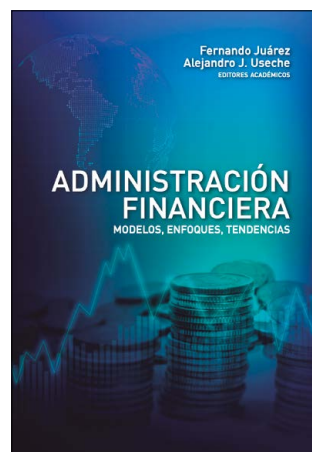


Page 44*

FINANCIAL MANAGEMENT MODELS, APPROACHES, TRENDS

Fernando Juárez Acosta and Alejandro J. Useche

This work offers an introduction to financial management in organizations focusing on its logical aspects and understanding it. It also shows the different models, approaches and trends, with a clear and adequate exposure to, without losing rigor, understand their concepts and foundations and be able to apply them correctly. This text is aimed at both professionals and students, and, in general, all those who want to understand the concepts that underpin financial management, and its language. In this way, an expository methodology focused on clarity and comprehensibility is used, but at the same time introducing the necessary formalisms, without losing the rigor, and applying the above in some examples. The book presents fundamental aspects, approaches and trends, and without pretending to be an exhaustive work, addresses key issues, in a thematic sequence that comprises the nuclear concepts (principles, functions, models, stakeholders, financial control, etc.), areas such as the stock market, the community approach, the relationship with areas such as marketing and, finally, with corporate governance, all with an integrative perspective.



Page 50*



Detail of the mausoleum of José Celestino Mutis in the Chapel of La Bordadita, of the Colegio Mayor del Rosario. In the image, Mutis and Consuegra teaching the first chair of Mathematics in the New Kingdom of Granada.

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Photograph: Alberto Sierra Restrepo

**Magazine
ADVANCES
IN SCIENCE**
Universidad del Rosario

