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Colombia Alluvial gold exploitation

Evidence from remote sensing 2019

October 2020



El futuro
es de todos

Minenergía



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Cover image: Alluvial gold exploitation in the municipality of Nóvita, Chocó.

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PROLOGUE

Colombia is a country rich in natural resources. In the world, it is the second most biodiverse country: it ranks first in bird and orchid species and has 50% of the world's moorland areas. In terms of mining resources, it is the first producer of emeralds and the ninth producer of thermal coal, with high geological potential for the exploitation of metallic minerals, among others. Its wealth has allowed it to contribute in a decisive way to the national economic figures and to the development of the regions. However, this mineral wealth has also represented great challenges such as the illegal exploitation of minerals (EIM). When the production of mineral resources is not done with the highest environmental, technical and social standards, the consequences can be harmful to society and at times irreversible for the environment.

For several years the country combated this scourge without the appropriate detection tools and the necessary information. Until a few years ago it was unthinkable to monitor through satellite means those places where non-renewable resources are exploited to verify if such mining was performed within the legal framework. Today, it is possible to use technologies that allow the scourge of EIM to be identified ever more precisely and to propose policies and strategies to combat it.

Legality is one of the guiding principles and main pillars of President Ivan Duque's government and this document is a testimony to that commitment. What is presented here is the result of a joint effort between the United States Embassy, the United Nations Office on Drugs and Crime (UNODC) and the Ministry of Mines and Energy, in articulation with the Ministry of Defense and various regional and local entities, in their interest of contributing to the awareness of this scourge and combating it.

The monitoring of evidence of alluvial gold exploitation from remote sensing (EVOA) has become the official source of follow-up to this activity and its information is fundamental in designing public policy, in developing projects in the regions and in planning of the country in general. This edition gathers the lessons learned from previous reports and makes new contributions to understand and to plan the industry sector, as well as, to obtain information of general interest about the national territory, offering inputs at the level of provinces, municipalities, National Natural Parks (PNN), communities and the types of mining exploiters. Likewise, this version includes a different understanding of both the legality and the monitoring of water, in order to dimension another type of exploitation in rivers, in such important areas as the Amazon, expanding the dimension in pursuing this type of exploitation.

All this effort is added to the bill against illegal exploitation of minerals as filed on July 21st, 2020 by the national government before Colombia's Congress of the Republic, in order to strengthen the legal tools to attack head-on all the links in the EIM chain, toughening penalties when such criminal activity is performed within protected areas, such as strategic ecosystems or natural parks. Our commitment is to a mining industry that complies with all laws, that performs its activities with the highest technical, environmental and social standards, that generates employment, resources and economic development, and that contributes to the sustainable reactivation of Colombia with legality, entrepreneurship and equity.

Diego Mesa Puyo,
Minister of Mines and Energy

LIST OF ABBREVIATIONS AND ACRONYMS

ACPM	Engine Fuel Oil
AGC	Autodefensas Gaitanistas de Colombia
ANLA	National Environmental Licenses Authority
ANM	National Mining Agency
ANT	National Land Agency
ARE	Special Reserve Areas
CAR	Regional Autonomous Corporation
CTI	Technical Investigation Group
DANE	National Statistics Administrative Department
DIAN	National Tax and Customs Directorate
EIM	Illegal exploitation of materials
ELN	Ejército de Liberación Nacional
EVOA	Evidence of Alluvial Gold Exploitation
FARC-EP	Fuerzas Armadas Revolucionarias de Colombia-Ejército del Pueblo
g	Gram(s)
GAO	Organized Armed Groups
ha	Hectare(s)
ICBF	Colombian Institute of Family Welfare
IDEAM	Institute of Hydrology, Meteorology and Environmental Studies
IGAC	Agustín Codazzi Geographic Institute
IUCN	International Union for Conservation of Nature
km	Kilometer(s)
m	Meter(s)
MinAmbiente	Ministry of Environment and Sustainable Development
MinEnergía	Ministry of Mines and Energy
NOMSZH	Name of hydrographic subzone
PNN	National Natural Parks of Colombia
RAMSAR	Convention on Wetlands of International Importance
RNN	National Natural Reserve
RPP	Private Property Recognition
RUCOM	Unique Registry of Mineral Dealers
RUNAP	Unique National Registry of Protected Areas
RUT	Unique Tax Registration
SI.Minero	Integrated Mining Management System
SIMCI	Integrated System for Monitoring Illicit Crops
SINAP	National System of Protected Areas
t	Ton(s)
UAESPNN	Special Administrative Unit of the Natural Park System
UNODC	United Nations Office on Drugs and Crime
ZHR	RAMSAR Wetlands Zone
ZRF	Forest Reserve Zones

EXECUTIVE SUMMARY

The energy & mining sector is a fundamental pillar of the country's economy and gold production; although this is not the main mineral resource exploited, it plays an important role in that sector's growth. Gold production increased from 35.6 tons in 2018 to 36.7 tons in 2019, linked to gold prices that have been the highest for the past seven years, with amounts beyond USD \$1,730 per ounce. As reported by the national government, this sector could be key to the country's sustainable economic recovery, and it could be an opportunity for the reactivation of employment and for royalty income.

With the expansion of legal and formalized gold extraction activity, the favorable conditions of the gold market have been driving informal exploitation, which is one of the most complex problems, with significant repercussions on the economic, social and environmental sectors. The boom in evidence of alluvial gold exploitation (EVOA) has been permeated by organized crime, which has seen the possibility of consolidating its structures and of facilitating the development of other illegal activities such as weapons smuggling, human trafficking and extortion. The illegal exploitation of minerals uses money laundering to give the appearance of legality to money obtained by transgressing mining regulations.

According to studies carried out on EVOA between 2014 and 2019, the territory with detection is an area of 145,484 ha. The illegal exploitation is carried out employing toxic substances and it is characterized by the indiscriminate use of heavy machinery on land and in water such as dredges, backhoes, motor pumps and engines. This has significantly transformed ecosystems, changes that in many cases are irreversible, such as the alteration of riverbeds or the contamination of water bodies.

Concentration of EVOA on land in 3 provinces and 10 municipalities

The results of the 2019 study show that 12 of the 32 provinces (i.e. departments) have EVOA on land, with a total of 98,028 ha, 6% more than that detected in 2018; nearly half of this area is located in Excludable zones from mining, territories where, due to their role in protecting and preserving the environmental heritage, exploitation is not permitted.

The EVOA on land is highly concentrated in three provinces: Antioquia, Chocó and Bolívar, with 88% of the national total. Concentration in the municipal area also prevails: 96 municipalities report detection (of a total of 1,122 in the country), of which 10 concentrate 54% of the total (Zaragoza, Nechí, Cáceres, Nóvita, El Bagre, El Cantón del San Pablo, Ayapel, Istmina, Río Quito and Montecristo), located in the provinces of Antioquia, Chocó, Córdoba and Bolívar.

EVOA water alerts are in the provinces of Amazonas, Guainía, Caquetá, Putumayo, Vaupés, Guaviare and Cauca. The tributaries identified suffering this condition are the Aparoris, Caquetá, Cotuhé, Inírida, Negro and Atabapo rivers.

52% of EVOA on land is in the Excludable zones from mining or Environmentally Protected Areas

The Excludable zones from mining correspond to territories set aside to protect and to develop renewable natural and environmental resources, where the law determines that exploration and mining works cannot be performed. However, by 2019, some 50,801 ha of EVOA

were detected on land, which corresponds to 52% of the total identified for that period.

The category with the highest detection corresponds to Forest Reserve Areas (determined by Law 2 dated 1959), in whose territories 47,445 ha were identified (48% of the total EVOA on land). The Pacific Forest Reserve, considered to be one of the largest biodiversity reserves in the world, has the highest figures, as a third of the EVOA on national land is located in this area.

The presence of EVOA in the National Natural Parks (PNN) generates alerts for the environmental effects that impact protecting ecosystems. EVOA was detected in Puinawai National Natural Reserve and Farallones de Cali National Natural Park; four PNN are at risk: Paramillo, Munchique, Serranía de los Churumbeles and Acandí Playón, because EVOA was found on land less than 10 km from them. Alerts for EVOA in waterbodies were also identified in five PNN: Serranía de Chiribiquete, Yaigojé Apaporis, Cahuinarí, Amacayacu and Puinawai.

48% of EVOA on land is in Environmental restrictions free zones

The Environmental restrictions free zones correspond to territories where there are no environmental restrictions for mining activity and exploration and exploitation permissions may be obtained after requesting them. By 2019, 47,226 hectares were detected, corresponding to 48% of the national total. 43% of the national total corresponds directly to Environmental restrictions free zones and 5% includes Restricted mining zones.

64% of EVOA in Environmental restrictions free zones corresponds to illegal exploitation and 36% coincides with territories that hold permissions; however, it is necessary to monitor and follow up to know if they are complying

with the technical and environmental commitments stipulated in the titles or Concession Contracts. Antioquia concentrates the largest amount of EVOA in Environmental restrictions free zones (64%), followed by Chocó (18%) and Córdoba (9%).

In the relation EVOA - Law arrangements 66 % corresponds to illegal exploitations and more than half is in Excludable zones from mining or protected areas

When analyzing the relationship between EVOA and the law, 64,727 ha. are illegal farms (66%); 26,615 ha. have technical and environmental permissions for the farm (27%) and 6,686 ha. are in transit to legality (7%). It is important to note that 57% of EVOA under the category of illegal exploitation is in Excludable zones from mining or protected areas.

45,985 ha. of EVOA were detected in special management territories, which include ethnic groups and areas of the Single Registry of Protected Areas (RUNAP). 85% of this area is located in Black Community Lands; 1% in indigenous reserves and 14% in Regional Integrated Management Districts. It is highly concentrated in Chocó (85%), followed by Nariño and Cauca. Of the 19 indigenous reservations with EVOA presence, the territories of the Embera-Katío and Embera peoples concentrate 65% of the detection.

The exploitation of minerals is one of the main direct causes of deforestation in Colombia. In this sense, 68% of the loss of plant cover of environmental value occurs in areas of illegal exploitation

The exploitation of alluvial gold with the use of machinery on land is an activity that involves

the removal of large areas of land; therefore, one of the main environmental impacts it generates is the loss of vegetation cover with consequences that may be irreversible in the ecosystems. In the period 2018-2019, Colombia lost 6,669 hectares of high environmental value cover, due to the appearance of new EVOA with the use of machinery on land. The loss of coverage of high environmental value, categorized at a high level, is concentrated in Chocó, Antioquia, Bolívar, Nariño and Cauca.

The reported gold production in 2019 is 36,7 tons

Reported gold production in 2018 and 2019 is at similar levels to 2000, with 35.6 t and 36.7 t respectively. When reviewing the behavior of production between 2010 and 2019, an average of 60 t is reported, and it decreases as of 2017. This behavior may not be directly related to actual production levels, due to the illegality present in the exploitation of this mineral in the country; also to the implementation of production controls for subsistence mining, which was reduced by 20.4 t between 2016 and 2017, and to the decrease under requests for legalization. The production structure in 2019 shows a concentration in two types of operators: with titles (46%) and artisanal miners i.e. "barequeros" (41%). At the provincial level, Antioquia reports the highest gold production with 20.8 t (57%), followed by Chocó with 4.8 t, Bolívar with 3.2 t, Córdoba with 2 t and Caldas with 1.6 t; 11 provinces contributed 4.3 t. At the municipal level, 10 municipalities concentrate 61% of national production.

Subsistence mining

Subsistence mining includes "artisanal minering" and prohibits subway activities and the use of mechanized and explosive

equipment for ore removal. Subsistence mining requires compliance with a ceiling of 35 g per month on average and 420 g per year on maximum production.

If national production is analyzed, it is estimated that each artisanal miner would be reporting 157 g of gold, less than the maximum amount of production established for this type of exploitation. According to the records of the Ministry of Mines as of December 2019, Antioquia has 47% of the registered artisanal miners and reports 54% of the national production of this type of operator, followed by Chocó with 19% of the registered "barequeros" and 21% of the national production reported by this type of subsistence mining.

The problem of coca crops and the illegal exploitation of minerals converge in some territories of the country

In 43% of the territories with EVOA on land in 2019, the presence of coca crops was identified. At the municipal level, in 72 municipalities with EVOA, the presence of coca crops with 92,300 ha. (2018). Of the 10 municipalities with the largest detection of EVOA in 2019, 8 of them reported the planting of coca crops. The territories that present the two phenomena of illegality are characterized by being vulnerable areas with conditions of poverty, marginality, difficult access and presence of illegal armed groups.

Only in 10% of the territory with the presence of coca crops and EVOA have control actions been carried out for both phenomena. The articulation of combined and integral efforts that impact on a positive transformation of the territory is urgent.

Actions of the Colombian Government against illegal exploitation of minerals

The illegal exploitation of minerals became a problem of national and public security. Colombia and the members of the Andean Community of Nations, in accordance with Decision 774 of the Thirty-Fifth Meeting of the Andean Council of Foreign Ministers, in an expanded form with the Permanent Representatives to the Commission of the Andean Community in 2012, consider illegal exploitation as a “problem of a multidimensional nature that in all its aspects constitutes a serious threat to peace, security, governance, economy and to the stability of the Member Countries”.

The national government's strategy is focused on reducing the illegal exploitation of minerals in the production, benefit and transport and commercialization stages. To this end, the strategic objectives that have been set are as follows: 1) to affect the value chain of the illegal exploitation of minerals; 2) to dismantle and affect criminal structures, which requires not only the capture of members of the structures, but also their judicialization and effective sanctioning is essential; 3) to strengthen inter-institutional coordination; and 4) to strengthen international cooperation.

In 2019, 447 general intervention operations were carried out in gold mines, in which 705 operational results were accumulated at the national level, 63% of which were carried out in areas known as illegal exploitation. Control operations were carried out in the Pacific Reserve Zone, in the municipalities of Buenaventura, on the Dagua River, and in Quibdó, on the Quito River. Of the total

operational results, 46% are related to intervened gold mines, 35% to seizures and the remaining percentage to destruction. Most of the operations were carried out in Antioquia (69%), followed by Chocó (9.8%) and Córdoba (4%), which coincide with the territories with the greatest EVOA presence.

The illegal extraction of minerals has developed a complex system of value in which legal and illegal actors participate simultaneously and where other crimes converge, including those that generate effects on the life, integrity and patrimony of citizens.

66% of alluvial gold exploitation with land-based machinery in Colombia is carried out outside of any legal arrangement, in scenarios that are favorable for the involvement of armed structures in this activity. In fact, the two provinces with the greatest detection of this phenomenon were Antioquia and Chocó, territories in which the authorities have reported the active presence of organized armed groups (GAO). The presence of these groups in these territories has resulted in their involvement in all phases of the value system associated with the illicit extraction of gold (exploration, extraction, transport, and commercialization).

EVOA's criminal prosecution must be oriented to the dismantling of criminal structures that control or participate in any of the gold exploration, exploitation, distribution and commercialization phases. Likewise, international cooperation can be useful in determining the scope of world trade in this material and the relationship with other actors (including legal ones) involved in the entire network described.

RESULTS TABLE

NATIONAL AREA DETECTED WITH EVOA ON LAND 2019			
98.028 ha			
EVOA on land 2019 and law arrangements (percentage national participation)			
Category	EVOA on land (ha)	National participation (%)	
Exploitation with technical and/or environmental permissions ¹ .	26,615	27	
Exploitations in transit to legality	6,686	7	
Illicit exploitation	64,727	66	
Special management territories			
Category	EVOA on land (ha)	National participation (%)	
Ethnic territories			
Black Community Lands	39,183	40	
Indigenous Reservations	494	<1	
Total ethnic territories	39,678	40	
RUNAP areas			
Integrated Management Regional Districts	6,307	6	
Total RUNAP areas	6,307	6	
Total special management territories	45,985	47	
Excludable zones from mining with EVOA on land 2019 ²			
Category	EVOA on land (ha)	National participation (%)	
Restricted mining zones within Excludable zones from mining	16,529	17	
Excludable zones from mining without Restricted mining zones	34,272	35	
Total	50,801	52	
Environmental restrictions free zones with EVOA on land 2019 ³			
Category	EVOA on land (ha)	National participation (%)	
Restricted mining zones outside Excludable zones from mining	4,818	5	
Environmental restrictions free zones without Restricted mining zones	42,408	43	
Total free zones	47,226	48	
National Natural Parks with EVOA on land presence 2019			
PNN	EVOA on land within PNN (ha)-2016	EVOA on land within PNN (ha)-2018	EVOA on land within PNN (ha)-2019
Puinawai	57	75	75
Paramillo	31	50	0
Los Farallones de Cali	0	2	18
Los Katíos	19	0	0
Florencia Jungle	4	0	0
Total	111	127	93
EVOA on land dynamics (2018-2019)			
Area:			
Stable		81,191	
New		5,042	
In expansion		11,795	
Signs of vegetable succession		10,855	

Loss of high environmental value coverage by EVOA on land (2018-2019)									
Category		Affectation (ha)		EVOA participation in national land (%)					
Primary Vegetation		4,343		4					
Secondary Vegetation		1,848		2					
High stubble		80		<1					
Short stubble		397		<1					
Total		6,669		7					
Provinces with EVOA on land's presence									
National area detected with EVOA on land	2014 78,939 ha		2016 83,620 ha		2018 92,046 ha		2019 98,028 ha		
Province	EVOA on land 2014 (ha)	National participation 2014 (%)	EVOA on land 2016 (ha)	National participation 2016 (%)	EVOA on land 2018 (ha)	National participation 2018 (%)	EVOA on land 2019 (ha)	National participation 2019 (%)	
Antioquia	26,323	33	30,897	37	36,447	40	40,201	41	
Chocó	36,185	46	33,024	39	35,194	38	35,105	36	
Bolívar	7,361	9	7,820	9	8,913	10	10,642	11	
Córdoba	3,544	4	3,592	4	3,982	4	4,976	5	
Nariño	1,676	2	2,677	3	2,921	3	3,171	3	
Cauca ⁴	1,408	2	3,702	4	3,004	3	2,697	3	
Valle del Cauca	1,570	2	1,023	1	889	1	608	1	
Putumayo ⁴	365	<1	537	<1	437	<1	291	<1	
Guainía ⁴	37	<1	117	<1	139	<1	135	<1	
Caquetá ⁴	5	<1	54	<1	50	<1	53	<1	
Vaupés ⁴	15	<1	32	<1	0	0	0	0	
Amazonas ⁴	0	0	0	0	0	0	0	0	
Guaviare ⁴	0	0	0	0	0	0	0	0	
Others	459	<1	146	<1	70	<1	147	<1	
Municipalities with the largest area detected with EVOA on land 2019									
Municipality	Province		EVOA on land (ha)		National participation (%)				
Zaragoza	Antioquia		8,461		9				
Nechí	Antioquia		7,489		8				
Cáceres	Antioquia		5,592		6				
Nóvita	Chocó		5,326		5				
El Bagre	Antioquia		5,132		5				

¹ The ANLA system has not been properly updated by the other institutions with jurisdiction for environmental licensing.

² Exclusive mining zones may contain Restricted mining zones.

³ Environmental restrictions free zones include Restricted mining zones.

⁴ In these provinces, EVOA alerts in water were also detected.

Note: All data presented in this document (text, tables and figures) are approximated by decimal numbers to the nearest whole number; therefore, the individual sum of any of these values may differ from the official result.

INTRODUCTION

The current scenario of the mining and energy sector, in particular the production of gold, an asset of great value in the world, presents great challenges not only because of its role in the economic reactivation of the country, but also in the face of the illegal exploitation of this mineral, which, due to the high income and incentives it generates, has been a sector permeated by organized crime. In this sense, there is a pressing need to address the structural causes of illicit exploitation in the territories and to strengthen the competent regional and local institutions, so that gold production can be linked to regional and local economic circuits and illegality can be reduced.

This document presents the results of the study on the evidence of alluvial gold exploitation (EVOA) in 2019, obtained with the implementation of the monitoring model developed in coordination between the Ministry of Mines and Energy and the United Nations Office on Drugs and Crime (UNODC), with the support of the Anti-Narcotics and Law Enforcement Section (INL) of the United States Embassy in Colombia, from 2016, which with remote sensing tools, geographic information systems (GIS) and field work, seeks to improve the knowledge framework of alluvial gold mining activity based on the detection of EVOA analysis to contribute to policy formulation and to design of intervention strategies.

The findings of the monitoring carried out in the national territory during 2019 show that 12 of the 32 provinces of the country have EVOA on land, with a total of 98,028 ha; 88% is concentrated in three provinces: Antioquia, Chocó y Bolívar, and at the municipal level there are 96 municipalities with detection, of which 10 concentrate 54% of the total. 52% of EVOA on land (50,801 ha.) is in areas that are Excludable

zones from mining or are environmentally protected, and the Pacific Forest Reserve, one of the largest biodiversity reserves in the world, has the highest amount of EVOA. As for the relationship between EVOA and law arrangements, 66% (64,727 ha.) corresponds to illegal exploitation. It is noteworthy that in 43% of the territories with EVOA on land in 2019 the presence of coca crops was identified.

The document begins with a review of the current political and normative framework regarding the mining context. It contextualizes the monitoring model and the fundamental pillars, supported by geography as a tool for knowledge and analysis, namely: 1) the detection of EVOA by means of satellite images and remote sensing tools that allow the identification and dimensioning of exploitation sites; 2) the official information related to technical and environmental permissions for the development of mining activity (law-abiding arrangements), and 3) the management model for interventions in the territory, which is based on the regulatory framework of Excludable zones from mining, Restricted mining zones and Environmental restrictions free zones without Restricted mining zones.

The second section includes the main findings related to EVOA on land and in water, which allows to obtain a territorial vision of the phenomenon. The relationship between EVOA and law-abiding arrangements is presented based as of the three categories established in the model: with technical and/or environmental permissions, exploitations in transit to legality and illegal exploitations, to make an approximation to legality and illegality, focused on the territories and their specificities. This section also presents the management framework for

intervention in the territories, in addition to the areas where territories with EVOA presence and coca crops converge, which, although they have different production cycles and market characteristics, are developed in vulnerable zones due to conditions of poverty, marginality, difficult access and presence of illegal armed groups.

The third section addresses the results of the EVOA dynamics, its relationship with environmental value coverage and the official gold production. The exploitation of alluvial gold with the use of land machinery is an activity that involves the removal of large extensions of land; therefore, one of the main impacts it generates is the loss of vegetation cover. The monitoring methodology considers four categories of vegetation cover of high environmental value, which are detailed and supported conceptually: primary vegetation, secondary vegetation of high bearing, high stubble and low stubble.

The fourth section, devoted to institutional management, presents data on the control of illicit exploitation and its relationship with EVOA. It also presents the different tools that

the Government has at its disposal for the regularization and formalization, as well as, for the focusing of strategies and the formulation of policies and, finally, it proposes alternative development as a strategy to be implemented according to the specificities of the territory.

The last section, Annexes, presents more detailed information on the geographical analysis of EVOA: 1) EVOA in water in Restricted mining zones (population centers); 2) environmentally valuable coverage; 3) population centers closest to the EVOA detected; 4) biodiversity in territories with illegal exploitation, and 5) watersheds as management units in territories with EVOA.

With this study, the Colombian Government and UNODC seek to contribute to the generation of evidence and monitoring to measure the dynamics of this highly complex sector, due to the processes that occur either within the legal and the illegal realm, to identify alerts and to help determine a multidimensional problem, with the goal of designing and of implementing policies adjusted to reality.

Photograph:
Alluvial gold exploitation on land, Orito (Putumayo)



The document presents the current political and normative framework regarding the mining context. It contextualizes the monitoring model and its fundamental pillars, supported by geography as a tool for knowledge and analysis.

SECTION I REFERENCE FRAMEWORK

POLICY AND REGULATORY FRAMEWORK

This chapter addresses the context in which this document is framed, with respect to the implementation of public policies and the norms governing mining activity. It should be noted, in this regard, that Law 685 dated 2001 defines illegal exploration and exploitation in article 159 as follows:

The illegal exploration and exploitation of mining deposits, which constitutes the crime contemplated in article 244 of the Penal Code, is configured when exploration work, extraction or capture of minerals of national property or private property is carried out without the corresponding mining title in force or without the authorization of the owner for such property exploitation.

Likewise, article 338 of Law 599 dated 2000 defines the illegal exploitation of mining deposits and other materials as:

The one that without permission of competent authority or with breach of the existing regulation exploits, explores or extracts mining deposit, or exploits sand, stony material or dragging of the channels and banks of the rivers by means capable of causing serious damages to the environment.

Taking into account the above-mentioned legal definition, the illegal exploitation of minerals is not considered a mining activity and, as it is contrary to mining, according to Title X of Law 1801 dated 2016, it is subject to control and gives “[...] place to corrective measures or the imposition of preventive measures referred to in Law 1333 dated 2009, as the case may be and without prejudice to those of a criminal or civil nature that derive from them” by police authorities.

In this sense, in accordance with Article 306 “Mining without a title” of the Mining Code, it is the responsibility of municipal mayors to attend to this type of situation, ex officio or at the request of a party, by suspending activities, under penalty of disciplinary action, in the following terms:

The mayors shall proceed to suspend, at any time, ex officio or by notice or complaint from any person, the exploitation of minerals without title registered in the National Mining Registry. This suspension shall be indefinite and shall not be revoked until the operators present said title. The omission by the Mayor of this measure, after receiving the notice or complaint, shall make him or her liable to disciplinary action for serious misconduct.

For its part, the Ministry of Mines and Energy (MinEnergía) acts within the framework of its competencies stipulated especially in Decree 381 of February 16th, 2012, through which its structure was modified, where it was established in Article 1 that its objective is “[...] to formulate, adopt, direct and coordinate the policies, plans and programs of the Mining and Energy Sector”.

In particular, the Vice-Ministry of Mines, among others, has the following functions according to Decree 4415 dated 2011: “1. To advise the Minister in formulating policies and action plans in the area of mining, and to assist him or her in the duty of directing, coordinating and controlling those affairs that correspond to him or her. 2. Review the evolution of the mining sector and propose policies and actions for its growth”.

It is clear then that, in accordance with the above rules, it is up to MinEnergía to formulate the policies and programs that correspond to the mining activity being carried out or intended to be carried out within the framework of the law, according to the regulations in force.

However, aware of the enormous scourge that illegal mineral exploitation activity represents for the country and its immense negative impacts on the environmental, economic and social spheres in the regions where it is carried out, MinEnergía supports the authorities with jurisdiction that report to it, with technical support and sectorial information; this, in exercising its duty of “Coordinating actions with executive branch institutions that should control of illegal mineral exploitation”¹.

For its part, the national government understands that one way to close the gaps to the mining illegality is to generate conditions and instruments that encourage the entrance and legal operation of the miners with vocation of

formalization, as well as, to carry out a rigorous follow up to the mining activity to assure operations that fulfill technical and environmental standards as well as to protect human life.

In this context, MinEnergía is developing a strategy aimed at identifying small-scale miners who require support to operate within the framework of the law and raise standards with a vision of achieving legal, entrepreneurial, responsible, inclusive and reliable mining activity.

According to Article 13 of Decree 0381 dated 2012, as amended by Decree 1617 dated 2013, which establishes the structure of MinEnergía, the design and formulation of programs and policies to legalize and to develop traditional and small-scale mining is articulated by the Directorate of Mining Formalization, under the leadership of the Vice Ministry of Mines. For this purpose, all actions taken are determined in the regulatory framework presented in Table 1.

Table 1. Regulatory Framework

TYPE OF NORM	CONTENT OF THE NORM
Law 685 dated August 15 th 2001	“Whereby the Mining Code is issued and other provisions are dictated”.
Decree 381 dated 16 th February 2012	“By which the structure of the Ministry of Mines and Energy is modified”.
Law 1658 dated July 15 th 2013	“Whereby provisions are established for the commercialization and use of mercury in the different industrial activities of the country”. Through this law, provisions are established for the commercialization and use of mercury in the different industrial activities of the country, requirements and incentives are set for its reduction and elimination, and other provisions are dictated.
Decree 480 dated March 6 th 2014	“By which the conditions and requirements for the conclusion and execution of mining formalization subcontracts are regulated”.

TYPE OF NORM	CONTENT OF THE NORM
Resolution 91267 dated 18 th November 2014	Definition of small-scale miners in formalized subcontracts and return of areas.
Decree 276 dated 17 th February 2015	<p>“By which measures are adopted related to the Single Registry of Marketers - RUCOM”.</p> <p>Article 112 of Law 1450 dated 2011 provides that:</p> <p>“For the purposes of controlling the commercialization of minerals, the Colombian Institute of Geology and Mining INGEOMINAS, or whoever is acting on its behalf, must publish the list of the mining owners who are in the exploitation stage and who have the required environmental authorizations or licenses. This list must also include the information of the agents that are authorized to commercialize minerals”.</p>
Decree 1073 dated 2015	Sole Regulatory Decree of the Administrative Sector of Mines and Energy. It compiles the norms of regulatory nature that are in force in the sector.
Law 1753 dated June 9 th 2015	<p>Whereby the National Development Plan 2014-2018 “All for a new country” is issued. This law, in which all the state’s governing bodies participated, allowed the sector to classify mining activities as subsistence, small, medium and large. It also established goals for green growth that promote technological development and innovation to strengthen national competitiveness, aspects that were clearly aligned with the strategies of the Ministry of Mines and Energy to eliminate the use of mercury.</p> <p>“Article 19. Mechanisms for work under a title protection in small-scale mining. The following are mechanisms to be able to work under the protection of a mining title”:</p> <ol style="list-style-type: none"> 1. Subcontract for mining formalization. 2. Devolution of areas for mining formalization. <p>Article 20. Reserve areas for mining development. The reserve areas for mining development shall be the following:</p> <p>Strategic mining reserve areas...</p> <p>Reserve areas for mining formalization...</p> <p>Reserve areas for the mineral-energy development...</p> <p>“Article 21. Mining classification. For the purpose of implementing a differentiated public policy, mining activities will be classified into subsistence, small, medium and large-scale mining. The national government will define them and establish the requirements considering the number of hectares and/or the production of the mining units according to the type of ore. For the exploration only the hectares will be taken into account”.</p>

TYPE OF NORM	CONTENT OF THE NORM
Decree 1886 dated 21 st September 2015	<p>Whereby the Safety Regulations for Underground Mining Activities are established.</p> <p>“Article 1. Purpose. The purpose of this Regulation is to establish the minimum standards for the prevention of risks in underground mining works, as well as, to adopt the procedures to carry out the inspection, surveillance and control of all underground mining works and those of open pit that are related to them, for the preservation of the safety and health conditions in the workplaces where such works are carried out”.</p>
Decree 2504 dated 23 rd December 2018	“Whereby the Unique Regulatory Decree 1073 dated 2015 is added, which defines the technical, technological, operative and administrative aspects to exercise the work of DIFFERENTIAL MINING AUDIT and other determinations are taken”.
Resolution 1258 dated 2015	With the Ministry of Environment and Sustainable Development, we contributed to the promulgation of this resolution which contains the Environmental Guide for the formalization of the traditional mining activities.
Resolution 40144 dated 15 th February 2016	Whereby the Management System of Procedures, Processes and Mining Services is adopted; i.e. the “SI.Minero”.
Resolution 40359 dated 8 th April 2016	Whereby the protocol is created to develop the mediation established in chapter 4 of the Unique Regulatory Decree 1073 dated 2015 for the non-regulated small mining.
Resolution 0565 dated April 2016	“By which the requirements and procedures for the Mercury Users Registry - RUM for the mining sector are established”. From 2013 until the publication of the norm, the Ministry of Mines and Energy accompanied the Ministry of Environment and Sustainable Development in the formulation of the document that regulates the registration of mercury users for the mining sector.
Decree 1421 dated September 2016	“By which the Single Regulatory Decree of the Administrative Sector of Mines and Energy 1073 dated 2015 is added and modified, with respect to the adoption of measures related to the Benefit and Commercialization of minerals and the Single Regulatory Decree of the Environment and Sustainable Development Sector 1076 dated 2015 is added and modified, with respect to the ENVIRONMENTAL LICENSE FOR BENEFIT PLANTS”.
Decree 1666 dated 21 st October 2016	By which the Sole Regulatory Decree of the Administrative Sector of Mines and Energy 1073 dated 2015 is added, related to the MINING CLASSIFICATION.
Decree 1975 dated 6 th December 2016	By which the Sole Regulatory Decree of the Administrative Sector of Mines and Energy 1073 dated 2015 is added, about the integration of areas and extensions of concession contracts.

TYPE OF NORM	CONTENT OF THE NORM
Decree 2133 dated 22 nd December 2016	<p>“Whereby control measures are established for the import and marketing of mercury and products containing it, in the framework of the provisions of Article 5 of Law 1658 dated 2013”. The Ministry of Commerce, Industry and Tourism together with the Ministry of Mines and Energy, the Ministry of Finance and Public Credit, the Ministry of Health and Social Protection and the Ministry of Environment and Sustainable Development actively participated in the construction of this regulatory document, which establishes aspects regarding the import and marketing of mercury: National Registry of Authorized Importers and Marketers; quotas for imports and their administration; prior authorizations; commercialization and transitory provisions, among others that are of special interest to the mining sector.</p>
Resolution 41265 dated 27 th December 2016	<p>Whereby the parameters and conditions for the exercise of the preemptive right referred to in Article 2.2.5.2.2.13 of Decree 1975 dated 2016 are established, “By which the Sole Regulatory Decree of the Administrative Sector of Mines and Energy, 1073 dated 2015, is added regarding the integration of areas and extensions of concession contracts”.</p>
Resolution 40103 dated 9 th February 2017	<p>Whereby the MAXIMUM VOLUME OF PRODUCTION IN SUBSTANCE MINING is established.</p>
Decree 1102 dated 27 th June 2017	<p>“By which the Sole Regulatory Decree of the Administrative Sector of Mines and Energy 1073 dated 2015 is added, with respect to the adoption of measures related to the Marketing of Minerals”.</p> <ol style="list-style-type: none"> <li data-bbox="573 1170 1391 1507">1. Subsistence miners must have the production declaration to sell the mineral product of their activity through the format established by the National Mining Agency (ANM), which is published in the webpage www.anm.gov.co. <li data-bbox="573 1507 1391 1724">2. Subsistence miners who extract precious metals, precious and semi-precious stones must provide the Unique Tax Registration, i.e. “Registro Único Tributario”, (RUT) at the time of registration with the respective Mayor’s Office, as a requirement for publication in the RUCOM. <li data-bbox="573 1724 1391 2025">3. Subsistence miners that extract precious metals, precious and semi-precious stones that are already registered with the corresponding Mayor’s Office and published in RUCOM will have a term of six (6) months, starting on June 27th 2017, to present the RUT to the Mayor’s Office where they are registered, under penalty of being eliminated from the RUCOM publication lists.

TYPE OF NORM	CONTENT OF THE NORM
	4. It is established that once the national mining authority has knowledge of the excess of the production limits established by the Ministry of Mines and Energy through Resolution No. 40103 dated 2017 for subsistence miners, it will proceed to the elimination of its publication in RUCOM, after advancing the respective action of the terms established in the Code of Administrative Procedure and Administrative Litigation.
Decree 1949 dated 28 th November 2017	“By which the Sole Regulatory Decree No. 1073 dated 2015 is modified and added, insofar as the mechanisms for work under a title in small-scale mining are regulated and other determinations are made”.
Law 1873 dated December 20 th 2017	<p>“By which the income and capital resources budget and appropriations law is decreed for the fiscal period from January 1st to December 31st, 2018”.</p> <p>“Article 111. The Ministry of Mines and Energy, in developing the National Mining Policy, may support small-scale miners and mining communities, through the acquisition and assembly of specialized mining equipment required for the improvement of the mining operation and cleaner production. Likewise, it may structure and implement productive projects for the labor re-conversion of small-scale and/or subsistence miners.</p> <p>The Ministry of Mines and Energy shall determine the requirements and other necessary actions for the development of this article and shall finance it with the available appropriations”.</p>
Law 1892 dated May 11 th 2018	Whereby the “Minamata Convention on Mercury made in Kumamoto (Japan) on October 10 th , 2013” is approved.
Resolution 41052 dated 17 th October 2018	Whereby the “Mesa de Interlocución Territorial Minera (MINA)” was created.
Law 1955 dated 2019	<p>National Development Plan which includes articles:</p> <p>22. Temporary environmental license for mining formalization</p> <p>30. Strengthening of supervision, monitoring and control of mining activities.</p> <p>325. Processing of applications for the formalization of traditional mining.</p> <p>326. Differential requirements for mining concession contracts.</p> <p>327. Subsistence mining.</p>

SOURCE: Mining Formalization Directorate.

MONITORING MODEL

In order to improve the understanding of alluvial gold mining in the territories, MinEnergía and the United Nations Office on Drugs and Crime (UNODC) joined efforts and knowledge to implement a monitoring model that allows, based on the study of the geography of the phenomenon, to dimension the problem, identify the dynamics, focus the interventions and follow up and evaluate the designed policies.

The model is based on the integration and analysis of three pillars. The first is based on the detection of evidence of alluvial gold mining (EVOA); through satellite images and remote sensing tools, replicable methodologies are designed for the detection of the phenomenon. For this purpose, two categories were created according to the exploitation: EVOA on land and EVOA in water.

In both cases, the detection methodology is based on the use of remote sensing tools that allow identifying and sizing the exploitation sites and building a layer of the studied area, the whole national territory² for EVOA on land and the rivers selected for EVOA in water. It is necessary to mention that in the identification of EVOA in land, methodologies are advanced to quantify the volume of land removed; however, the current model does not incorporate this variable in the analyses yet.

The second pillar is made up of the official information provided by the Colombian Government, related to the technical and environmental permissions required for the development of mining activity (law arrangements). This information is structured and organized in

the information system and then categorized according to a scheme built jointly with MinEnergía, which identifies three categories: 1) with technical and environmental permissions; 2) in transit to legality; and 3) illegal exploitation.

Area framework

In 2011, the SIMCI project developed a tool to organize the territories based on sampling units. This tool, known as the area framework, facilitates geographic continuity, spatial analysis and statistical analysis of the activities monitored by the project, as is the case with EVOA. The area frame covers the whole country with a systematic arrangement of units of 1 km² (100 ha.) and is part of the cartographic instrument of UNODC/SIMCI for the calculation and monitoring of indicators with geographical focus.

It should be noted that the location analysis is carried out with the center of each grid, so the tool presents a general overview of the territory arrangement; however, there are territories of 1 km² that can be assigned to more than one class or category.

The third pillar focuses on the management model for interventions in the territory, which is based on the regulatory framework of mining restriction (Excludable zones from mining, Restricted mining zones and Environmental restrictions free zones). The Government of Colombia has multiple tools to address the problem of unauthorized alluvial gold mining; however, the selection of the right tool to address the problem also depends on the conditions of the territory: for example, formalization tools can only operate outside the exclusion zones.

² This study includes the detection of EVOA alerts in water in ten major rivers located in the Amazon and Orinoco regions. However, the model has application in rivers all over the national territory with a minimum width of 45 m, according to the methodological scope depending on the pixel size of the satellite images used.

The monitoring model seeks to provide policy and strategy makers with elements that will improve their effectiveness and efficiency.

The geographic *integration* of these pillars is useful not only because it offers the possibility of adding information on other dimensions of the problem but also because it provides the opportunity to learn about its history. In this sense, a historical series is being constructed with great potential for monitoring the phenomenon³. The conformation of the historical series constitutes a fundamental element for the monitoring that allows not only to focus the action in the areas with EVOA presence on land and to undertake prevention actions according to the spatial tendencies, but also to identify the way in which the territories evolve after the intervention.

It is important to mention that the database is fed by the geographic information that has been built in the framework of the monitoring of illicit crops and incorporates additional specialized information, both primary and secondary sources related to the mining dimension. The integration is based on the area framework of the Integrated Monitoring System for Illicit Crops (SIMCI), a 1 km x 1 km grid system that facilitates the integration and analysis of geographic information.

After the integration of information, the model enables the analysis and study of the phenomenon, which from the geography allows to understand its specificities according to the territories and facilitates the design of public policy strategies that considers not only its characteristics, but also those of the territories where the phenomenon is present.

One of the main advantages of having a national layer of EVOA that is integrated into

the area framework lies in the possibility of using geographic information systems (GIS) to consolidate analyses in which other environmental variables are available. Therefore, the area frame data serves to consolidate a useful database for sampling and to be able to characterize the socioeconomic conditions of the populations immersed in mining activity, as well as to carry out territorial analyses and define the distribution of the population with respect to the EVOA in Colombia. The monitoring system carries out studies on a regional scale to learn about the social, cultural and economic conditions, and in general, associated with the vulnerability of the territories to the occurrence of illicit activities such as the illegal exploitation of minerals and the planting of illicit crops. The results are useful for the design of public policies aimed at reducing the vulnerability conditions of the territories.

The integration of the Excludable zones from mining and the Restricted mining zones was carried out through territorial and hierarchical analysis within the framework of areas. For this reason, a grid can only have one category in the model; however, as already mentioned, it can contain some kind of lower order, for example, a grid classified as National Natural Park (PNN) at the same time can belong to territories of mining zones of ethnic communities or forest reserve zones, but for this exercise the grid will be classified as PNN.

It is important to mention that the applications for public policy are not restricted to direct actions on EVOA, but also to the integration of the mining issue in development planning and land management; it also includes programs related to health, environment, best mining practices and control of illegal activities; targeting strategies can also be improved by incorporating the geographic component offered by

³ As of the date of this study, there is a historical series of four moments in time: 2014 2016, 2018 and 2019.

the detection of EVOA and available through the monitoring system. In this sense, one of the challenges for the immediate future is to facilitate access to information by territorial entities.

Finally, the efforts in the publication of researches, the timely delivery of data and analysis to government entities, as well as the presentation of the most outstanding findings, are

part of the system. For this purpose, the first approach to a model of access to EVOA's data was designed and built with the use of new information technologies, where the available technological ecosystem of UNODC was available. The result allows the visualization, consultation and analysis of EVOA's georeferenced information in Colombia.

EVIDENCE OF ALLUVIAL GOLD EXPLOITATION (EVOA)

In general, gold mining in Colombia contemplates two types of deposits according to the geological conditions of the formation: 1) primary, known as reef or vein⁴, characterized mostly by underground mining, and 2) secondary or alluvial⁵, with open pit exploitation. In turn, exploitation of deposits, both vein and small deposit as well as alluvial deposits, presents two basic modalities in terms of exploitation, according to the model of material removal: a) by manual means, without the use of machinery, and b) with the use of machinery. In this sense, the type of exploitation and the tools or machinery used generate physical evidence in the territory⁶ which, depending on its size, can be detected and measured⁷.

The monitoring model addresses, from remote sensing tools, the detection of EVOA,

of exploitation in secondary deposits using machinery for the initial removal of material. In this context, it is necessary to specify that the type of evidence depends on where and how the exploitation takes place. For operations that take place in alluvial landscapes with the use of land machinery (backhoes), the evidence is characterized by changes in the surrounding landscape related to alterations in water bodies, deforestation and soil degradation, among others [1]. On the other hand, for exploitations with the use of machinery in water, evidence is based on the alteration of suspended sediments, which are detected through spectral indices⁸, exploitations that are developed directly in water currents with the use of dredges or rafts where each one generates different types of evidence.

⁴ Primary deposits refer to in situ mineral deposits.

⁵ Secondary deposits are those in which, after the meteorization process of a primary deposit, there is a natural mechanical disintegration and, through the action of water, gold particles are transported over certain distances which tend to concentrate in watercourses, giving rise to the well-known "auriferous pleasures" [62].

⁶ Physical evidence is any significant sensitive material that is perceived by the senses and that is related to a fact [59].

⁷ Subsistence mining is not addressed in this study, as evidence of the activity is not detectable.

⁸ Spectral indices are based on the algebraic combination of bands with radiometrically corrected and calibrated spectral values (reflectance); the objective is to group and minimize the different sensor responses into a single value per pixel, which can be successfully related to a phenomenon to be investigated [1].

LAW ARRANGEMENTS CONTEMPLATED IN THE MINING REGULATORY FRAMEWORK

The second of the pillars of the monitoring model is based on the regulatory framework that gives gold mining specificities and scope that must be identified in order to obtain a territorial vision of this phenomenon. The scope of this study seeks to ensure that the institutions responsible for formulating public policy, as well as for the management, administration and control of resources, have objective information that will allow them to improve the characterization of the phenomenon and, therefore, the comprehensive vision of the territory where the phenomenon is present, in order to focus the different interventions that are implemented, in accordance with the specificities of the territories.

The study addresses the relationship between EVOA and law arrangements⁹, whose official source is the National Mining Agency (ANM) in relation to the mining permissions required for exploration and exploitation in a mining project, and the National Environmental Licensing Authority (ANLA) in the case of the necessary environmental permissions. The ANLA is the entity in charge of ensuring that the projects, works or activities subject to environmental licensing, permissions or procedures comply with environmental regulations, in such a way that they contribute to the sustainable environmental development of the country (Decree 3573 dated 2011) [2]. In this regard, it is necessary to specify that the ANLA system has not been updated by the other entities (see box) with competence for environmental licensing. By virtue of this circumstance, the analysis and geographic information relating to environmental licensing must be interpreted with caution.

With respect to the ANM, this is the entity in charge of administering the State's mining resources in an efficient, effective and transparent manner through the promotion, granting of titles and monitoring and control of mining exploration and exploitation, in order to maximize the sector's contribution to the country's integral and sustainable development [3].

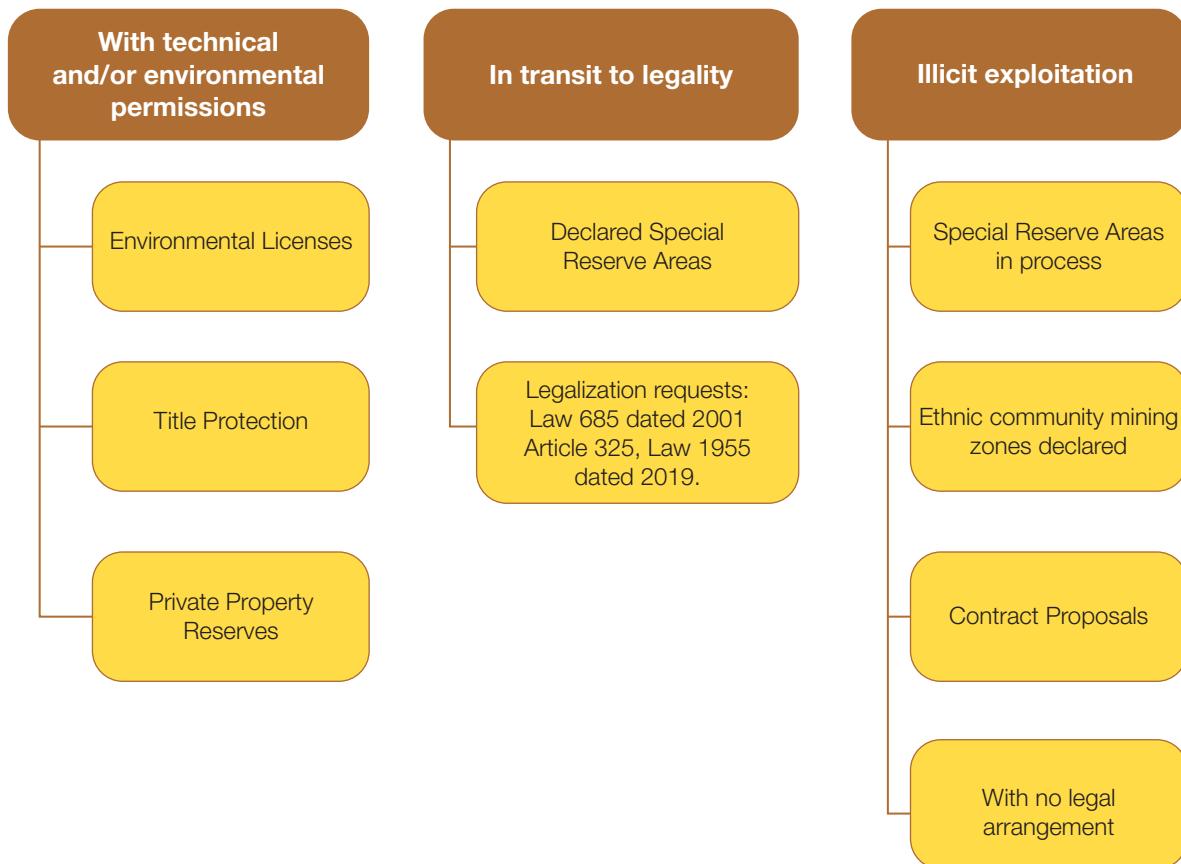
In this context, the study has official information from the ANM regarding Concession Contracts or mining titles, Recognitions of Private Property (RPP), Concession Contract Proposals, Mining Legalization/Formalization Applications, Ethnic Community Mining Zones and Special Reserve Areas (ARE) in process and declared. The following (figure 1) illustrates the categorization of the figures and then explains each one of them.

Who is responsible for environmental licensing?

Under current regulations for the exploitation of metallic minerals and precious and semi-precious stones, environmental licensing is the responsibility of the National Environmental Licensing Authority (ANLA), when the total projected removal of useful and sterile material is greater than or equal to two million (2,000,000) tons per year and is the responsibility of the Regional Autonomous Corporations, of Sustainable Development and those environmental authorities created by Law 768 dated 2002 when the total projected useful and sterile material removal is less than two million (2,000,000) tons per year (Decree 1076 dated 2015). In any case, once the environmental licenses are granted, they must be reported to the general system of the ANLA.

⁹ For the purposes of this study, law arrangements are understood to be any aspect of the normativity of the exploitation, with geographical attributes and with regulated conditions that can be circumscribed to a territory.

Figure 1. Law arrangements contemplated in the classification scheme



Environmental Licenses

Authorization granted by the environmental authority with jurisdiction by means of an administrative act to a person for the execution of a project, work or activity that according to the law and regulations may produce serious deterioration of renewable natural resources or the environment, or introduce considerable or notorious modifications to the landscape, in which the requirements, obligations and conditions that the beneficiary of the Environmental License must comply with to prevent, mitigate, correct, compensate and manage the environmental effects of the authorized project, work or activity are established¹⁰.

Protection of exploitation and exploration titles¹¹

The Mining Code defines the Mining Title as the document that grants the right to explore and exploit the soil and subsoil. Mining titles are classified as follows: 1) Exploration and/or exploitation licenses; 2) Contracts for mining contributions; 3) Exploitation mining contracts, and 4) Mining Concession Contracts [4]. The study considers the arrangements related to exploitation as a technical permission for this activity; on the contrary, exploration titles or licenses are not included as a technical permission, since any exploitation activity carried out in a territory with this arrangement is catalogued as illegal exploitation.

¹⁰ Decree 1753 dated 1994, article 2.

¹¹ There are arrangements such as formalization subcontracts that can exploit minerals, but these are already over the area of a mining title, for the same reason and concept of its legal qualification.

Private Property Acknowledgments

The RPP constitute an exception to the general postulate according to which minerals of any kind and location lying on the ground or in the subsoil, in any natural physical state, are the exclusive property of the State, which constitute individual, subjective and concrete legal situations perfected under pre-existing laws, in accordance with articles 5 and 14 of Law 685 dated 2001.

On the other hand, Law 685 dated 2001 establishes that the RPP constitute a valid Mining Title; however, RPP holders must carry out their mining activities in strict compliance with environmental and technical norms and requirements, in accordance with Article 339 of Law 685 dated 2001[5].

Special Reservation Areas

These are areas where there are traditional informal mining operations and which, at the request of a traditional mining community or ex officio, are delimited in such a way that, temporarily, no new proposals are admitted on all or some of the minerals located in these areas.

They are delimited and declared in order to prepare geological-mining studies that will allow the identification of their potential for the development of strategic mining projects for the country. These studies are financed by the ANM. If the studies show the existence of mining potential, a special concession contract is then signed with the beneficiary mining community.

Otherwise, a reconversion project is proposed that consists of offering the community a process of coordination with the authorities with jurisdiction to seek the labor transformation

of the miners, as well as, the environmental and social readjustment of the area [6].

Ethnic community mining zones

These are areas located in legally recognized territories belonging to ethnic communities (indigenous reservations and Black Community Lands). In this sense, there are indigenous, black community and mixed mining zones. The establishment of a mining zone is requested by the ethnic community from the ANM, which is responsible for its delimitation. The establishment of a mining zone gives the community in this territory the right of priority over third parties when obtaining a Mining Title.

Contract Proposals

They are those applications submitted by individuals to the State to enter into a Mining Concession Contract for the execution of studies, works and exploration and exploitation of minerals owned by the State [7].

Legalization requests

They are those requests made by state-owned mine operators, without Mining Title registered in the National Mining Registry, and by those who carry out exploitation of deposits and/or mining deposits prior to August 17, 2001 [8].

Requests for legalization of de facto mining of article 165 of Law 685 dated 2001

Under this framework, the legalization of exploitation activities is contemplated by means of a concession to the operators of state-owned mines without a title registered in the National Mining Registry. [4]. While the request for legalization presented by operators of state-owned mines without a Mining Title registered

in the national mining Registry, there will be no place to suspend the exploitation work, confiscate the exploited mineral, or to continue the criminal action referred to in Article 338 of Law 599 dated 2000 (Criminal Code). The foregoing is without prejudice to the actions that may be applicable by virtue of the environmental norms in force [9].

The information related to the protection of titles, special reserve areas and applications for legalization, contract proposals and mining zones is provided by the National Mining Agency (ANM), which is the entity in charge of administering the State's mining resources in an efficient, effective and transparent manner through the promotion, granting of titles, monitoring and control of mining exploration and exploitation, in order to maximize the sector's contribution to the country's integral and sustainable development [2].

However, it is important to note that Antioquia, through the Secretary of Mines, is the only province that has a mining delegation, with the duties of mining promotion and development, Titled and mining supervision, following the guidelines of the Mining Authority and the Ministry of Mines and Energy, and intervening directly in the territory [61]. Consequently, the Secretary of Mines of Antioquia is the institution in charge of the province's information regarding these legal arrangements.

On the other hand, the source for environmental licenses is the National Environmental Licensing Authority (ANLA), an entity responsible for ensuring that projects, works, or activities subject to environmental licensing, permissions, or procedures comply with environmental regulations, in such a way that they contribute to the sustainable environmental development of the country (Decree 3573 of 2011).

Article 325, Law 1955 dated 2019

Related to the processing of applications for traditional mining formalization. This article contemplates that those individuals, groups or associations that presented a request for the formalization of traditional mining up to May 10th, 2013 before the competent mining authority and that as of the date of promulgation of this law, are in force and in a free area, will continue the process in order to verify the technical viability of the development of the small mining project. In the case that the applications for the formalization of traditional mining have been presented in an area occupied entirely by a Mining Title and that is in force at the date of enactment of Law 1955 dated 2019, the mining authority will proceed to carry out a mediation process between the parties. If the application is partially within a title, the mining authority will proceed to make the respective cuts [10].

Finally, in order to improve the understanding of the scope of each law arrangement contemplated, a model has been designed for the study that starts with the structuring and with prioritization of the information provided by the ANM¹², the Secretary of Mines of Antioquia and the ANLA¹³ and, a categorization has been established according to the general scope of each arrangement in respect of the presence of EVOA.

Category I. With technical and/or environmental permissions

This category includes EVOA that spatially coincide with mining titles (Concession Contracts, exploitation licenses, RPP, etc.)

¹² The ANM information has a November 2018 cut-off date. The attached data table does not differentiate exploitation modalities, nor types of deposits, since the files represent the universe of law arrangements around gold exploitation without differentiation by vein or alluvium.

¹³ Information provided by ANLA has a November 2018 cut-off date.

and environmental instruments (Environmental Licenses, Environmental Management Plan, etc.).

In this area it is necessary to specify:

- The normative framework for the beginning of the mining activity in a determined area of the national territory implies the fulfillment of having a mining exploitation permission (Mining Title, Concession Contract) granted by the mining authority and registered in the National Mining Registry and the environmental instrument approved by the environmental authority with jurisdiction. This framework culminates with the obtaining of the environmental permission for exploitation or Environmental License¹⁴.
- Private Property recognitions or titles must be registered in the National Mining Registry, and in order to develop mining activities, the respective environmental permission must be obtained.
- Obtaining the environmental permission implies that the technical permission is already in place, since it is a requirement for the processing of the first permission.
- The ANLA system has not been properly updated by the other institutions with jurisdiction for environmental licensing and some are not up to date with their work; for this reason, we only have environmental licensing information for the province of Antioquia. By virtue of this circumstance, the analysis and geographic information related to environmental licensing should be interpreted with caution for the rest of the territories with Title Protection, since it does not necessarily imply that the exploitation is

being carried out without the environmental permission, but it may be due to the lack of updating of the ANLA system.

- The mining titles are subject to monitoring and control by the environmental authority and are subject to mining supervision, which requires compliance with the authorized standards in the technical documents presented for the licensing and development of the mining project. If they do not abide with the regulations, the mining owner will be subject to the different sanctions stipulated in the current regulations.

Category II. In transit to legality

This category refers to declared and delimited Mining Legalization/ Formalization and ARE requests, where the regulations grant exploitation prerogatives while the Concession Contract or Mining Title is being processed without the use of machinery.

In this regard, although the EVOA detected is not illegal, the areas must be subject to follow-up, monitoring and supervision by the mining and environmental authority in charge of the territory, to guarantee that the agreements established by the regulations regarding the use of machinery are being followed.

- Declared and delimited Special Reserve areas. This arrangement refers to the areas where a traditional mining community has initiated the process to obtain a special Concession Contract. It should be noted that these areas have the prerogative of mining exploitation and should not present evidence of exploitation with heavy machinery or any mechanized equipment.

¹⁴ In order to advance the assembly work and use of a mine, two final requirements must be met: the mining title and the environmental license. Therefore, this arrangement refers to the arrangement of Protection of Titles that has the environmental license issued by the competent authority and is considered the only arrangement under which exploitation activities would be developed within the framework of the law.

- Applications for legalization as per Law 685 dated 2001. Under this arrangement there are applications lodged that have the prerogative of exploitation without the use of mechanized equipment.
- Applying for legalization as per article 325 of Law 1955 dated 2019. This arrangement contemplates the requests to formalize traditional mining under the article, which have the prerogative of exploitation and should not have evidence of exploitation with heavy machinery or mechanized equipment as stipulated in Article 106 of Law 1450 dated 2011.

Category III. Illicit exploitation

It is configured when exploration work, extraction or capture of minerals of national property or private property is carried out without the corresponding mining title in force or without the authorization of the owner of such property. This category includes Contract Proposals, mining zones of ethnic communities and ARE, as well as those areas where no legal arrangement exists.

- Special Reserve Areas in process. This arrangement refers to the areas requested from the ANM but that have not been delimited or declared as such. It should be noted that in these zones any exploitation is considered to be outside the framework of the law.

- Mining zones of ethnic communities in process and declared¹⁵. These zones are in ethnic territories. However, the declaration by the mining authority or the request made to it does not grant any legal authority to explore or exploit minerals. For this reason, any exploitation is illegal.

It is worth mentioning that as specified in the previous chapter, the declaration of a mining area confers the right of priority to the ethnic community before third parties for the application of a Concession Contract, but in order to carry out exploration or exploitation activities, the procedures for the Concession Contract must be lodged and requested form the mining authority.

- Contract Proposals. This arrangement includes zones that have been the object of request to celebrate a Contract of Mining Concession between the State and individuals for the exploitation of the mineral; the very nature of the arrangement implies the non-accomplishment of tasks in exploiting the mineral until the proposal does not trigger the arrangement of holding a Mining Title and later an Environmental License in performing the exploitation.
- With no arrangement as per the law. It refers to EVOA without any procedure or request for exploitation.

¹⁵ In accordance with the established hierarchy, this study, unlike the 2018 study, in which priority was given to contract proposals, gives hierarchical priority to the mining areas by granting them priority as a community to obtain the concession contract. In this sense, the data broken down into areas of illegal exploitation may vary between these two arrangements with respect to the previous study. On the other hand, it should be noted that once the community or a third party makes an application for a concession contract over a mining area, the arrangement that takes precedence is the Contract Proposal.

MANAGEMENT MODEL FOR INTERVENTIONS IN THE TERRITORY

The third pillar of the monitoring model is based on the regulatory framework of mining restrictions (articles 34 and 35 of the Mining Code), which divides the territory according to the limitations when performing the mining activity, based on the specificities of environmental protection and / or cultural characteristics of it. By virtue of the above, there are territories with exclusive characteristics such as PNN, others with restrictive conditions such as ethnic territories and others free to carry out the exploitation activity under the technical and environmental regulatory framework. Its dimensioning and geographic knowledge allows for the expansion of the objective information base, for decision making in accordance with the specificities of each geographic space; it also contributes to the design of strategies aimed at resource management, control and monitoring of mining activity in the country.

In this context, the management model offers a comprehensive view on the location of EVOA in three specific areas and allows the integration of information regarding control or

prevention interventions carried out for their follow-up and response in the territories, as well as, the control, regularization and monitoring actions carried out by the respective authorities. The zones established in the model are:

- Excludable zones from mining: PNN, Regional Natural Parks, Delimited Moorland Areas, RAMSAR Wetlands, Forest Reserve Areas under Law 2 dated 1959 and Protected Forest Areas.
- Restricted mining zones: human settlements, public works zones, sites of archaeological interest, among others.
- Mining zones Free from environmental restrictions for mining.

Figure 2 shows the hierarchy and order of the management model, where classes of zones at the base of the pyramid lose territory if they contain a higher level of restriction zone. It is recommended that the data be used for analysis of the EVOA situation at the national level, but with caution for focused analysis.

Figure 2. Hierarchies for integration into the UNODC/SIMCI grid framework



Excludable zones from mining

The areas in which the law¹⁶ expressly determines that exploration and mining works may not be carried out are considered exclusion zones. These territories correspond to zones declared and delimited in accordance with current regulations as areas for the protection and development of renewable natural resources or the environment, areas that are part of the System of National Natural Parks (SPNN)¹⁷, regional natural parks, other areas of the National System of Protected Areas (SINAP)¹⁸, Protected Forest Reserve Zones, paramo ecosystems and wetlands designated within the list of international importance of the RAMSAR Convention¹⁹.

According to the Mining Code, Article 34, “no work or exploration and mining exploitation work may be carried out in areas that have been declared and delimited in accordance with the regulations in force as being for the protection and development of renewable natural resources or for the environment...”.

Of the above areas, only those Forest Reserve Zones established by Law 2 dated 1959 can be submitted to the Ministry of Environment and Sustainable Development (MinAmbiente) for the possible development of mining activity.

¹⁶ Article 34 of the Mining Code, Law 685 dated 2001.

¹⁷ The geographical coverage of PNN corresponds to official information from UAESPNN in 2017.

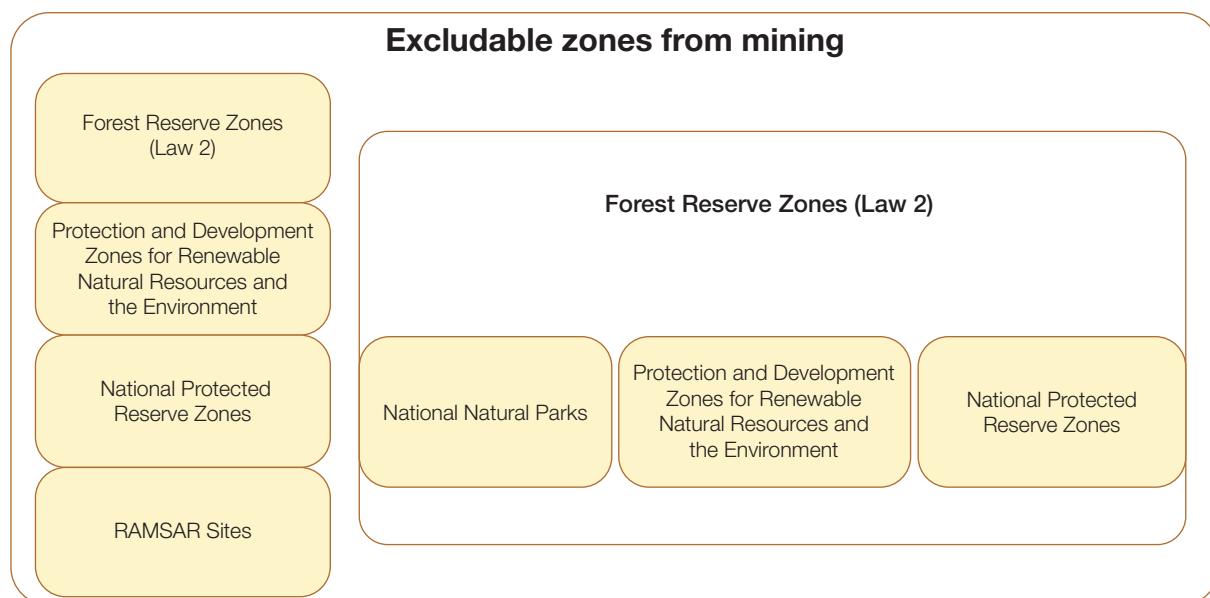
¹⁸ The geographic coverage of the SINAP corresponds to official information from UAESPNN in 2017.

¹⁹ These Excludable zones from mining generate, in case of total overlap with a Proposal for a Concession Contract, the rejection of the request and in case of partial overlap the cutting of the area, in order to grant the area that does not overlap with the areas declared as Excludable zones from mining.

It is important to note, additionally, that some categories of protected areas, excludable from mining activities, overlap geographically and have different management characteristics in

respect of the environmental authority. Figure 3 shows how these conservation areas are found in territories with EVOA on land.

Figure 3. Excludable zones from mining categories



Forest Reserve Zones

Since 1959, with the enactment of Law 2, seven large Forest Reserve Zones were declared throughout Colombian territory for the development of the forest economy and the protection of soil, water, and wildlife [11]: Cocuy, Sierra Nevada de Santa Marta, Central, Serranía de los Motilones, Río Magdalena, Pacífico and Amazonía.

According to Article 34 of Law 685 dated 2001, these areas are located within Excludable zones from mining; however, the environmental authority may decree, through a well-founded administrative act, the removal of the required area and may authorize mining activities in these zones that are restricted or conditioned on certain methods of exploitation that do not affect the objectives of the exclusion zones.

By their nature, these areas are of public utility and of social interest, and thus have become the main integrating element in environmental, territorial and forestry management. They are not protected areas; however, within them there are areas of the SINAP and of collective ownership territories. The zoning and management of these areas facilitates planning and guidance on environmental matters for the country's different productive sectors [12].

Protection and Development Zones for Renewable Natural Resources and the Environment

Colombia signed the Convention on Biological Diversity (CBD), approved through Law 165 dated 1994, which committed it to establishing strategies for in situ protection of biological diversity, including the establishment

of protected areas to help meet the country's conservation objectives.

One of the strategic actions to increase the ecological representativeness of the National System of National Natural Parks is the identification of conservation gaps and the definition of priorities through technical studies in sites of ecosystem importance. In addition, given the danger of serious and irreversible damage represented by the authorization and development of mining exploration activities without prior environmental evaluation, in areas that contain strategic and unique ecosystems in the country that are currently under-represented or not represented in the SINAP, MinAmbiente through resolutions 1628 and 1814 dated 2015 declared 57 Zones for the Protection and Development of Renewable Natural Resources and the Environment. It should be clarified that the protection measures in these zones are temporary, while the process of declaring them as protected areas is underway.

RAMSAR Sites

The Convention on Wetlands is an intergovernmental treaty whose mission is "the conservation and wise use of wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world" [14]. Currently, 171 nations have joined the Convention as Contracting Parties, with more than 2,300 wetlands covering an area of more than 2.5 million km² designated for inclusion in the RAMSAR List of Wetlands of International Importance [14].

Colombia has been a party to the RAMSAR Convention since January 1997, when

the Congress of the Republic of Colombia approved the Convention on Wetlands of International Importance, especially as Waterfowl Habitat, and by virtue of this decision the country is responsible for the management of wetlands in its territory. The inclusion of a wetland in the RAMSAR list represents the commitment of the Government, through the MinAmbiente, to take the necessary measures to ensure that its ecological characteristics are maintained.

National Protected Reserve Zones

They are geographical spaces that allow exclusively the preservation, sustainable use, restoration, knowledge and enjoyment of forest ecosystems, even if their structure and composition has been modified.

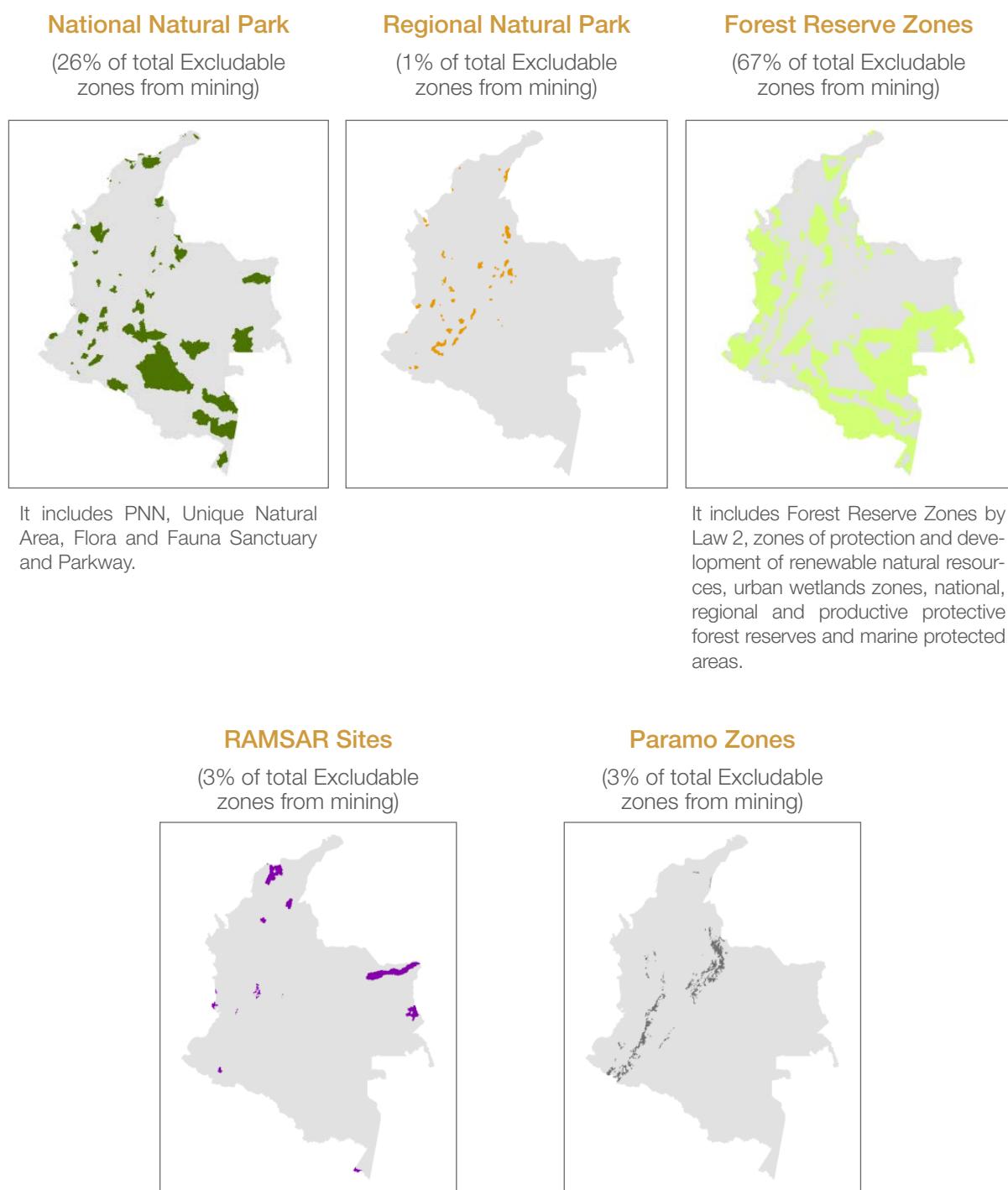
National Natural Parks

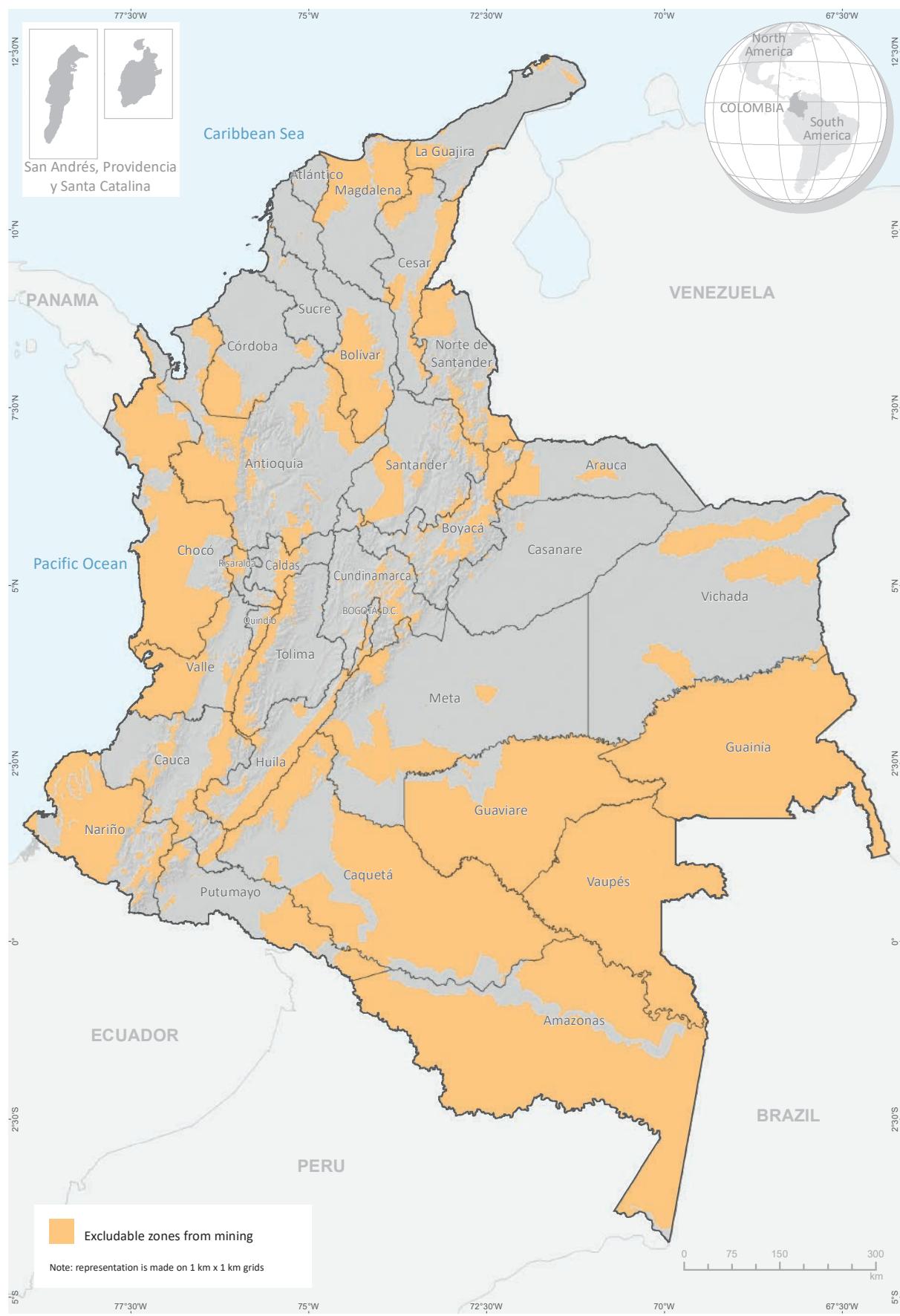
The objective of PNN is to protect natural biodiversity along with the underlying ecological structure and the environmental processes on which it rests. In turn, they seek to promote education and recreational use through a special management regime [15]. However, the destruction of these protected areas has increased in recent years alarmingly, due to various pressure fronts including extensive cattle raising, illegal crops, timber trafficking and the extraction of minerals such as gold, coal, copper, silver, zinc and clay.

In Colombia, 13%²⁰ of the territory has PNN jurisdiction, but by integrating all the special management entities, coverage reaches 50% of the country's total. Figure 4 and map 1 below show the spatial distribution of the Excludable zones from mining in Colombian territory.

²⁰ The calculation of percentage is made based on the framework of areas of the SIMCI project.

Figure 4. National distribution of Excludable zones from mining



Map 1. Excludable zones from mining, 2019

Source: Government of Colombia - Monitoring system supported by UNODC.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Restricted mining zones

Restricted mining zones are defined in the Colombian Mining Code²¹ as those areas where it is possible to carry out works and perform exploration and mining exploitation, as long as, some corresponding conditions are taken into account and fulfilled in each case. Eight categories of Restricted mining zones are contemplated:

- Areas within the urban perimeter of cities and towns.
- Areas occupied by rural constructions.
- Areas defined as of archaeological, historical or cultural interest.
- Beaches, low tide zones and river routes.
- Areas occupied by a public work or assigned to a public service.
- Indigenous mining zones.
- Black communities mining zones.
- Mixed mining zones.

In the case of mining zones constituted as indigenous, black communities or mixed, when the ethnic community authorities, within the time period indicated, have not exercised their preferential right to obtain the Mining Title to explore and exploit in relation to the provisions of the chapter on ethnic groups in the Mining Code, the Mining Title may be granted to the third party applicant and then prior consultation with the ethnic communities must be performed in the process of environmental licensing. If the ethnic community does not request the declaration of a mining area, the permissions may be granted to a third party when all requirements are met, especially when

Although it is true that Restricted mining zones have a particular connotation for the development of exploration or mining activities, well established in the regulations; they can be immersed in both Excludable zones from mining and Environmental restrictions free zones. In the particular case of the Excludable zones from mining, their intrinsic character of exclusion, until the technical permissions for the development of the activity are granted by the mining authority and the due environmental license has been granted, after subtracting the area of protection by the environmental authority.

performing the activity is not detrimental to the cultural, social and economic values of these groups²².

On the other hand, although there are areas that do not have the presence of legally protected ethnic groups in terms of autonomy in decision-making regarding the use of natural resources, they are included in the management model and have certain conditions that must be met in order to request the exercise of mining activity according to the provisions considered relevant by the administrators (public or private) of these territories, without affecting the interests of each type of area. In this sense, there are five other categories of Restricted mining zones where, as with the mining zones of ethnic communities, the fact that they have authorization from the owner/ administrator/ local manager does not mean that they are authorized to exploit minerals, since the respective procedures with the corresponding institutions are required.

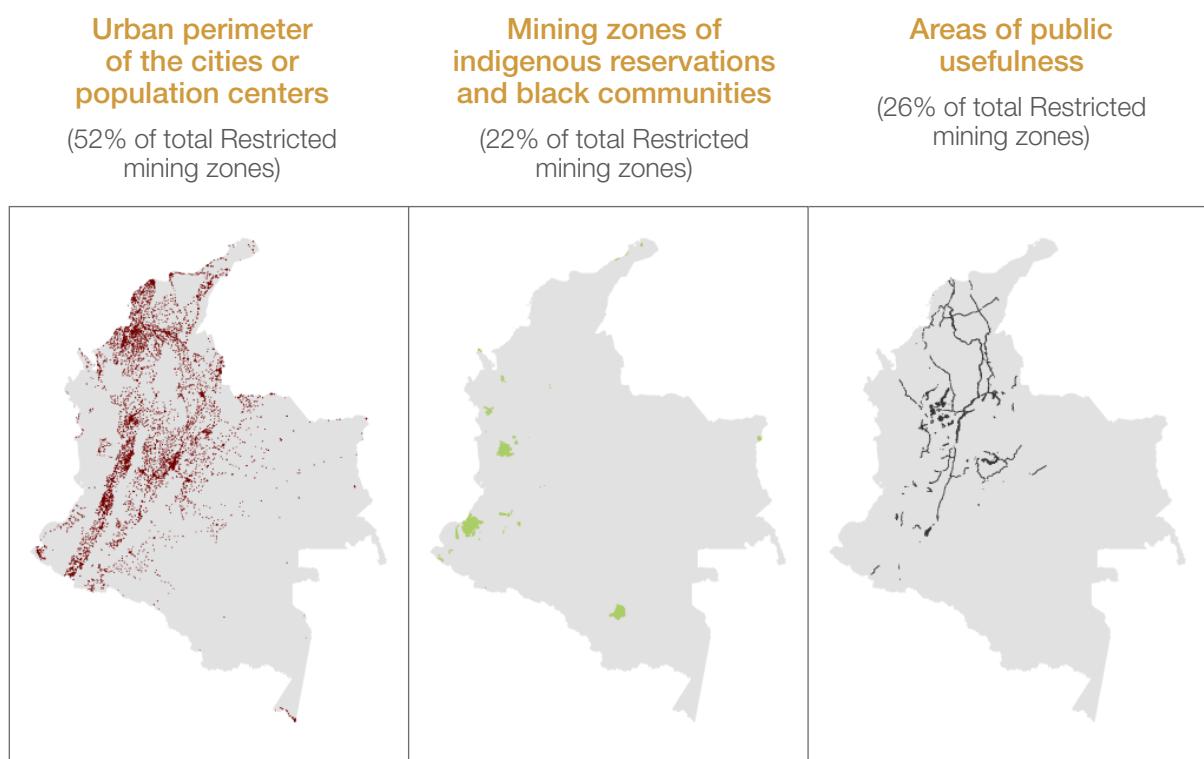
²¹ Article 35, Law 685 dated 2001

²² Chapter XIV, Law 685 dated 2001.

In the national consolidated listing, 3% of the territory presents some condition of restriction. The urban perimeter category of cities or population centers²³ constitutes 52% of the total restricted area. The areas of public usefulness constitute 26% and the mining

zones of indigenous lands (i.e. reservations) and black communities 22%; finally, the areas of archaeological interest and areas of the low seas constitute the remaining 0.1% of the country (figures 5 and 6, map 2).

Figure 5. National distribution of Restricted mining zones

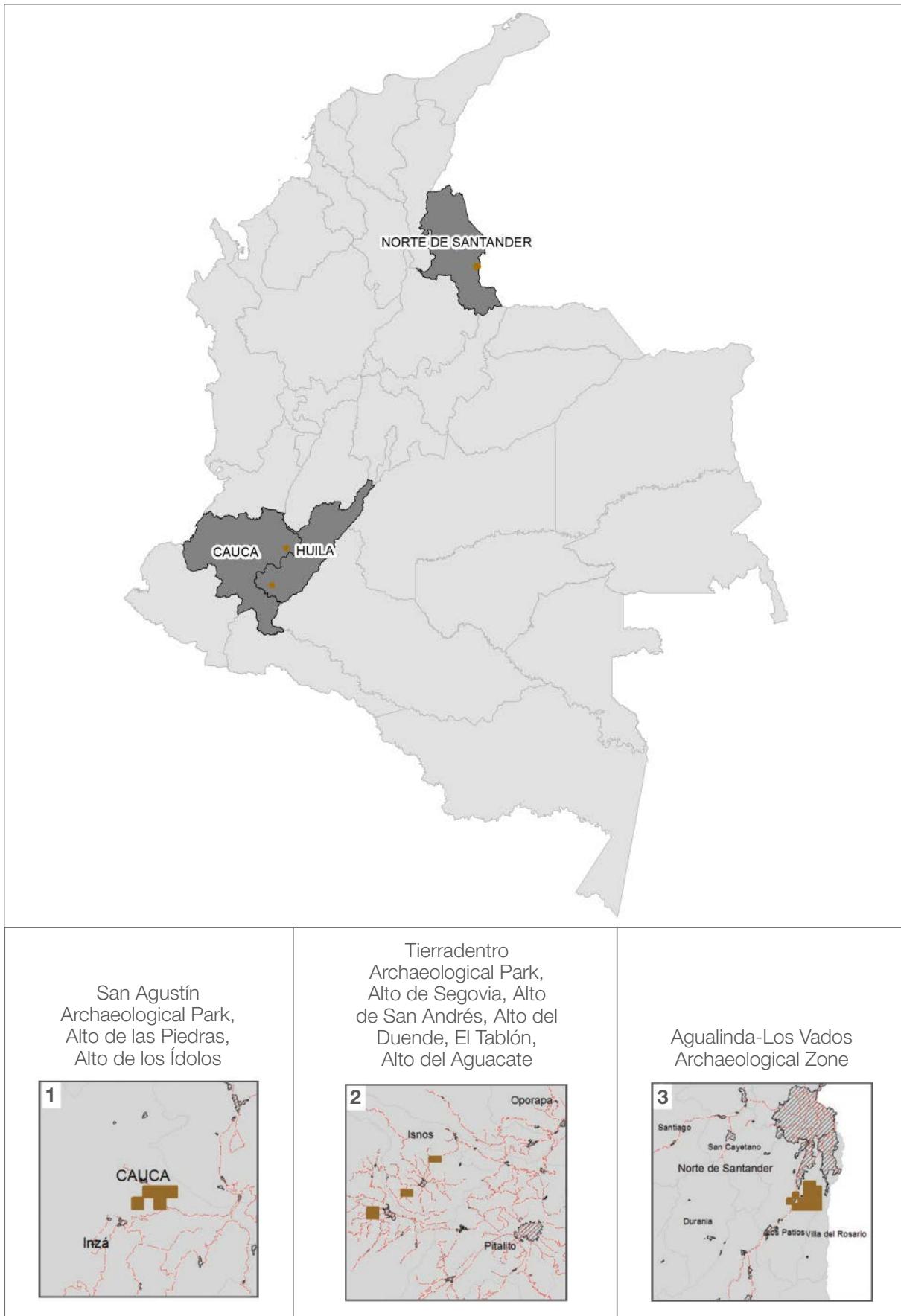


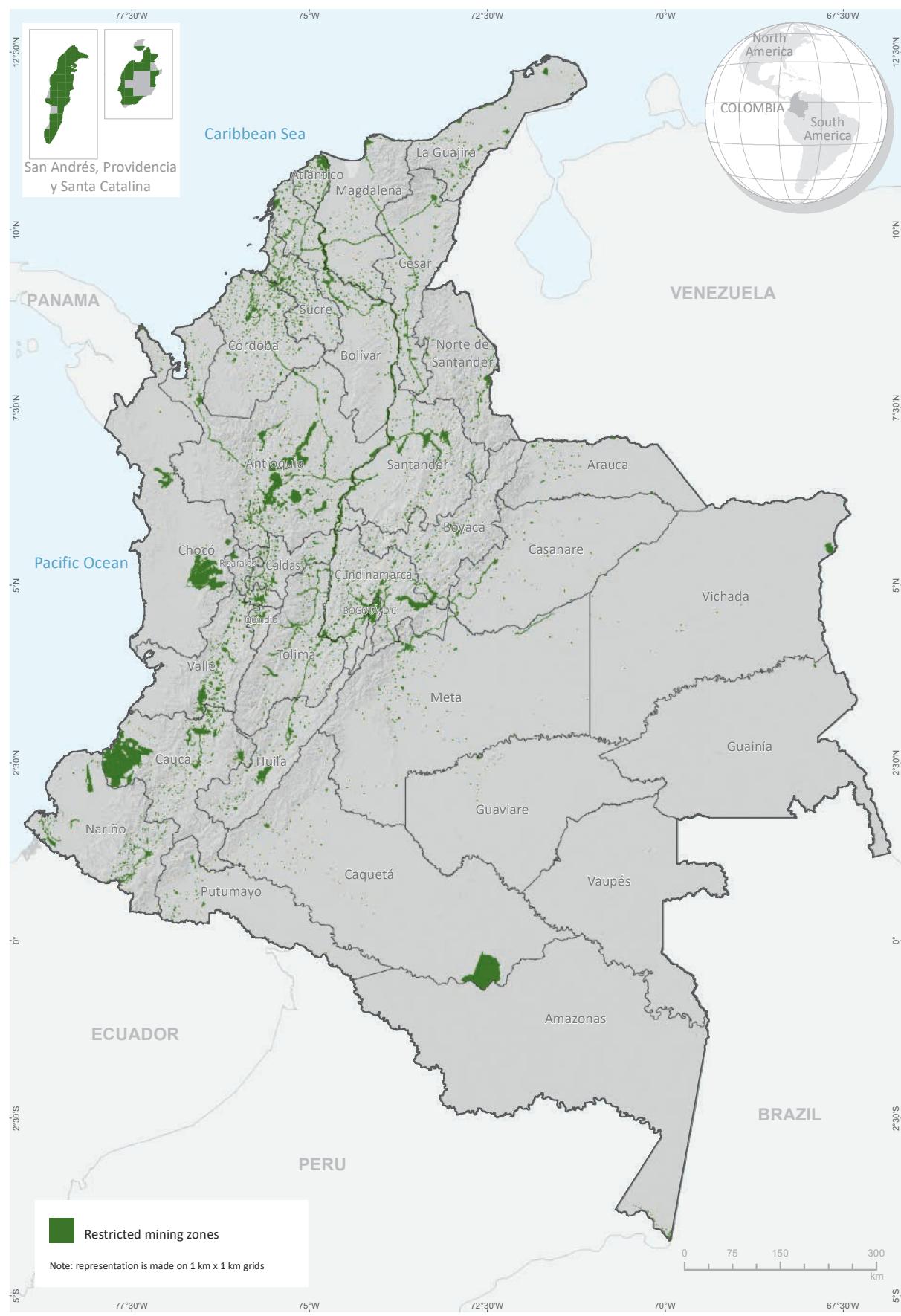
1 km² grids that intersect with some population center.

²³ The geographic coverage of population centers corresponds to official information from the Instituto Geográfico Agustín Codazzi (IGAC), cartography at a scale of 1:100,000.

Figure 6. Areas defined as of special archaeological, historical or cultural interest

(0.1 % of total Restricted mining zones)



Map 2. Restricted mining zones, 2019

Source: Government of Colombia - Monitoring system supported by UNODC.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Environmental restrictions free zones for mining

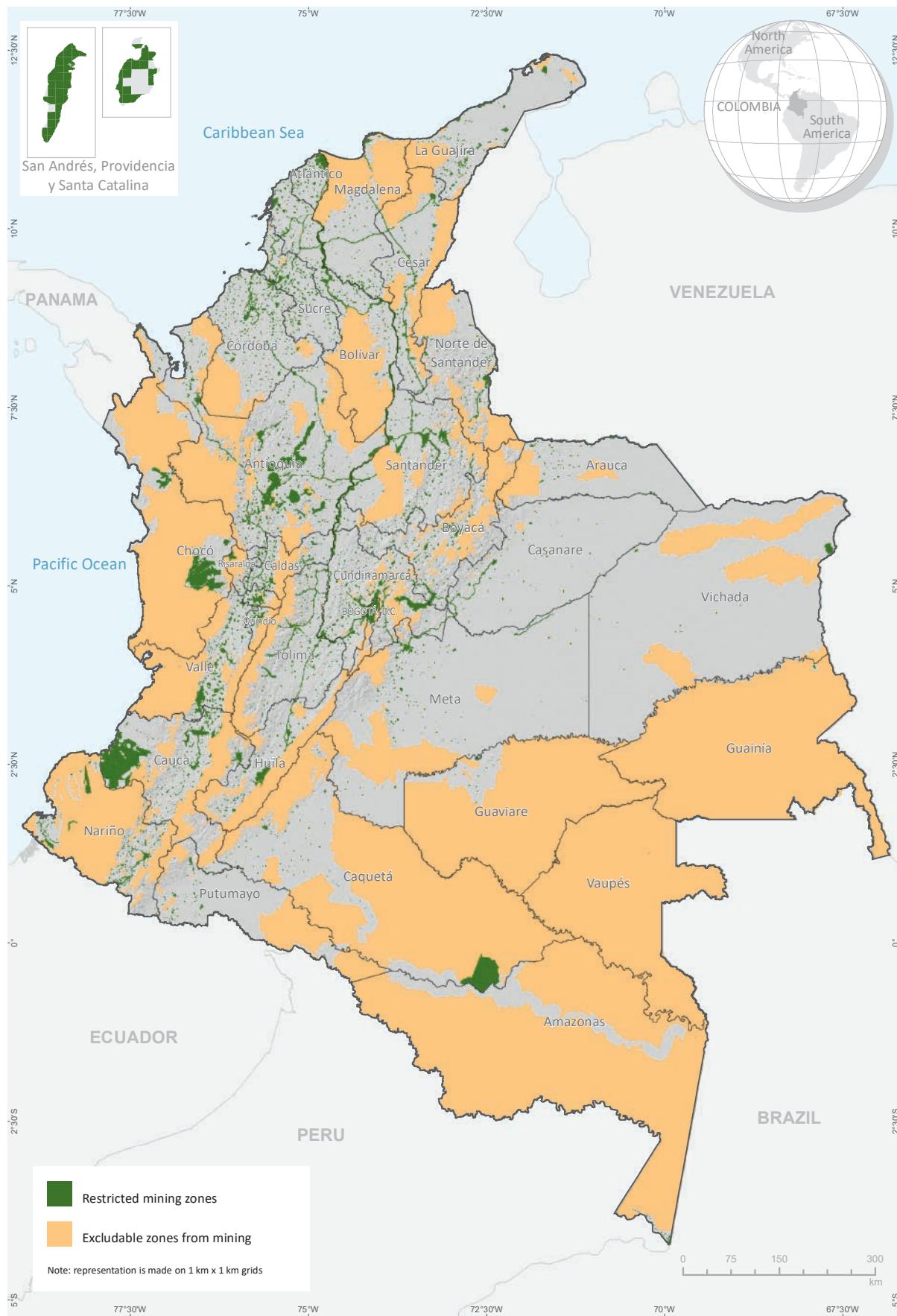
These are territories outside the categories that can be excluded or restricted from mining (table 2 and map 3). When these zones are recognized as territories of ethnic communities,

they may be requested obtaining all exploitation permissions (Mining Title and Environmental License); however, in the case that these zones are in ethnic territory, prior consultation with the community must be carried out in the process of environmental licensing.

Table 2. Distribution of the territory according to the management model

Name	Territory (km ²)	Percentage with respect to the national
Excludable zones from mining include Restricted mining zones declared in these territories	567,511	50
Environmental restrictions free zones	508,686	45
Restricted mining zones inside Environmental restrictions free zones	39,277	3
Free zones with exploitation permissions or on request	25,507	2
Total	1,140,981	100

Map 3. Excludable zones from mining and Restricted mining zones in the Colombian Territory, 2019



Source: Government of Colombia - Monitoring system supported by UNODC.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

SPECIAL MANAGEMENT TERRITORIES

For the purposes of this document, regardless of the management model for interventions in the territory, a section is set aside for special management territories, which by the very nature of their creation or declaration in terms of the conservation and protection of national biodiversity, imply differentiated models of management and intervention that are not totally contemplated within the framework of mining regulations (Restricted mining zones or Excludable zones from mining), but that in the environmental and cultural framework present specificities that must be taken into account for the design and focus of interventions in the control and prevention of illicit exploitation in these territories. Similarly, in these territories there may be conditions that apply to both Excludable zones from mining and Restricted mining zones.

In this sense, in order to have a global vision of these territories, the section is focused on the following areas: 1) those zones titled under the concept of collective property by the Colombian state to the ethnic communities that inhabit them (indigenous peoples and communities of African descent), and 2) protected areas that are not part of the areas that are Excludable zones from mining or Restricted mining zones but are registered in the Unique National Registry of Protected Areas (RUNAP).

Ethnic territories

The historical presence of ethnic communities in Colombia means the existence of their own territorial administrative model, established by national legislation to guarantee that

populations with ancestral traditions are the ones who make the important decisions regarding the management of the place where they have lived for several centuries, given their condition of being a minority population in the country.

Colombian mining regulations identify territories that, based on their characteristics, are classified as Excludable zones from mining and Restricted mining zones, with some territories being considered as Environmental restrictions free zones for mining. Therefore, there are territories with specificities that require a differential approach by the authorities with jurisdiction in this area. These specificities are due to different factors, according to the objectives of protection in the territory: ethnic populations and natural resources.

According to Colombian legislation, these territories are protected and have specific protection measures in each case, in order to guarantee the existence of the human, cultural and environmental heritage protection. In this sense, legal means have been stipulated in respect of the special handling required in these cases, which limit the permitted and prohibited activities, indicate the administrative procedures to be followed, and designate the authorities responsible for enforcing effectively these regulations.

Under this precept, the Lands of the Black Communities²⁴ and the indigenous reservations²⁵ were configured to title lands to these ethnic communities, in such a way that they would have an administration differentiated from the conventional hierarchical institutional structure for the majority population groups

²⁴ Law 70 dated 1993, "by which transitory article 55 of the Political Constitution is developed", for the recognition of the right to collective property in the areas historically inhabited by black communities in the Pacific basin, in accordance with their tradition for production.

²⁵ Decree 2164 dated 1995, "by which Chapter XIV of Law 160 dated 1994 is partially regulated," in relation to the endowment and Titled (constitution, maintenance, restructuring and/or expansion) of lands to indigenous communities for their adequate settlement and development, as well as the clean-up of those that were occupied by third parties unrelated to the respective partiality.

(governments, municipalities, etc.) without going against the national Constitution, in the interest of granting them legal protection to exercise the model of territorial oversight that best suits their ancestral traditions, in which fundamental concepts such as autonomy to organize and lead their own structure of internal functioning prevail [16] and prior consultation for the approval of any intervention by third parties in these areas [17].

Black Community Lands

As a result of the recognition granted by the 1991 National Political Constitution to Afro-Colombian communities in the nation, Law 70 dated 1993 defined the concept of the Black Community as a ethnic group that has inhabited for several generations wastelands in the Pacific region and some areas of the Caribbean coast and of the south of the country, with African ancestors from whom they have a linguistic, ethnic, and cultural heritage [18] [19]. The legal arrangement for exercising maximum authority within these collective territories is called the Community Council, as established in Decree 1745 dated 1995, which consists of the black community living there which constitutes a legal entity for this purpose. The instrument for planning, governance, and territorial ordering in the lands of the black communities is called the Ethnic Development Plan, which must be formulated and registered with the Colombian State [20].

According to official information²⁶, there are 5,711,496 ha. titled Black communities in Colombia, administered by 196 different community councils and distributed in 11 provinces, although the bulk of these territories (95% of the area titled to 170 community councils) are located in the four provinces of the Pacific strip:

Cauca, Chocó, Nariño and Valle del Cauca. The provinces with the remaining 5% participation at the national level are: Antioquia, Bolívar, Córdoba, La Guajira, Magdalena, Putumayo and Risaralda. It should be noted that, in some cases, the same collective territory entitled to black communities can be in an area between two provinces.

According to the data reported for 2018, 2,956,709 people recognized themselves as black, mulatto, Afro-descendant, Afro-Colombian, or Palenquero from San Basilio [21], ethnic groups that who have received titles of collective lands under the concept of Black Community Land. However, only some community councils periodically update the population information within their jurisdiction as part of the ongoing process of autonomous territorial planning, accompanied and monitored by various agencies and institutions that support the internal strengthening of governance. In this regard, only some community councils periodically update the demographic information within their jurisdiction as part of the ongoing process of autonomous territorial planning, accompanied and monitored by various agencies and institutions that support the internal strengthening of governance [22].

According to the vision of territory of the black communities [18], biotic and abiotic natural resources are the basis for the sustainable functioning of the environment in which there is an internal order of spaces according to the roles and activities of the community, resources that guarantee their subsistence through fishing, hunting, artisanal mining, forestry and agriculture; additionally, the forest not only has an ecological and timber connotation, but also protects the essence of their ancestral knowledge given the healing power of medicinal

plants. Consequently, any intervention made in these territories by third parties must be approved by the community councils through the mechanism of prior consultation and, therefore, contemplated within the activities permitted and zoned in the Ethno-Development Plan.

Indigenous Reservations

According to Decree 2164 dated 1995, which partially regulates the National System of Agrarian Reform and Rural Peasant Development (Law 160 dated 1994), through the constitution, expansion, restructuring, or reorganization of indigenous reservations, the Colombian State defined the requirements to guarantee the provision and/or Titled of lands to indigenous communities in the appropriate extension for their settlement and development in order to recognize the ownership and historical occupation of these populations in the territory, as well as, to preserve their ancestral customs and to improve the quality of life of those inhabitants. In this sense, it is understood that the indigenous reservations is a legal socio-political institution, made up of a recognized territory where indigenous communities live²⁷.

In terms of the administration and organization of territory in indigenous reservations, there are legal institutions recognized by Decree 2164 dated 1995, as well as, other instruments, which provide the basis for their functioning: 1) traditional authorities, who exercise power within their own internal structures; 2) Indigenous councils, special public entities made up of elected members of the community with political duties; and 3) life plans, which are the instrument for planning, policy and government

for Indigenous peoples and which are agreed upon with the State [23].

Official information for Colombia²⁸ records 767 Indigenous reservations in the country, for a total of 5,852,805 hectares titled to these communities, distributed among 28 of the 33 administrative units (32 provinces plus the capital district); the five jurisdictions that do not have a presence of Indigenous reservations are: Archipelago of San Andrés, Providencia and Santa Catalina, Atlántico, Bogotá, Bolívar and Santander. In several cases an indigenous reservation is in an area belonging to two provinces. Although there are sources of information that report various figures regarding the number of Indigenous peoples²⁹ in the country, the official data of the Colombian State recognizes 115 Indigenous peoples [24].

The Indigenous population of Colombia represents 4.4% of the total national population [25]. However, it is difficult to establish an exact demographic picture within Indigenous reservations solely because of migration to other territories, and there is no consolidated and consistent record of the actual population living within the reservations [26].

The worldview of Indigenous communities, both in Colombia and in the Americas, is based on the concept of Mother Earth as a symbol of life. In this sense, the environment is conceived by these communities as a harmonious relationship between people and natural resources that obliges them to contemplate specific roles within their internal structure in order to preserve their natural surroundings above all else, and thus guarantee their survival [27]. Thus, the life plans of these communities prohibit any

²⁷ Articles 2.14.7.5.1 of Decree 1071 dated 2015.

²⁸ Indigenous Reservations geographic layer. National Agency of Lands, 2019.

²⁹ An indigenous community is a group of communities belonging to the same ethnic group, which share certain specific customs, traditions and beliefs.

activity that is detrimental to the sacred heritage of the indigenous peoples in the reservations, and therefore, any intervention in these territories that is alien to the protected population must be subject to prior consultation and study by the community.

Protected areas included in the National System of Protected Areas (SINAP), registered in the Single National Registry of Protected Areas (RUNAP) that are not part of the Excludable zones from mining

In addition to the SPNN, in Colombia there is a wide variety of protection categories for areas that are part of the SINAP, which are registered in the RUNAP, so they are geographically

defined and are designated, regulated, and administered in order to achieve specific conservation objectives.

Despite their conservation status, in some categories such as the Integrated Management Districts, there is no tacit prohibition to carry out exploration and mining activities and therefore, according to their legal regime, their development is possible, allowing for a rational and sustainable use of non-renewable natural resources. The environmental regulations establish the possibility of taking away from protected areas when, for reasons of public usefulness and social interest, it is planned to develop uses and activities that are not permitted within them [2].

Photograph:
Alluvial gold exploitation on land, Magüí Payán (Nariño)



This section includes findings related to EVOA on land and in water and its dynamics. It presents the relationship between EVOA and legal arrangements, as well as with the management model for interventions in the territory.

SECTION II FINDINGS

This chapter addresses, according to the monitoring model, the findings throughout the national territory for EVOA on land and for the EVOA baseline on water built for ten rivers in the Amazon and Orinoco Colombian region (Putumayo, Caquetá, Apaporis, Guainía, Amazonas, Yarí, Inírida, Cotuhé, Puré and Atabapo). In this sense, it is necessary to draw attention to the reading and the interpretation of EVOA's results in water, since the study deals exclusively with the rivers mentioned³⁰.

The first part of the chapter deals with the law arrangements from the three categories established in the model, which allows one to have an approach to the legality and illegality of the EVOA. Subsequently, the findings are concentrated according to the management model, which is framed according to the specificities of the territories, the viability of the mining exploitations and, finally, a consolidation of the presence of EVOA in the provinces is presented with a special section focused on the alerts by EVOA with the use of machinery in water.

³⁰ The monitoring system of EVOA has projected for 2020 to extend the study to other rivers with presence of this activity.

EVOA AND LAW ARRANGEMENTS

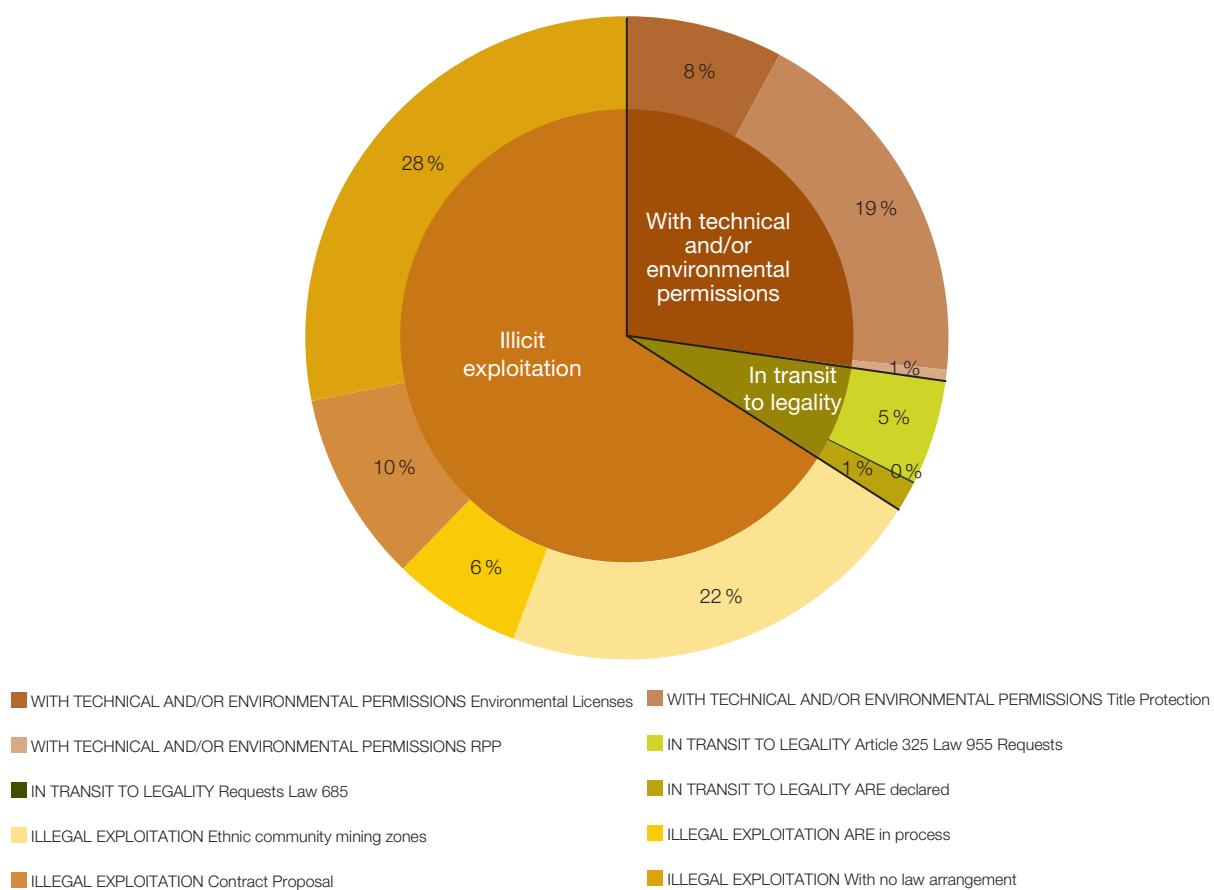
The methodology used for detection does not allow direct identification of the legal nature of the activity for all EVOA, but it does provide the competent institutions in charge of the management, administration and control of the resources with evidence-based information for institutional strengthening regarding the frame of reference of the phenomenon and, therefore, for the management of the resource and the control of the illegal exploitation of minerals. For this purpose, observing the EVOA and the areas under the law contemplated in the study regarding gold exploitation allows one to obtain a territorial vision of the phenomenon.

For this purpose, and to discern the legal nature of the EVOA in relation to the conditions

of the territories and the law arrangements present there, this chapter shows the main findings for the three categories established in the previous section.

According to the ranking, for the 2019 national consolidated, 66% (64,727 ha.) of EVOA correspond to illegal exploitations, 27% (26,615 ha.) correspond to exploitations under the framework of the law (with technical and/or environmental permissions), that is to say, they have technical or environmental permissions for the exploitation and the remaining 7% (6,686 ha.) is in transit to legality. Figure 7 illustrates the percentage relationship between EVOA and the related law arrangements.

Figure 7. National percentage distribution of EVOA with respect to the categorization of law and land-lot legality arrangements, 2019



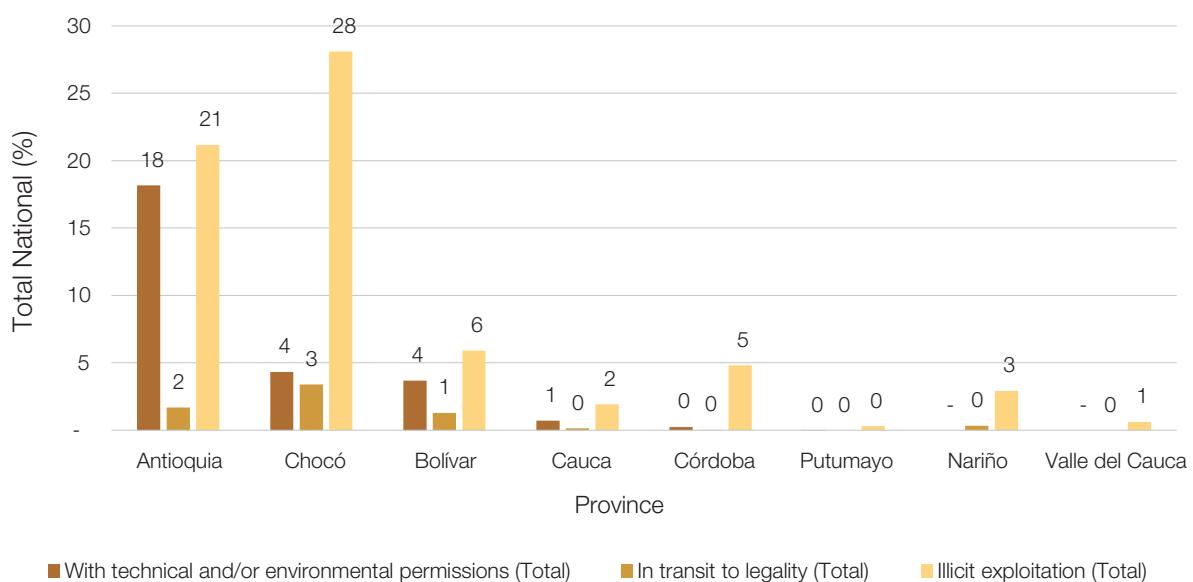
As per the provincial distribution, it is found that Antioquia is the province that has the largest amount of EVOA under arrangements that have technical and/or environmental permissions (18% of the national total). The provinces of Chocó and Bolívar each present a contribution of 4% in this category.

In this context, 28% of the consolidated national figure is made up by the illicit exploitations found in Chocó, which is the province

that presents the highest percentage of EVOA in this category, followed by Antioquia with 21% of the national total (figure 8).

Chocó is the province that presents the greatest amount of EVOA under the category of illicit exploitation with 28% of the national consolidated (27,543 ha.), which represents 78% of all the detection within the province; only 12% corresponds to exploitations under the framework of the law.

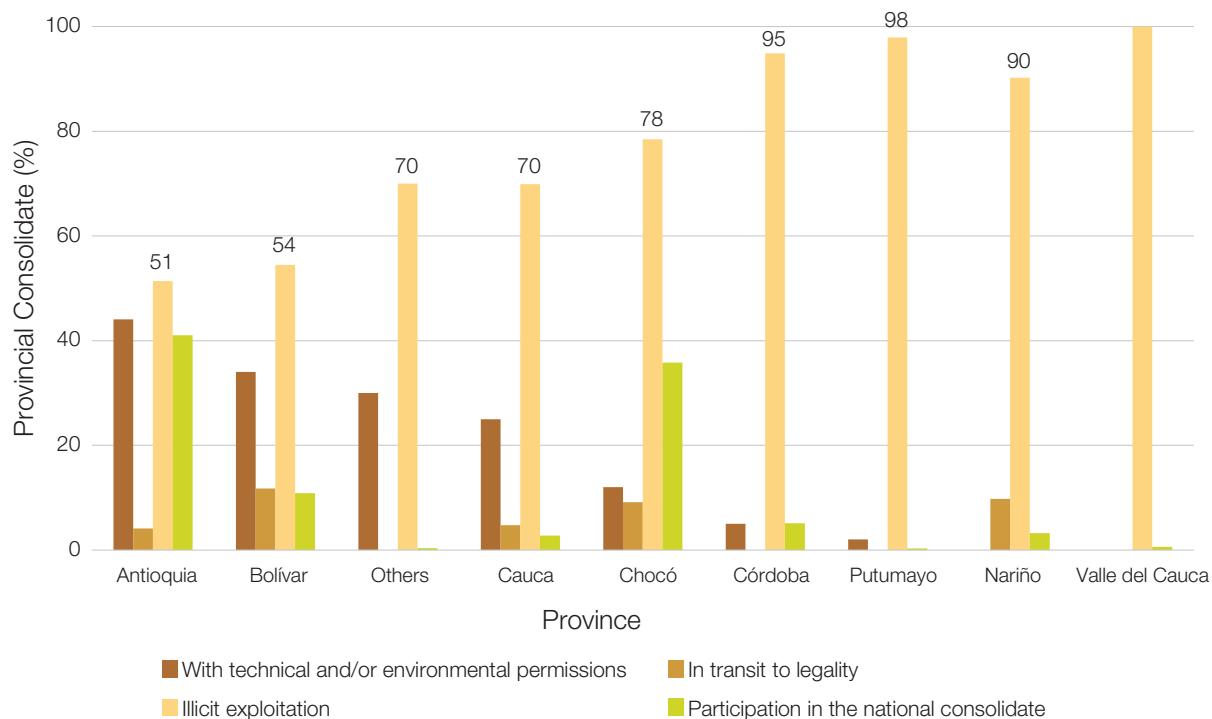
Figure 8. Provincial distribution of EVOA in the national consolidated, 2019



However, when taking a closer look at the provincial scale (Figure 9), one finds that although Valle del Cauca represents 1% of EVOA detected at the national level, 98% corresponds to illegal exploitations. On the

other hand, in the provinces of Nariño, Córdoba and Putumayo, which represent 4% of EVOA's detections in the country, more than 90% correspond to this same illicit category.

Figure 9. Distribution in the provinces of the hierarchy of law arrangements, 2019

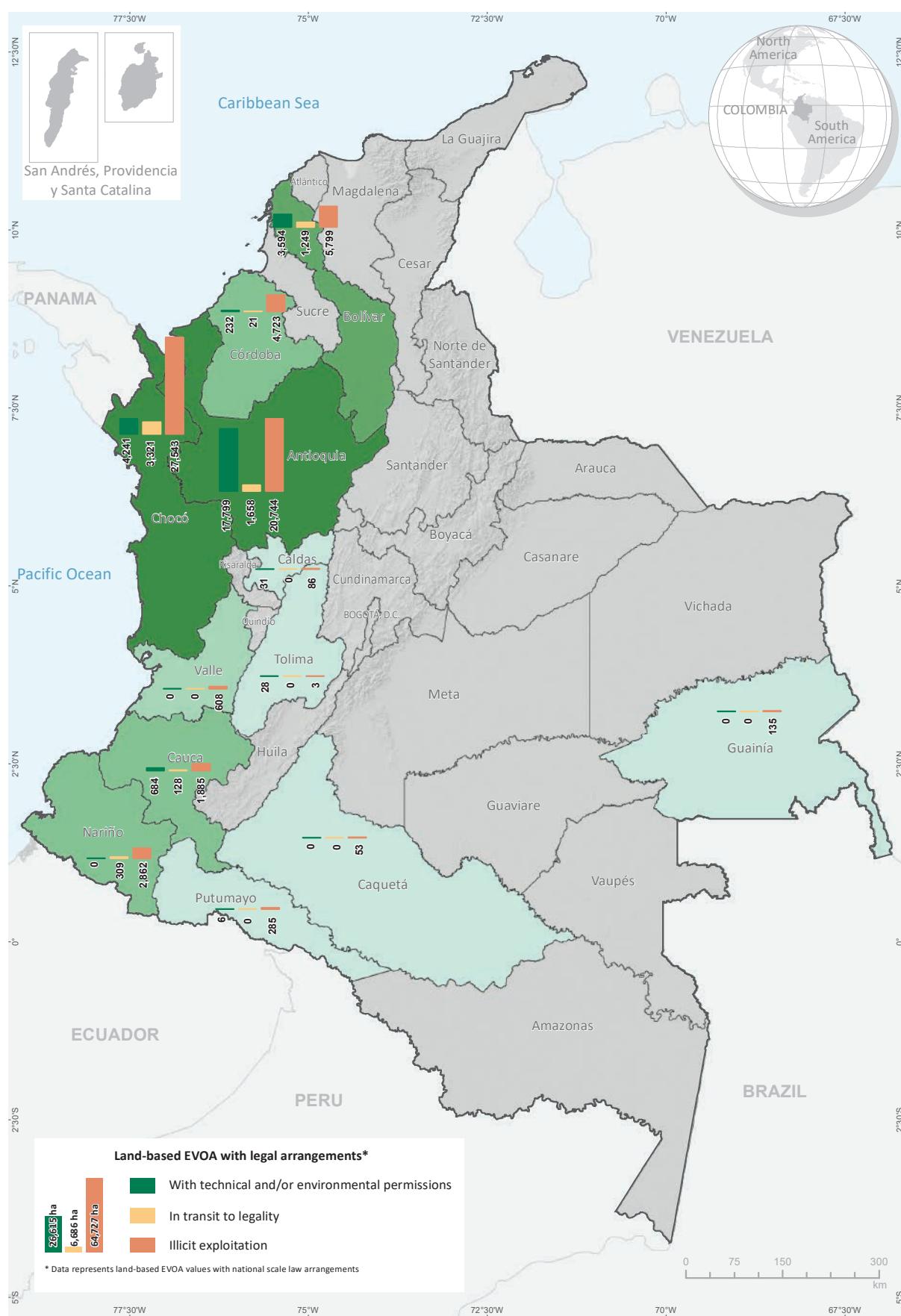


In Chocó, the province with the second highest number of detections in the country, nearly 80% of the EVOA detected correspond to illegal farms or land-lots, while only 12% are being developed with technical or environmental permissions³¹. The situation is very similar in Cauca, although in this province the percentage of EVOA corresponding to land lots with technical and environmental permissions is double that of Chocó.

On the other hand, in Antioquia and Bolívar approximately half of the EVOA are illegal land lots; those lots of land under the law correspond to 44% and 34%, respectively. Below (map 4), the findings for each category are presented.

³¹ Although the EVOA detected in these territories correspond to law arrangements related to technical or environmental permissions, these are focused on notorious changes and modifications in the landscape, which do not agree with the essence of the environmental regulations and must be subject to the follow-up and control of the agreements made in the Concession Contract and the Environmental License.

Map 4. Land-based EVOA distribution according to legal arrangements, 2019



Source: Government of Colombia Monitoring system supported by UNODC for law arrangements: Ministry of Mines and Energy.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Category I: With technical and/or environmental permissions

By 2019, 27% of EVOA coincides with arrangements related to technical and/or environmental permissions; in other words, these land-lot farms would be mined under the legal regulatory framework. It is the responsibility of the mining authority and the environmental authority of each jurisdiction to monitor, control and supervise the compliance with the obligations and to implement, according to their work plan and to the environmental instruments, the respective actions, be they of control, of mitigation, recovery or restoration.

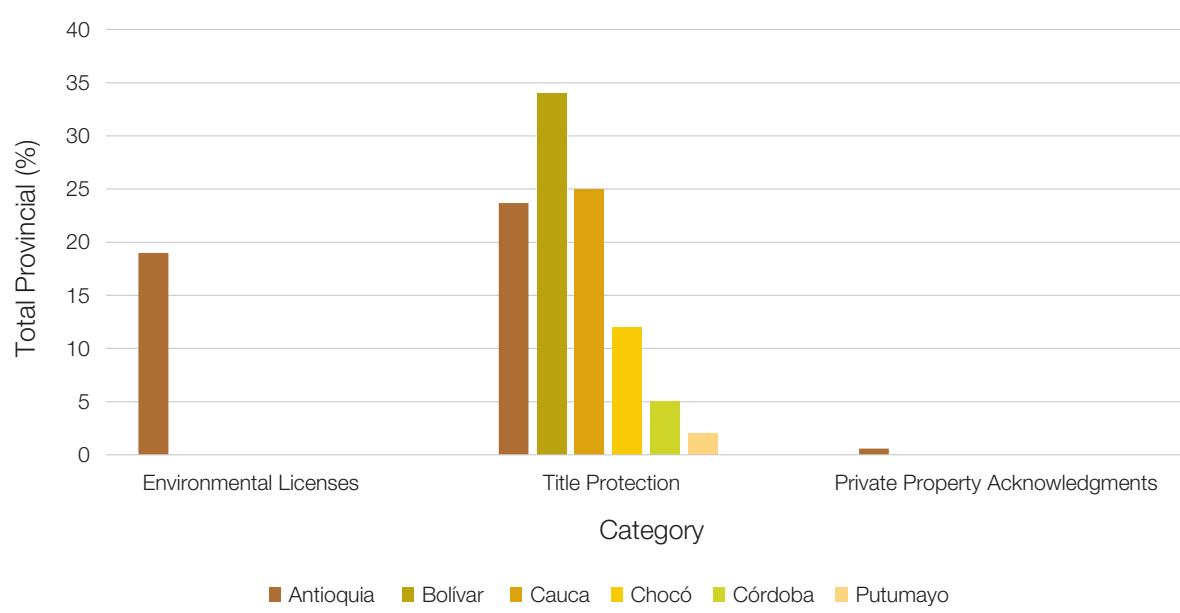
8% of EVOA detected are under the arrangement of Environmental License, which means that they have the technical and environmental permission for the mining exploitation. 100% of these evidences are in the province of Antioquia and represent 19% of the provincial total.

This figure is mostly concentrated in the municipalities of Nechí (48%), El Bagre (26%), Zaragoza (15%) and Caucasia (11%).

However, 19% of the area detected is under the modality of "Amparo de Títulos" (Title protection) and they are located in five provinces, mainly in Antioquia (52%), Chocó (23%) and Bolívar (20%). However, it is worth noting that the latter presents the highest percentage of EVOA under this modality (34%) of the provincial total (see Figure 10).

All the 20% of the EVOA that have a Title Protection or Private Property Recognition cannot present the necessary environmental permission to carry out exploitation activities. It is necessary to update the system of the ANLA for the validation of these data and, consequently, for the design and the focalization of control strategies where it would have place.

Figure 10. Provincial distribution of EVOA corresponding to areas with technical and/or environmental permissions, 2019



In respect of Private Property Recognition (RPP), about 1% of the national consolidated area is under this arrangement, 100% located in the province of Antioquia, in the municipalities of Anorí (48%), Amalfi (25%), Cáceres (17%) and Zaragoza (10%).

Category II: Exploitations in transit to legality

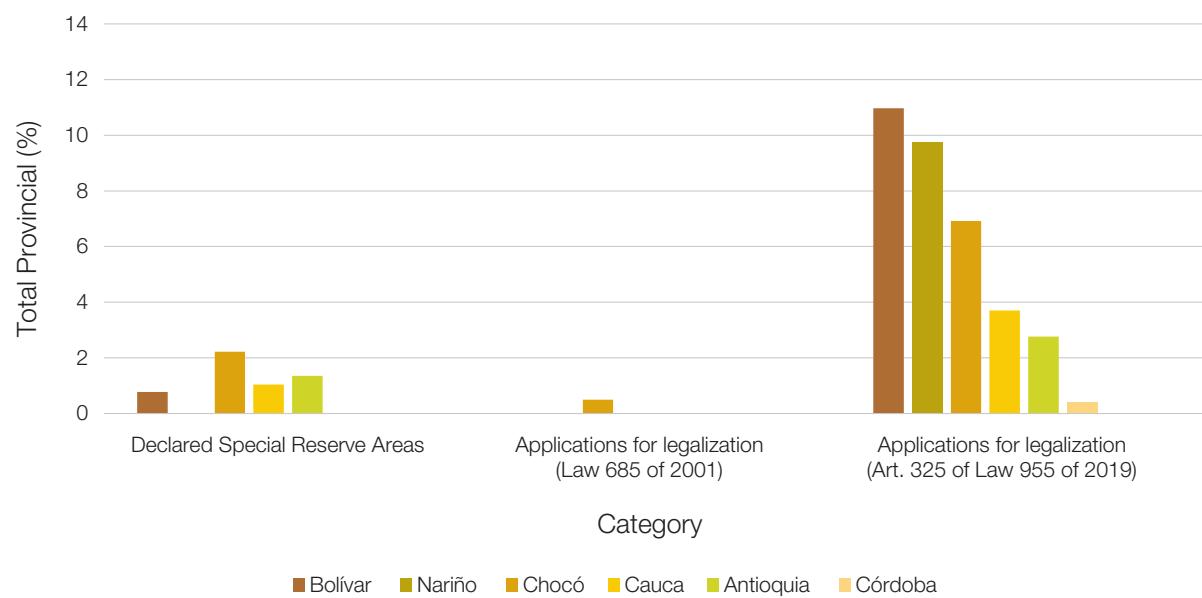
In 2019, 7% of the EVOA of the national consolidated coincides with arrangements in this category, and 5% with applications for legalization under Article 325 of Law 1955 dated 2019. In addition, a little more than 1% is found in declared Special Reserve Areas and less than 1% in areas with legalization requests under article 165 of Law 685 dated 2001 (see figure 11).

There are five provinces that present EVOA under the legalization framework of article 325 of Law 1955 dated 2019: Bolívar, Nariño, Cauca, Antioquia and Chocó; it is in this last one where 47% of the national detection

under this arrangement is concentrated, which represents 7% of the total EVOA in the province. This evidence is mainly concentrated in the municipalities of Unión Panamericana (41%) and Condoto (30%).

On the other hand, in Bolívar there is 23% of EVOA at national level detected under this arrangement, which represents 11% of the total detected in the province, where the municipality of Montecristo reports 53% of the province under this arrangement. With very similar participation in area is the province of Antioquia, whose EVOA represents 22% of the national total under this arrangement and 3% of the provincial total, being the municipalities of Cáceres and Remedios the ones that lead the participation, with 39% and 22% respectively, of the provincial detection under this arrangement of legalization. For its part, Nariño presents a very similar percentage distribution in the province (10%), which represents 6% of the national detection consolidated under this arrangement.

Figure 11. Provincial distribution of EVOA corresponding to exploitations in transit to legality, 2019



In respect of the declared Special Reserve Areas, 54% of EVOA under this arrangement is located mainly in Chocó, in the municipalities of Medio Atrato (37%), Unión Panamericana (21%) and Condoto (20%); the remaining 22% is in the municipalities of Cértegui and Tadó. Antioquia reports 38% of this arrangement in its territory. In this province, in particular, the municipality of Tarazá is the one with the largest territory in this figure, with 22% of the national total in the figure and 7% of the provincial total in the arrangement. The provinces of Bolívar and Cauca report 6% and 2%, respectively, of the consolidated territory under this figure.

Finally, the EVOA detected under requests for legalization as per Law 685 dated 2001 do not reach 1% (0.11%), 0.1% less than in the previous study, and are located entirely in the province of Chocó, mainly in the municipalities of Unión Panamericana (54%) and Tadó (29%).

Category III: Illicit exploitation

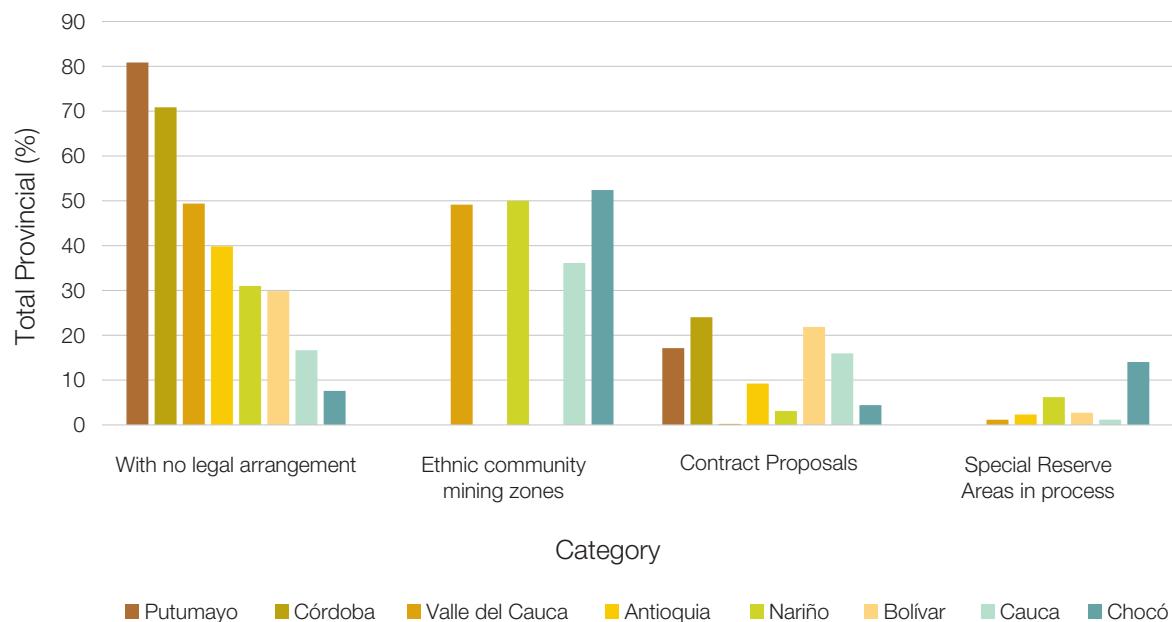
In this category, 39% (37,138 ha.) of the exploitations are under law arrangements without

permissions and 28% (27,589 ha.) is in territories without any law arrangement (figure 12).

As for the EVOA under law arrangements lacking permissions for exploitation, 58% refers to mining zones of ethnic communities (indigenous, black or mixed communities), 25% to Concession Contract Proposals and 17% to Special Reserve Areas in process.

When analyzing each of these arrangements, it is found that for mining zones of ethnic communities, 86% of the EVOA are in the province of Chocó and represent 52% of the provincial total. 7% is in Nariño, where it represents 50% of the total detected in the province; the municipalities of Barbacoas, Magüí Payán and El Charco consolidate 92% of the EVOA detected under this arrangement of illegal exploitation in the province. For their part, the provinces of Cauca, Valle del Cauca, Antioquia and Guainía group the remaining 5% corresponding to this arrangement.

Figure 12. Distribution of EVOA by province corresponding to illicit exploitation, 2019



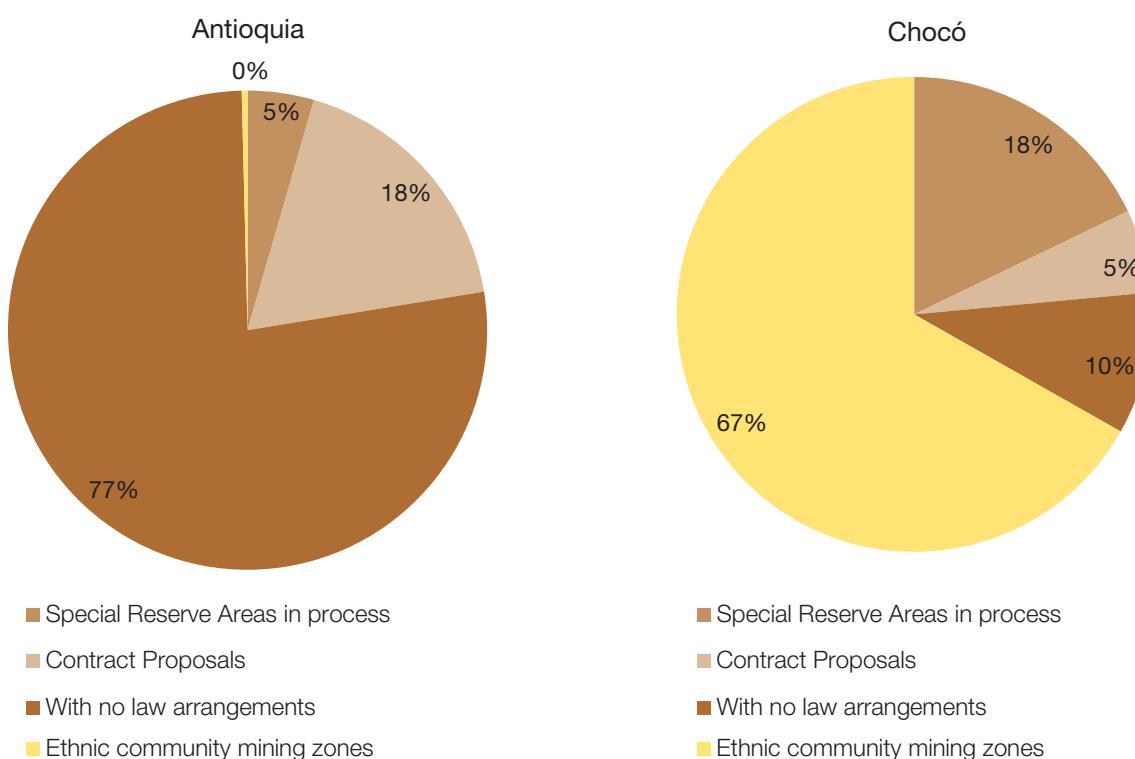
However, of the EVOA detected under the arrangement of Proposals for Concession Contracts, 40% are located in the province of Antioquia, where they represent 9% of the provincial total; in Bolívar 25% and 22%; in Chocó 17% and 4%, and in Córdoba 13% and 24%, respectively. The remaining 6% of the national total is in the provinces of Cauca, Nariño, Putumayo, Caldas, Tolima and Valle del Cauca.

About the EVOA detected in territories without any legal arrangement (28% of the national total), 92% are concentrated in four provinces: Antioquia, Córdoba, Bolívar and Chocó. Antioquia leads the participation in this category with 58%, which represents 16% of the national total and 40% of the entire province. Córdoba, Bolívar and Chocó have a very similar participation, 13%, 11% and 10%, respectively.

Finally, for Special Reserve Areas in process, Chocó groups 77% of this arrangement. The remaining 23% is distributed in the provinces of Antioquia, Bolívar, Nariño, Cauca, Caquetá and Valle del Cauca.

On the other hand, in Chocó, which occupies the first place in illegal exploitations with 28% of the national consolidated, it is under the arrangement of mining zones of ethnic communities where 67% of the total of the province is concentrated. In Antioquia, which concentrates 21% of the national total in this category, it is in the category without a legal arrangement that 77% of the illegal exploitation in the province is concentrated (see Figure 13).

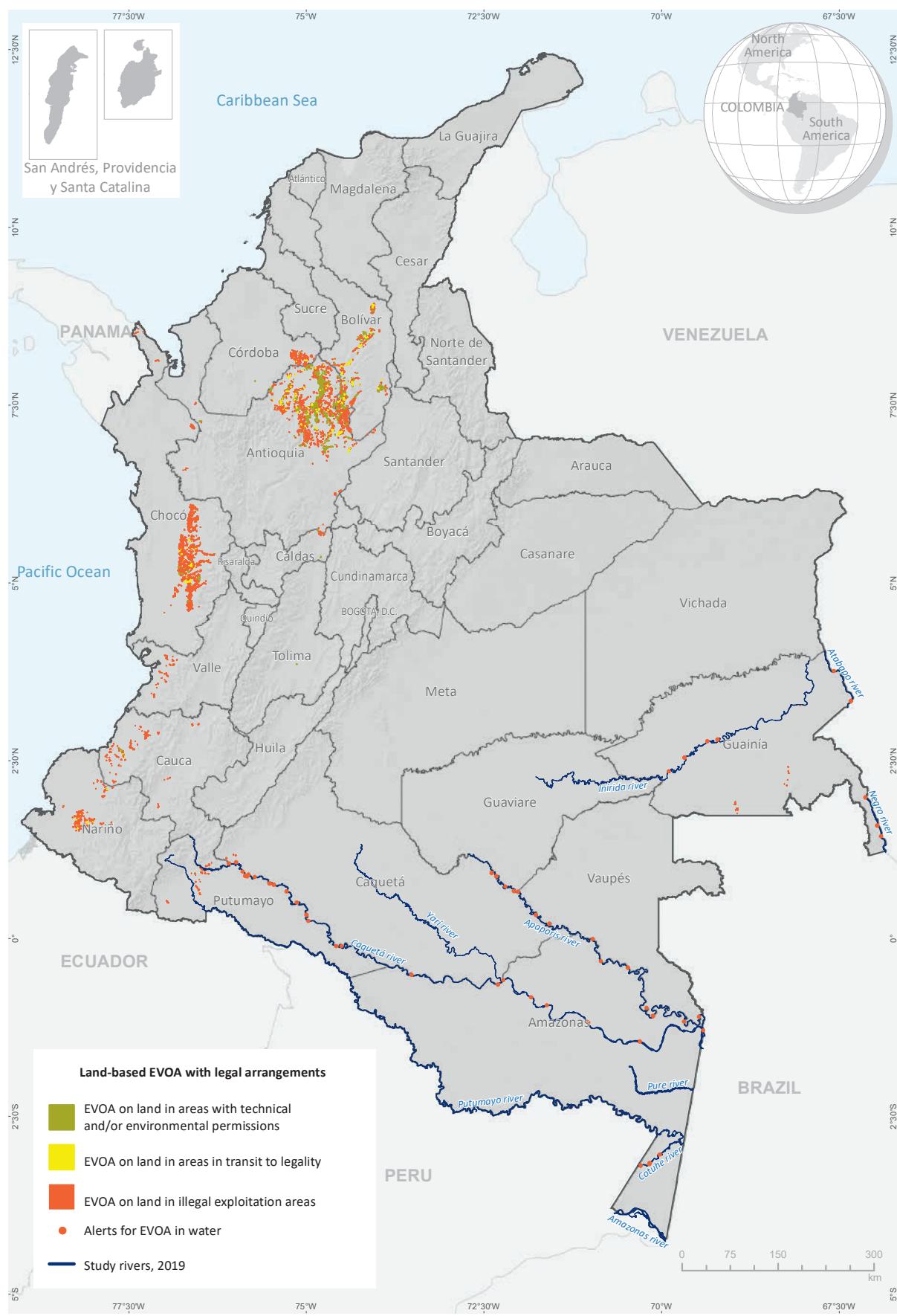
Figure 13. Distribution of EVOA on land under the category of illicit exploitation in Antioquia and Chocó, 2019



59% of EVOA detected (38,166 ha.) under the category of *Illegal Exploitation is Excludable zones from mining*, that is, in areas that are environmentally protected by Colombian law.

In Map 5, EVOA is shown in land according to law arrangements in the country.

Map 5. EVOA on land according to law arrangements classification, 2019



EVOA AND MANAGEMENT MODEL FOR INTERVENTIONS IN THE TERRITORY

The observation of the territory's specificities contributes to improve the knowledge of the dynamics, the focus of efforts and the design of specific strategies to face problems in each area. In line with the classification for the management of the territory, the results are presented for Excludable zones from mining, Restricted mining zones and Environmental restrictions free zones that entail, within the framework of the regulations, different models of action as opposed to the management of the resource and the control of illegal exploitation. However, it is necessary to clarify that in the Excludable zones from mining there are also Restricted mining zones, which carry both connotations. In other words, they imply all the normative elements regarding the nature of protection, but they are catalogued in areas of priority for the granting of exploitation permissions to the ethnic communities that inhabit them, as long as the requirements of the mining authority are met and the environmental authority carries out the respective geographic subtraction of the Excludable zones from mining and grants the permission for its exploitation.

Similarly, in Environmental restrictions free zones there are also Mining zones of ethnic communities³², which have the peculiarity that they entail the cataloguing of Restricted mining zones and the right of priority for the granting of Concession Contracts or mining titles, in case the ethnic community inhabiting the territory carries out the procedures contemplated

in the regulations to be beneficiaries of the exploitation permission. In this context, the following sections focus on the management model of the territory and make the respective clarifications.

Excludable zones from mining

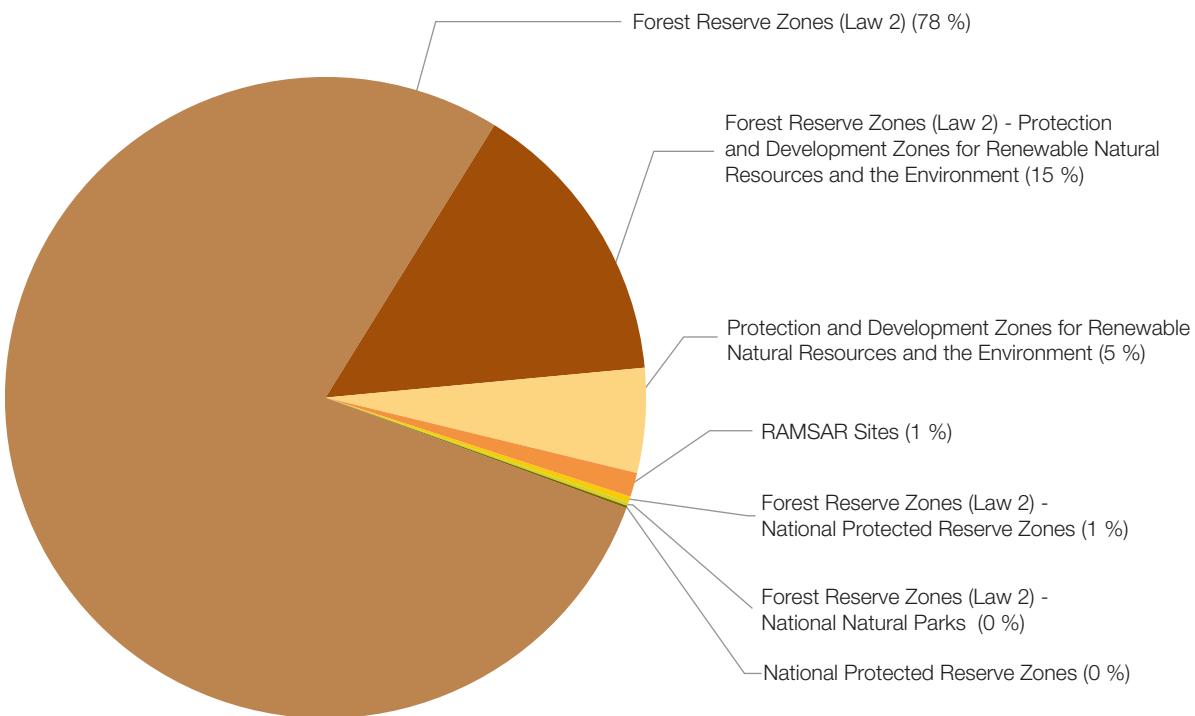
By 2019, 50,801 ha. of EVOA on land were detected in these areas, 52% of the total for this period. Also, EVOA alerts were identified in water in rivers that are part of these special management areas for conservation. The category with the most EVOA on land corresponds to Forest Reserve Zones of Law 2 dated 1959, with 47,445 ha.; however, it is necessary to specify that other protected areas coexist in the geographic space delimited for this category: 7,458 ha. coincide with Protection and Development Zones for Renewable Natural Resources and the Environment; 151 ha. belong to National Protection Reserve Zones, 93 ha. correspond to National Natural Parks (PNN) and the remaining 39,743 ha. are exclusively part of Forest Reserve Zones.

On the other hand, in territories that do not coincide geographically with Forest Reserve Zones, EVOA was detected on land in Zones for the Protection and Development of Renewable Natural Resources and the Environment, which total 2,679 ha.; in RAMSAR wetlands³³ 619 ha. and, finally, 59 ha. in Protected Forest Reserve Zones. Figure 14 shows the distribution.

³² These areas are free to be the object of applications for exploitation permissions by third parties.

³³ The geographical coverage of the RAMSAR sites corresponds to official information from the Ministry of Environment and Sustainable Development, 2018.

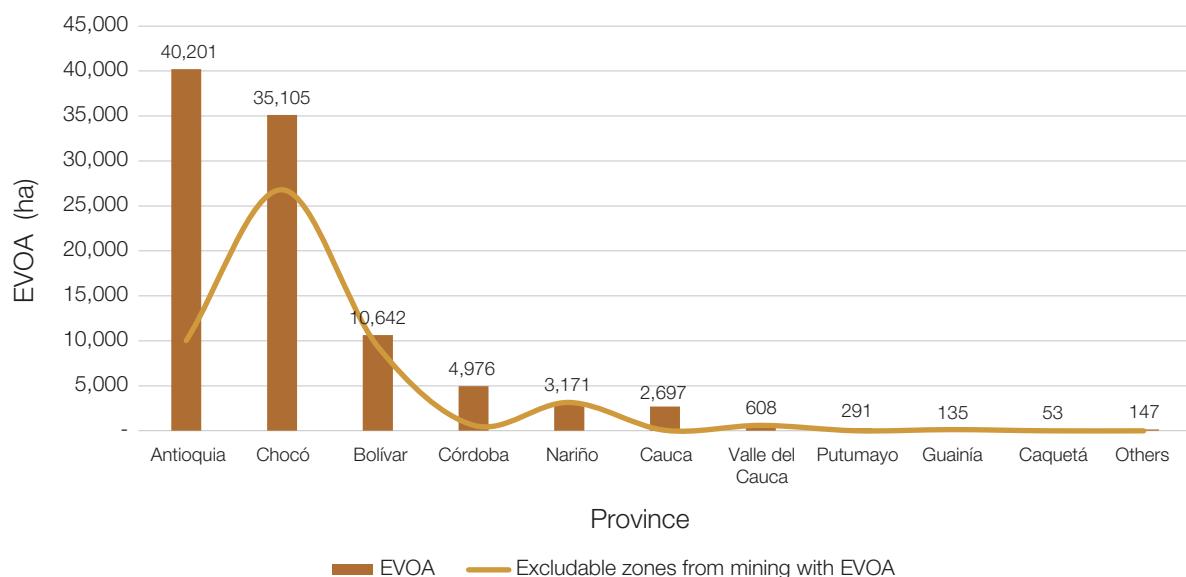
Figure 14. Onshore EVOA in Excludable zones from mining by Management Category, 2019



Analyzing the national consolidated charts, Chocó is the province that concentrates the largest area of EVOA in Excludable zones from mining with 53%, which corresponds to 76% of the detection in the province. It is followed by Antioquia and Bolívar with 20% and 18%, respectively, which represent 25% and 88% of the detection in these administrative units (Figure 15).

Nearly all the EVOA on land detected in Caquetá, Cauca, and Putumayo is outside of the Excludable zones from mining.

Figure 15. Onshore EVOA in Excludable zones from mining by province, 2019



Likewise, alerts for the presence of EVOA in water were detected in the Apaporis, Caquetá, Cotuhé, Atabapo and Inírida rivers, with influence in Forest Reserve Zones, RAMSAR sites and PNN.

The following describes the presence of EVOA on land and EVOA in water in each of the categories of Excludable zones from mining. It should be noted that this analysis is based on the management model presented in previous chapters, where categories are hierarchized according to their extension, as mentioned, and it is possible to find that the same territory is in two or more management categories.

Forest Reserve Zones

48% (47,445 ha.)³⁴ of the total EVOA on land in the country is located in Forest Reserve Areas (ZRF), a similar proportion to that

presented in 2018. The Pacific Forest Reserve has the highest detection with 64% of the area reported in this category, which means that approximately one third of EVOA on national land is in this area.

The Forest Reserve of the Magdalena River records 35% of EVOA on land detected in forest reserve areas (17% of the national total). The Amazon Forest Reserve reports less than 1% of EVOA detection on land.

The growth in area with EVOA reported by the Forest Reserve of the Magdalena River stands out: since 2016 it has increased by 4,318 ha., although its participation in percentage has remained stable. The Pacific Forest Reserve also shows an increase in EVOA on detected land, with 2,354 ha. for this period. Table 3 displays the EVOA changeover on land for the years 2016, 2018 and 2019 in the ZRF.

³⁴ This area does not include land-based EVOA detected in SPNN territories that are part of the ZRF.

Table 3. EVOA on land in Forest Reserve Zones, 2016-2018-2019

Forest Reserve Zones (ZRF)	EVOA on land 2016 (ha)	Total EVOA On land 2016 (%)	Total EVOA on land 2018 (ha)	Total EVOA On land 2018 (%)	Change 2016-2018 (%)	Total EVOA on land 2019 (ha)	Total EVOA On land 2019 (%)	Change 2018-2019 (%)
Pacific	28,198	34	29,922	32	6	30,552	31	2
Magdalena	12,436	15	14,504	16	17	16,754	17	16
Amazonia	153	<1	142	<1	-7	138	<1	-3
Total ZRF	40,835	49	44,567	48	9	47,445	48	7

In relation to the dynamics of the phenomenon in the period 2018-2019 in these areas, the Amazon Forest Reserve had the highest proportion of new EVOA (21%). The expansion was mainly located in the Magdalena River Forest Reserve with 21% (Nechí River Basin).

As for EVOA with indications of pastures and grasslands, the Amazon reserve reports the largest area with 31%. Finally, 89% of the area identified as EVOA on land in 2018 remains stable in 2019 (Table 4).

Table 4. Dynamics of EVOA on land in Forest Reserve Zones, 2018-2019

Forest Reserve Zones (ZRF)	Area with signs of grasses and herbaceous (%) *	Stable area (%)	Area in expansion (%)	New area (%)
Amazonia	31	69	6	21
Magdalena	13	87	21	8
Pacific	10	90	9	2
Total ZRF	11	89	13	4

* Percentage calculated with respect to the area reported in 2018

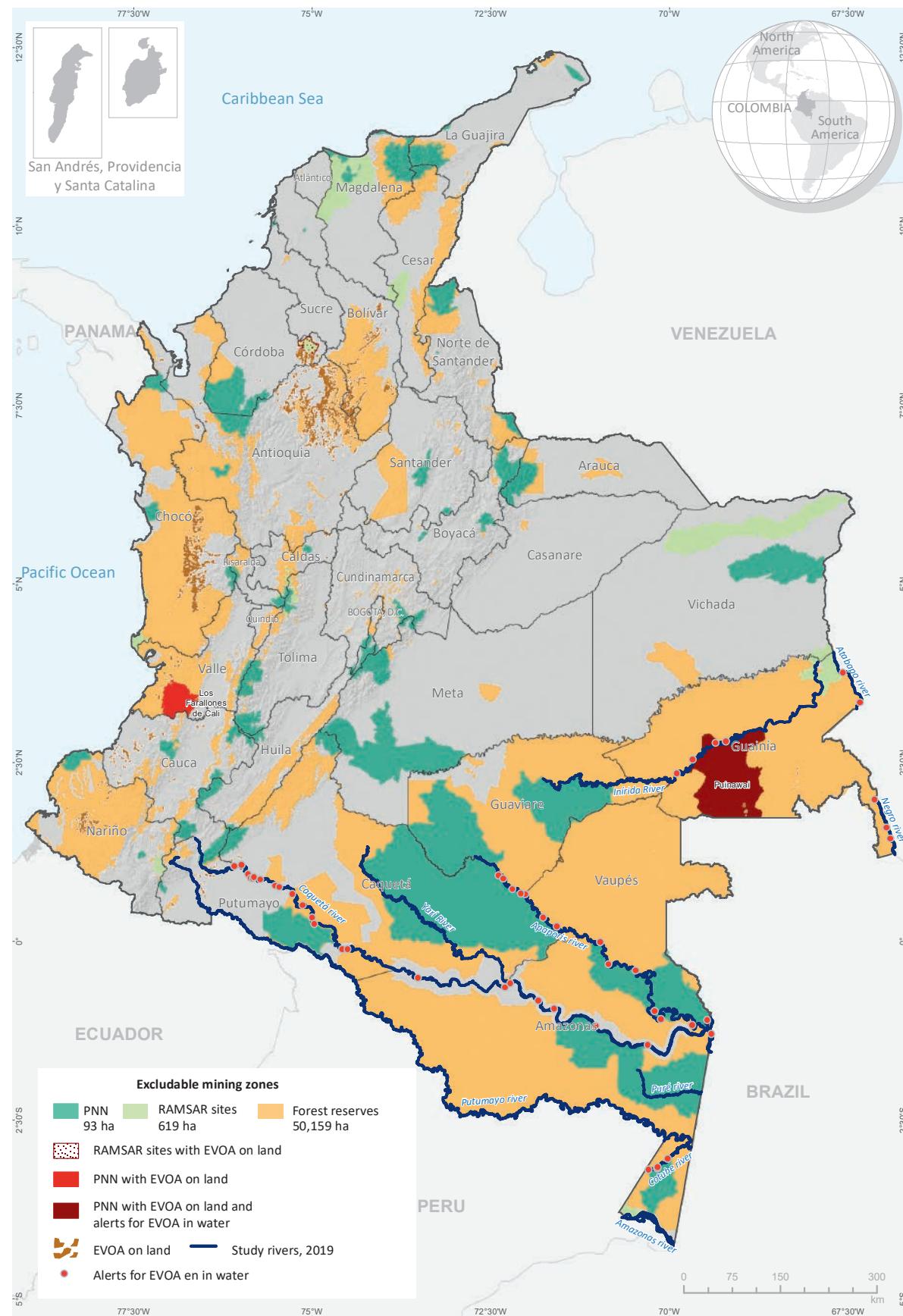
With regard to the detection of EVOA alerts in water, six of the rivers studied that register this type of alert (Apaporis, Atabapo, Caquetá, Cotuhé, Inírida and Negro) are located in the Amazon Forest Reserve.

Most of the EVOA water alerts on the Caquetá river are located in a section of more than 650 km upstream of La Pedrera (Amazonas), which corresponds to a subtraction area of the Amazon Forest Reserve, so the reserve

presents alerts for this concept on the Caquetá river only between Solano (Caquetá) and La Maná (Solano-Caquetá), and a small stretch between Solita (Caquetá) and El Gallinazo (Puerto Guzmán-Putumayo); upstream of this last stretch the river presents alerts outside this forest reserve.

Map 6 shows the Excludable zones from mining in the country with EVOA presence on land and in water.

Map 6. Excludable zones from mining with EVOA presence on land and EVOA alerts in water, 2019



Source: Government of Colombia - Monitoring system supported by UNODC. For PNN: National Natural Parks, 2019. For Forest Reserve Zones and RAMSAR Sites: Ministry of the Environment and Sustainable Development 2017.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Protection and Development Zones for Renewable Natural Resources and the Environment

In 2019, 10,137 ha. of land-based EVOA were identified in Protection and Development

Zones for Renewable Natural Resources and the Environment, distributed as shown in table 5. It is important to mention that 7,458 hectares detected in these protected areas coincide with territories also categorized as ZRF by Law 2 dated 1959.

Table 5. EVOA on land in Zones for the Protection and Development of Renewable Natural Resources and the Environment, 2019

Zone for the Protection and Development of Renewable Natural Resources and the Environment	EVOA on land 2019 (ha)
Serranía de San Lucas	7,484
Bajo Cauca-Nechí	2,263
Humedal El Sapo II	318
Bosques Secos del Patía	60
Reserva Natural de Río Bravo	12
Total ZPDRNR	10,137
Participation against national EVOA (%)	10

The Protection Zone with the most EVOA on land is the one located in the Serranía de San Lucas with 7,484 ha., 74% of the total in this category. It is followed by the Zone of Bajo Cauca-Nechí with 2,263 ha (22% of the total); the Zone of Humedal El Sapo II with 318 ha. (3%); Bosques Secos del Patía with 60 ha (less than 1%), and the Reserva Natural de Río Bravo with 12 ha (less than 1%).

RAMSAR Sites

Of the thirteen sites designated as RAMSAR sites in Colombia, one of them reported EVOA's

presence on land: the "Complejo Cenagoso de Ayapel"³⁵, which recorded 619 ha. of EVOA, 14% more than in 2018 (see Figure 16 and Map 7). Since 2009 this RAMSAR site is under the protection of the Integrated Natural Resources Management District and is considered an Important Bird Conservation Area, since it is strategic for biodiversity in general. The disruption that this wetland complex receives due to the indiscriminate exploitation of natural resources and the expansion of illegal gold mining in the region threatens the sustainability of the ecosystem and the well-being of those who depend on it [28].

³⁵ Declared as RAMSAR Site through Decree 356 dated February 2nd, 2018.

Figure 16. Expansion of the area with EVOA's presence in the “Complejo Cenagoso de Ayapel”, RAMSAR Site



Note: Worldview True Color images (left 2015, right 2018).

Map 7. EVOA on land detected in the Ayapel Wetlands Complex Integrated Management District (SINAP Area and RAMSAR Site), 2019



Source: Government of Colombia - Monitoring system supported by UNODC. For Protected Areas: National System of Protected Areas (SINAP). For Ayapel Wetlands Complex. Sole Registry Distrito de Protected Areas (RUNAP): Ministry of the Environment and Sustainable Development.
The boundaries, name and titles used on this map do not constitute endorsement or acceptance by the United Nations.

EVOA water alerts were also identified in the Fluvial Inírida Star Wetland Complex³⁶ along the Atabapo River (Figure 17).

Adverse factors for this protected area include commercial gold, tantalum, and coltan extraction practices. In addition, the uncontrolled use of mercury for gold mining causes public health problems for both the miners who handle this bioaccumulative metal and the local populations who base their diet on fish consumption.

Artisanal gold mining with rafts and dredges began in the Fluvial Inírida Star Wetland Complex more than thirty years ago; these dredging processes have increased the turbidity levels of the rivers, decreasing their productivity and affecting the ecological integrity of the ecosystems, as well as the availability of aquatic species.

Figure 17. Landsat 0457 RGB 432 image showing contrasting rivers at the Inírida River Star



Note. Left: confluence of white-water river (Guaviare river) and black-water river (Inírida); right: confluence of mixed water (Guaviare and Inírida) and black water (Atabapo). This combination of biomes and the mix of different types of waters (white, clear and black) are unique in the world and determine its regional importance for its multiple ecosystem services. Adaptation of [29].

National Protected Reserve Zones

These geographic spaces are exclusively for the preservation, sustainable use, restoration, knowledge and enjoyment of forest ecosystems, although their structure and composition has been modified. However, in recent years, EVOA has been detected on land in three of the protected areas, located in the Colombian

Pacific: Darién³⁷, Anchicayá River³⁸ and Escalarete and San Cipriano River³⁹.

In 2019, 210 ha. were identified (20% less than in 2018) in these reserves, distributed as shown in Table 6; it is worth mentioning that 59 ha. detected in these protected areas coincide with EVOA areas in ZRF by Law 2 dated 1959.

³⁶ Declared a RAMSAR site by Decree 1275 of July 8, 2014.

³⁷ Declared by Resolution No. 136 of 1977 of the National Institute of Renewable Natural Resources and the Environment (INDERENA) as a Protected Forest Reserve Area in the jurisdiction of the municipality of Acandí, Chocó.

³⁸ Declared by Agreement No. 011 of 1943 and expanded by Resolution No. 38 of 1946 of the Ministry of National Economy. The Resolution of the Ministry of Environment and Sustainable Development 1208 of 2018 specifies the limit of the National Protected Forest Reserve of the Anchicayá River.

³⁹ Declared by Resolution No. 031 of 1979 as a Protected Forest Reserve Area in the jurisdiction of the municipality of Buenaventura, Valle del Cauca.

Table 6. EVOA on land in National Protected Forest Reserves, 2019

National Protected Forest Reserve (RFPN)	EVOA on land 2019 (ha)
Darién	59
Río Anchicayá	149
Río Escalarete y San Cipriano	2
Total RFPN	210
Participation against national EVOA (%)	0.2

72% of EVOA on land within these areas is in two reserves located in the jurisdiction of Buenaventura-Valle del Cauca (RFPN Río Anchicayá, [Figure 18] and RFPN Río

Escalarete and San Cipriano), while the remaining 28% is in the municipality of Acandí-Chocó (RFPN Darién).

Figure 18. EVOA on land identified in the RFPN Río Anchicayá, Buenaventura, Valle del Cauca



Note. Left: Landsat image 1057 CC 654; right: Worldview true color image.

National Natural Parks

In two of the 59 PNN⁴⁰ in the country, EVOA was detected on land in 2019; this area totals 93 ha. and represents 0.09 % of the total national area. It should be noted that these protected territories are also part of the ZRF category as per Law 2 dated 1959.

The Puinawai National Natural Reserve continues to register the greatest presence of EVOA with 75 ha. located mainly in the Serranía de Naquén (Figure 19), a protected area that represents 81% of the total detected in the PNN.

⁴⁰ The geographic coverage of PNN corresponds to official information from UAESPNN, 2017.

Figure 19. EVOA on land in the Puinawai Natural National Reserve



Note: Worldview images.

On the other hand, in Los Farallones PNN in Cali 18 ha. were registered, which denotes an increase from 2018 by 16 ha.; this increase was identified in the vicinity of the Cacolí stream in Buenaventura (Valle del Cauca).

Considering the proximity of EVOA on land to the PNN, the strong pressure that are exercising

the fronts of advance of the phenomenon in these territories, which aggravates more its environmental situation. Table 7 presents the PNN with EVOA on land in three ranges of proximity: 1) inside the PNN; 2) less than 10 km from their limits, and 3) between 10 km and 20 km from the limits.

Table 7. EVOA on land detected in PNN, 2019

National Natural Park	EVOA on land within PNN (ha)	EVOA on land up to 10 km from PNN (ha)	EVOA on land up to 20 km from PNN (ha)
Puinawai RNN	75	0	0
Los Farallones de Cali	18	269	361
Paramillo	0	87	715
Los Katíos	0	0	34
Munchique	0	17	477
Serranía de los Churumbelos	0	58	218
Plantas Medicinales Orito Ingi-Ande	0	0	18
Tatamá	0	0	9
Acandí Playón	0	2	67
Alto Fragua Indi-Wasi	0	0	66
Total	93	433	1,965

The results reveal four additional PNN: Paramillo, Munchique, Serranía de los Churumbelos and Acandí-Playón, are at risk of EVOA's presence on land less than 10 km away, a situation that occurs in the first three since 2016; to these are added the PNN: Los Katíos, Medicinal Plants Orito Ingi-Ande, Tatamá and Alto Fragua Indi-Wasi, when evidencing detection in the strip of 10 km to 20 km.

The Los Farallones PNN in Cali registers an increase of 28% in EVOA on land, centered mainly in the Cacolí Creek, which belongs to the Cajambre-Mayorquín-Raposo river sub-basin in the municipality of Buenaventura, Valle del Cauca.

It should be noted that the presence of EVOA on land in areas of influence from 10 km to 20 km increased by 23%, mainly in the Farallones de Cali and Paramillo PNN with respect to the areas reported in 2018; this increase corresponds to 374 ha.

In this sense and according to previous studies, it is observed that the vulnerability of the PNN associated with the presence of EVOA on land does not depend only on the proximity in distance to the park, but also on the river connectivity⁴¹ of rivers with EVOA. In Los Farallones National Park in Cali, Munchique and Serranía de los Churumbelos, vulnerability is increased by being directly connected inland through some rivers or their tributaries, as shown in Table 8.

⁴¹ Information obtained from a mining community within the framework of this study indicates that the axis of exploitation and operation is concentrated in the water flow, in the natural limits of the hydrographic basins.

Table 8. River connectivity between detected EVOA on land and PNN

National Natural Park	River connectivity	NOMSZH* sub-basin
Munchique	Micay River and tributaries, Chuaré River	San Juan del Micay River
	Anchicayá River	Anchicayá
Los Farallones de Cali	Mallorquín River, Cajambre River, Guapi River, Juan López stream, Don Carlos stream, Cacolí stream	Cajambre-Mallorquín-Raposo Rivers
Serranía de los Churumbelos	Mandiyaco River, Caquetá River and tributaries Pacayaco and Santa Lucía streams	Alto Caquetá

* Hydrographic Subzone Name (NOMSZH), IDEAM.

Alerts for the presence of EVOA in water were also identified in five PNN: Serranía de Chiribiquete, Yaigojé Apaporis, Cahuinari, Amacayacu and Puinawai. In addition to these areas, the La Paya PNN is indirectly influenced

by the extraction of gold in the Caquetá River, since this current is the axis of the present indigenous community and of the rich fauna of this territory. Table 9 summarizes the alerts found by area.

Table 9. Alert for EVOA in water identified in PNN, 2019

National Natural Park	Water body detected	Sub-basin
Yaigojé Apaporis	Apaporis River	Low Apaporis River
Cahuinari	Caquetá River	Low Caquetá River
Serranía de Chiribiquete	Apaporis River	High Apaporis River
Amacayacu	Cotuhé River	Cotuhé River
Puinawai RNN	Inírida River	Mid Inírida River

The highest concentration of EVOA alerts in water occurs in Yaigojé Apaporis PNN along the Apaporis River, where this body of water is the boundary between Vaupés and Amazonas, in towns near the mouths of the Taraira rivers in the south of the PNN, near the Puerto Lulu and Pira Paraná settlements in the north of this protected area.

In the same concentration, EVOA alerts were identified in water in the Serranía de Chiribiquete PNN in the upper Apaporis River basin, mainly in the San Fernando sector, where this body of water is the limit between Caquetá and Guaviare and, as in 2018, in the Palogordo sector, the limit between Caquetá and Vaupés.

On the other hand, there is a significant concentration of alerts in Amacayacu National Park along the Cotuhé River, in sectors of the Caña Brava and Buenos Aires settlements, in the non-municipalized area of Tarapacá, Amazonas.

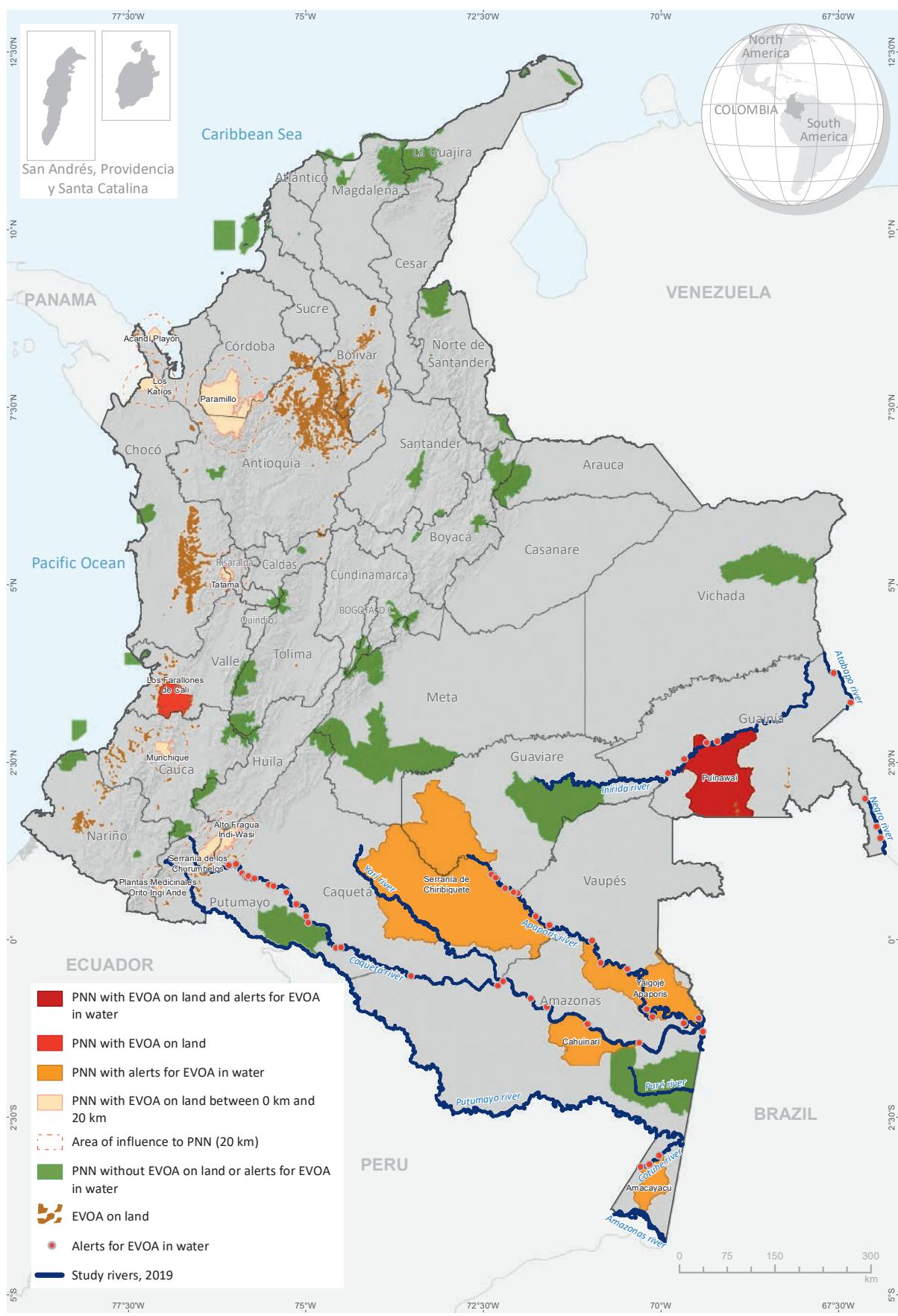
The exploitation of alluvial gold in the Cotuhé River has been carried out in an artisanal manner for approximately twenty years, which has caused negative impacts to both the population and the environment, with the contamination of water resources, the reduction of fish, the appearance of diseases and changes in social dynamics due to the use of mercury [58].

Although in a smaller proportion than in 2018, EVOA alerts were identified in water in Cahuinarí PNN along the Caquetá River, in the vicinity of La Pedrera, Amazonas, in towns near the mouth of the Bernardo River.

Finally, it should be noted that EVOA alerts were found in water in the Puinawai National Natural Reserve (RNN) along the Inírida river, in the municipalities of Inírida and Barranco Minas, Guainía. As mentioned, this protected area also reports EVOA on land, a situation that makes it especially vulnerable to the environmental damage produced by this activity.

Map 8 illustrates the presence of EVOA in water and on land in the SPNN.

Map 8. National Natural Parks System and EVOA, 2019



Source for EVOA: Government of Colombia Monitoring system supported by UNODC for PNN: National Natural Parks, 2019.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Excludable zones from mining and law arrangements

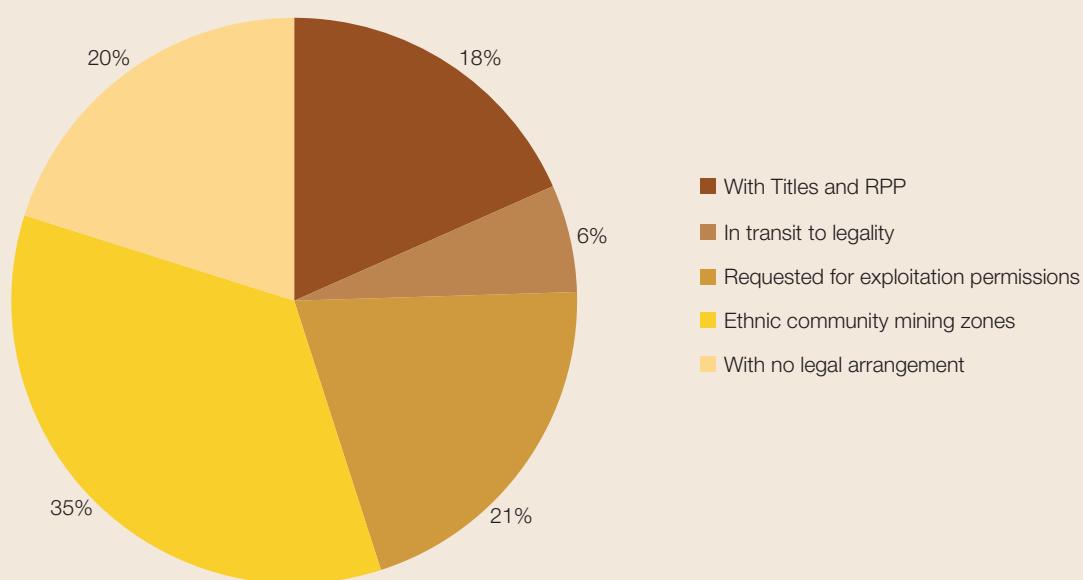
32% of the Excludable zones from mining coincide with ethnic territories that have Mining zones of ethnic communities, which favors the community with the right of priority if the process for obtaining a Concession Contract is pursued.

On the other hand, 19% of EVOA in these zones coincide with areas that have been titled, that is to say, that they have the technical permission; however, with the information available for this study it is not possible to dimension what percentage of these technical permissions have the respective environmental permission.

The 6% of EVOA coincides with territories over which legalization processes are being carried out, protected by the normative frameworks of Law 685 dated 2001 and Law 1955 dated 2019, and processes carried out by traditional mining communities with the focus of declared Special Reserve Areas.

Twenty percent of this evidence corresponds to areas that have been requested from the mining authority to obtain exploitation permissions. Finally, 23% of the evidence is outside of any area that has advanced any procedure for obtaining permissions. Figure 20 presents these results.

Figure 20. EVOA on land in Excludable zones from mining and advanced permissions in these territories, 2019



Restricted mining zones

In 2019, 27,211 ha. of EVOA on land were presented within Restricted mining zones, 28% of the national detection for that year⁴². This happens in seven provinces, although it is mainly concentrated in Chocó. Of the eight categories that make up the Restricted mining zones⁴³, five report EVOA on land, mainly in declared Mining zones of ethnic communities, more specifically in Mining zones of Black

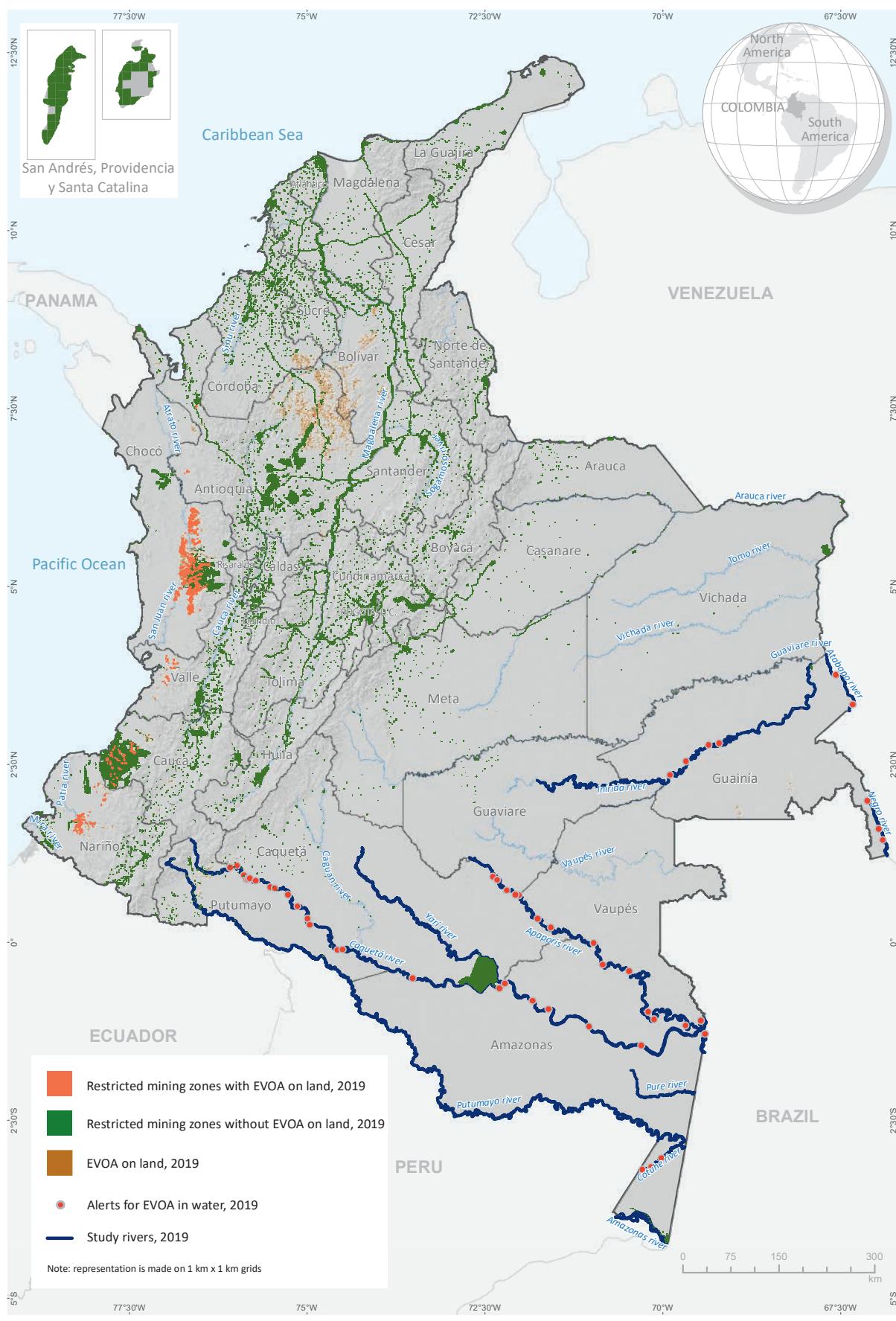
communities; on the other hand, 77% of the detection in declared Mining zones of ethnic communities spatially coincides with Excludable zones from mining. In relation to the EVOA alerts on water⁴⁴, it was identified that in the Caquetá River there is a close influence on the Mining zones of indigenous communities and the Zones of the urban perimeter of cities and towns. Map 9 displays the location of the phenomenon in Restricted mining zones.

⁴² In the 2019 study, the management model was consolidated because the data was broken down to allow for a more focused analysis of these territories, unlike 2018 when these values were presented in a general consolidation that counted part of this category in Zones that could be excluded due to the effects of hierarchy in prioritization; for this reason, the figures are not comparable between the two years.

⁴³ See literal (a)-(h), Article 35 of the Colombian Mining Code (Law 685 dated 2001).

⁴⁴ The ten rivers studied are in the Amazon region and have no spatial relationship with the areas where there are Black Community Mining Zones, so there are no data for this group; this does not mean that this type of exploitation does not occur there.

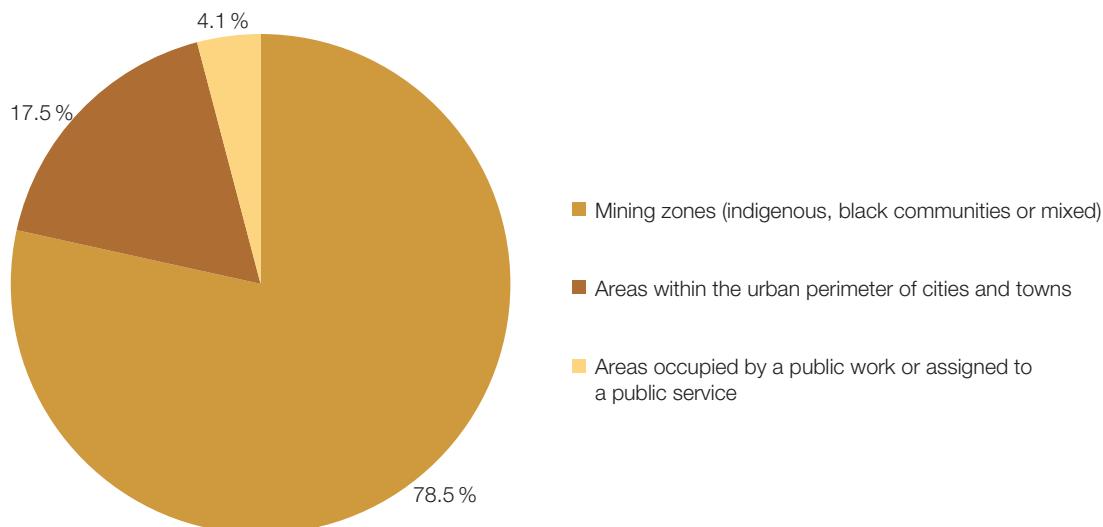
Map 9. National presence of EVOA in Restricted mining zones, 2019



Of the total land EVOA in Restricted mining zones, 21,347 ha. are in Mining zones of ethnic communities (indigenous, black communities or mixed); the zones within the urban perimeter of cities or population centers report 4,749 ha.,

while 1,115 ha. are in areas occupied by public works or assigned to a public service. Figure 21 presents the distribution of EVOA on land for each category in Restricted mining zones.

Figure 21. EVOA on land by mining restricted area category, 2019



Ethnic community mining zones

94% of EVOA on land within these territories is in Mining zones of Black Communities (20,107 ha.). In total, 56 community councils located in five provinces (Antioquia, Cauca, Chocó, Nariño and Valle del Cauca) coincide

with the area detected in this sub-category, with Chocó having the highest participation (86%); in seven of these community councils, all located in Chocó, 73% of the arrangement is concentrated in the Mining zones of Black Communities⁴⁵.

With regard to indigenous mining zones, there are 70 ha. of EVOA on land (less than 1% of the total recorded in ethnic community mining zones). Five indigenous reservations have this condition, in Guainía, Antioquia, Chocó and Valle del Cauca.

The remaining 5% of the detection in mining zones of ethnic communities (1,170 ha.) does not present a direct spatial correspondence with any special management territory (Black

Although there are several Mining zones in the area of influence of the alerts detected by EVOA in water, three vulnerable areas are highlighted in the category Zones within the urban perimeter of cities and towns, given the proximity of the phenomenon:

1) the town center of José María (Puerto Guzmán-Putumayo) and 2) the municipal capitals of Solita and Curillo (Caquetá).

⁴⁵ Each of these seven community councils reports more than 1,000 ha of EVOA on land in the declared Mining zone within their territory: Mayor del Medio Atrato ACIA, ACADESAN, Istmina y parte del Medio San Juan, Mayor de Nóvita, Mayor del municipio de Condoto e Iró, Mayor de Unión Panamericana and Paimadó.

Community Lands and Indigenous Reservations)⁴⁶, so it is inferred that they are in Mixed mining zones⁴⁷.

As for the alerts detected by EVOA in water in Mining zones of ethnic community in the rivers studied for this period, although they were not identified directly at the point of the river that borders one of these areas, there are sectors of the Caquetá River downstream (14 km-25 km) and upstream (100 km) of the Indigenous Mining Zone of the Monochoa Reservation.

Other Restricted Mining Zones

For the category of Zones within the urban perimeter of cities or towns, EVOA is presented on land in eight provinces; Chocó and Antioquia condense 84% of this group. 46% percent of total detections in this category (2,185 ha.) also show spatial coincidence with 39 community councils; there is no EVOA on land within this group that coincides with indigenous reservations.

In relation to the last category of Restricted mining zones in which EVOA on land was detected, areas occupied by a public work or assigned to a public service, Antioquia concentrates 99% of this arrangement.

Finally, with respect to the EVOA alerts in water detected in other Restricted mining zones, there is only influence of the points identified in the Caquetá River with areas corresponding to the category Zones within the urban perimeter of cities and towns. A total of fourteen population centers on the Caquetá riverbank in Amazonas, Caquetá and Putumayo (Annex 1) present this situation.

Environmental restrictions free zones

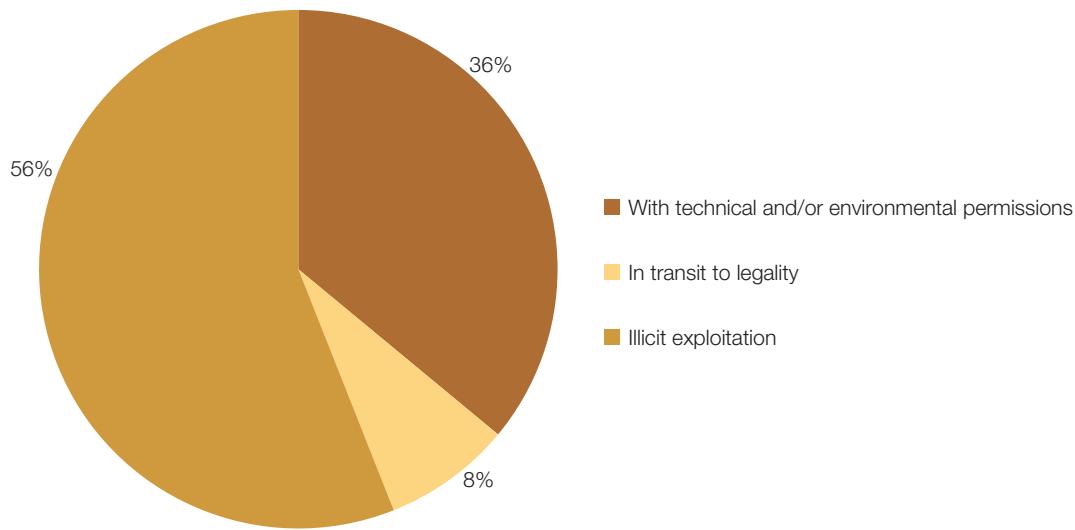
In accordance with current regulations and the land management model, these zones are located outside Excludable zones from mining, but may contain Restricted mining zones, which indicates that they may be requested in order to obtain mining permissions (Title Protection and Environmental License).

The results of EVOA's detection on land indicate that by 2019, 48% of the national consolidated (47,226 ha.) will be in Environmental restrictions free zones, of which 10% is concentrated in declared Mining zones of ethnic communities, which in turn are part of Restricted mining zones. Below (see Figure 22), an overview of these territories is provided with emphasis on the relative scope of the attributes for mining contemplated in the law arrangements in this study.

⁴⁶ There is no overlap according to the spatial analyses of the official information for Mining zones in Black Community Lands and Indigenous Reservations.

⁴⁷ No official disaggregated geographic information is available for the three categories of mining areas, so each is determined from the 1 km * 1 km SIMCI grid analysis of the special management territories.

Figure 22. EVOA on land in Environmental restrictions free zones and Law arrangements, 2019



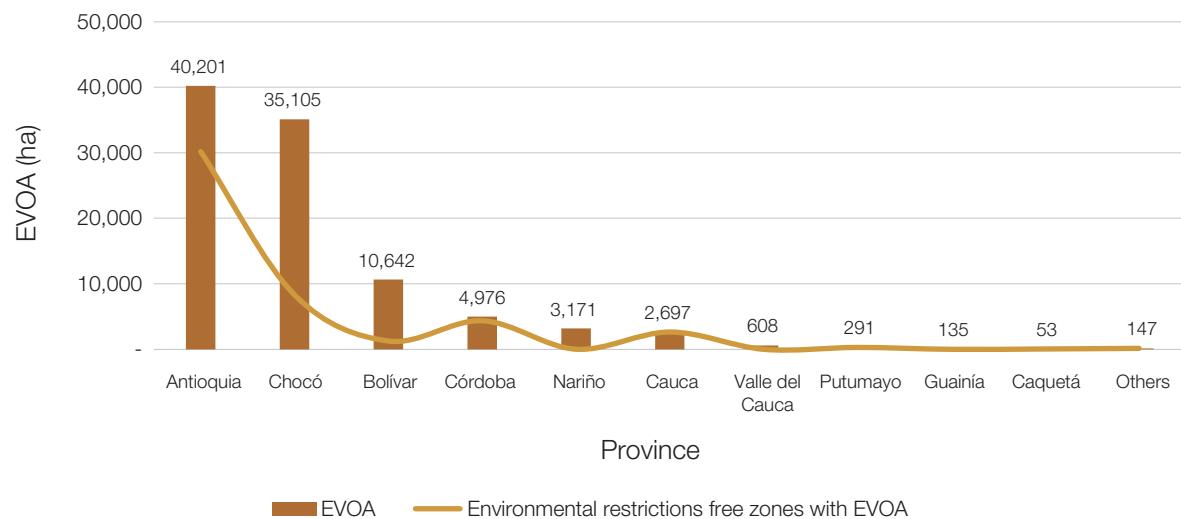
In Environmental restrictions free zones for mining, 36% of EVOA coincides with territories that have technical and/or environmental permissions for exploitation; that is, they have already been titled or have the respective title and environmental permission. 8% are in territories where processes of transition to the legality of the mining activity are being carried out - protected under the regulatory framework of Law 685 dated 2001 and Law 1955 dated 2019 - and in declared Special Reserve Areas. Of the 56% that correspond to illegal exploitation, 12% are in areas that have been requested from the mining authority to obtain exploitation permissions (Contract Proposals and Special Reserve Areas [ARE] in process) and, finally, 34% are in territories where no permission has been requested to exploit minerals or where transit programs to legality are in progress. In this sense, it can be stated that 64% of EVOA in Environmental restrictions free zones

correspond to illegal exploitation; although the remaining 36% coincide with environmental licensing, it is necessary to determine that these territories are subject to control by the mining authority and monitoring by the environmental authority.

In the national consolidated, Antioquia is the province that concentrates the largest amount of EVOA in Environmental restrictions free zones, with 64%⁴⁸, which corresponds to 75% of the detection in the province. It is followed by Chocó and Córdoba, with 18% and 9%, respectively; these figures represent for each province 24% and 88% of the total detection. At the provincial level, Valle del Cauca, Nariño and Guainía stand out, as they do not present EVOA in this category, and all percentage detection is concentrated in Excludable zones from mining (Figure 23).

⁴⁸ Unlike the previous study, this one considers free zones in an integral manner; that is, they also include Restricted mining zones, but which, despite being in this category, because they are also in Environmental restrictions free zones, can be the object of applications for exploitation permissions. Therefore, the data are not directly comparable.

Figure 23. Distribution of EVOA on land by provinces, 2019



EVOA AND SPECIAL MANAGEMENT TERRITORIES

In order to provide a global vision of EVOA's presence in areas that present different specificities in terms of management for intervention in the territories, this chapter addresses the general findings found in ethnic territories and environmental protection zones not contemplated in the normative framework of environmental restrictions.

consolidated). Almost all of the detection (99%) in these areas is located in Black Community Lands (39,183 ha.), while only 1% is located in Indigenous Reservations (494 ha.). Table 10 shows the provincial distribution of EVOA detection in ethnic territories, with the province of Chocó standing out, as it accounts for 85% of EVOA detection in these territories.

Ethnic territories

In 2019, 39,678 ha. of EVOA on land were recorded in ethnic territories (40% of the national

Table 10. Provincial distribution of ethnic territories with EVOA on the ground, 2019

Province	EVOA on land 2019 (ha)	Indigenous Reservations (ha)	Black Community Lands (ha)	Percentage
Chocó	33,314	203	33,111	85
Nariño	2,962	10	2,952	8
Cauca	2,336	52	2,285	6
Valle del Cauca	575	13	562	1
Antioquia	355	81	273	
Guainía	135	135		
Total	39,678	494	39,183	100

In relation to EVOA alerts in water, the contemplated study zone is in the Amazon region, where the indigenous reservations are the

ethnic territories that are in the area of influence where alerts for this type of exploitation were detected.

Due to the specificities of special management territories (already discussed in a previous chapter) that coincide with Environmental restrictions free zones, it is worth mentioning that some premises of the regulatory framework for the design of intervention strategies should be considered. The special management territories considered in this study are:

Ethnic territories: these areas refer to territories of Indigenous Reservations and Black Communities Lands that are recognized, not included in Mining zones or contemplated in Law 2 dated 1959. If the community does not request the declaration of a Mining zone, the permissions may be granted to a third party with the fulfillment of all the requirements, without this being to the detriment of the cultural, social and economic values of these groups.

Protected areas included in the SINAP and registered in the RUNAP: they are not part of the Excludable zones from mining (art. 34 of the Mining Code) and are considered special management territories by virtue of the specific objectives of their creation.

greatest presence in this type of territory in area (85%) as well as in number of councils where the phenomenon was detected, 20 in total. According to the management model, the highest proportion in these areas is found in Restricted mining zones (51%). With respect to law arrangements, only 13% of EVOA on land is in sites with technical exploitation permissions.

The phenomenon in these territories is distributed in five provinces: Chocó (33,111 ha.), Nariño (2,952 ha.), Cauca (2,285), Valle del Cauca (562 ha) and Antioquia (274 ha.). Figure 24 shows the behavior by province of detection in community councils.

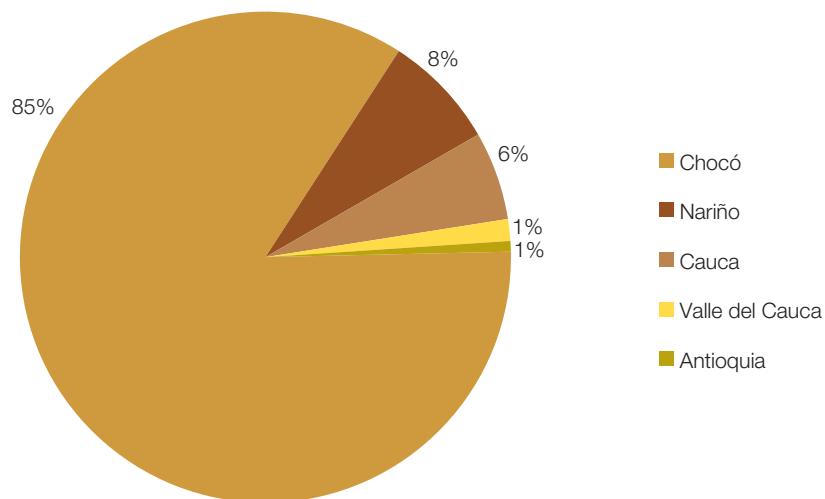
Of the consolidated of Excludable zones from mining to the interior of these territories, 60% coincide with areas that have been requested to obtain technical permissions, while 13% are in transit to legality. It should be noted that obtaining a technical and environmental permission in these zones implies the subtraction of forest reserve areas from Law 2 dated 1959.

On the other hand, in Environmental restrictions free zones, 55% of EVOA already has technical exploitation permissions; 9% coincide with Contract Proposals for obtaining permissions and 24% are in transit to legality.

Black Community Lands

In total, 39,183 ha. of EVOA on land were registered in the jurisdiction of 77 community councils. Chocó is the province with the

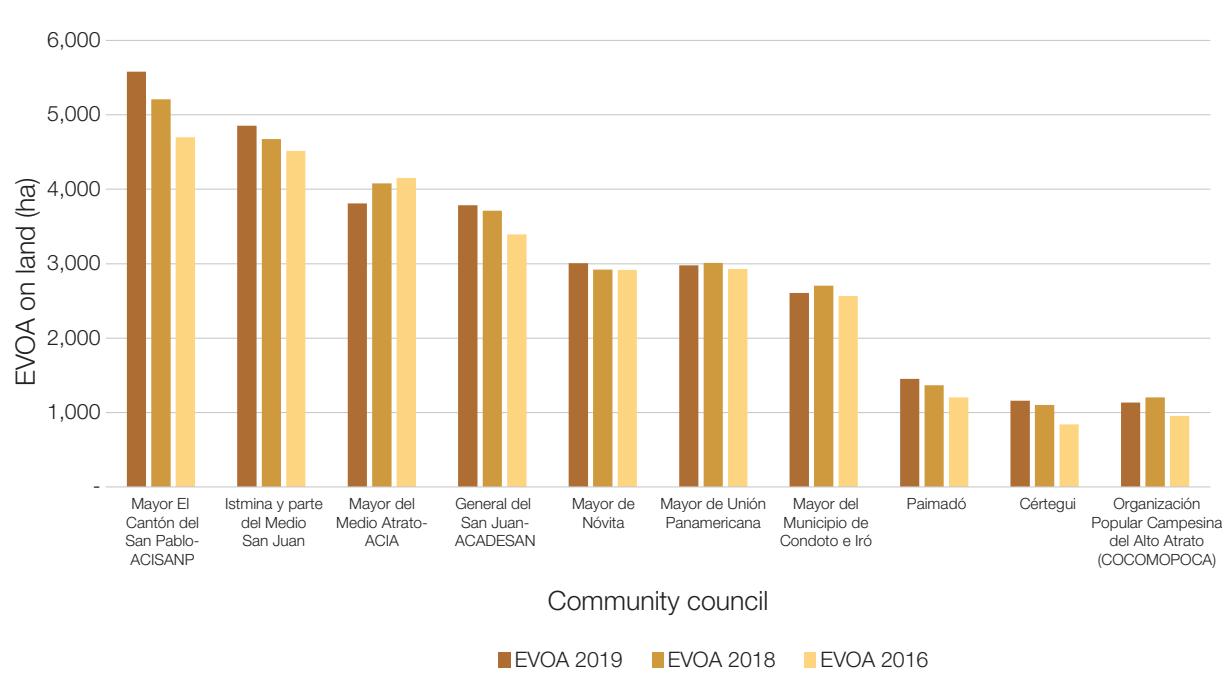
Figure 24. Provincial distribution of EVOA on Black Community Lands, 2019



Although the number of community councils whose territories present EVOA on land is similar in several provinces, the ten territories that report the largest area are in Chocó and represent 77% of the total detection in Black Community Lands (see figure 25).

By extending the analysis to the first 20 councils with more EVOA on the ground, these concentrate 91% of the total reported for this type of territory; 14 of them are in Chocó (85% of the total), 4 in Nariño and 2 in Cauca.

Figure 25. Community Councils with the largest EVOA presence on the ground, 2016-2018-2019

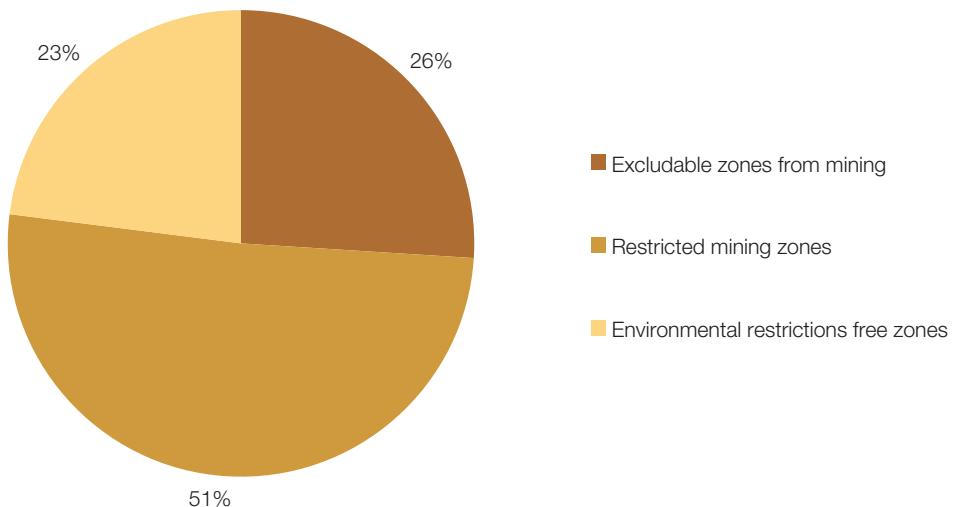


Of the total detected in Black Community Lands, more than half is in Restricted mining zones, while the remaining area is similarly distributed between Excludable zones from mining and Environmental restrictions free zones, as shown in Figure 26. 90% of what is reported within Restricted mining zones in these territories corresponds to declared Mining zones of ethnic communities⁴⁹ and the

remaining 10% is in other areas covered by this category⁵⁰. On the other hand, the EVOA on land in Excludable zones from mining is due to the presence of the phenomenon in two Forest Reserve Zones (Law 2 dated 1959): Pacific and Magdalena.

Map 10 shows the location of EVOA on land within the Black Communities Lands.

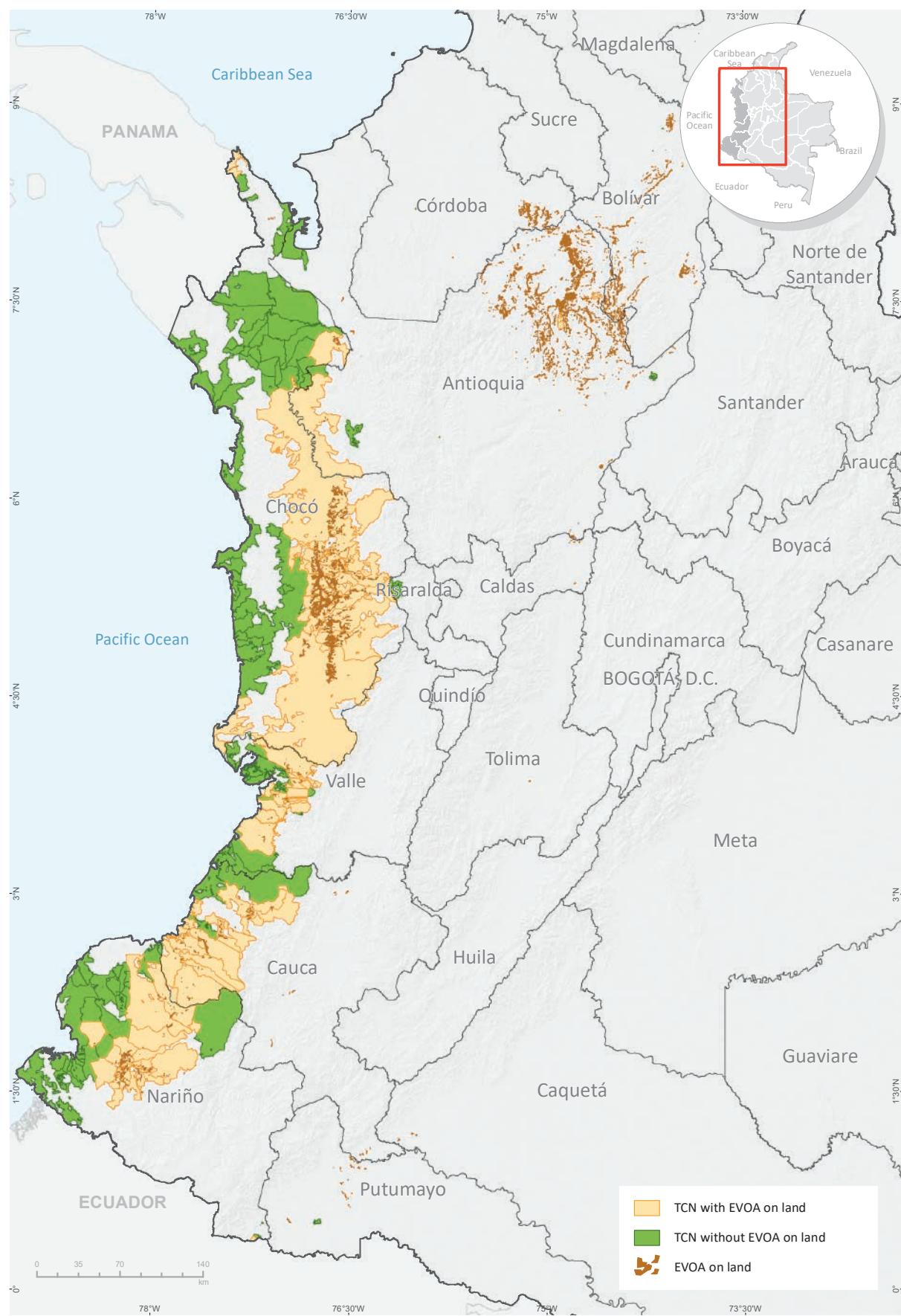
Figure 26. EVOA on land in Black Community Lands according to the management model, 2019



⁴⁹ Mining areas may coincide with territories under Law 2 dated 1959, but under the management model this category prevails. The declaration of a Mining zone does not guarantee the Title or Concession Contract, so the area is not subtracted from Law 2 territories.

⁵⁰ Literals (a) and (e) of Article 35 of Law 685 dated 2001 (Colombian Mining Code).

Map 10. Black Community lands with EVOA on land presence, 2019



Source: Government of Colombia - Monitoring system supported by UNODC for Black Community Lands: National Land Agency (ANT). The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Of the detection in Excludable zones from mining within these territories, 60% coincide with areas that have been requested to obtain technical permissions⁵¹, while 13% are in transit to legality. On the other hand, 55% of EVOA on land in the Environmental restrictions free zones under the jurisdiction of community councils already have technical exploitation permissions; 9% coincide with Contract Proposals and 24% are in areas in transit to legality.

In addition to the high socio-economic vulnerability to which the black communities are exposed in their territories, there is also the environmental and mobility problem generated by the exploitation of alluvial gold with machinery on land in their surroundings: 1) loss of plant cover; 2) flow and accumulation of large volumes of sediment; 3) alteration of water quality, and 4) deviation of riverbeds, which are the main axis of mobilization in these areas.

In relation to the alerts by EVOA in water, the study carried out for 2019 only addresses ten rivers in the Amazon and Orinoco regions, which is why there are no data for Black Community Lands, since these types of special management areas are located mainly in the Pacific and Caribbean regions. Although there is no information about the presence of this

type of mineral exploitation in Black Community Lands, does not mean that this phenomenon does not take place in these territories.

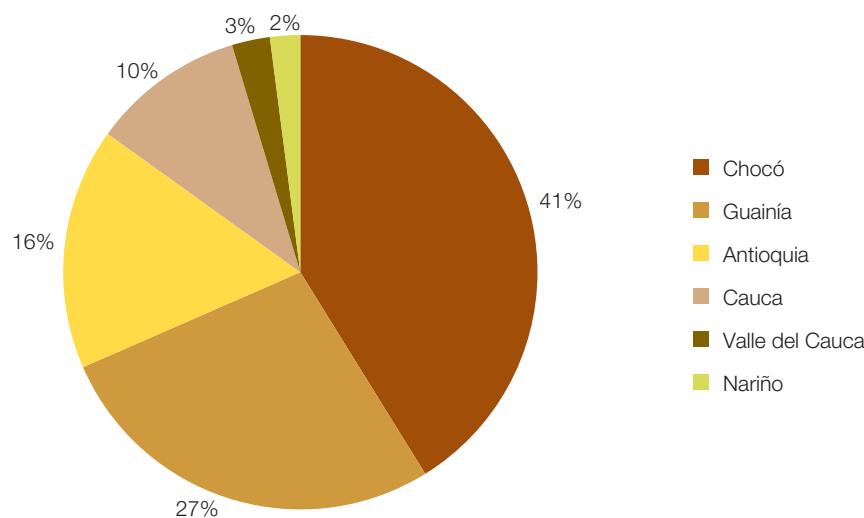
Indigenous Reservations

In 2019, 494 hectares were registered with EVOA on land in these territories (0.5% compared to the national total), where 19 reservations, mainly of the Embera-Katío and Embera ethnic groups, reported the presence of this phenomenon. Although detection by this concept is in six provinces, Chocó and Guainía concentrate close to two thirds of this figure. According to the management model, most of the EVOA in these reservations are in which are the main axis of mobilization in these areas. With respect to the law arrangements, only 9% of the detected area coincides with zones that have technical exploitation permissions. In relation to EVOA in water, alerts were identified in the zone of influence of 21 reservations, mainly in the Caquetá and Apaporis rivers.

The province with the greatest presence of EVOA on land in indigenous reservations is Chocó (204 ha.); it is followed by Guainía (135 ha.), Antioquia (81 ha.), Cauca (52 ha), Valle del Cauca (13 ha) and Nariño (10 ha). Figure 27 shows the provincial distribution of indigenous reservations with EVOA on land.

⁵¹ Obtaining the technical and environmental permission leads to the subtraction of authorized areas from the ZRF in the country.

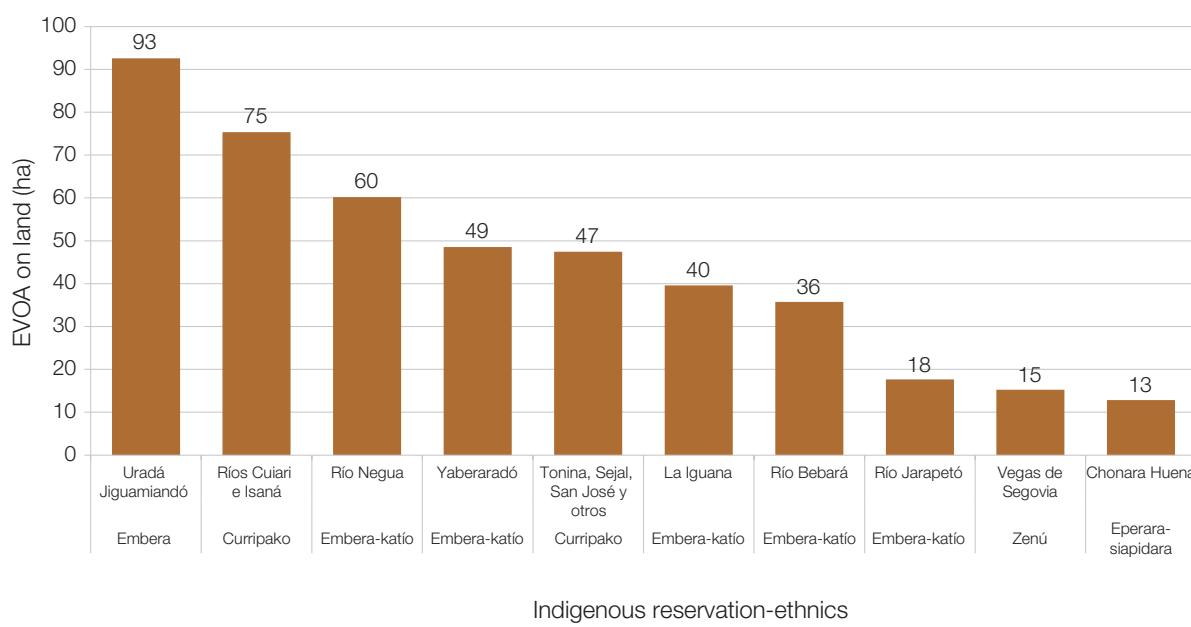
Figure 27. Provincial distribution of EVOA on land in indigenous reservations, 2019



In the 19 indigenous reservations with EVOA on land presence in 2019, there are 9 ethnic groups or indigenous peoples; the Embera-Katío and Embera peoples are the ones who live in the areas with the greatest detection of the phenomenon, since they concentrate 65% of the figure under this concept, followed by the Curripako people with 25%. The 10 “reservations with the largest area of EVOA on land account for 90% of the figure in these territories, a list to which must be added reservations of the zenú and eperara-siapidara

ethnic groups (figure 28). This is of great relevance because, once the ethnic groups whose reservations have the greatest area detected with EVOA on land have been identified, it will be possible to define differentiated intervention strategies according to the traditions and cultural norms of each indigenous people, in order to counteract the negative effects on the natural resources that are precisely the basis of the ancestral knowledge of those who inhabit these territories.

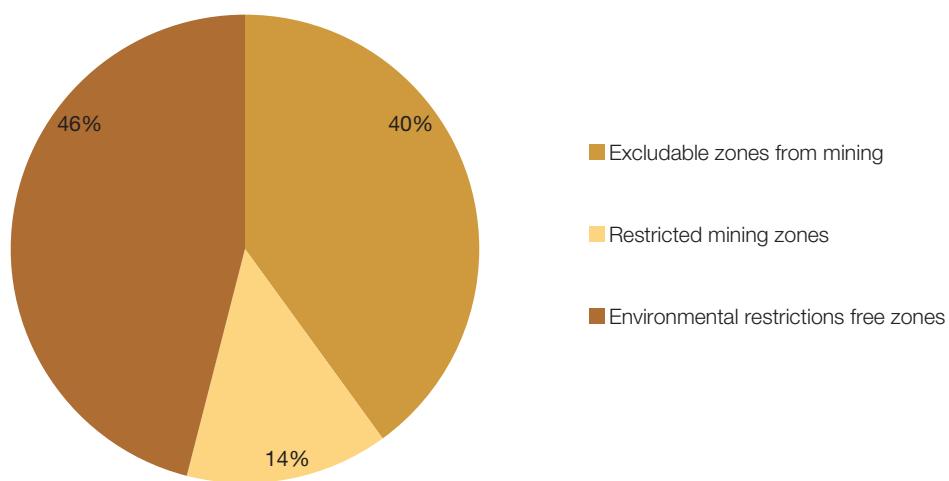
Figure 28. Indigenous reservations with the largest EVOA presence on land, 2019



Of the total area detected in indigenous reservations, 230 ha. correspond to EVOA findings on land in Environmental restrictions

free zones; 195 ha. are in Excludable zones from mining and 70 ha. are in Restricted mining zones. Figure 29 shows the distribution.

Figure 29. Presence of EVOA on land within indigenous reservations, 2019



Of the consolidated indigenous reservations for Environmental restrictions free zones, 20% of EVOA on land present there already has technical operating permissions and 42% coincide with Contract Proposals to obtain permissions. In Excludable zones from mining in these territories, 4% coincide with Contract Proposals to obtain permissions.

Although the Environmental restrictions free zones may be subject to the application and award of permissions to carry out mining activity, if they do not have these, the EVOA in these areas are illegal. The detection in Excludable zones from mining is due to the presence of the phenomenon in ZRF (Law 2 dated 1959) and is similarly distributed in this type of zones in the Amazon and the Pacific. Finally, the presence

of the phenomenon in Restricted mining zones in these ethnic territories corresponds to Mining zones of ethnic communities⁵².

In relation to the detection of EVOA alerts in water⁵³ in indigenous reservations, 21 of these ethnic territories have a direct or indirect spatial relationship with this phenomenon; the Caquetá and Apaporis rivers, which influence 16 reservations, are the ones that present alerts directly on or near these areas. The Comefayú and Puerto Córdoba reservations also stand out, as they are in the area of influence of the alerts detected in more than one river. Annex 1 contains complete information on all the reservations with proximity to EVOA alerts in water. Map 11 displays the location of EVOA on land and in water in indigenous reservations.

⁵² See chapter II of Law 65 of 2001 (Colombian Mining Code), on the legal status of exploitations, despite being a declared mining zone.

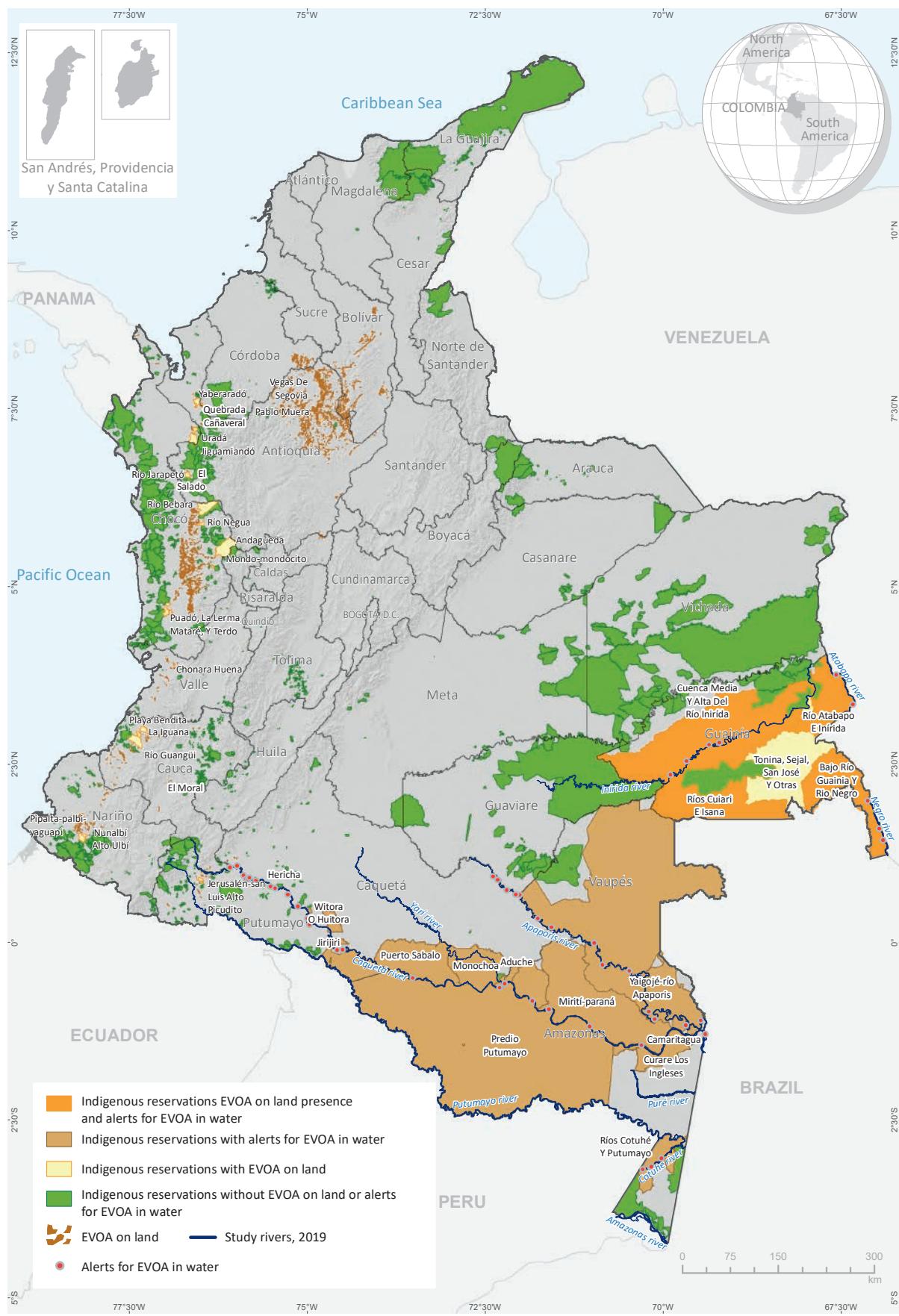
⁵³ Rivers evaluated in the Amazon and Orinoco regions.

Biodiversity in territories with illegal exploitation

The use of satellite images provides an overview of the changes in landscapes due to the presence of EVOA, which is confirmed by the data presented in the chapter dedicated to the loss of vegetation cover with emphasis on environmentally valuable cover. This impact not only refers to the loss of forest cover and the like, but also to the species and ecosystem value that these geographic areas harbor.

In order to have a first approximation to the impact of EVOA on biodiversity, the data of the estimates of potential distribution of species were crossed from the models developed by the Biodiversity Informatics team (BioModels) of the Alexander von Humboldt Institute for Research on Biological Resources with the detected EVOA polygons. In this study an estimation of the number of potential species present in the areas with EVOA is proposed (Annex 4).

Map 11. Indigenous reserves with EVOA on land and in water presence, 2019



Source: Government of Colombia - Monitoring system supported by UNODC for Indigenous Reservations: National Land Agency (ANT). The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Protected areas included in the National System of Protected Areas (SINAP), registered in the Single National Registry of Protected Areas (RUNAP) that are not part of the Excludable zones from mining

6,307 ha. of EVOA on land were detected by 2019 in protected areas registered with RUNAP, which are not part of the Excludable

zones from mining, specifically in the category Regional Integrated Management Districts⁵⁴ (table 11).

Table 11. EVOA on land detected in other RUNAP categories, 2019

Protected Area name	EVOA on land (ha)
Ayapel Wetlands Complex Integrated Natural Resources Management District	4,782
El Sapo and Hoyo Grande Swamps Regional Integrated Management District*	1,200
Corrales and El Ocho Swamps Regional Integrated Management District**	318
Regional Integrated Management District Cacica Noría***	7

* Declared as a protected area on October 26th, 2017 by Resolution 508 of the Board of Directors of CORANTIOQUIA

** Declared as a protected area on December 10th, 2019 by means of Agreement 576 of the Board of Directors of CORANTIOQUIA.

*** Declared as a protected area on November 29th, 2016 by Agreement 480 of the Board of Directors of CORANTIOQUIA.

The area with the most EVOA on land is the Integrated Natural Resources Management District of the Ayapel Wetlands Complex, where 76% of the total detected in these protected zones is concentrated, 4,782 ha. that represent 3% of the total area of this District. With respect to 2018, it was evident that in this territory the area reported increased by 986 ha, which represents a 26% increase. This complex is in the Province of Córdoba, in the upper and middle part of the San Jorge River. Its hydrographic basin is part of the Atlantic plain of northern Colombia and forms part of the macro-wetland system and flood zones of the Momposina Depression, which covers areas of the provinces of Córdoba, Sucre, Magdalena and Bolívar [30].

This area is of great ecological interest because it has different aquatic and terrestrial biotopes, is home to great biological diversity, and supports a series of environmental services that make it the natural capital of the region and the country [31]. The growing trend in the number of EVOA is a call to focus and manage these territories, whose ecological balance is threatened by gold exploitation, which weakens the very essence of the protected area.

On the other hand, 1,200 hectares of EVOA were identified on land in the Ciénagas El Sapo and Hoyo Grande Regional Integrated Management District, a protected area declared in October 2017. These are two ecosystems that regulate the flow of the Nechí and Cauca

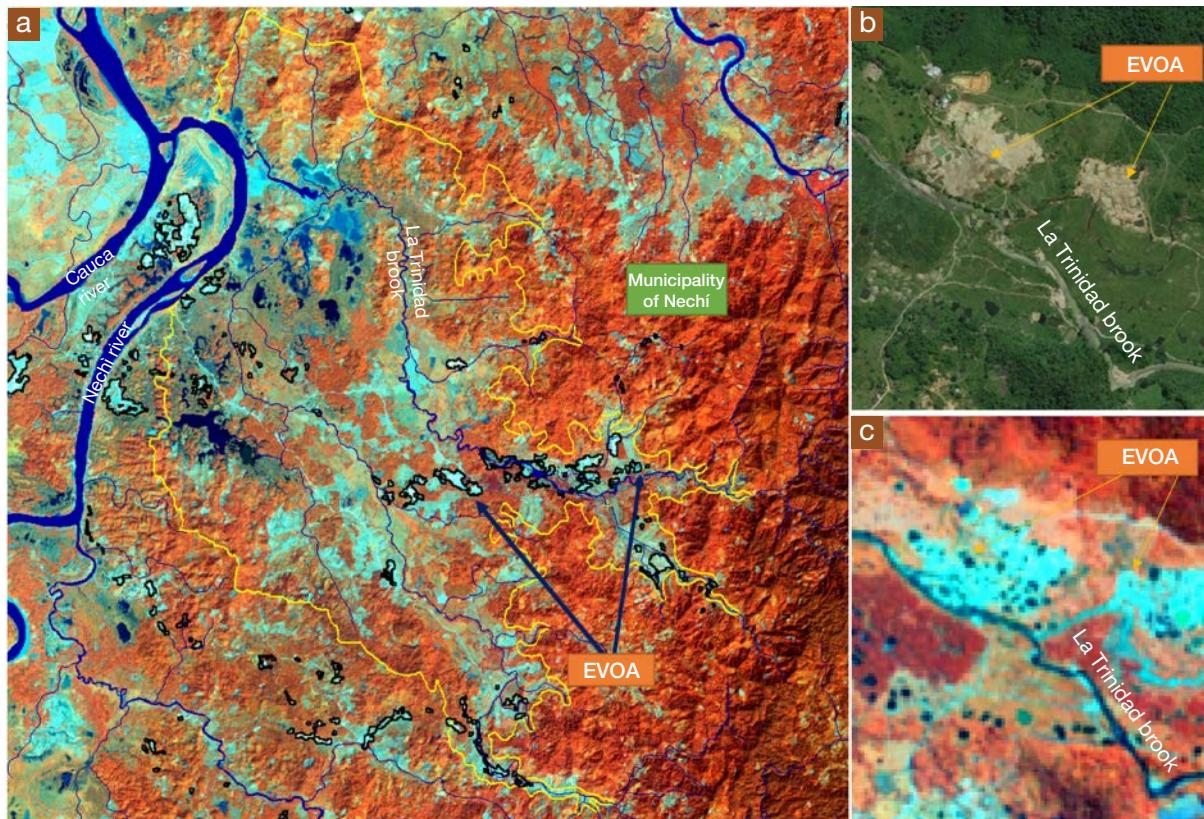
⁵⁴ Geographic space in which landscapes and ecosystems maintain their composition and function, even though their structure has been modified, whose associated natural and cultural values are made available to the human population for their sustainable use, preservation, restoration, knowledge and enjoyment (Article 14 of Decree 2372 of 2010).

Rivers, which are highly diverse in terms of fish species and have become one of the most important wetlands at the ecological and social level in the Lower Cauca Antioquia [32].

Finally, in the Regional District of Integrated Management Ciénagas Corrales and El Ocho,

a recently declared protected area, 318 ha. of EVOA on land were identified. This zone of the Lower Cauca Antioquia presents extensive areas of wetlands in the vicinity of the Nechí River (see Figure 30).

Figure 30. Regional Integrated Management District Ciénagas Corrales and El Ocho



Note: District boundaries in yellow line; a) presence of EVOA on land (black line), Landsat 8 RGB image (564); b) Worldview image zoom; c) Sentinel-2 image zoom.

PROVINCES WITH EVOA'S PRESENCE

The results of EVOA detection on the ground indicate that 12 of the 32 provinces in Colombia present this phenomenon in their territories, with a total of 98,028 ha., 6% more than what was detected in 2018 (see table 12). The greatest provincial increase with respect to 2018 is located in Córdoba (25%), where the increase is concentrated in the municipalities of Ayapel and San José de Uré; in second place is the province of Bolívar (19%), and is focused on the municipalities of San Pablo, Altos del Rosario and Norosí, with an increase of more than 45%; the third place in expansion of the EVOA area is occupied by Antioquia with 10%, an increase concentrated in the municipalities of Puerto Berrio, Yondó, Segovia and Caucasia. On the other hand, the provinces of

Cauca, Valle del Cauca and Putumayo show a decrease in the EVOA detected, presenting instead beginnings of plant succession.

Concepts:

Municipality with presence: municipality with detection, by remote sensing, of EVOA on land or EVOA in water.

EVOA on land: track or signal detected by interpretation and digital processing of satellite images that is characterized by landscape alteration in alluvial lands.

EVOA in water: track or signal detected by spectral indices in satellite images characterized by alteration of the suspended sediments in the water body.

Table 12. EVOA on land by provinces, 2018-2019

Province	EVOA on land 2018 (ha)	EVOA on land 2019 (ha)		
		Hectares	Total National (%)	Change 2018-2019 (%)
Antioquia	36,447	40,201	41	10
Chocó	35,194	35,105	36	0
Bolívar	8,913	10,642	11	19
Córdoba	3,982	4,976	5	25
Cauca	3,004	2,697	3	-10
Nariño	2,921	3,171	3	9
Valle del Cauca	889	608	1	-32
Putumayo	437	291	0	-33
Others	259	337	0	30
Total	92,046	98,028	100	6

In this sense, EVOA's presence on the ground covers 96 municipalities (9%) of the total in Colombia⁵⁵ (1,122)⁵⁶. The first place in number of municipalities with detection of the phenomenon is shared by Antioquia and Chocó, each with 22 municipalities. In Antioquia, the EVOA is concentrated in 4 municipalities: Zaragoza, Nechí, Cáceres and El Bagre, which account for 66% of EVOA in the province and 27% of the national figure.

In Chocó, the EVOA are concentrated in 5 municipalities: Nóvita, El Cantón de San Pablo, Istmina, Río Quito and Unión Panamericana (Figure 31), which contribute 61% of the EVOA in the province and 22% of the national figure.

At the national level, the phenomenon is strongly concentrated: 54% of the national detection is in 10 municipalities in the provinces of Antioquia, Chocó, Córdoba and Bolívar.

Figure 31. EVOA on land, Chocó



Note: UNODC photographs taken during verification overflight.

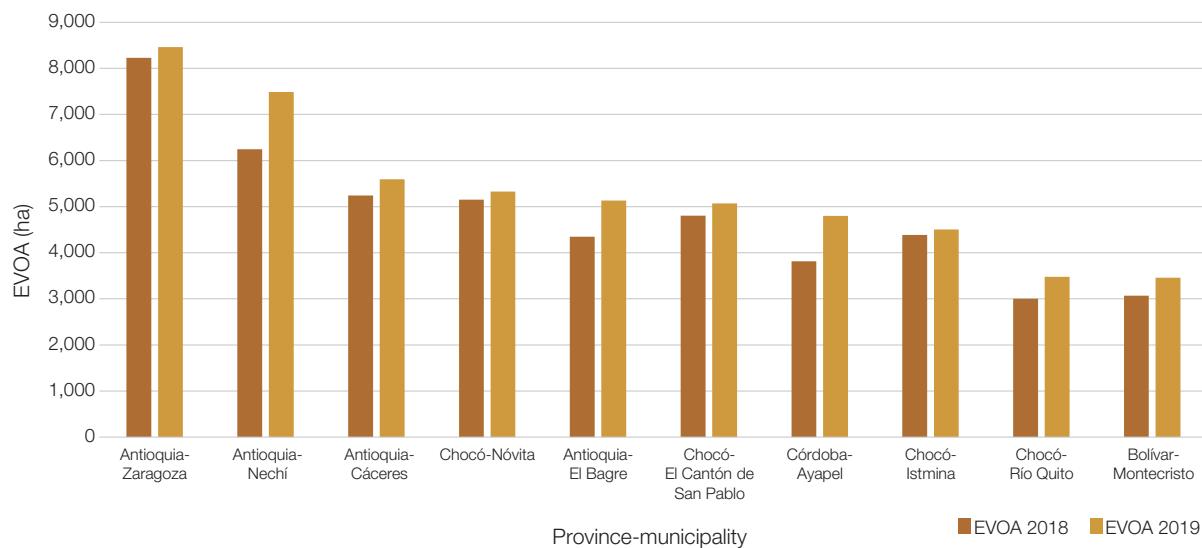
Antioquia and Chocó each contribute 4 municipalities to this list, with 27% and 19% of the national area detected, respectively. Zaragoza, Nechí and Cáceres lead, in the province of Antioquia, the municipal ranking with 8,641 ha., 7,489 ha. and 5,592 ha., respectively, representing 22% of the national total; they are followed in their order: Nóvita (Chocó), El Bagre (Antioquia), El Cantón de San

Pablo (Chocó), Ayapel (Córdoba), Istmina and Río Quito (Chocó) and Montecristo (Bolívar). The fact that Río Quito, which did not figure in the ranking of the 2018 study, enters this list in 2019, displacing Unión Panamericana in Chocó, stands out. Río Quito presents an increase of 16% with respect to what was detected in 2018 (figure 32).

⁵⁵ The spatial archives of municipalities and other administrative units were updated during 2017. According to this, the data on the dynamics of some municipalities may differ from those published in previous studies.

⁵⁶ Colombia is divided into 1,101 municipalities, 20 non-municipal areas and the Island of San Andrés and Providencia. For the purposes of the report, the figure of 1,122 municipalities is used.

Figure 32. Ranking of the ten municipalities with the largest EVOA on land presence, 2018-2019



On the other hand, of these ten municipalities, Ayapel (Córdoba), Nechí (Antioquia) and El Bagre (Antioquia) are the ones that report the greatest increase in the area detected with EVOA with respect to 2018, with 26%, 20% and 18%, respectively.

Finally, a comprehensive analysis of the findings by province shows that 52% of the national total is located in Excludable zones from mining; 17% of the national figure corresponds to declared Mining zones of

ethnic communities and the remaining 48% of the national figure is located in Environmental restrictions free zones, where 5% of the national figure coincides with declared Mining zones of ethnic communities. In this context, and in accordance with the previous findings, it is noteworthy that more than half of EVOA detected are located in territories where, based on the protection and conservation of the national environmental heritage protected by the current regulatory framework, exploitation is not allowed (see Table 13).

Table 13. Territory and EVOA on land (ha), 2019

Province	EVOA (ha)	Excludable zones from mining (%)						Environmental restrictions free zones (%)					
		With titles*	In transit to legality	Illicit exploitation			Percentage in the province	With technical and/or environmental permissions	In transit to legality	Illicit exploitation			Percentage in the province
				Requested	Connotation with ethnic community mining areas	With no law arrangement				Requested	Ethnic community mining zones	With no law arrangement	
Antioquia	40,201	8	1	4	0	12	25	37	3	7	0	28	75
Chocó	35,105	10	17	3	42	5	77	2	2	6	11	3	24
Bolívar	10,642	30	20	10	0	28	88	4	5	1	0	2	12
Córdoba	4,976	0	0	0	0	12	12	5	24	0	0	58	88
Nariño*	3,171	0	9	10	50	31	100	0	0	0	0	0	0
Cauca	2,697	0	2	0	0	0	2	25	15	5	36	16	98
Valle del Cauca	608	0	1	0	49	49	100	0	0	0	0	0	0
Putumayo	291	0	0	0	0	1	1	2	17	0	0	80	99
Guainía	135	0	0	0	9	91	100	0	0	0	0	0	0
Caquetá	53	0	0	0	0	0	0	0	26	0	0	74	100
Others	147	0	0	0	0	0	0	40	7	0	0	53	100

* Corresponds to technical permissions.

At the national level, Antioquia is in first place in EVOA with 40,201 ha.; in second place is Chocó with 35,105 ha., and in third place is Bolívar with 10,642 ha., which correspond to 41%, 36% and 11%, respectively, of the consolidated national area. However, Chocó has the highest concentration of EVOA in Excludable zones from mining, which represents 27% of the national total and corresponds to 76% of the detection in the province. Bolívar and Antioquia follow with 10% of the national consolidated, which represents 88% and 25% of the consolidated within their territories, respectively. In this same context, it is worth

noting that in Valle del Cauca, Guainía and Nariño 100% of EVOA coincides with these protection territories.

Environmental restrictions free zones, Antioquia is the province with the greatest representation with 31% of the national detection and 75% of the consolidated provincial detection (Figure 33), followed by Chocó with 8% of the consolidated national detection and 24% of the detection within the province. It should be noted that the provinces of Cauca, Putumayo and Caquetá concentrate almost all EVOA in Environmental restrictions free zones.

Figure 33. Alluvial gold exploitation on land, Antioquia



On the other hand, as mentioned above, Restricted mining zones can be immersed in both Excludable zones from mining and Environmental restrictions free zones; in this sense, Chocó is the province with the highest concentration of these zones, with 14,623 ha. in the former and 3,773 ha. in the latter, for a total of 18,396 ha. in these Restricted mining territories which, in turn, represent 86% of the total EVOA in declared Mining zones of ethnic communities and are equivalent to 19% of the national total. Based on these data, it is urgent to focus control strategies in the province on these areas, which coincide with

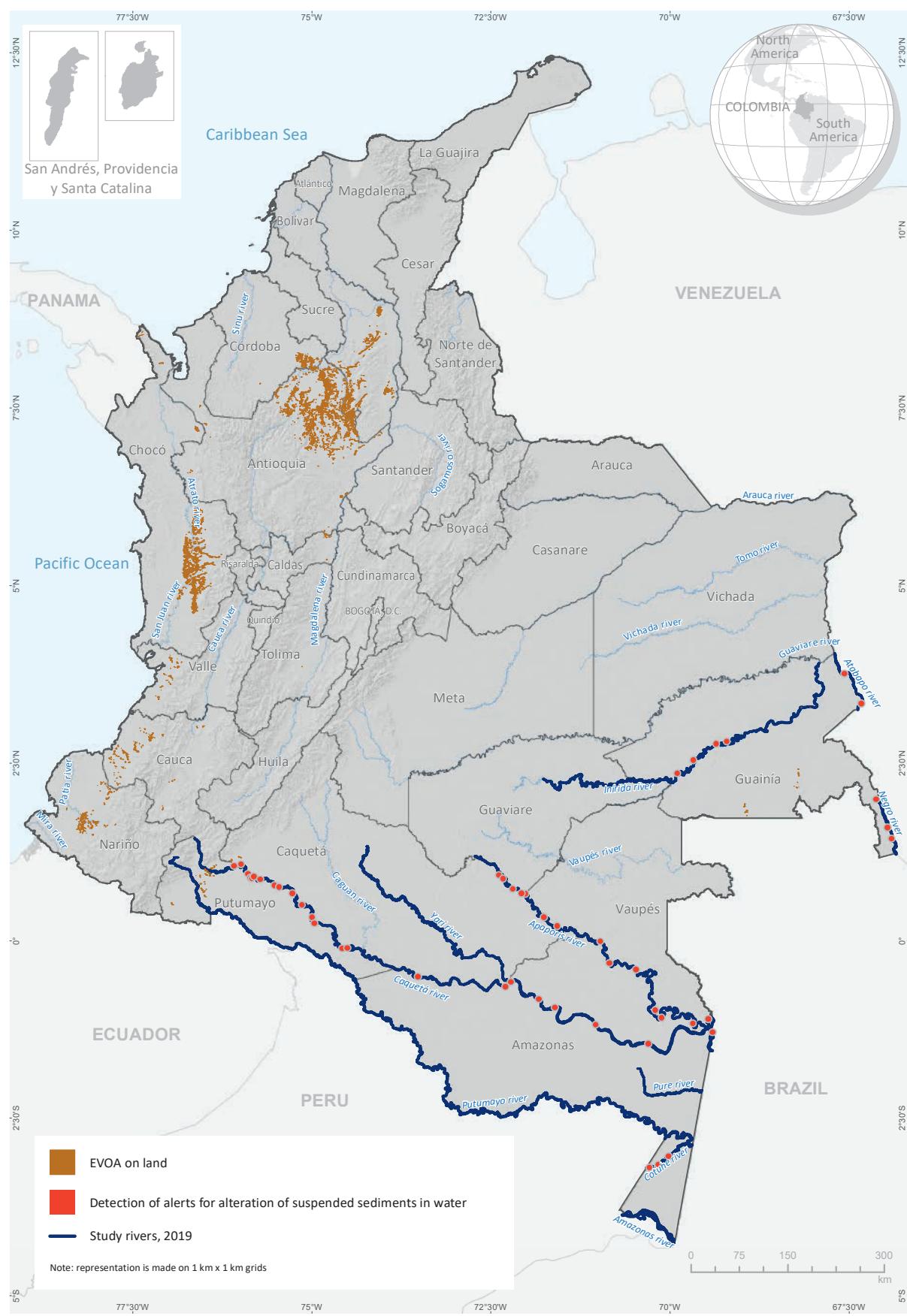
Chocó ranks second in the national consolidated EVOA, with 76% in Excludable zones from mining.

Bolívar ranks third in EVOA detection at the national level and 88% is in Excludable zones from mining.

ethnic territories where exploitation outside the regulatory framework has a direct impact on the conservation of biotic and cultural heritage.

Map 12 displays the distribution of EVOA in Colombia.

Map 12. EVOA detection in Colombia, 2019



Source: Government of Colombia - Monitoring system supported by UNODC.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Alerts for EVOA in water

The 2019 study addressed, according to the methodology based on alteration of suspended sediments presented in previous studies, the detection of EVOA alerts in water in 10 rivers in the Amazon and Orinoco regions: Putumayo, Caquetá, Apaporis, Amazonas, Atabapo, Cotuhé, Yarí, Guainía (Río Negro), Puré and Inírida. The findings report alerts in the provinces of Amazonas, Caquetá, Cauca, Guainía, Guaviare, Putumayo and Vaupés. On the other hand, the provinces of Putumayo, Caquetá, Cauca and Guainía report both types of exploitation (see table 14).

The detection of EVOA alerts in water was based on the spectral dynamics of 10 rivers measuring approximately 7,000 km in Colombian territory.

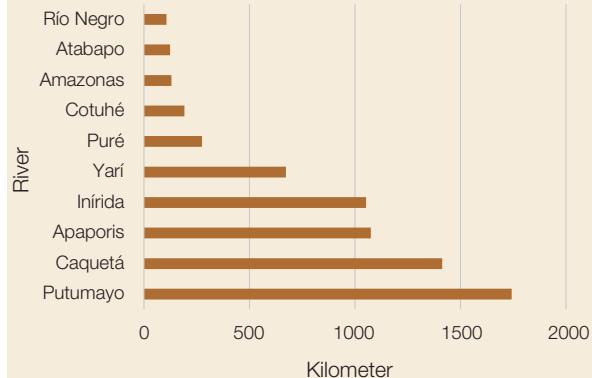


Table 14. Provincial presence of alerts for EVOA in water, 2019

Municipalities with alerts for EVOA in water, 2019*		
Province	Municipality	Study river
Amazon	La Chorrera	Caquetá river
	La Pedrera	Apaporis river
		Caquetá river
	La Victoria (Pacoa)	Apaporis river
	Leticia	Cotuhé river
	Mirití-Paraná (Campoamor)	Caquetá river
	Santander (Araracuara)	Caquetá river
Caquetá	Tarapacá	Cotuhé river
	Curillo	Caquetá river
	Solano	Apaporis river
Cauca	Solita	Caquetá river
	Piamonte	Caquetá river
Guainía	Cacahual	Atabapo river
	Inírida	Inírida river
	La Guadalupe	Negro river
	Morichal (Morichal Nuevo)	Inírida river
	San Felipe	Negro river
Guaviare	Miraflores	Apaporis river
Putumayo	Puerto Guzmán	Caquetá river
	Puerto Leguízamo	Caquetá river
Vaupés	Pacoa	Apaporis river
	Taraira	Apaporis river

* The 2019 study covers only ten rivers, so these data are limited only to these and do not account for the totality detected in Colombian territory by this mode of exploitation.

Caquetá, which presents EVOA on land in San José del Fragua, registers another of its municipalities with EVOA on water: Solano, Solita and Curillo. EVOA alerts in water were detected mainly in the Caquetá river, except for Solano, which also has alerts in the Apaporis river.

Amazonas, on the other hand, only reports this exploitation modality and presents alerts in three rivers: Caquetá, Apaporis and Cotuhé. The municipalities close to the alerts are: La Victoria, Mirití-Paraná, Leticia, Santander, Tarapacá, La Chorrera and La Pedrera, which has detection in two rivers: Apaporis and Caquetá.

In this context, Guainía registers the presence of EVOA on land in the municipalities of Paná Paná and Puerto Colombia. This province has EVOA alerts in water in the municipalities of Morichal, on the Inírida river; Cacahual, on the Atabapo river, and La Guadalupe and San

The presence of EVOA covers 115 municipalities (10%) of the total of 1,122 in the country. Of these, 93 register EVOA on land, 18 report only EVOA in water and 3 municipalities, Puerto Guzmán in Putumayo, Inírida in Guainía and Piamonte in Cauca, have both modalities of exploitation.

Felipe, on the Negro river. The detection in these three municipalities coincides with rivers bordering Venezuela.

Of the ten rivers studied, Puré and Amazonas (in Amazonas), Yarí (in Caquetá) and the Putumayo river do not present alerts for this type of exploitation for this period. However, it is worth mentioning that in the Putumayo river, jurisdiction of the Amazonas province, there were unusual values of the indicator index that could be related to this type of exploitation, but which were not validated by the local authorities.

TERRITORIES WITH EVOA AND COCA CROPS

The UNODC monitoring platform is the official source for Colombia of coca crops figures since 2003 and EVOA figures since 2018. These two phenomena in some areas of the country converge in the same geographical space, creating complex territories for the management and monitoring of any activity, including the exploitation of minerals under the regulatory framework, since they are in a context of illegality (due to coca crops) and it is assumed that there may be actors who are carrying out other illegal activities such as, for example, the illegal exploitation of minerals, specifically gold.

These two phenomena, although they have different production cycles and market characteristics, take place in vulnerable areas due to conditions of poverty, marginality, difficult access and the presence of illegal armed groups. The presence of these phenomena not only generates negative effects on natural ecosystems but is also a determining factor in the economic and social dynamics of the territories⁵⁷.

In Colombia, for the territories with EVOA presence on land in 2019, coca crops were identified in 43% of them. In these areas, the area planted with coca in 2018 reached 13,705 ha. and 28,120 ha. of EVOA on land (See figure 34 and map 13).

Figure 34. Zone with alluvial gold exploitation in land and coca crops, Central region

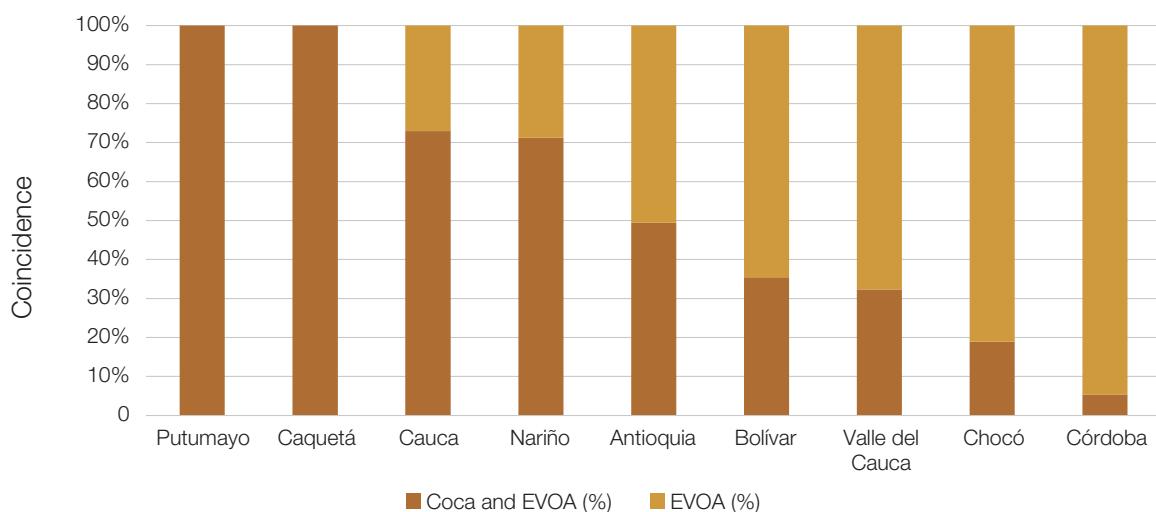


57 The EVOA and coca crops analyses are carried out in 5 km² grids of the area frame, since a territorial and not a geographical coincidence is sought.

At the provincial level, an increase of territories with coincidence of EVOA and coca crops was identified in Antioquia, a province that went from a congruence in both phenomena of 45% in 2018 to 49% in 2019, concentrating this in the municipalities of Remedios, Yalí, Vegachí

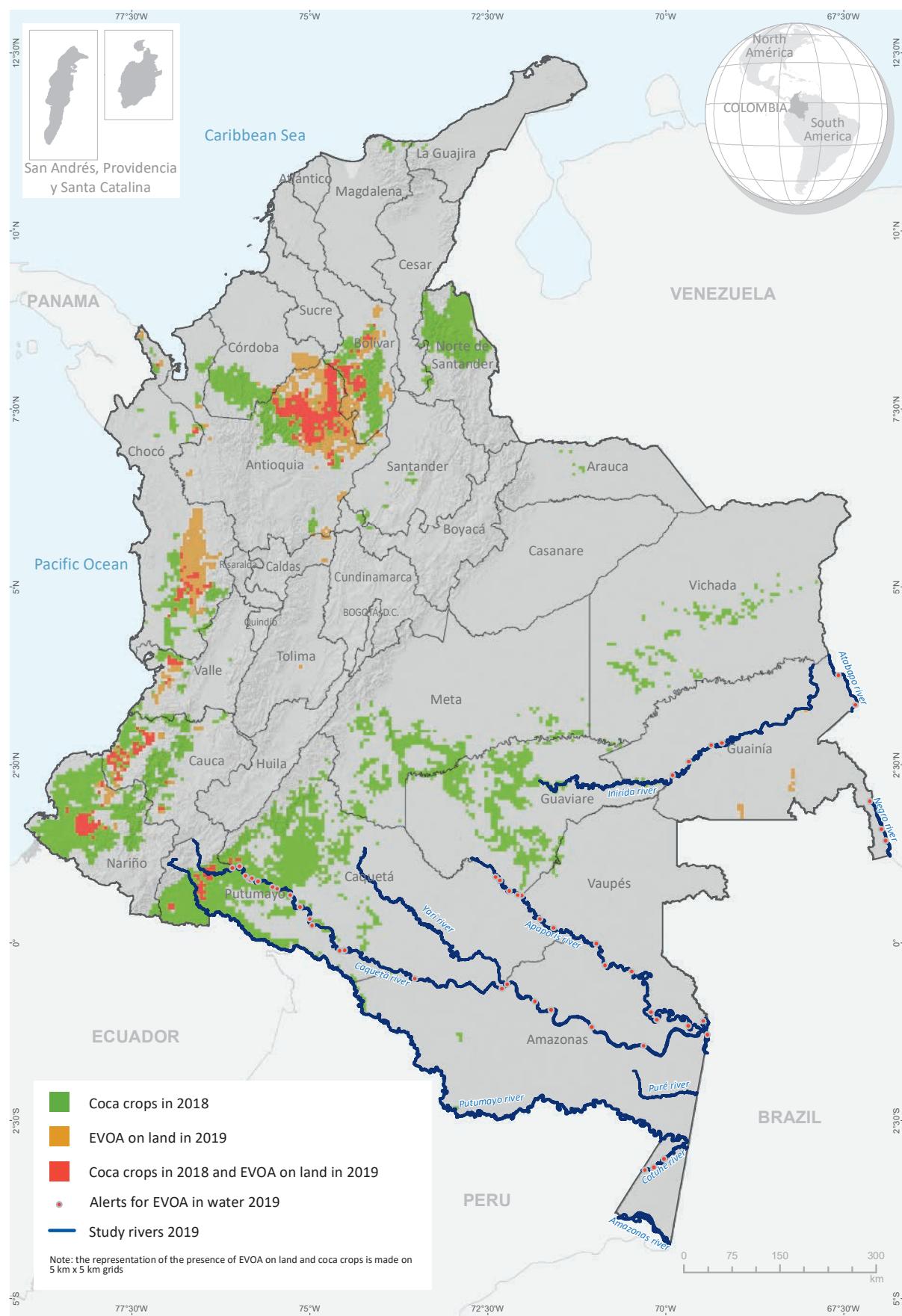
and Segovia. In Putumayo, all the grids with EVOA detected in 2019 showed coca crops in 2018, evidencing a migration of coca to converge in territories with alluvial gold exploitation (figure 35).

Figure 35. Coincidence of territories with EVOA on land (2019) and coca crops (2018)



For Antioquia, in the grids identified with EVOA in 2019, there was an increase in the area planted with coca crops of 6%, which would indicate a process of consolidation of these activities in the territory. The same happens in Bolívar, with an increase of 44%

of coca crops in 2018 compared to 2017 and 19% of EVOA. On the other hand, for the rest of the provinces the data of coca crops show a reduction of 15% on average in the territory with EVOA on land.

Map 13. Territories with EVOA and coca crops

Source: Government of Colombia - Monitoring system supported by UNODC.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

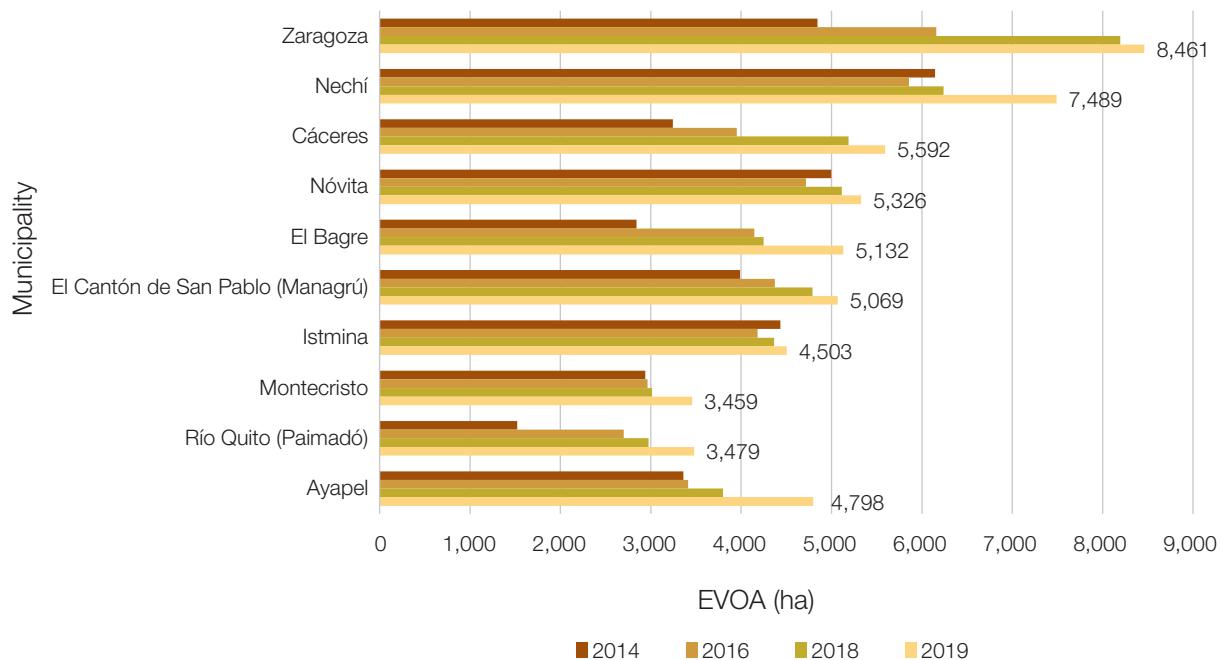
In the municipal context, 96 municipalities do present EVOA on land in 2019. The ranking of the ten municipalities with the highest detection (table 15) shows that they accumulate

54% of EVOA at national level, whose trend since 2014 is a constant increase. Figure 36 displays the 2014-2019 serial data for EVOA.

Table 15. Ranking of the ten municipalities with the largest EVOA presence on land, 2019

Province	Municipality	EVOA 2019 (ha)	Total National (%)	Change 2018-2019 (%)
Antioquia	Zaragoza	8,461	9	3
Antioquia	Nechí	7,489	8	20
Antioquia	Cáceres	5,592	6	8
Chocó	Nóvita	5,326	5	4
Antioquia	El Bagre	5,132	5	21
Chocó	El Cantón del San Pablo (Managrú)	5,069	5	6
Córdoba	Ayapel	4,798	5	26
Chocó	Istmina	4,503	5	3
Chocó	Río Quito (Paimadó)	3,479	4	17
Bolívar	Montecristo	3,459	4	15

Figure 36. Ranking of the ten municipalities with the largest presence of EVOA on land



In analyzing all the municipalities with EVOA, it was found that in 72 of them also had coca crops planted, concentrating 92,300 ha. in 2018 (55% of the national coca total in that year). From the above ranking, eight municipalities

report coca crops in 2018 (4 with a tendency to increase and 4 to decrease); on the other hand, Río Quito has not reported coca crops since 2015 and Ayapel has not reported coca in the entire historical series (figure 37).

Figure 37. Historical series of coca crops 2017-2018 in the municipalities with more EVOA on land in 2019

Municipality	EVOA 2018	EVOA 2019	Change EVOA 2018-2019 (%)	Coca 2017	Coca 2018	Change coca 2017-2018 (%)
Montecristo	3,015	3,459	15	511	717	40
El Bagre	5,114	5,132	0	595	811	36
Zaragoza	8,196	8,461	3	347	471	36
Nechí	6,240	7,489	20	552	708	28
Cáceres	5,188	5,592	8	1,944	1,826	-6
Nóvita	5,114	5,326	4	162	130	-20
Istmina	4,365	4,503	3	743	577	-22
El Cantón de San Pablo (Managrú)	4,788	5,069	6	12	6	-53

As a complement to the review of the ten municipalities with the highest number of coca crops, a municipal analysis was conducted with EVOA data for the period 2019-2018 and coca crops for 2017-2018. Four classes were created to classify the municipalities with an increasing tendency of both phenomena and for opposite tendencies between coca and EVOA (map 14).

Map 14 shows a growth node for both activities in the northern zone of Antioquia and southern Bolívar; there are 16 municipalities that accumulate 37% and 6%, respectively, of the areas detected with EVOA in 2019 and coca in 2018 for the whole country. In the northern

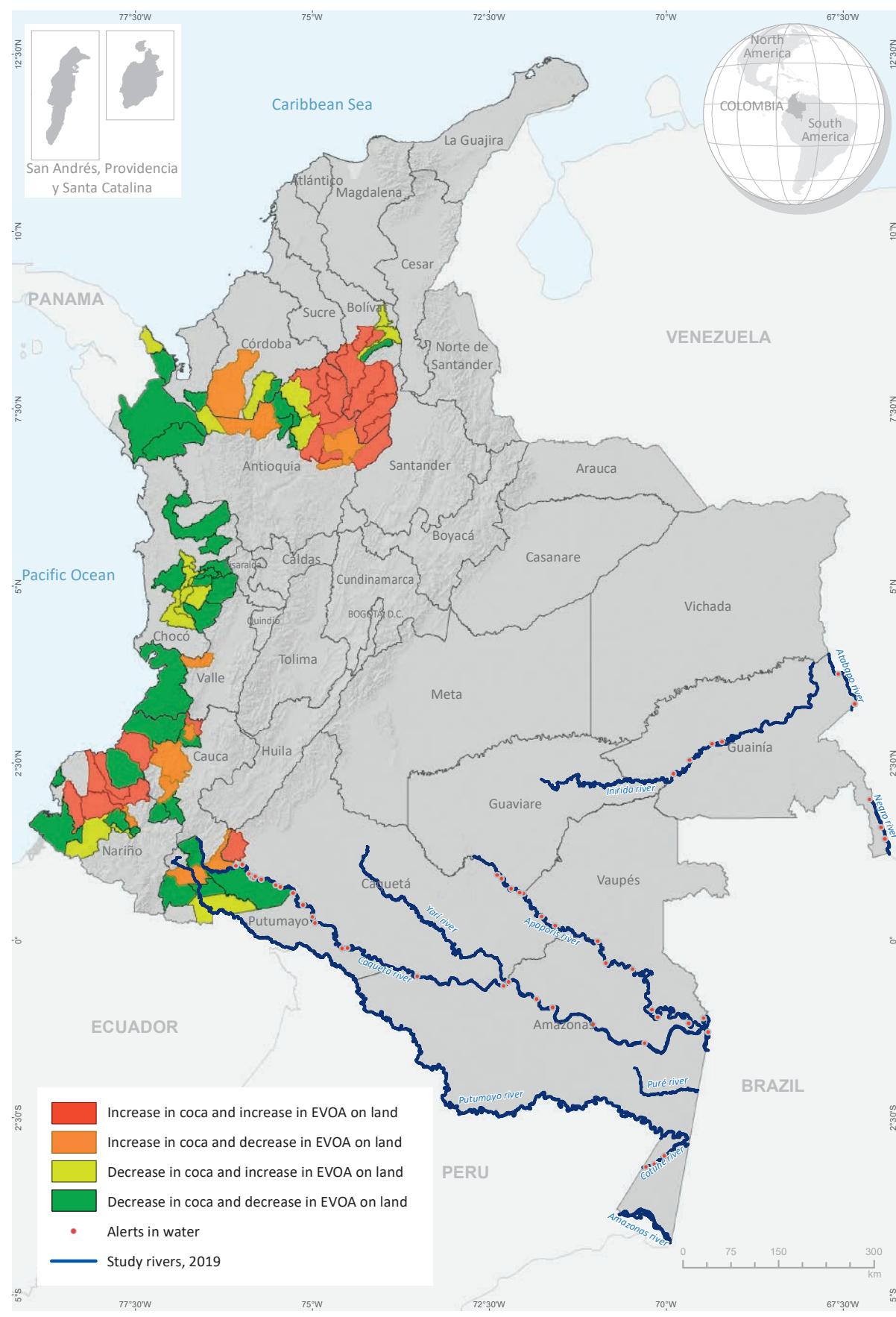
zone of Nariño the same dynamics is observed in the municipalities of El Charco, Magüí Payán, Roberto Payán and Santa Bárbara with growth of EVOA and coca, but the percentage of the national total of coca (6%) in this case is higher than EVOA (1%).

On the other hand, with respect to the classification of the law arrangements, it can be seen that the defined zone of growth of both phenomena in Antioquia contrasts with the municipalities with EVOA with technical and / or environmental permissions; that is, there is growth in both phenomena. Only in Yondó (Antioquia) and in Cantagalito and San Pablo (Bolívar), besides showing an increase in both

phenomena, 100% of EVOA is either titled or has the respective environmental permission. On the other hand, in Nariño, in the territories where both phenomena are growing, the EVOA

does not have any technical and/ or environmental permission for the activity, that is to say, in these territories both phenomena of illegality are being consolidated.

Map 14. Dynamics of the municipalities with presence of coca crops in 2018 and EVOA in 2019



Source: Government of Colombia Monitoring system supported by UNODC.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

From the results presented, it can be inferred that the municipalities with a tendency to increase the two activities are highly complex scenarios, where isolated intervention strategies can result in failed efforts.

When analyzing data on territorial intervention such as voluntary and forced eradication for illicit crops and data on operational control against illicit exploitation, at least one modality of intervention is evident in 88% of the municipalities with both phenomena; that is, efforts are only being made to control one of these phenomena. In 10% of these territories, the three modalities of intervention were presented (municipalities of Cáceres, Zaragoza, Valdivia, Tarazá, El Bagre and Nechí in Antioquia, and López de Micay in Cauca). These municipalities concentrate 14% of the coca crops as of 2018 and 37% of EVOA as of 2019. Finally, in 2% of the territory where both phenomena are present, no control activities were carried out.

In these areas, it is recommended to design action plans articulated between the different institutions working on interdiction such as the Armed Forces and the Police; on monitoring and control by the mining authority; other

policy making institutions such as the Ministry of Justice and Law (MinJusticia) and, of course, with institutions that strengthen the social fabric of the area to reduce the vulnerability of the communities, which can easily migrate from one activity to another, depending on the market conditions and the territorial control that the Government exercises.

On the other hand, with respect to the EVOA water alerts in these territories detected in 2019, for the provinces of Putumayo and Caquetá there was a coincidence according to 25 km² grids on the Caquetá river, in the municipalities of Puerto Guzmán and Puerto Leguízamo. For the historical series of illicit crops 2001-2018 and the sediment alerts in water since 2016, a coincidence can be identified for these two activities in the municipalities and/or non-municipalized areas of El Encanto, La Chorrera, La Pedrera, La Victoria, Mirití-Paraná, Puerto Alegría, Puerto Santander, in Amazonas; Valparaíso, Solano, Curillo and Solita in the province of Caquetá; Inírida and Morichal in Guainía; Miraflores in Guaviare; Puerto Guzmán and Puerto Leguízamo in Putumayo, and Pacoa and Taraira in Vaupés.

SECTION III

DYNAMICS OF THE PHENOMENON

Photograph:
Alluvial gold exploitation on land, Itsmina (Chocó)



This section addresses the results of the EVOA dynamics, its relationship with environmental value coverage and the official gold production.

DYNAMICS OF THE PHENOMENON

This chapter presents the changes detected in the period 2018-2019 in the territories, after comparing the detection of EVOA in both years and in relation to the key concepts to understand this behavior (see box). Between 2018 and 2019 the study indicates that there is an affected area by EVOA on land of 108,883 ha. As in the period 2017-2018, 76% of the affected national territory is concentrated in Antioquia and Chocó, with 41% and 35% respectively, which in turn represents a 3-point increase in Antioquia and 3-point decrease in Chocó.

The affected territory is made up of stable areas, new areas, expanding areas and areas with signs of grasses and herbaceous vegetation⁵⁸ (table 16). In this context, 75% of the affected territory is represented by stable areas between 2018 and 2019; of this, 78% is concentrated in the provinces of Antioquia and Chocó, with equal percentage participation. However, it should be noted that 91% of EVOA in Chocó belongs to this category, and in Cauca, Valle del Cauca and Putumayo the stable areas contribute more than 80% of the consolidated area of the province. This phenomenon of stability can be interpreted from two approaches: 1) the richness of the alluvium that is being extracted is of such magnitude that the activity is maintained, or 2) they are already abandoned areas, but due to their degree of alteration it has not been possible to begin the process of environmental recovery with pioneer species typical of secondary vegetation; in this last case, anthropic intervention is required to facilitate the beginning of these processes.

As for new or expanding areas, it was detected that 15% of the national consolidated

Concepts:

Affected territory 2018-2019: geographic sum of EVOA detection on land in these years.

Stable area: area with permanent ground EVOA, detected in the 2018 and 2019 surveys.

New area: Area with EVOA on land detected in 2019, but not found in 2018.

Expanding area: Area with EVOA on the ground detected in 2019 that has new area of exploitation and continuity with EVOA detected earlier.

Area with indications of grasses and grasslands: areas with EVOA detected in 2018, but which in 2019 are found with herbaceous vegetation or low stubble, characteristic of early stages of plant succession.

No information: areas with EVOA detected in 2018, but which are under cloud cover in the study period.

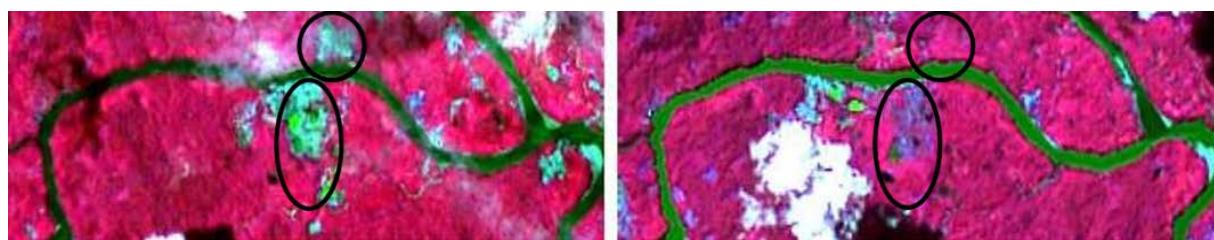
is part of this category. Antioquia concentrates close to 50% of these areas; Chocó and Bolívar concentrate 35% between them and, on the other hand, in Caquetá 34% of the detection is focused on these areas, being the province where this dynamic is more present, followed by Bolívar, Córdoba and Nariño, each one with percentages higher than 22%. The risk-focused analysis of this dynamic will allow for the institutions with jurisdiction to identify the control and prevention measures to be implemented in the territories most vulnerable to expansion. The dimension of this dynamic will be deepened in a later chapter.

⁵⁸ The herbaceous category indicates that there is a spectral response related to incipient vegetation of plant succession; however, this does not imply that the succession process continues until maturity, so this category should be interpreted with caution.

On the other hand, 10% of EVOA on land detected in 2018 shows signs of grasses and herbaceous plants, a characteristic stage of the initial stages of plant succession. 42% are concentrated in Antioquia and 30% in Chocó, indicating high activity in the search for new exploitation sites. However, it should be taken into account that, in these stages, the requirement of germplasm or genetic material to initiate succession is less demanding in terms of diversity and species richness with respect

to the higher stages of plant succession; in this sense, the successful completion of a succession process will depend, among other factors, on the quantity, viability and diversity of the germplasm as well as the physical and chemical conditions of the soil [33]. Therefore, it is not possible to ensure that the areas under this category will progress towards a recovery of the original conditions of the forest cover (Figure 38).

Figure 38. EVOA on land dynamics, Landsat image 8 RGB 547



Note. Left: in black circles EVOA, April 2014; right: in black circles areas with low grass and stubble, January 2017.

The provinces of Putumayo and Valle del Cauca are the ones that concentrate the most this dynamic within their territories, with

percentages of 66% and 62% respectively, with respect to the affected area in the period 2018-2019 (see Table 16).

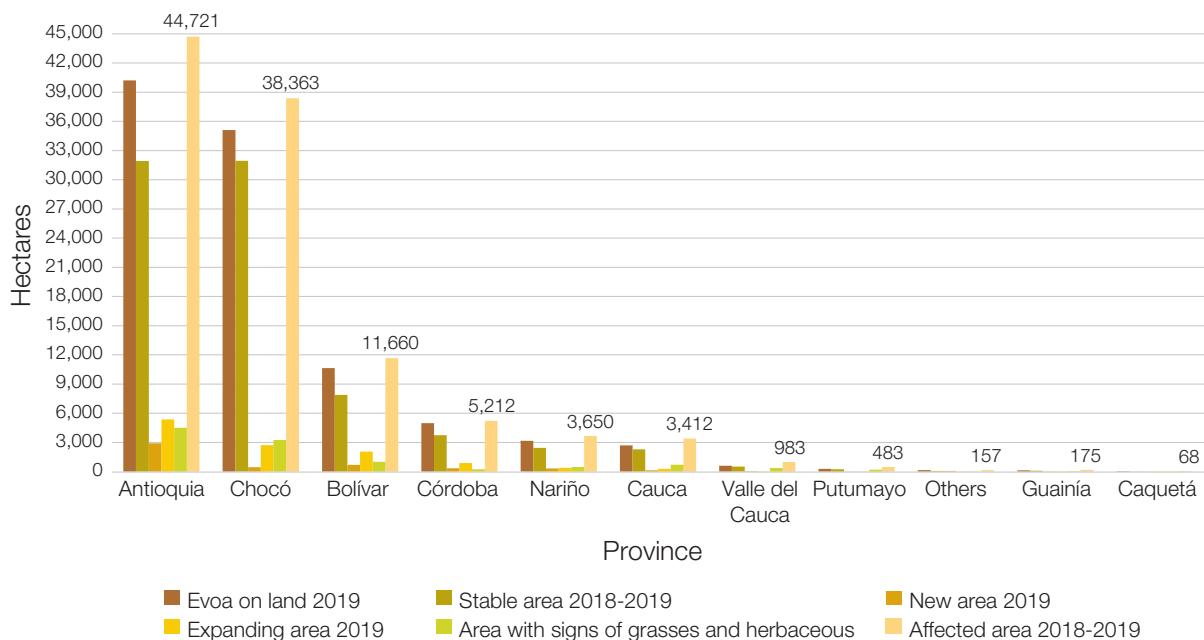
Table 16. Affected territory (ha) by EVOA on land, 2018-2019

Province	EVOA on land 2019 (ha)	Stable area 2018-2019	New area 2019	Expanding area 2019	Area with signs of grasses and herbaceous	Affected area 2018-2019	Total affected area 2018-2019 (%)
Antioquia	40,201	31,927	2,901	5,374	4,520	44,721	41
Chocó	35,105	31,936	460	2,710	3,258	38,363	35
Bolívar	10,642	7,894	686	2,062	1,019	11,660	11
Córdoba	4,976	3,747	354	875	235	5,212	5
Nariño	3,171	2,443	334	394	479	3,650	3
Cauca	2,697	2,289	127	281	715	3,412	3
Valle del Cauca	608	514	56	38	375	983	1
Putumayo	291	245	9	37	192	483	<1
Others	149	62	78	7	8	157	<1
Guainía	135	99	29	7	40	175	<1
Caquetá	53	35	8	10	15	68	<1
Total	98,028	81,191	5,042	11,795	10,855	108,883	100

Figure 39 illustrates the provincial distribution around the territory with EVOA 2018-2019

and map 15 illustrates the dynamics of the phenomenon for the same period.

Figure 39. Affected area by EVOA on land, 2018-2019



It is noteworthy that, during recent field surveys, it was observed that the removal of material to reach the alluvial deposit stopped being superficial to give way to deeper excavations and reach older alluvial deposits, which correlates with stability dynamics in the EVOA area (Figure 40). This factor becomes very important in the risk assessment for nearby populations and properties, because the magnitude of the excavations alters dramatically the retaining

walls of the riverbeds, destabilizing the natural means of control in periods of heavy rain. This dimension of the activity will be evaluated in the next study.

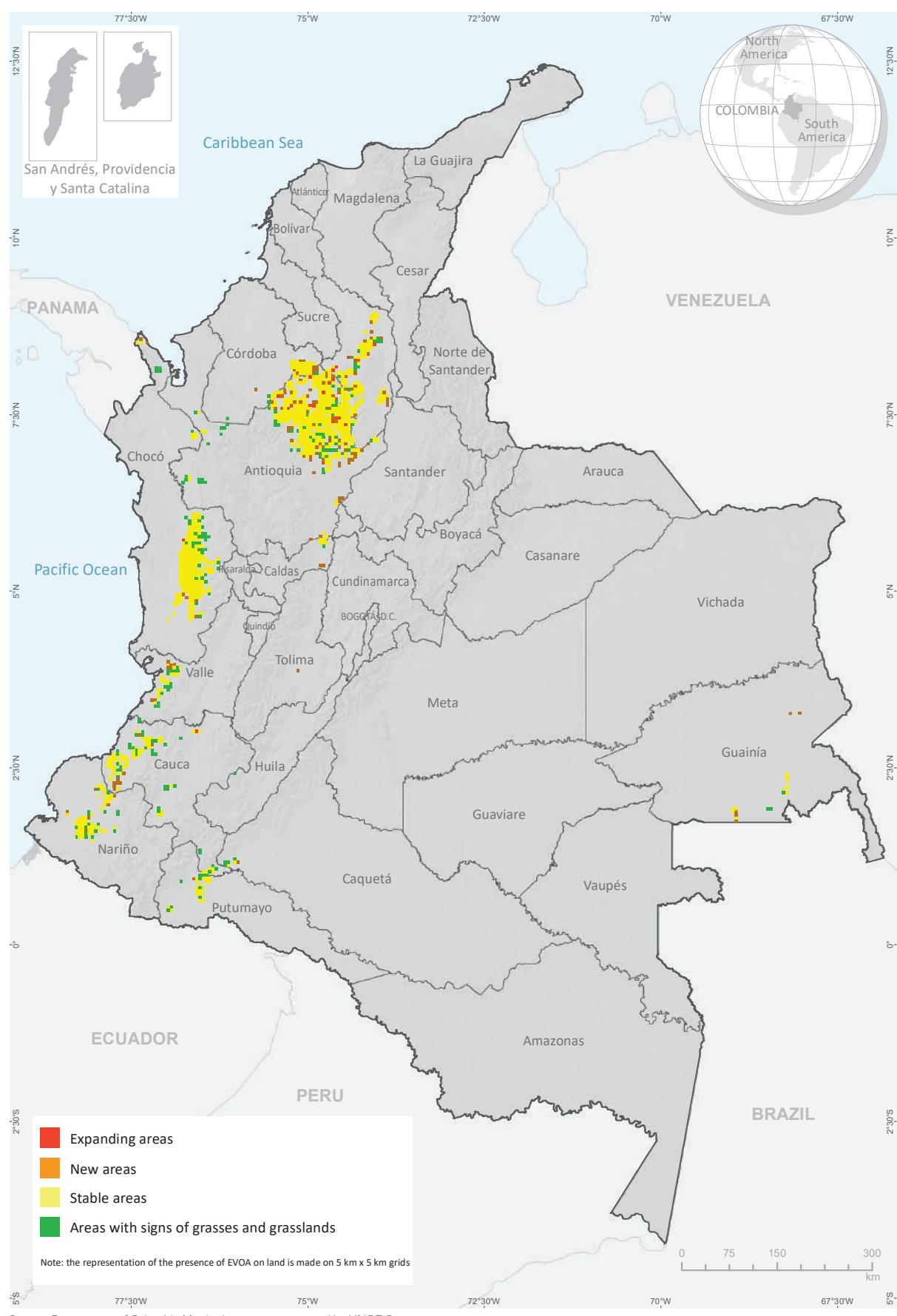
According to studies, the territory affected by EVOA on land between 2014 and 2019 is 145,484 ha.

Figure 40. Aerial reconnaissance photographs showing the depth of exploitation



Note: a) deep excavation at a short distance from the riverbed wall; b) surface excavation.

Map 15. Affected territory by EVOA, 2018-2019



Source: Government of Colombia Monitoring system supported by UNODC.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Expansion and creeping of the EVOA phenomenon in the period 2014-2019

The expansion and creeping analyses seek to identify new territories, the routes along which the phenomenon moves and the possible areas of expansion. The initiative of this type of analysis is directed to the construction of risk models that facilitate early interventions, prevention and regularization that, as a result, reduce the environmental, legal and mining resources in the country.

In 2016, the UNODC monitoring platform presented an exploratory analysis of EVOA expansion based on geographic information of the polygons identified in the satellite images, as well as EVOA and vectors with direction and magnitude of the growth of each one of them. However, there were limitations associated with the dynamics of the phenomenon itself, since when areas with greater presence of EVOA were detected in circumstances of growth in more than one direction, the model only determined the longest vector of such growth.

By 2020 the monitoring platform has performed four EVOA measurements that allow to address a new approach and build a more objective model of the phenomenon's creeping analysis, using 2014-2019 series space-time patterns. This model has two advantages over the previous one: first, it uses the 1 km² grid area framework as the unit of standard analysis, a necessary condition to

share the data with government institutions and researchers, and to offer a technical tool to improve the knowledge of the dynamics of this activity in the territories. In this way, it is expected to contribute to the targeting of intervention, control and prevention strategies. Secondly, it allows for replication and inclusion of new data, thus ensuring comparability and updating for new measurements.

The area framework integrates all the information of the monitoring system both for illicit crops and for EVOA and other information sources, and the use of a standard unit facilitates the spatial-temporal analyses of different activities; for this case, only EVOA data from the 2014-2019 period were used. The processes to obtain a space-time line from the grid are:

1. Determine the universe of study (all the grids that have presented EVOA at some point in the 2014-2019 series).
2. Perform the cluster analysis for each year.
3. Create the space-time cube from defined locations (1 km² grid).
4. Perform the emerging hot spot analysis of the time series⁵⁹.

EVOA Cluster Analysis

An optimized hot spot analysis⁶⁰ was performed for each year (see Figure 41):

⁵⁹ The Gi* statistic returned for each entity is a z-score. For positive z-scores that are statistically significant, the larger the z-score, the more intense the cluster of high values (hot spot). For negative z-scores that are statistically significant, the smaller the z-score, the more intense the cluster of low values (cold spot) (<https://pro.arcgis.com/es/pro-app/tool-reference/spatial-statistics/optimized-hot-spot-analysis.htm>).

⁶⁰ Creates a map of statistically significant hot and cold spots by using Getis-Ord's Gi* statistics. Evaluates the characteristics of the input entity class to produce optimal results (<https://pro.arcgis.com/es/pro-app/tool-reference/spatial-statistics/optimized-hot-spot-analysis.htm>).

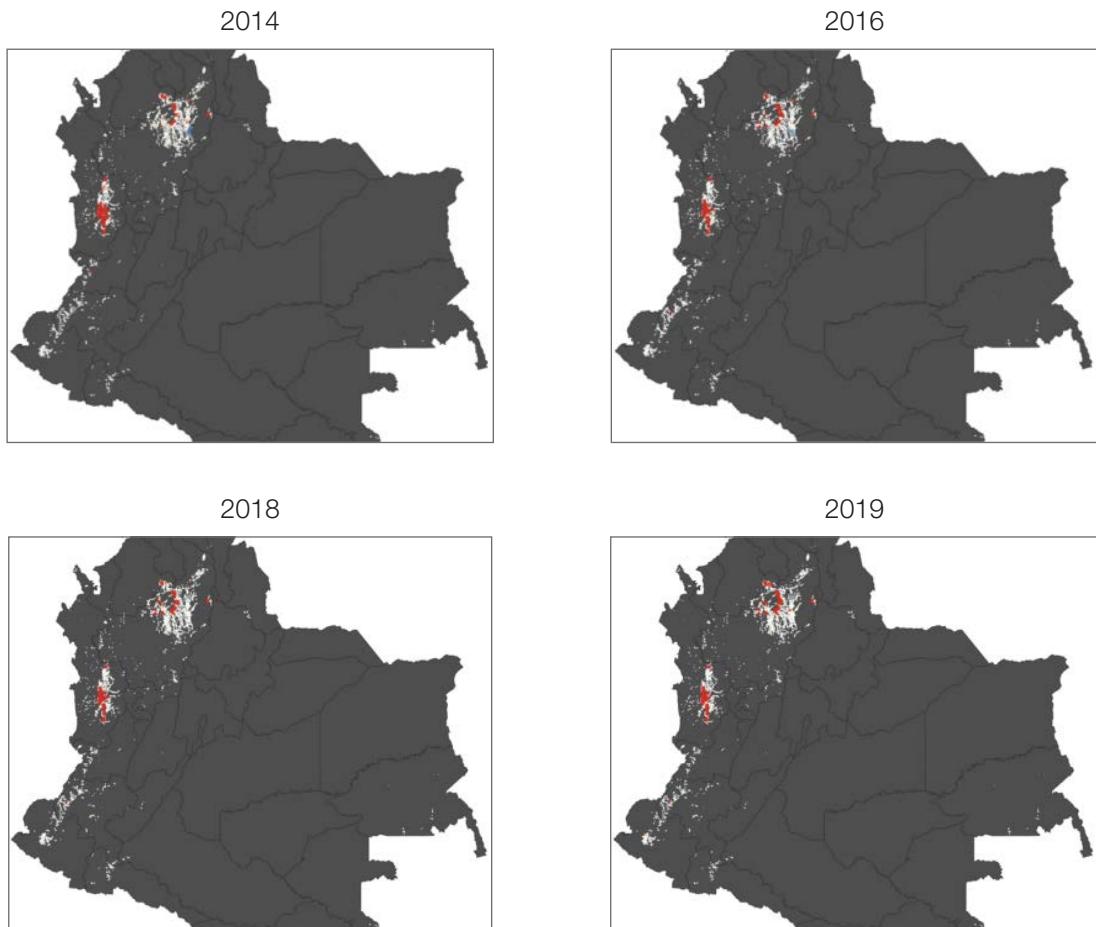
Figure 41. Example of hot spot analysis on 1 km² grids



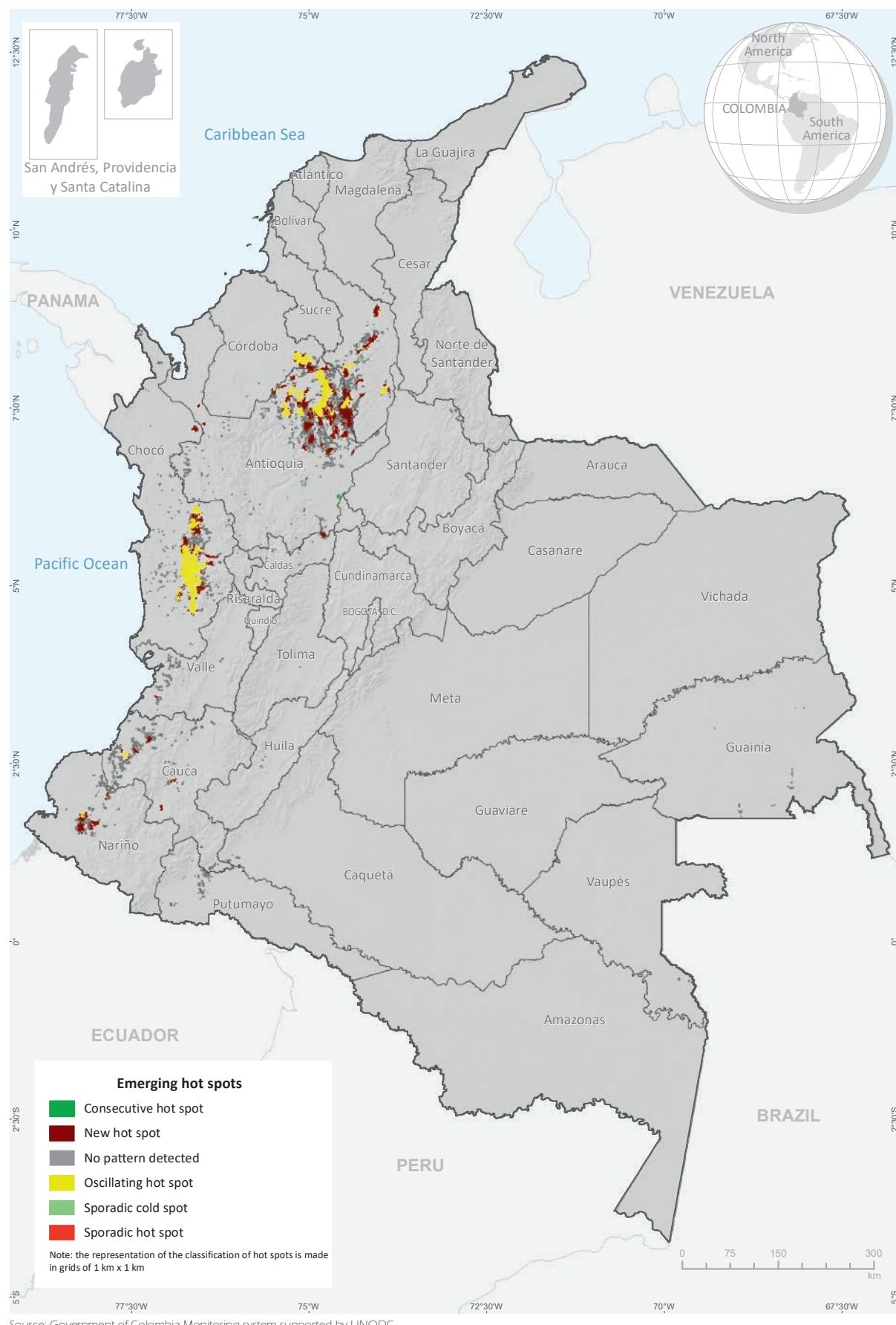
The cluster data analyzed independently present a homogeneous behavior (figure 42), with EVOA presence in the provinces of Antioquia, Bolívar and Chocó, concentrating in the same areas each year (in red colors), a result attributable to the stability of EVOA and directly comparable with the density map (see

map 16). The cluster analysis besides showing the places with high values also shows the territories with EVOA presence that form a cluster with low values (blue colors), which could be interpreted as areas where the activity is present in an incipient way.

Figure 42. Clusters analysis per year



Map 16. Emerging EVOA hot spots, 2014-2019



Space-time cube from 1 km² grids

In this procedure, data from the area frame panel is used where the attributes change over time (EVOA of each year), but the location of the grid does not. The result is a file with a space-time structure that can be interpreted as a three-dimensional cube, composed of space-time boxes where the x and y dimensions represent the space and the t dimension the time⁶¹.

The analysis of emerging hot spots allows identifying the cluster in each grid and uses three variables: amount of EVOA, location and time, so it gives 17 different classes when combining the variables; for the case of EVOA,

6 of the 17 possible classes in the 2014-2019 series were found (table 17). Unlike the previous study, besides defining zones with high and low concentration, this analysis evaluates whether this behavior has been maintained or not over time; for example, the new hot spots are zones in the territory where the phenomenon did not occur in previous years but that for the last measurement show a concentration of EVOA, and also evidence the new territories with EVOA presence. On the other hand, a sporadic cold spot shows the zones where the phenomenon appears and disappears in the series and that in addition have never had great values of EVOA, which can be interpreted as zones in which the mineral is searched and has not yet been successfully exploited.

Table 17. Classification of territories with EVOA according to emerging hot spots, 2014-2019

Pattern's name	Definition
No pattern detected	It is not included in any of the hot or cold spot patterns.
New hot spot	A location that is a statistically significant hot spot for the final period and never was.
Consecutive hot spot	A single run location with no interruption of statistically significant hot spot box in the final period intervals. The location was never a statistically significant hot spot before the last hot spot run and less than 90% of the boxes are statistically significant hot spots.
Sporadic hot spot	A location that becomes and ceases to be a hot spot again. Less than 90% of the period intervals have been statistically significant hot spots and none of the period intervals have been statistically significant cold spots.
Oscillating hot spot	A statistically significant hot spot for the final period interval that has a history of also being a statistically significant cold spot during a period. Less than 90% of the period intervals have been statistically significant hot spots.
Sporadic cold spot	A location that becomes and ceases to be a cold spot again. Less than 90% of the period intervals have been statistically significant cold spots and none of the period intervals have been statistically significant hot spots.

Source: <https://pro.arcgis.com/es/pro-app/tool-reference/space-time-pattern-mining/learnmoreemerging.htm>.

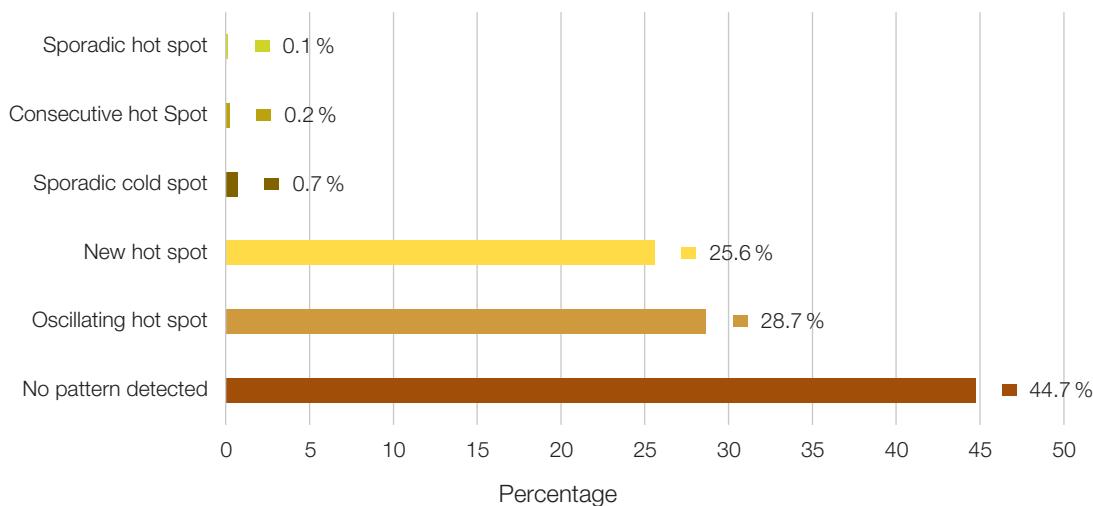
⁶¹ <https://pro.arcgis.com/es/pro-app/tool-reference/space-time-pattern-mining/createspacecubefromdefinedlocations.htm>.

Major Findings

In the national consolidated chart, 45% of the data still do not have a defined pattern in the time series; this result is due to the fact that four measurements are a short series to detect patterns in all data. However, the advantage of

the proposed model lies in its structure of defined locations; that is, for each new measurement, the model is capable of recalculating the new pattern, including another measurement either from previous years, from intermediate moments or in the future (Figure 43).

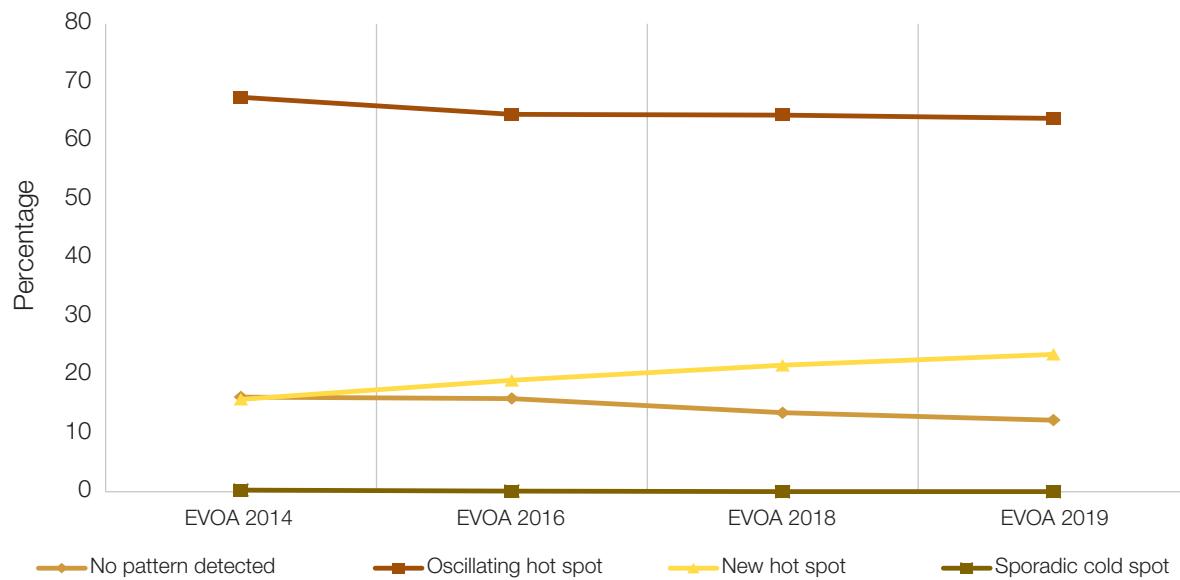
Figure 43. Participation percentage of emerging hot spot patterns, Colombia, 2014-2019



On the other hand, in 55% of the classified grids, two classes stand out: the first one of oscillating hot spots (29%), that is to say, areas that by 2019 are considered to have a high concentration of EVOA, but that in previous periods were considered cold spots, and the second one of new hot spots (26%), expanding areas that in 2019 present a high concentration of EVOA, but that before in the series never

had. Although the series of oscillating hot spots maintains the highest EVOA values, a percentage change between each year can be seen on average of +6%, unlike the series of new hot spots where the percentage change is on average +22% (figure 44). By 2019, 87% of the EVOA data, about 85,600 ha., can be identified in the territories marked by these two classes.

Figure 44. Percentage of EVOA participation according to emerging hot spot classification, 2014-2019



In the provincial context, Antioquia and Bolívar are characterized by having the largest number of grids catalogued as new hot spots; that is, where the phenomenon has expanded the most. On the other hand, Chocó, Antioquia and Córdoba present the largest amount of territories defined as oscillating hot spots, where the phenomenon presented its highest intensity during the period 2014-2019, but currently does not represent an important agglomeration of EVOA.

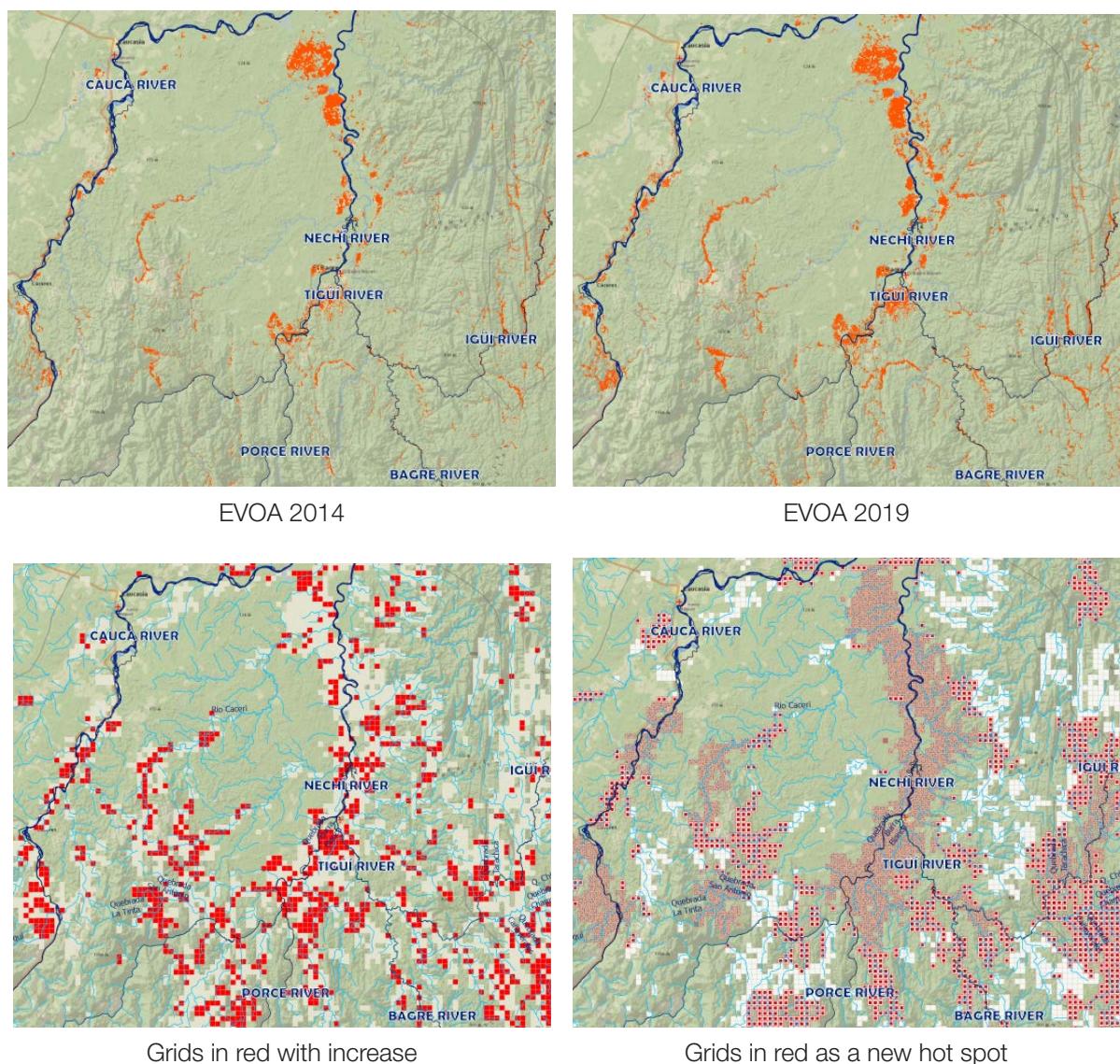
The time series and emerging hot spots analysis, besides presenting a national context, characterized in detail by the analyses that preceded this chapter, allows detecting local behaviors hidden in the national generalities. For example, the provinces of Bolívar and Nariño, despite not being the ones that record the most detected hot spots are those with the newest hot spots, i.e., territories with the greatest expansion of the phenomenon. On the other hand, data at a municipal level presents 14 municipalities where more than half of the territory identified with EVOA was classified as expanding the phenomenon; in these areas it is recommended to increase

control and regularization actions of the mining activity in order to avoid their consolidation as consecutive hot spots, where institutional action will be much more complex.

Finally, in order to define expanding territories, a trend analysis was carried out using a linear function that is adjusted with an R^2 of 0.7; that is, the grids that have an increasing trend (positive slope) and with an adjustment of the function of 70% certainty are analyzed.

For the 2014-2019 series, 2,694 grids show a positive slope with an increase each year. In the last measurement these territories accumulated 40% EVOA. In the province of Antioquia, it is concentrated in the territories of the Cauca, Nechí, Porce, Bagre and Tigüí rivers (Figure 45); it can be seen that exploitation began in the main rivers mentioned and the analysis of emergent points shows that at present the phenomenon rises through all its tributaries by the streams La Tinta, San Antonio, San Bartolo, Burra Blanca, Champán, Tarachicá, Chicamoque and Cañaverales and by the rivers Cacerí and Puquí. In the Urabá area, the Sucio river presents a similar dynamic.

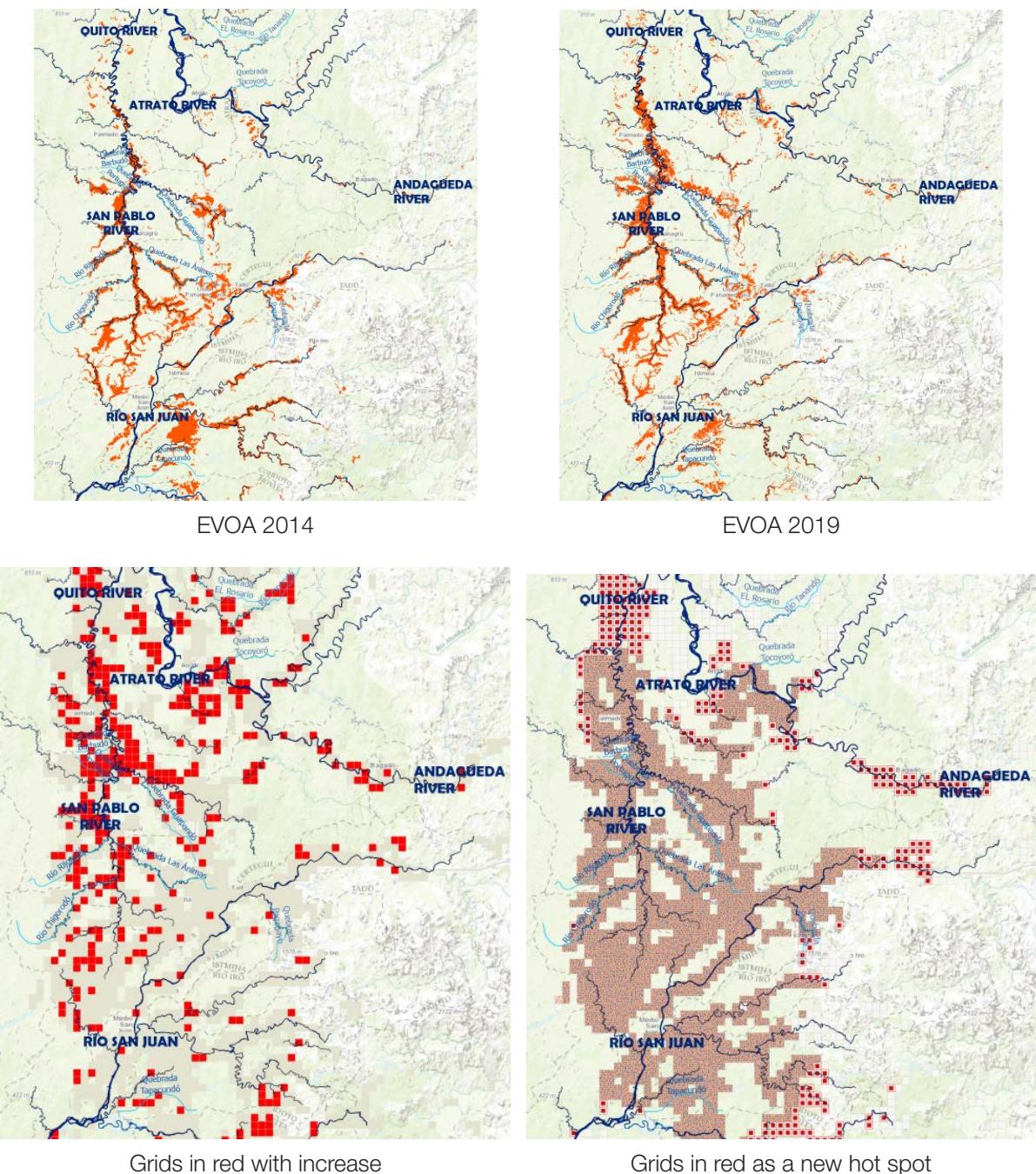
Figure 45. Visualization of the expansion of the phenomenon in Antioquia, 2014-2019



In the province of Chocó along the Quíto, Atrato, and San Juan rivers and all their tributaries, the same situation exists (Cacerí and Puquí rivers; La Tinta, San Antonio, San

Bartolo, Burra Blanca, Champán, Tarachicá, Chicamoque, and Cañaverales streams) (Figure 46).

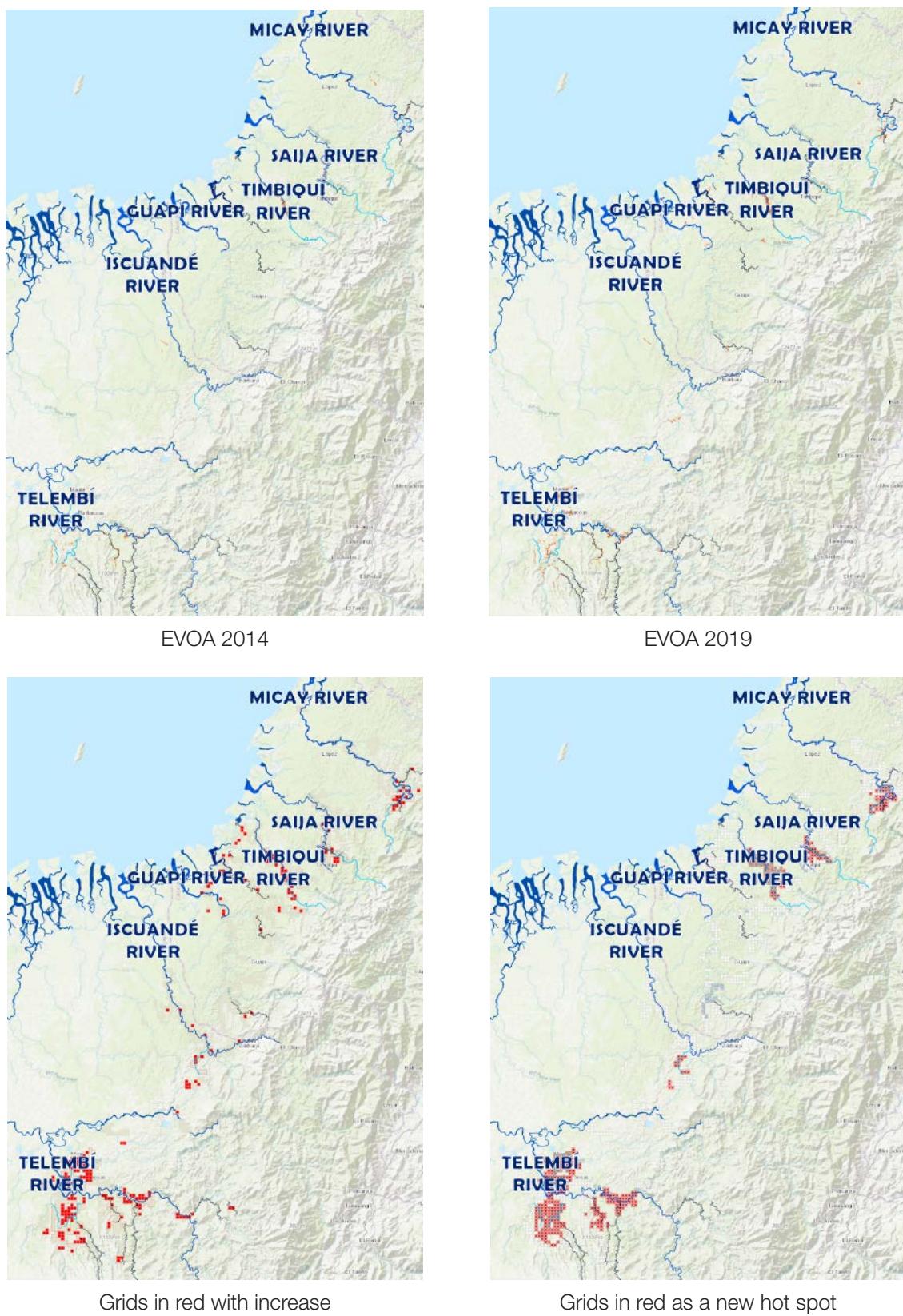
Figure 46. Visualization of the expansion of the phenomenon in Chocó, 2014-2019



In the provinces of Nariño and Cauca the EVOA phenomenon in magnitude is much lower than in Antioquia and Chocó. The main rivers were identified: Saija, Micay (Brazo Noanamito), Timbiquí, Guapi, Iscuandé and Telembí, and

only a few tributaries: Guapipí, Mina Nueva, Cortés, Santa Gertrudis, Pascualito, Inguambí and Mariana streams, and the Güelmambí, Joli, Yatín, Sesey Timbiquí rivers (Figure 47).

Figure 47. Visualization of the expansion of the phenomenon in Cauca and Nariño, 2014-2019



In the national consolidated chart, there are 129 double drains that present a similar situation as per the examples presented.

LOSS OF HIGH ENVIRONMENTAL VALUE PLANT COVER 2018-2019

The exploitation of alluvial gold with the use of land machinery is an activity that involves the removal of large extensions of land; therefore, one of the main environmental impacts it generates is the loss of vegetation cover [34]. In this sense, mineral exploitation has been identified as one of the main direct causes of deforestation in Colombia.

Notwithstanding the above, this chapter addresses a different approach to deforestation; although the literature and other studies have focused mostly on the loss of forest cover⁶² due to the effects of mineral exploitation, it has served as a reference to document this publication in accordance with the scope oriented towards vegetation cover of high environmental value, according to the categories defined by UNODC/SIMCI [1].

Categorization of high environmental value coverages

Through the application of remote sensing techniques for the identification and delimitation of land cover and a subsequent multi-temporal analysis with GIS tools, the changes due to the effect of the loss of vegetal cover of high environmental value derived from the appearance of areas with EVOA on land during the

period 2018-2019⁶³ were quantified; the geographical interaction of these changes with diverse units of spatial analysis that compose this document was also identified.

The methodology proposed by UNODC for this analysis considers four categories of land cover of high environmental value, which differ from other classification systems⁶⁴, according to two concepts: 1) level of intervention of the original cover (that this cover has not been removed previously or to the three states of vegetal succession after a removal), and 2) detectability by remote sensing, given the diverse spectral behavior of the covers according to the vigor of the vegetation and its degree of homogeneity/heterogeneity in the size and width of the crown of the individuals, behavior that is possible to identify with analysis of traceability and of its pictorial-morphological characteristics. The four categories of vegetation cover of high environmental value contemplated in this study are listed below, which are detailed and conceptually supported in Annex 2:

- Primary Vegetation
- Secondary Vegetation
- High stubble
- Short stubble

⁶² Land occupied mainly by trees that may contain shrubs, palms, guaduas, herbs and lianas, in which tree cover predominates with a minimum canopy density of 30%, a minimum canopy height (*in situ*) of 5 m at the time of identification, and a minimum area of 1.0 ha. Excluded are commercial forest plantations (coniferous or broadleaf), commercial palm plantations, trees planted for agricultural production and trees in urban parks [60].

⁶³ Emergence of EVOA on land: new and expanding areas (see section III, chapter "Dynamics of the phenomenon" in this document).

⁶⁴ In some cases, the coverage categories proposed in this document may have conceptual similarity with other classification systems.

Major Findings

In the period 2018-2019, Colombia lost 6,669 ha. of high environmental value coverage as a result of the appearance of EVOA on land, equivalent to 7% of the total national detection.

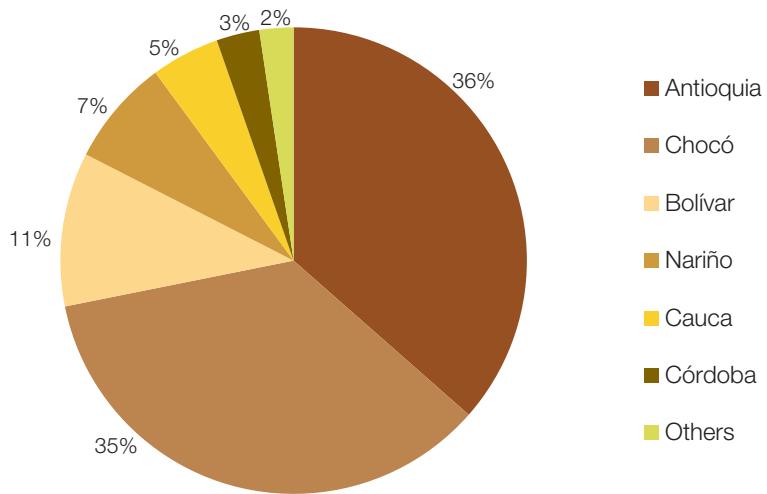
93% percent of this loss (6,192 hectares) was in the two types of cover with the presence of trees (primary and secondary vegetation) that provide most of the ecosystem services indicated; the remaining 7% corresponds to the intervention of areas with early and intermediate stages of plant succession (high and low stubble).

Twelve provinces have this situation; however, 71% of the coverage of high environmental value that was lost by EVOA on land is in Chocó and Antioquia (Figure 48).

Chocó reported the loss of 2,244 ha. of primary vegetation, which means 95% of the coverage lost in the province and 52% of the total primary vegetation in the country.

In Antioquia, cover losses predominate in stages of plant succession (secondary vegetation, high stubble and low stubble); 1,465 ha. were detected in these categories (60% of the provincial losses and 63% of the total national cover with some stage of plant succession).

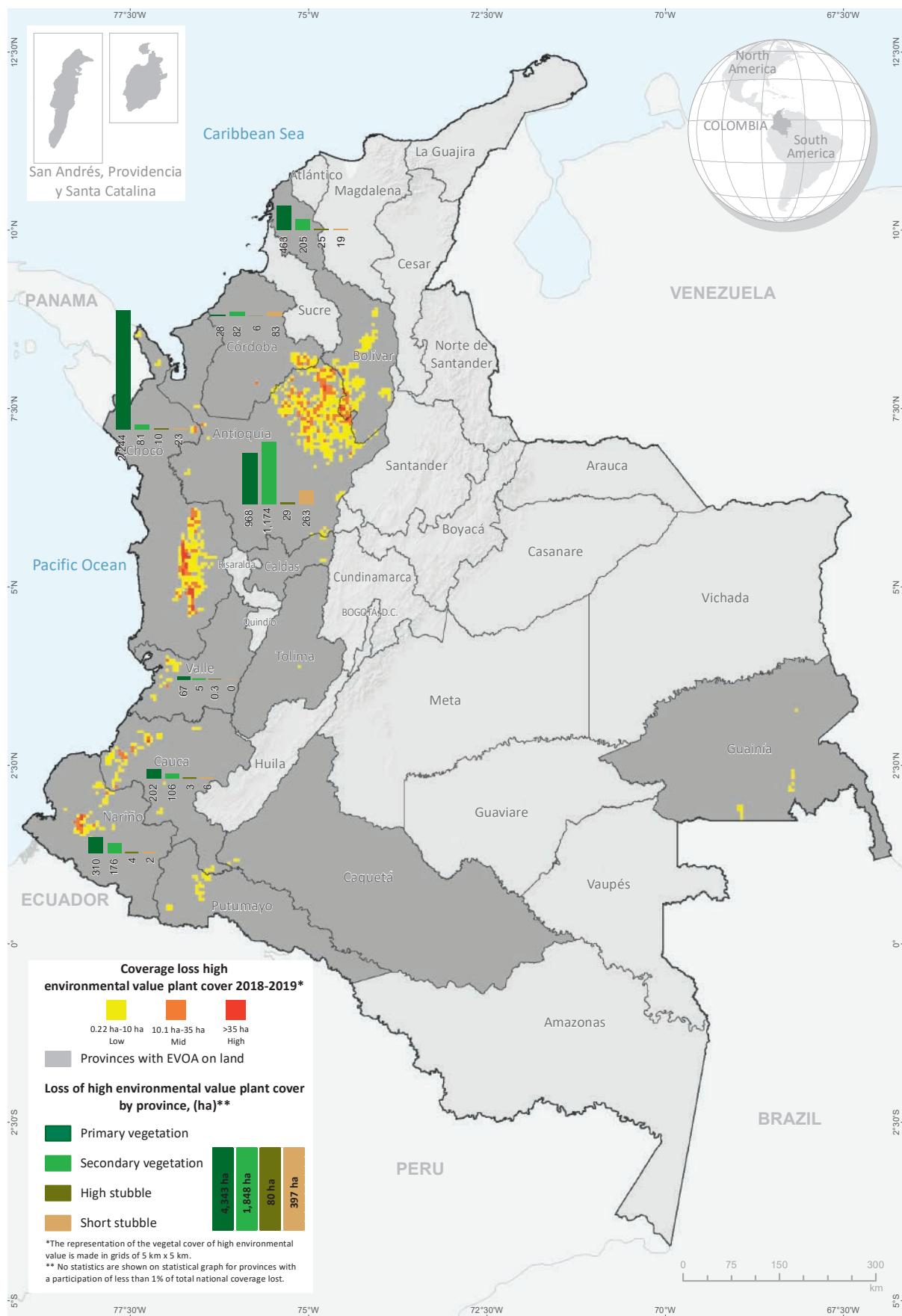
Figure 48. Loss of high environmental value plant cover by province, 2018-2019



Another 26% of the losses are concentrated in four provinces (Bolívar, Nariño, Cauca and Córdoba), where losses of primary vegetation predominate. The remaining 2% of the high environmental value coverages that were lost

are distributed in six provinces (Valle del Cauca, Guainía, Putumayo, Caldas, Caquetá and Tolima), in which losses of primary vegetation and areas in stages of plant succession have a similar behavior.

Map 17. Loss of high environmental value vegetal coverage by EVOA on land, 2018-2019



Source: Government of Colombia - Monitoring system supported by UNODC.
 The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

According to map 17, the loss of coverage of high environmental value considered at a high level⁶⁵ is in 12 municipalities of 5 provinces but is concentrated in Chocó. Only 4% of the total number of grids in which coverage losses were detected present the condition of high-level loss and concentrate 28% of the consolidated number of hectares reported of all the high environmental value coverage detected in areas with EVOA on land. Table 18 shows the municipalities with the highest level of loss of high environmental value coverage by EVOA on land per unit area.

68% of the losses in areas with illegal exploitation were concentrated in primary and secondary vegetation cover.

In areas with technical and environmental permissions for exploitation, 92% of the loss of high environmental value cover occurred on primary and secondary vegetation.

85% of cover losses in areas in transit to legalization coincide with requests for legalization.

Table 18. Municipalities with high level of loss of high environmental value coverage by EVOA on land, 2018-2019

Province	Municipality
Antioquia	Anorí
	El Bagre
	Segovia
Bolívar	Montecristo
Cauca	López de Micay
Chocó	El Cantón de San Pablo
	Istmina
	Medio Atrato
	Nóvita
	Río Quíto
Nariño	Barbacoas
	Magüí Payán

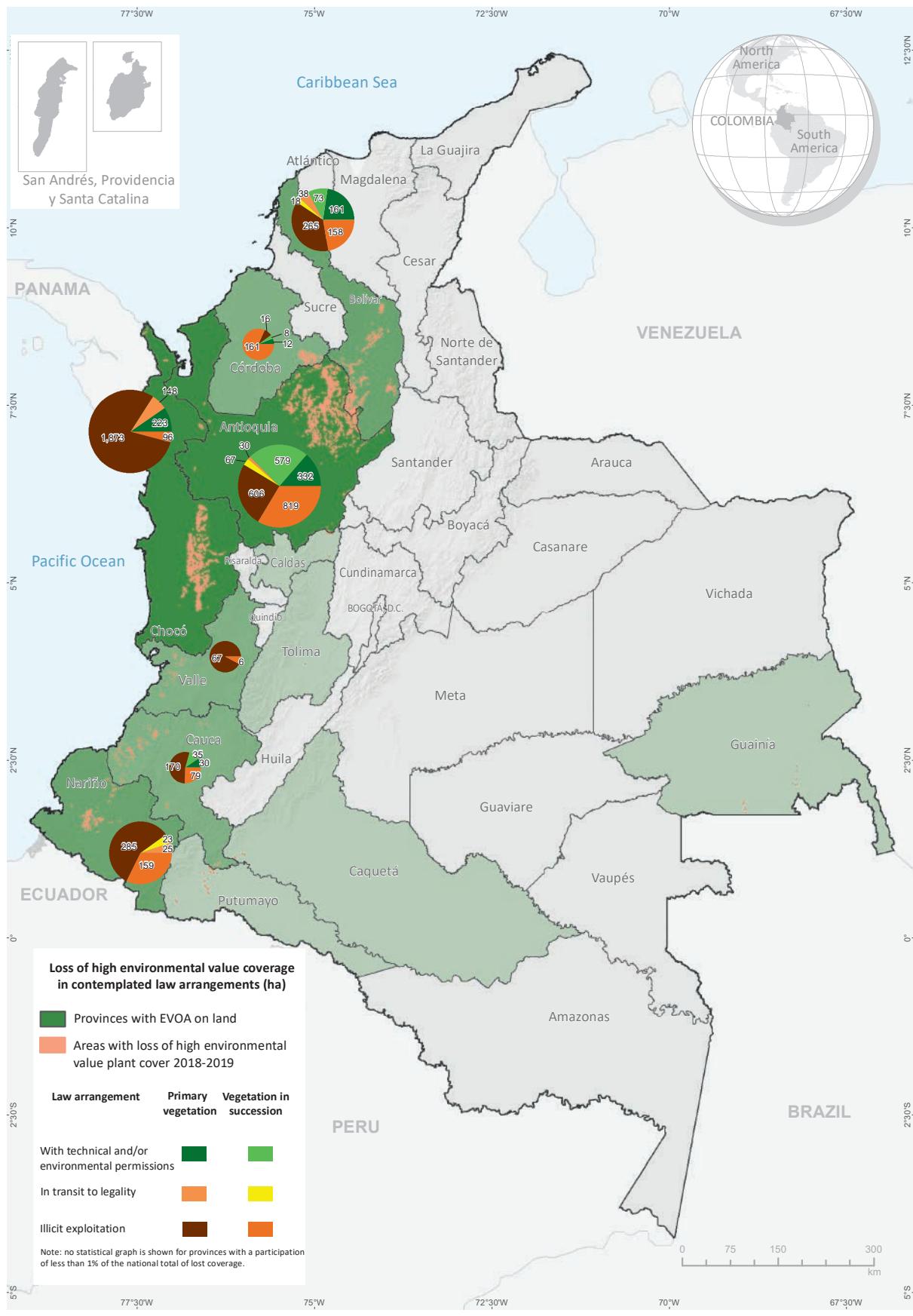
Findings according to the classification of the law arrangements contemplated

In terms of current law arrangements and their relation to the loss of vegetation cover of high environmental value due to EVOA on land, 73% of total losses (4,843 ha.) occur in

areas classified as illegally exploited; 22% correspond to losses in areas with technical and/or environmental permissions for exploitation (1,463 ha.), while the remaining 5% (363 ha.) refers to the loss of cover in places that are in transit to legality (Figure 49). Map 18 presents the location of losses by law arrangements.

⁶⁵ Most hectares are concentrated in 5 km * 5 km grids, according to three classes of natural cuts.

Map 18. Loss of high environmental value coverage in law arrangements contemplated, 2018-2019



Source: Government of Colombia Monitoring system supported by UNODC for law arrangements: Ministry of Mines and Energy.
The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

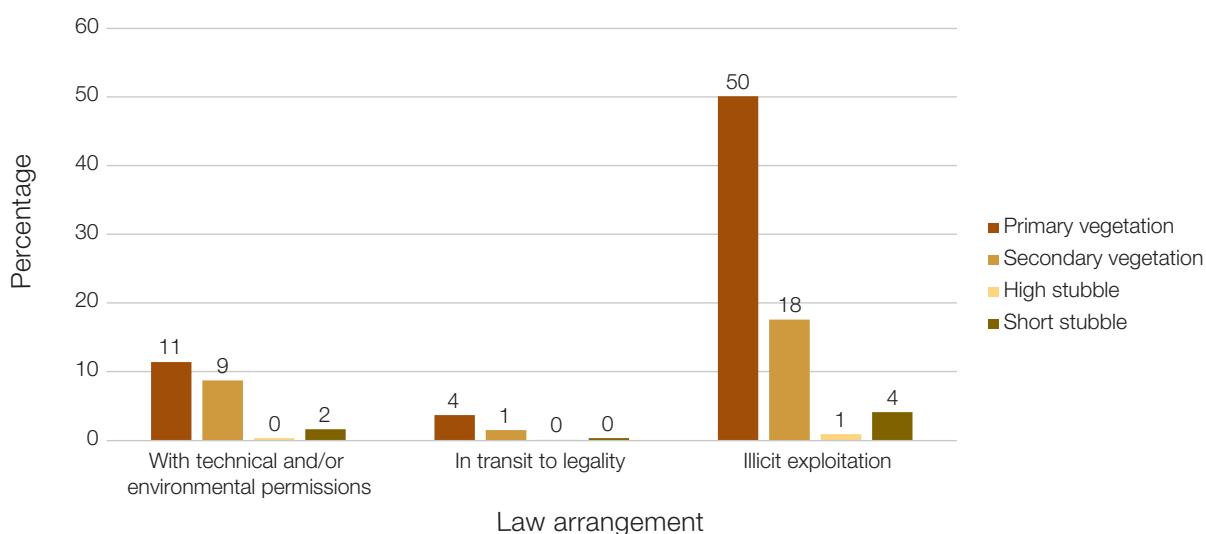
New and expanding EVOA on land areas tend to be located outside the legal framework and mainly remove continuous masses of tree vegetation, putting at risk the supply of the referred vital ecosystem services, typical of this type of vegetation. Consequently, it is necessary to review in detail what happens with the inspection in these areas, since irreversible environmental effects on the ecosystems found there are evident.

With respect to losses in areas with technical and/or environmental permissions, there are three possible analysis scenarios: 1) Non-compliance with the requirements in authorized activities would demand the corresponding

interventions of the entities in charge; 2) review of environmental compensation in case of authorized plant removals, or 3) disturbance of third parties in mining titled areas would require administrative protection action.

In the case of loss in areas that are in transit to legality, evidence of this situation could negatively impact future approvals for exploitation within the legal framework, since there is a prerogative of exploitation, but it is limited to the use of manual methods and there should not be major alterations in plant cover. It is necessary to determine if there are administrative protection actions in progress, in case of disturbances made by third parties in these areas.

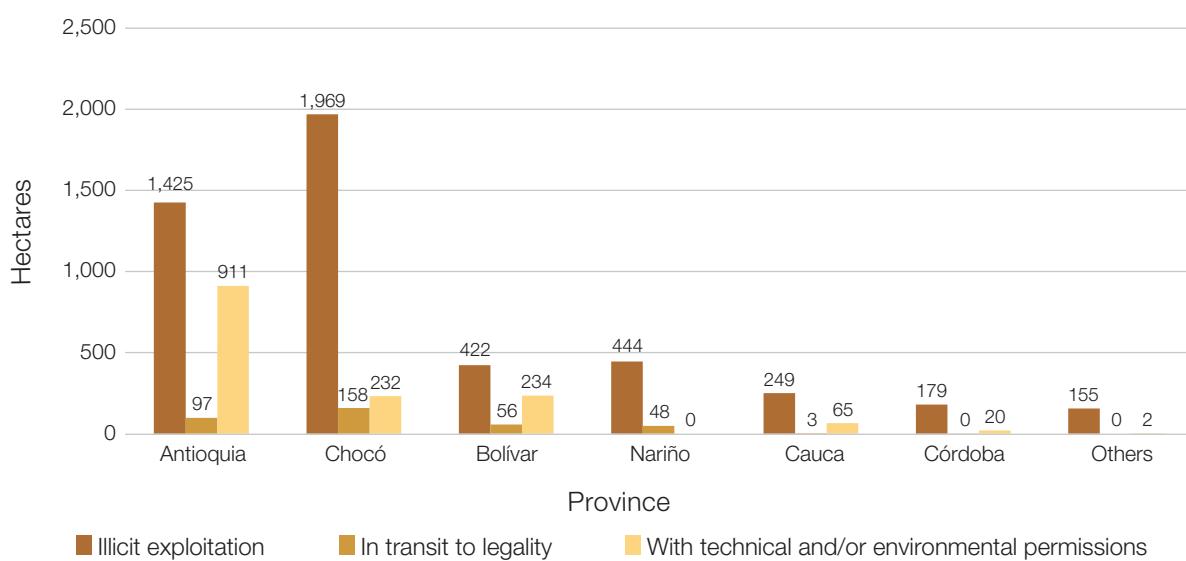
Figure 49. Loss of high environmental value coverage by EVOA on land according to the contemplated law arrangements, 2018-2019



In the twelve provinces with loss of high environmental value coverage by EVOA on land, illegal exploitation predominates, although in seven of them there are also losses in areas

with technical and/or environmental permissions for exploitation; only in six of them is this situation present in areas that are in transit to legality (Figure 50).

Figure 50. Provincial distribution of the loss of high environmental value coverage according to the contemplated law arrangements, 2018-2019



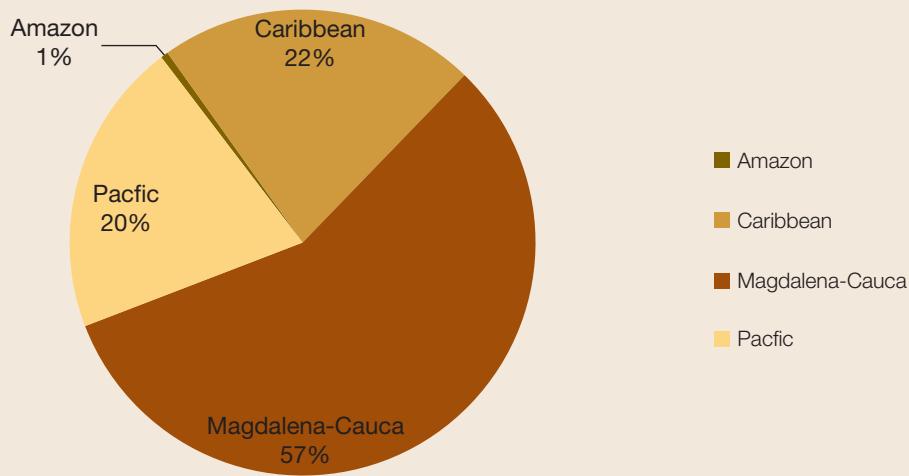
WATERSHEDS AS MANAGEMENT UNITS IN TERRITORIES WITH EVOA

In 2019 the presence of EVOA on land was evident in five Hydrographic Areas or macro basins, 18 Hydrographic Areas or basins and 66 Hydrographic Sub-Zones or sub-basins.

The macro-basin with the greatest presence of EVOA on land is the Magdalena-Cauca, a territory in which 57% of the total

area is concentrated, that is, 55,800 ha. It is followed by the Caribbean (22%) and Pacific (20%) macro-basins with areas of 21,647 ha. and 20,056 ha., respectively. The Amazon and Orinoco macro-basins represent 1% of the total figure with an area of 512 ha. and 12 ha., respectively (Figure 51). For more information see Annex 5.

Figure 51. EVOA on land in macro-basins 2019



EVOA AND GOLD PRODUCTION

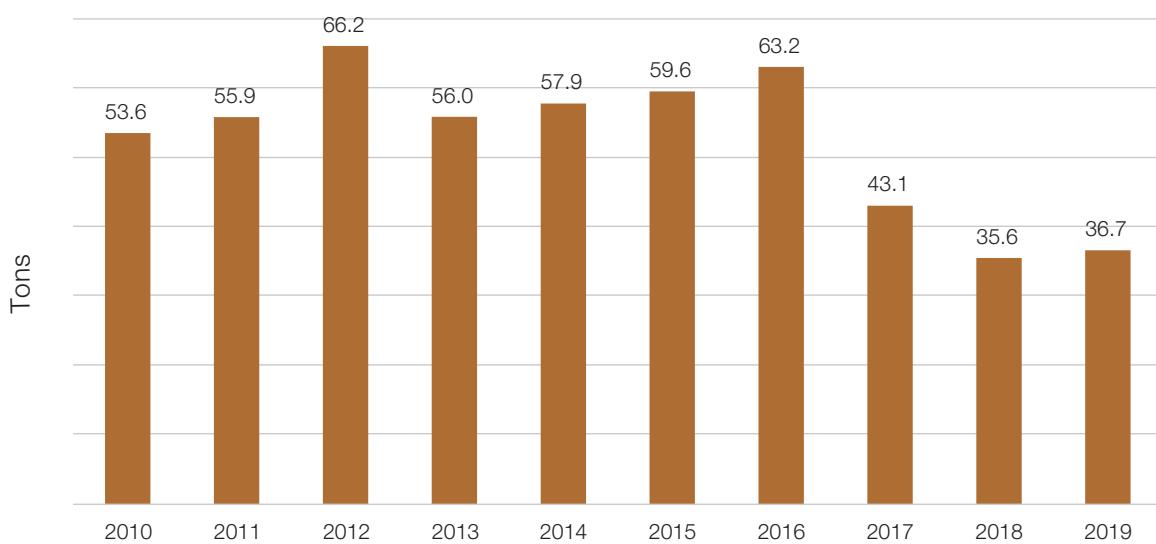
The National Mining Agency (ANM) is in charge of the official report of mineral production in the country, and it is obtained from the declaration of production made by the six types of miners authorized to exploit and the corresponding liquidation and royalty payments; in the case of precious metals, the production level, quantities of ore exploited, origin in relation to municipality and province, by type of exploiter, is determined. The figures presented below of the production variable are the official ones reported by the ANM; the 2019 data comes from the preliminary report of February 2020 elaborated by the mining authority.

The report of gold production by type of operator by municipality and province, crossed with the areas detected with EVOA in the category of illegal exploitation, allows us to infer some patterns of behavior that are described from a relationship analysis, establishing degrees of correlation between the two variables

from the proportionality presented at the municipal and provincial level, in order to contrast their variations and thus describe the dynamics. This exercise begins with a generalized characterization of the national gold production report and, subsequently, is crossed with the EVOA detected at the different levels, to determine their level of association and their reasons.

The national gold production reported in 2019 shows an increase of 3.1%, equivalent to 1.1 tons over the previous year. In turn, the behavior of production between 2010 and 2019 shows that from 2017 the level of production decreased in relation to what was presented between 2010 and 2016, due to the implementation of controls to the production of subsistence mining, which was reduced by 20.4 t (51.4%) between 2016 and 2017. Likewise, it was observed that for this last period referred to, the production report from legalization requests decreased by 8 t (Figure 52).

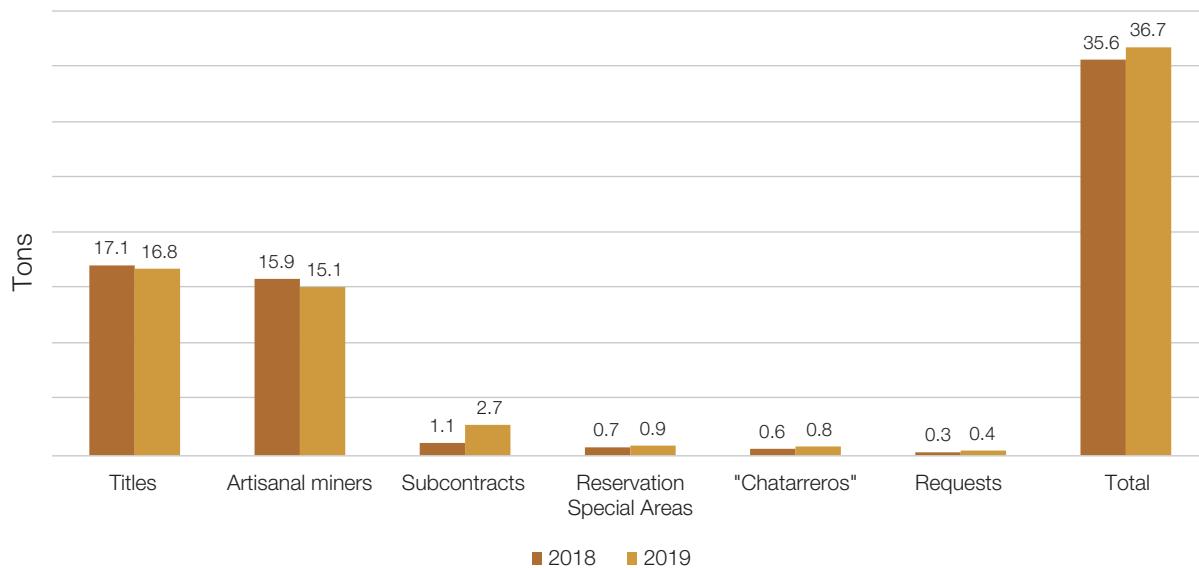
Figure 52. Gold production, 2010-2019



The production structure in 2019 shows a concentration of 87% between two types of operators: Titled (46%) and artisanal miners (41%), very similar to that reported in 2018, which was 93% between Titled (48%) and artisanal miners (45%). The other authorized operators contributed 13%, equivalent to 4.8 t,

of which 2.7 t corresponded to subcontracts; 0.9 t to Special Reserve Areas (ARE); 0.8 t to scrap dealers and 0.4 t to legalization requests. With respect to 2018, there was a significant change in the report of subcontracts, which increased by 145%, since this year it was 1.1 t (Figure 53).

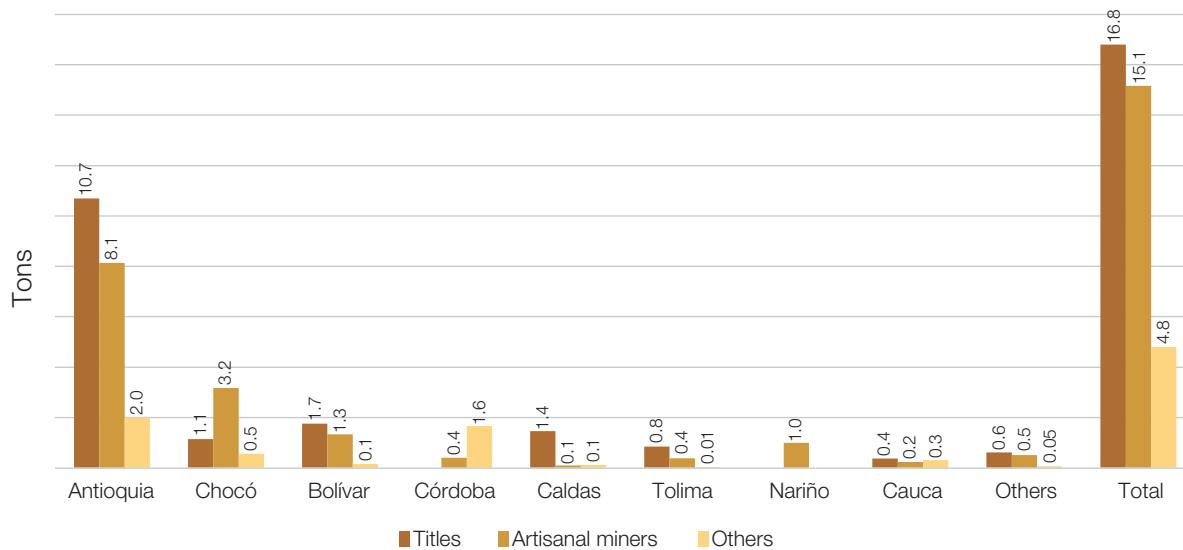
Figure 53. Gold production by exploiter type, 2018-2019



In relation to the gold producing provinces, Antioquia reports the highest production with 20.8 tons, equivalent to 57% of the national total in 2019, of which 10.7 tons come from titles; 8.1 tons from artisanal miners and 2 tons from other exploiters. With respect to 2018, production in this province decreased by 1.4%. Other provinces with important participation in

the total national production are: Chocó with 4.8 t (13% of the national total), of which 65.4% comes from artisanal miners; Bolívar with 3.2 t (9% of the national total); Córdoba with 2 t (6% of the national total); Caldas with 1.6 t (4% of the national total), and 11 other provinces with 4.3 t (11% of the national total) (Figure 54).

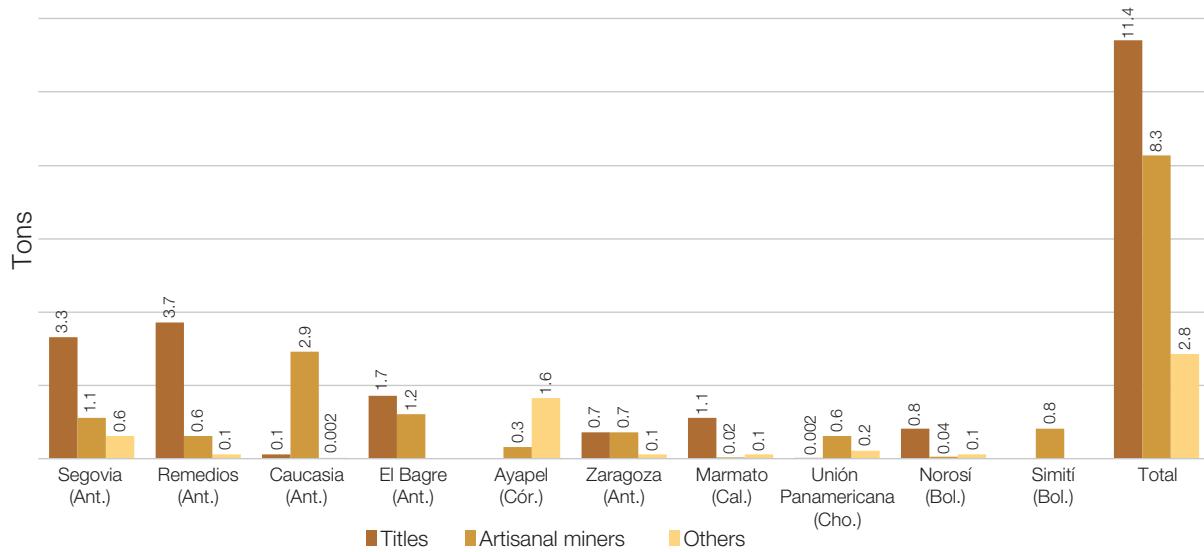
Figure 54. Gold production by province and by exploiter type, 2019



At the municipal level, the 10 municipalities with the highest gold production report 61% (22.5 tons) of national production, 5 of which are in the province of Antioquia, 2 in Bolívar, 1 in Córdoba, 1 in Caldas and 1 in Chocó. Segovia and Remedios, in the province of Antioquia,

are located in the first and second place in the ranking, reporting that 65% and 84%, respectively, come from titles, while Caucasia, located in third place, reports that 98% (equivalent to 2.9 t) comes from artisanal miners (figure 55).

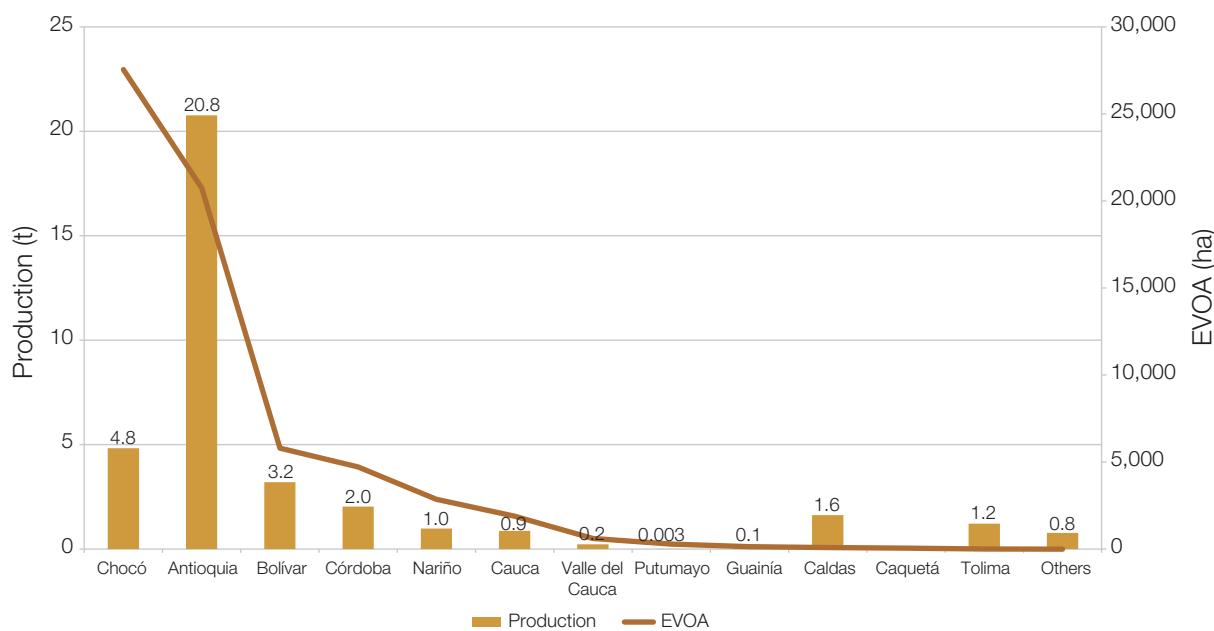
Figure 55. Major gold producing municipalities by type of exploiter, 2019



Meanwhile, the positive relationship between the behavior of the production level of the ore producing regions and the magnitude of EVOA may be evident and logical due to the existing richness of the ore in the regions with greater productive activity. For the purposes of the analysis of these two variables, the EVOA hereinafter refers to those detected in the category of Illicit Exploitation, which correspond to the evidence identified in areas not suitable for mining activity.

The provinces with the highest presence of EVOA are Chocó and Antioquia with 43% and 32%, respectively. Although these two provinces are the largest gold producers in the country, Antioquia reports 4.3 times more than Chocó. On the other hand, the provinces of Bolívar, Córdoba, Nariño and Cauca maintain their levels of proportionality in the contribution to each of the variables, which allows obtaining significant positive correlation⁶⁶ (Figure 56).

Figure 56. Gold production and EVOA (Category III) by province, 2019



In relation to what was observed in Bolívar and Córdoba, located in the third and fourth place in the two rankings: presence of EVOA and production report, the proportion of contribution in the national total of these variables is the same in the case of Bolívar with 9% and in Córdoba they are very close: 7% in EVOA and 6% in production. Regarding the distribution by municipalities, in Bolívar the EVOA are located in 12 municipalities, concentrated in 2 of them: Montecristo (39%) and Santa Rosa

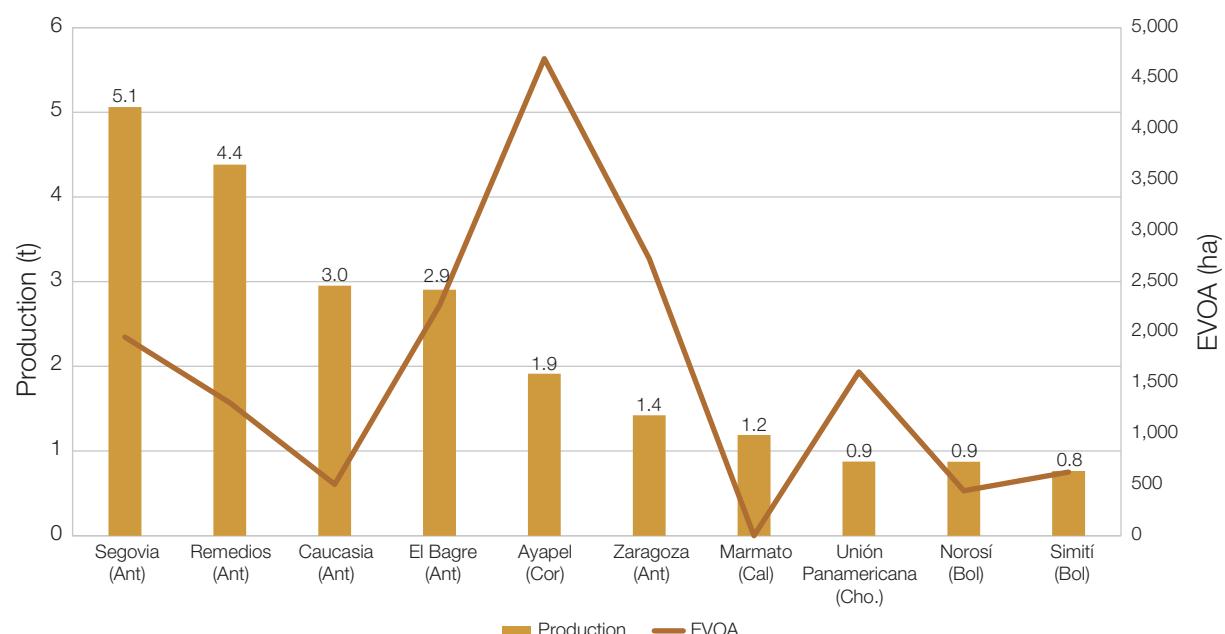
del Sur (28% of the total of the province), while the production is reported in 13 municipalities, concentrated in 4 of these: Norosí (27%), Simití (24%), San Martín de Loba (16%) and Tiquisio (12%), which are different from the ones where the phenomenon is most detected. In the case of Córdoba, the EVOA are in 4 municipalities concentrated in Ayapel with 99% and the production report in 3 municipalities, with a 94% participation of this same municipality with presence of this activity.

For the rest of the country's provinces, the proportionality in relation to the contribution of EVOA detection and the production report is maintained, with the exception of the provinces of Caldas and Tolima, which present a low participation of 0.14% of EVOA, with a contribution of 7.8% to the national production.

On the other hand, at municipal level, the existence of a correlation between EVOA and the gold production volumes reported per municipality indicates that Segovia, El Bagre and Zaragoza in Antioquia, and Ayapel in

Córdoba, among the 10 largest producers in the country that contribute 61% of the national total, are also at the top of the ranking of the 10 municipalities with the greatest presence of EVOA. The remaining 6 municipalities of the producers' ranking report lower levels of EVOA; even one of them (Marmato, Caldas) does not report EVOA. Therefore, the degree of association of the variables at the municipal level is weakly positive, a degree that turns out to be lower than that obtained at the provincial level (see Figure 57).

Figure 57. Main gold producing municipalities with EVOA presence (Category III), 2019



Now, in terms of reporting by type of operator, of the 10 municipalities with the greatest report of production from artisanal miners, El Cantón de San Pablo in Chocó, and El Bagre, Segovia and Zaragoza in Antioquia, are in the ranking of the 10 municipalities with the greatest presence of EVOA and 3 more municipalities

are very close to this group. Likewise, 3 of the 10 municipalities with the highest report of production from mining titles are in this ranking of municipalities with EVOA; however, 5 of these municipalities with the highest detection of illicit exploitation do not report production from mining titles (table 19).

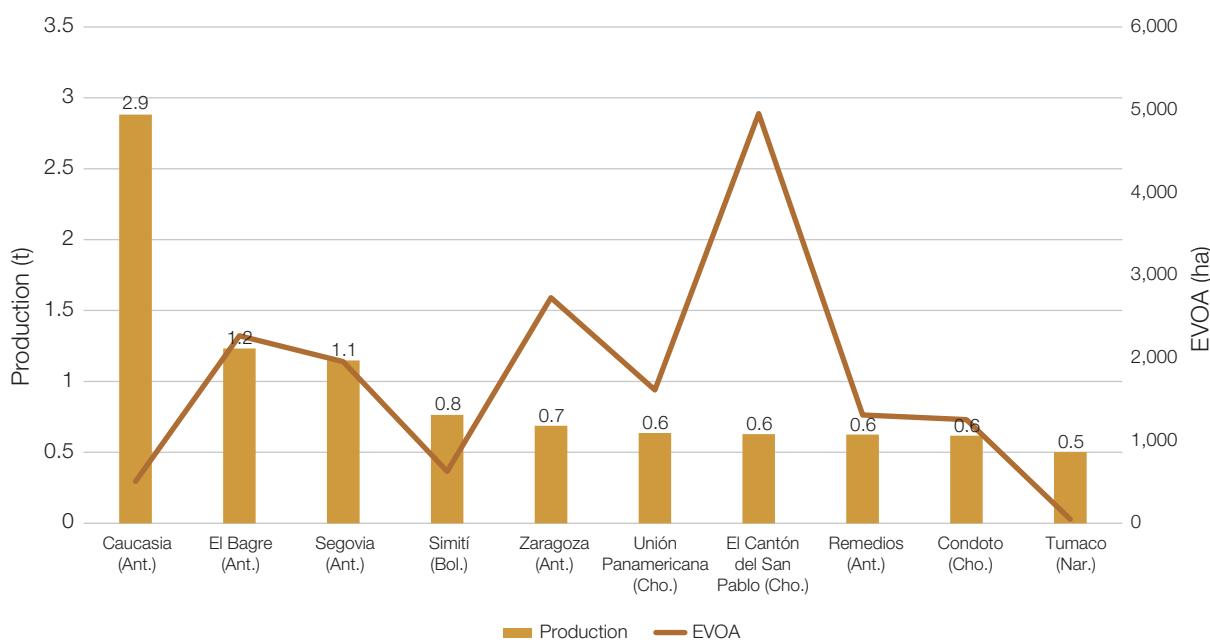
Table 19. Ranking of municipalities with the highest report of illegal exploitation vs. the report of gold production

Province	Municipality	Ranking EVOA	Total production ranking	Production by titles ranking	Production by artisanal miners ranking
Chocó	El Cantón de San Pablo (Managrú)	1	14	Not reported	7
Córdoba	Ayapel	2	5	Not reported	13
Chocó	Nóvita	3	43	Not reported	41
Antioquia	Cáceres	4	16	43	26
Antioquia	Nechí	5	27	Not reported	11
Chocó	Río Quito (Paimadó)	6	49	Not reported	32
Antioquia	Zaragoza	7	6	6	5
Chocó	Istmina	8	19	16	12
Antioquia	El Bagre	9	4	3	2
Antioquia	Segovia	10	1	2	3

According to the above, it is observed that in the municipalities with reported production of artisanal miners during 2019 and the EVOA identified as illegal exploitation, 67% (43,565

ha.) of this evidence is found in the municipalities with production greater than 100 kg, that is, in 30 of the 92 municipalities with reported production of this type of operator⁶⁷ (Figure 58).

Figure 58. Main gold producing municipalities from artisanal miners and EVOA (Category III)



⁶⁷ The correlation observed for this level between these two variables remains weakly positive, in part because of the dynamics of commercialization of subsistence mining production, according to existing requirements and controls (Figure 58).

According to the relationship analysis presented, it is generally concluded that in the production regions with high participation of artisanal miners there is evidence of a greater area with EVOA detected, in relation to those of mining titles. Although the data show a greater association between variables at the provincial level and a lesser association at the municipal level, this variation may be due in part to distortions in the reporting of the actual

origin of production. Therefore, it is relevant to strengthen the development of mining activity in territories with significant subsistence mining participation, as well as its controls and requirements. Similarly, the above allows us to call the attention of the municipal governments to exercise greater monitoring of this activity in their jurisdictions, especially, in the registration and approval of their miners.

SECTION IV INSTITUTIONAL MANAGEMENT

Photograph:
Alluvial gold exploitation on land, Puerto Libertadores (Córdoba)



This section presents data pertaining to control actions in respect of illicit exploitation and its relationship with EVOA. It presents the different tools that the Government has at its disposal for regularization and formalization, when targeting strategies and when formulating policies. Finally, it proposes alternatives for licit development, according to the specificities of the territory.

INSTITUTIONAL MANAGEMENT

The strategies to fight against the illegal exploitation of minerals address different axes that range from normative proposals to the execution of operational actions, which are oriented to stopping illicit activity, which impacts networks and criminal organizations. However, in the case of gold, there is a history of exploitation performed manually and for a long time, and another scenario of high prices of the precious metal and increased global demand.

In this sense, the government, at the head of the Ministry of Mines and Energy (MinEnergía), as the governing body of the country's mining policy, has established tools to bring miners with a true vocation of performing the activity within the legal system, taking into account the specificities of the territories and the nature of the exploitations. In the case of illegal exploitation, MinEnergía supports the work of the authorities with jurisdiction when exercising control.

Under this concept, the alternative of providing legal tools that allow the transit to legality is offered to those miners who perform the activity in permitted areas, with real mining vocation, under conditions in which the safety and life of people prevails, where there is the will to do things right; this decision leads towards legality for real miners. All of this is in the hands of the mining and environmental authorities, so that they can timely evaluate the procedures to favorably conclude the necessary permissions for the development of the activity, along with the accompaniment and fulfillment of the miner's duties and all the requirements of the law.

On the other hand, in those cases where the extraction of minerals occurs without complying with the requirements of the law and those who carry it out do not seek the transition to

The role of the Ministry of Mines and Energy in addressing and combating the scourge of illicit mineral exploitation is focused on coordinating and strengthening the authorities involved in generating and executing actions to control the phenomenon, using different mechanisms, among them: technical, human, financial and logistical support for the implementation of operational control in areas affected by the territory; monitoring of areas with a presence of illicit exploitation; provision of clear and objective information on the dimension and characterization of the problem, along with other intersectoral strategies, as well as control of inputs used in this illicit activity and the structuring and presentation of draft legislation that seeks to provide powerful tools for the fight against this scourge, which are intended to stop the expansion and promote the reduction of this illicit activity in the mining sector.

Additionally, based on the contribution to the characterization, location and dimension of the illicit activities developed in the mining chain, from the exploitation to the export of the minerals, inputs are provided for the exercise of the control functions of the different administrative, operational, judicial and criminal authorities, as well as to establish the basis for the formulation of public policy, the implementation of prevention mechanisms and the application of other actions that tend to reduce illegality in the sector, such as strategic programs of transition to legality, among others.

legality, where the activity is transitory and the concept of opportunity and particular benefit prevails, it is necessary to generate control measures.

There are also some activities of different magnitude, whose methods of exploitation vary and are developed in areas where mining activity is excludable for environmental reasons or where there are not enough mining resources

to make it a profitable activity. It is in these cases that a change of productive activity is also necessary.

Actions of the Colombian Government against illegal exploitation

Control operations are the responsibility of the Carabineros Directorate, which is a National Police specialty; however, the National Army supports these operations through the Brigade against Illegal Mining. In 2019, 447 general intervention operations were carried out in gold mines, in which 705 operational results were accumulated at the national level, which represented an increase of 14% for the operations compared to those reported in 2018; however, in terms of operational results, a reduction of 66% was observed with respect to the same reference year.

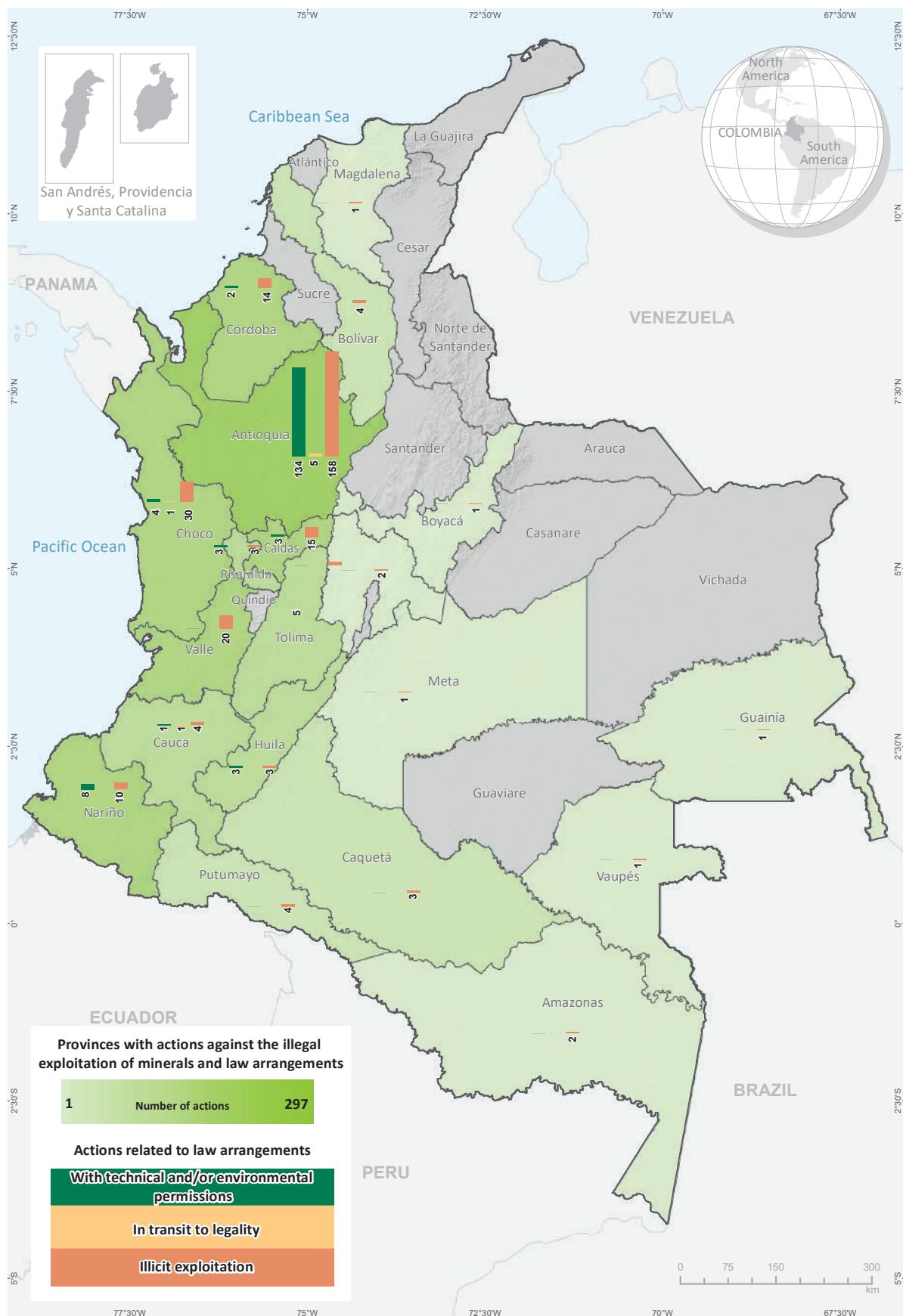
When analyzing the control operations against the territories that have evidence of EVOA on the ground, it was determined that 30% of the operations carried out in 2019 have some relationship with a territory with EVOA presence. There are some operations that are related to territories with alerts for EVOA in water, which are located on the Putumayo, Caquetá, Inírida and Vaupés rivers and that, as a result of the operation, in all cases, dredges

were destroyed. It is important to mention that the file provided for this analysis does not discriminate the type of exploitation; therefore, this report includes illicit gold exploitation related to vein or vein.

For the operations that do not coincide with EVOA on land or in water, it is not possible to identify their relationship with the territory, due to the lack of details in the information provided; however, it is presumed that there are actions carried out in vein or vein exploitation territories. Likewise, it is important to mention that there are other types of conducts or actions that derive from the control operations to the illegal exploitation such as the capture of people that are not directly associated to the exploitation site.

According to the framework of the current regulations on the exploitation of metallic minerals and precious and semi-precious stones, control operations may be carried out in any part of the Colombian territory where the exploitation of minerals is not executed under the parameters established and agreed upon in each of the normative arrangements established by law and whose source is the ANM and the ANLA. The location of these operations is shown in map 19.

Map 19. Operations against illegal gold mining



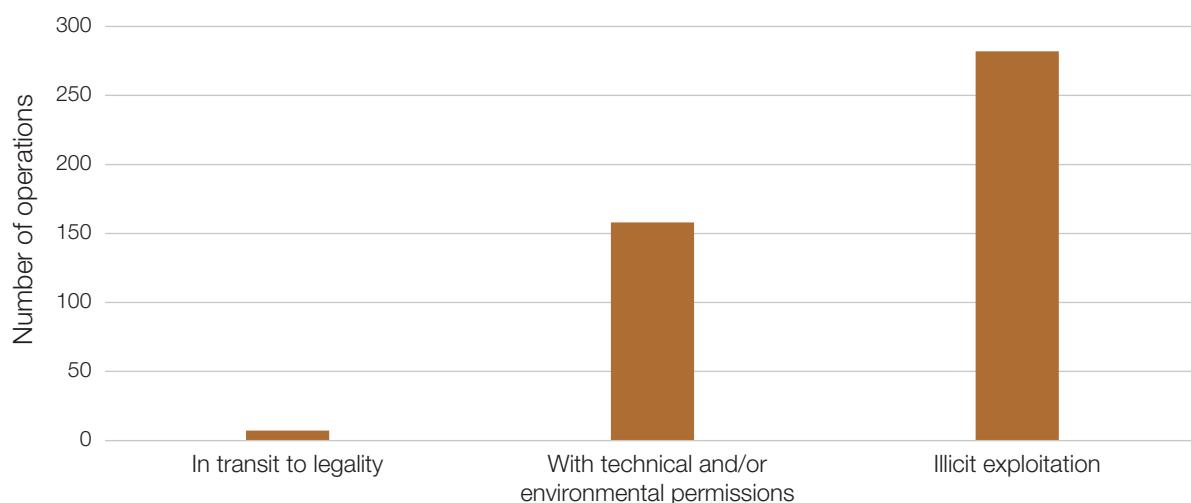
Source: Government of Colombia Monitoring system supported by UNODC for law arrangements: Ministry of Mines and Energy; for actions against illegal exploitation: Ministry of National Defense, 2019.

The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

In order to determine the relationship between control operations and law arrangements (Figure 59), the analysis was undertaken according to the classification of law

arrangements: 1) In transit to legality; 2) With technical and/or environmental permissions, and 3) Illicit exploitation.

Figure 59. Number of control operations carried out in areas with some law arrangements, 2019



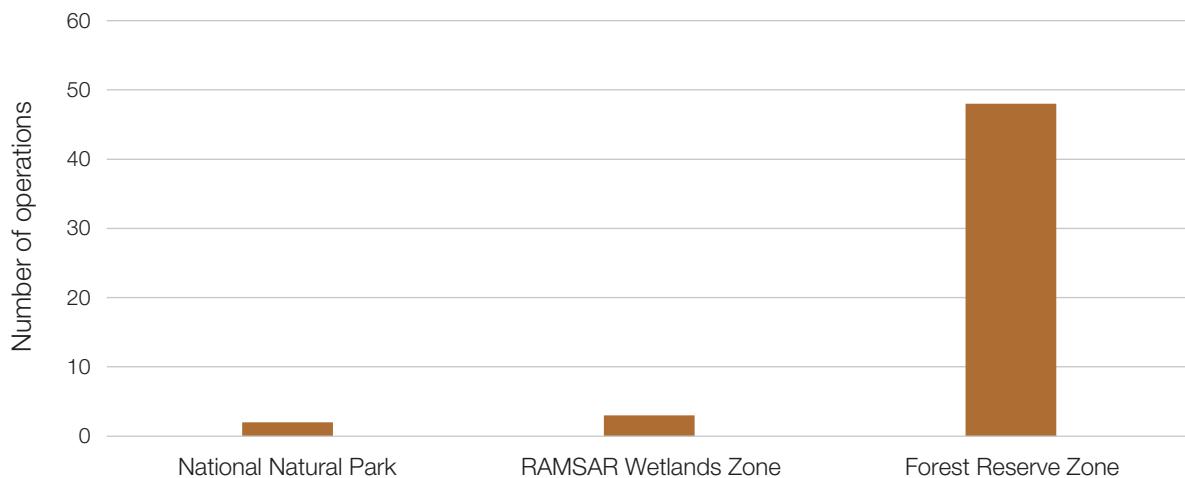
For 2019, in the first place, it was identified that of the total number of operations executed, 63% were carried out in areas known as illicit exploitation, with the predominance of those carried out in areas where there is no reference to any previously established legal arrangement (73% of the total number of legal arrangements).

Secondly, there is a concentration of operations in areas with technical and/or environmental permissions, with 35% of total operations (61% for title Protection and 39% for Environmental Licenses of the total class of law arrangements); in Antioquia more than 80% of this type of intervention is concentrated. The actions carried out in areas with this characteristic may be due to interventions related to administrative appeals; however, in

order to validate this case, it is necessary to analyze in greater detail the spatial information of administrative appeals, which was not obtained.

Given the conditions of environmental relevance of some territories, there are Excludable zones from mining for the development of any mineral exploitation activity (this topic was extensively developed in previous chapters); however, upon analyzing the location of control operations, it is identified that of the total number of operations only 12% were carried out in this type of areas, being the Forest Reserve Zones (ZRF) in which operations predominated with 90% of the total in Excludable zones from mining (Figure 60). Finally, 54% of the operations in the ZRF are related to EVOA.

Figure 60. Number of control operations carried out in Excludable zones from mining, 2019



The area where the control operations were mainly located is the Pacific (73% of the total in the ZRF), declared in western Colombia on the Pacific Ocean and oriented to protect the biodiversity that shelters the predominant tropical rainforest in the area. In particular, the interventions are in the municipalities of Buenaventura on the Dagua River and Quibdó on the Quíto River, both located in a region with a presence of licit and illicit gold exploitation of both vein and alluvial gold.

In PNN, on the other hand, intervention operations were carried out in Tatamá (Risaralda) and in Paramillo (Córdoba). For RAMSAR Wetlands, operations were focused on the Ciénaga de Ayapel (Córdoba).

Typification of control actions

The operational results for 2019 are classified into three types of conduct: destruction, seizure, and intervened mines; for the first two, it is specified whether the action was carried out with any type of input (ACPM, sodium cyanide, mercury) or machinery dedicated to the exploitation, benefit (dredge, classifier, backhoe, engines) or result of the exploitation (of gold).

The intervention operations are carried out by the operative groups of the Military Forces and the National Police; in some cases, according to the nature of the crime, they are carried out with the accompaniment of other institutions such as the Attorney General's Office, the Technical Investigation Body (CTI), the Regional Autonomous Corporations (CAR), the SIJIN, among others.

Of the total operational results, 46% are related to intervened gold mines, 35% to seizures and the remaining percentage to destruction. Engines are the main contributor to the overall operational results (destruction and seizure) with 30% of the overall results. Of the three substances that are seized ACPM, sodium cyanide and mercury, the last one is the most seized, with 9% of the total of seizures.

Antioquia, Chocó and Córdoba are the provinces where the operational results for 2019 are concentrated (83%), with 69%, 9.8% and 4%, respectively; Antioquia (41%) and Chocó (35.8%) are the provinces with the greatest presence of EVOA in 2019, which coincides with a greater number of interventions. However, if the third province with presence of EVOA is analyzed (Bolívar, with 20%), it is observed

that only 0.9% of the operational results are registered; these finding permissions focusing efforts where there is a greater concentration of evidence and where there are signs of expansion of the phenomenon.

Córdoba, on the other hand, is in the fourth place of EVOA detection (5.1%) and in the third place in operational results. In order of presence of EVOA, Nariño and Cauca follow, which together reach a participation of 6% and the operational results reach 5% for the provinces.

55% of the operational results are concentrated in six municipalities, all belonging to the province of Antioquia: Buriticá (gold exploitation in vein), Cáceres (EVOA on land), Caucasia (EVOA on land), Zaragoza (EVOA on land), San Roque (gold exploitation in vein) and Giraldo (gold exploitation in vein). In the first three, asset seizure and mine intervention operations predominate, and for the last two municipalities, all actions are focused on mine intervention.

According to what has been identified at the municipal level, there is a correlation between a greater presence of mineral exploitation activity as opposed to control operations, as can be seen in Zaragoza, the main municipality with EVOA for 2019 with 8.6% of the national total, as well as in Cáceres which concentrates 5.7%. For Caucasia, the participation in the national total of EVOA 2019 reaches 1.9%, which although it is surpassed by other municipalities with EVOA, these do not concentrate a significant number of operational results; this is mainly explained because Caucasia is part of the populated centers of the region that are considered as the epicenter for the purchase of inputs, elements and machinery; likewise, it is a point of transit and, therefore, of entry of machinery and site of commercialization of the extracted material.

Registration and control of subsistence mining

Subsistence mining - which also includes artisanal minerling activities - is regulated by Article 327 of Law 1955 dated 2019. This type of mining requires personal and free registration with the Mayor's Office of the municipality where the activity is carried out; it does not include subway activities nor does it allow the use of machinery or mechanized equipment for the removal of the ore, explosives, nor can it exceed the production volumes indicated by MinEnergía. For the exercise of this activity, miners must comply with the restrictions established in articles 157 and 158 of Law 685 dated 2001.

In accordance with Law Bill number 59 of 2020, it is contemplated:

Subsistence miners, including artisanal miners, cannot be registered in more than one municipality at a time but only in the jurisdiction where they carry out their activity. The registration must be renewed annually in a personal way, and the information can be updated by the miners at any time, in case of a change in the execution of the activity.

It is the responsibility of the mayors to monitor compliance with the provisions of the aforementioned article and to impose the necessary measures, without prejudice to the preventive and punitive measures imposed by the environmental authority for the prevention or commission of environmental damage in accordance with the provisions of Law 1333 dated 2009, or the regulation that modifies, adds or replaces it. Additionally, the mayor may refrain from registering or canceling the registration of the subsistence miner in the following events:

- a) If the activity takes place in areas excluded or prohibited from mining activities;
- b) If the activity is not carried out with the restrictions established in articles 157 and 158 of Law 685 dated 2001;
- c) If the activity is carried out in a different place other than the one indicated in the registration;
- d) When it exceeds the production volumes indicated by the Ministry of Mines and Energy or the competent authority;
- e) When it uses machinery, mechanized equipment or explosives to remove the minerals;
- f) If the activities are carried out underground;
- g) When it extracts a mineral different from the one established in the registration.

A subsistence miner who has his or her registration cancelled will not be able to register at any municipality for a term of six (6) months. If the requirements demanded in this article for the development of subsistence mining are not met, the miners

will be considered illegal exploiters of mining deposits under the terms of the Colombian Criminal Code or the norm that modifies or substitutes it.

In this context, and in order to facilitate the work of the mining institutions and users, since the end of 2010 the information system for the management of procedures for the administration of mining resources, called SI.Minero, was made available to the public and migrated to Genesis. Starting in 2014, this platform will provide a module so that subsistence miners can register and carry out their own procedures, with the support of the municipal governments, via the web.

For this registration, since March 31st, 2020, the ANM has had the Genesis platform⁶⁸. Through this platform, the registration of the subsistence miners must be renewed, with the fulfillment of these requirements within six months.

However, due to the strong pressure of illegal economies on the vulnerable population around gold extraction, MinEnergía established by Resolution 40103 dated 2017 the maximum monthly and annual production volumes for subsistence mining (Table 20).

Table 20. Permitted gold production for subsistence mining in Colombia

Mineral and/ or materials	Monthly average production (g)	Maximum annual production (g)
Precious metals (gold, silver, platinum)	35	420

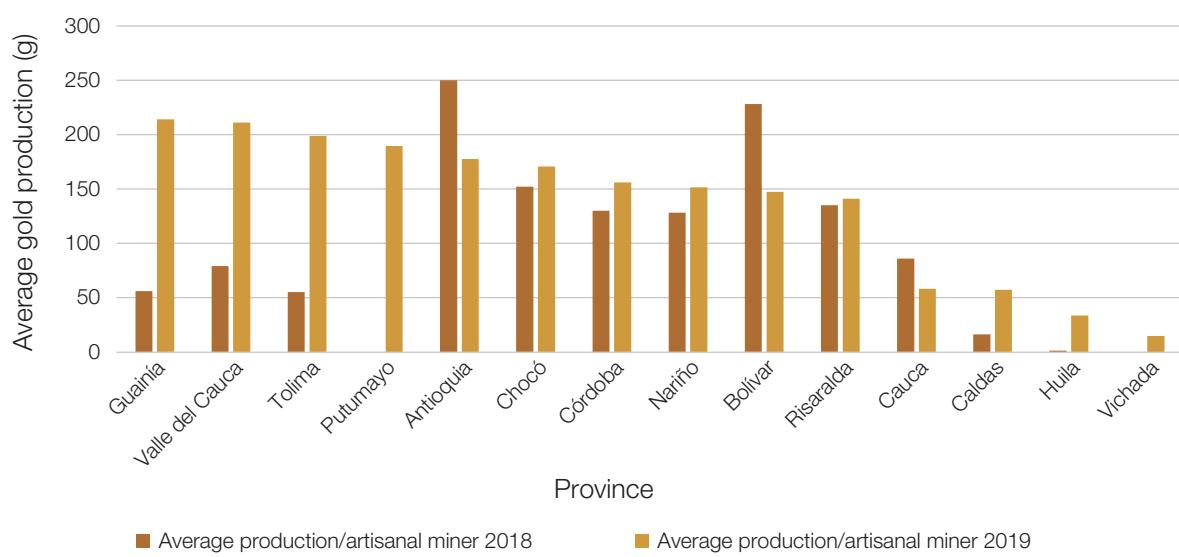
⁶⁸ <https://www.anm.gov.co/?q=genesis>

Although subsistence mining by its very nature does not strongly impact the landscape, according to field information obtained by the project, this activity in some regions is linked to exploitation with machinery on land, which according to the code should be outside a 300 m radius of mechanized exploitation. In these cases, agreements are established between the owners of the machines and the miners, who are allowed from time to time to carry out their prospecting work in the area where the backhoe loader works, or sometimes this subsistence community goes after the machines, taking advantage of the removal of material left behind by the machines to increase the probability of success in obtaining gold. However, there is no evidence to generalize this throughout the Colombian territory, being also recurrent the ancestral practices of sand washing in streams without exploitation with machinery on land.

It is estimated that 43% of national production reported for 2019 will come from subsistence mining, which represents 4 percentage

points less than that reported for 2018; 41% will come from barterers and 2% from scrap dealers. Considering that all registered gold panners as of December 31st report production and comparing this with the national production data, it is found that each gold panner would be reporting an average of 157 g of gold, less than the maximum production established for this type of exploitation. In this sense, when analyzing the provincial level, the gold artisanal miners with the highest production reports are in Valle del Cauca and Guainía, reaching 50% of the established maximum. They are followed by Tolima and Putumayo, where individual production per artisanal miner is approximately 45% of the maximum established in the regulations. However, these first three provinces, to which Caldas is added, show increases in production reports of more than 160% under this exploitation modality. A case is Putumayo, which by 2018 did not report production under this modality. Finally, a reduction close to 30% in the production report is seen in Antioquia, Bolívar and Cauca. Figure 61 illustrates this information.

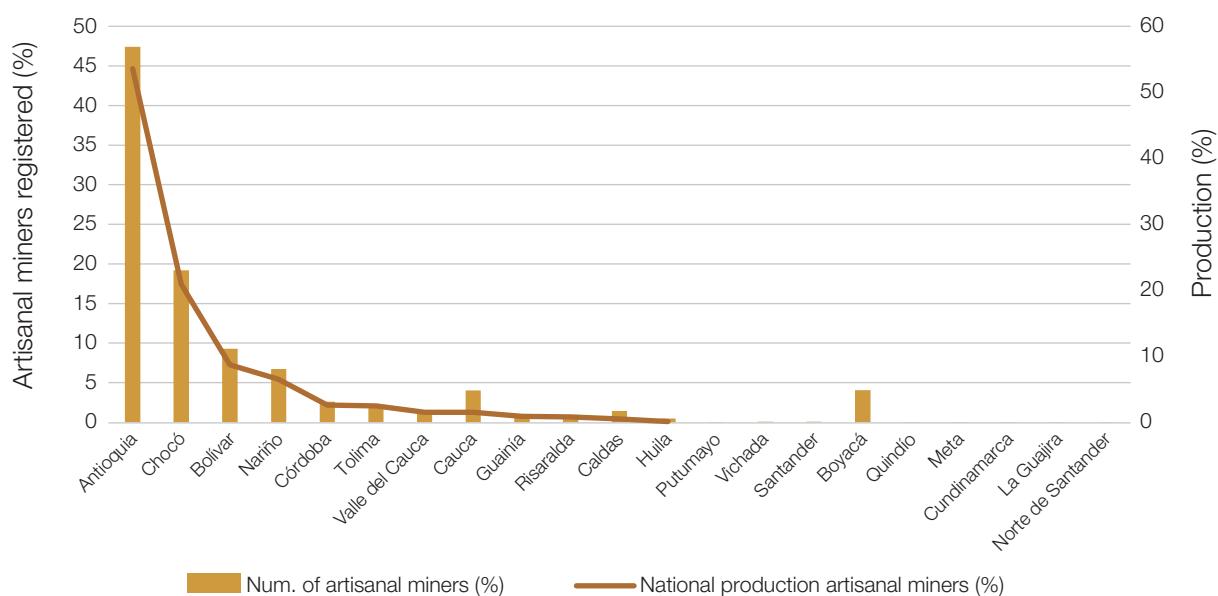
Figure 61. Distribution of gold production (g) by average artisanal miner/province



On the other hand, according to the records of the Mining Ministry as of December 2019, Antioquia is the province that shelters 47% of the registered barge workers and reports 54% of the national production reported by this type of operator, followed by Chocó with 19% of

the registered barge workers and 21% of the national production reported by this type of subsistence mining. These are the same two provinces that hold first and second place in both EVOA detection and reported production in 2019 (see Figure 62).

Figure 62. Percentage distribution of artisanal miners registered in the Mining Service, December 2019



It is worth mentioning that provinces such as Huila, Putumayo, Vichada, Santander, Quindío, Meta, Cundinamarca, La Guajira and Norte de Santander also report registered artisanal miners, but the sum of their percentage of national participation is less than 1%, and only the first three provinces report production. In this regard, Boyacá, which has 4% of the registered and approved artisanal miners in 2019, does not report production for this year.

As in 2018, the consolidated production of artisanal miners is only 5 percentage points below that reported by the titled areas, despite the imbalance in infrastructure and specialized machinery that allows the efficient exploitation

of the resource, compared to the manual means used in subsistence mining.

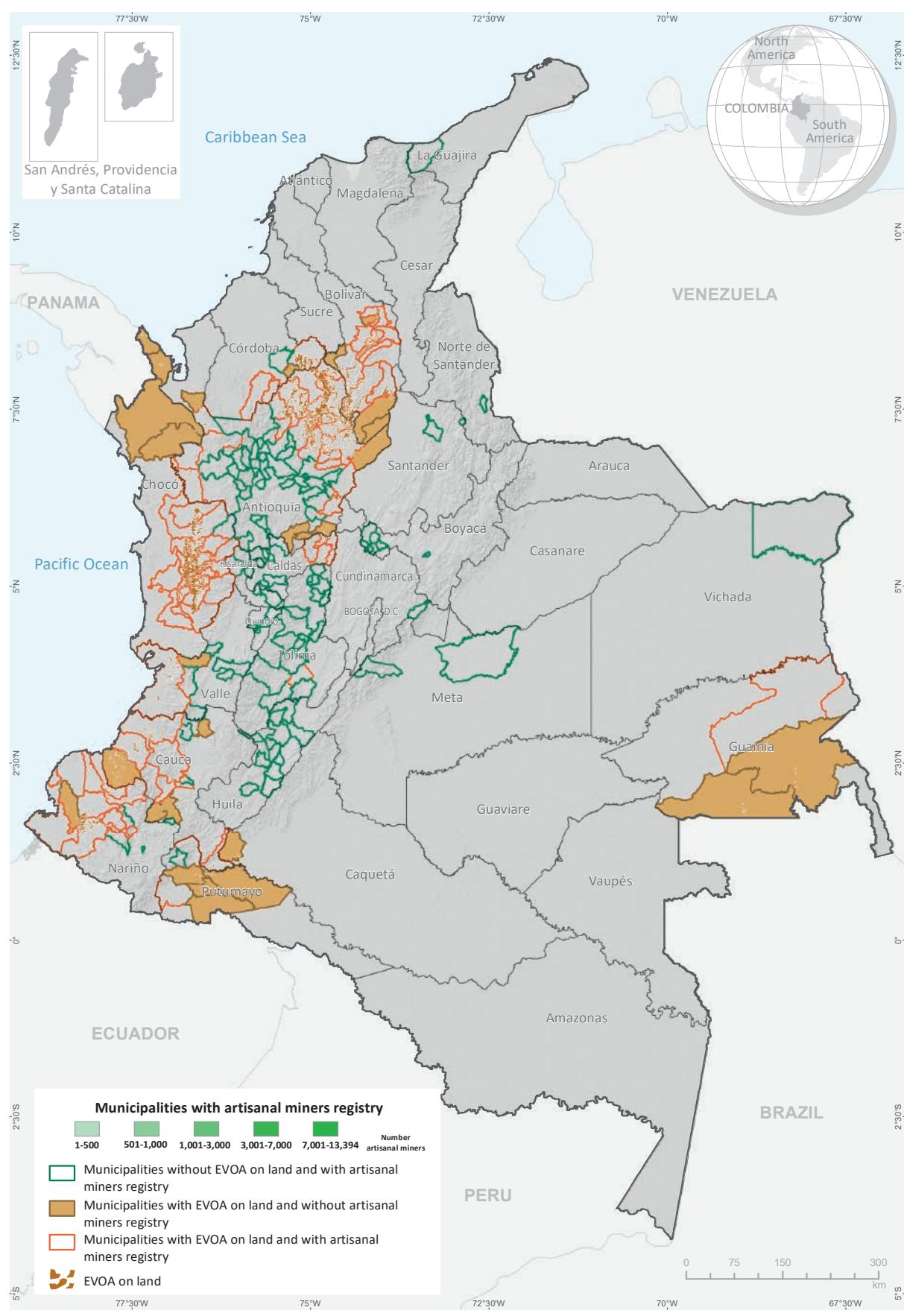
On the other hand, Caucasia concentrates 21% of the registered artisanal miners in Antioquia, followed by El Bagre (18%), Zaragoza (9%) and Segovia (7%), all located in the ranking of the 5 municipalities with the highest production in 2018 and with the exception of Segovia, in the ranking of the 10 municipalities with the highest amount of hectares of EVOA detected for 2018. With respect to the province of Chocó, Condoto, Istmina and Atrato with 18%, 15% and 11% respectively, concentrate the highest proportion of artisanal miners in the province. Map 20 presents the distribution of the artisanal miners registry in the country.

Nearest population centers to EVOA

The exploitation of alluvial gold occurs not only where the availability of the material allows it, but also in territories with conditions of vulnerability of the population, institutional weakness and limitations for the development of the communities' capacities. In this sense, understanding the dynamics of territories where there is evidence of alluvial gold mining contributes to better design of public policy interventions and targeting of efforts.

Likewise, the spatial and geographic relations between the closest population centers, municipal capitals, provincial capitals and in general the country's productive structure, should be considered not only to focus mining control or formalization interventions, but also to promote a more efficient presence of the State in these territories. Annex 3 proposes a detailed level of micro-focusing based on population centers.

Map 20. Distribution of the “artisanal miners” registry (SI.Minero), 2019



Source: Government of Colombia - Monitoring system supported by UNODC for artisanal miners registry: Ministry of Mines and Energy, 2019. The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

From illegality to legality: formalization

Strategy Group of support to the actions of control of the illicit exploitation of minerals in the national territory

Aware of the enormous scourge that the illicit activity of mineral exploitation means for the country and its immense negative effects on the environmental, economic and social fields in the regions where it is performed, Min-Energía supports the authorities with jurisdiction with technical support and sectorial information when exercising its control. This is done when exercise of the role of “Coordinating actions with entities of the executive branch to control the illicit exploitation of minerals⁶⁹.

In this context, MinEnergía has been supporting actions to prevent and to control the illicit exploitation of minerals and related activities in the national territory, mainly through the investment project “Support for actions to control the illicit exploitation of minerals in the national territory”, with the objective of facilitating the implementation of initiatives by the authorities with jurisdiction to suspend or control this scourge. Given the above, through the articulation and strengthening of the competences of the authorities with jurisdiction, cooperation agreements were signed to support the implementation of activities to identify or georeference some areas with the presence of the phenomenon of illicit exploitation of minerals.

Actions such as:

Support to oversight & control actions in the national territory

Agreement signed with the National Police and the Colombian Air Force. MinEnergía

supports the execution of operations to control the illicit exploitation of minerals and related activities by the National Police-UNIMIL (National Unit against Illegal Mining and Anti-terrorism). The operational results obtained allowed for the destruction and seizure of equipment, intervention in mines and the capture of offending actors by the National Police. In order to provide more detailed information on the areas with illicit mineral exploitation, the capabilities provided by the Colombian Air Force in the provinces of Amazonas, Antioquia, Caquetá, Chocó, Nariño and Valle del Cauca were used for aerial reconnaissance and georeferencing of areas by means of aerial photography.

Evidence of alluvial gold mining by remote sensing-EVOA

In cooperation with the United Nations Office on Drugs and Crime (UNODC), MinEnergía and the support of the U.S. Embassy through the Counter Narcotics and Law Enforcement Section (INL), the report “Evidence of Alluvial Gold Mining with the Use of Land-based Machinery EVOA” is generated through the monitoring system, using satellite images from remote sensors.

Strengthening of competences of the authorities with jurisdiction in the territory

The Vice-Ministry of Mines, through the annual training program “Coordination Tools for the Control of Illicit Mineral Exploitation” and the accompaniment of working groups, coordinated with the authorities with jurisdiction of the control of this scourge the training in territory, with the purpose of socializing the mining, environmental, administrative, commercial and judicial regulations, as well as the competence of each institution for the

control, generating spaces for dialogue and feedback to address regional situations in this area. During the period June 2019 - June 2020, 19 training sessions and 4 working groups were held in the provinces of Amazonas, Antioquia, Boyacá, Caldas, Cauca, Caquetá, Chocó, Córdoba, Cundinamarca, La Guajira, Huila, Nariño, Norte de Santander, Risaralda, Santander, Tolima and Valle del Cauca. With the participation of 761 people, among them were representatives of institutions such as the National Police, the National Army, the Attorney General's Office, the Comptroller General's Office, government offices, mayor's offices, the National Tax and Customs Directorate (DIAN), CAR, among others. This

activity is performed in the regions, under the coordination of MinEnergía, with the support of the ANM, the Attorney General's Office, DIAN, the Colombian Institute of Family Welfare (ICBF), the National Police, the National Army, the Ministry of National Defense (MinDefensa), Migration Colombia, National Natural Parks (PNN), ANLA, the Ministry of Environment and Sustainable Development (MinAmbiente) and the Technical Investigation Body (CTI).

In 2019, fifteen training sessions and two working groups were held with regional, local and provincial authorities that control the illicit exploitation of minerals in the provinces listed in Table 21.

Table 21. Consolidated table of strengthening actions in the national territory, 2019

Event	Province	Dates	Number of attendees
Training	Jamundí	27, 28, and 29 of March, 2019	84
	Cúcuta	10 and 11 April 2019	49
	Medellín	9 and 10 May 2019	142
	Leticia	28 and 29 May 2019	76
	Popayán	6 and 7 June 2019	89
	Quibdó	11 and 12 July 2019	69
	Ubaté	17, 18 and 19 July 2019	59
	Barrancabermeja	25 and 26 July 2019	71
	Córdoba	1 and 2 August 2019	52
	Riohacha	15 and 16 August 2019	61
	Pasto	29 and 30 August 2019	70
	Caquetá	12 and 13 September 2019	70
	Pereira	14 and 15 November 2019	70
	Huila	14 and 15 November 2019	65
	Córdoba	13 December 2019	33
Worktable	Bogotá	14 of February 2010	32
	Córdoba	23 July, 2019	25

Source: Vice Ministry of Mines and Energy

It should be noted that MinEnergía does not have the authority to suspend, remedy or control this illicit activity; however, the identification activities that this portfolio supports are essential to achieve this goal, since the starting point is to make known which activities in the territory are legal and which are not, and thus address the corresponding legal route by local, environmental, police and judicial authorities.

Alerts of threats to biodiversity near areas detected with EVOA

The illicit exploitation of minerals is an activity that generates changes in the vegetation cover and in the quality of water in the areas where it is carried out; for this reason, it is important to show the different threats that this activity generates to the ecosystems. Bearing this in mind, a work was started to show the species of fauna that may be threatened by the proximity of this activity in the national territory, this from primary information collected in the territory and secondary information provided by entities such as PNN, the Alexander von Humboldt Institute, among others.

Fuel control strategy

From the Vice-Ministry of Mines, in coordination with the Vice-Ministry of Energy and the support of the Public Security and Infrastructure Directorate of MinDefensa, the strategy for the control of fuels in areas of convergence of illegal economies is being developed.

Strategy to generate conditions that encourage the legality of miners with a vocation for formalization

With the National Development Plan (PND), specifically through the “Pact for Sustainability” and the “Pact for Mineral and Energy Resources for Sustainable Growth and Expansion

of Opportunities”, the national government sought to strengthen the legal framework for a competitive and high standard mining activity allied to the territories. In this sense, four work areas are highlighted: 1) more efficient institutions; 2) greater control and legality; 3) higher standards; and 4) differential approach.

To implement this vision, the MinEnergía Strategic Plan for the sector set out three axes for the four-year period: 1) institutional strengthening; 2) diversification of the mineral production matrix, and 3) raising standards of legality and promotion of mining activity.

In the area of legality and promotion, we are working to fulfill the Government's precept of developing a sector with legality and entrepreneurship, which generates equity in the country. This is part of a strategic vision of the mining business that will make it possible to achieve, by 2030, the ideal of a mining entrepreneur and an effective contribution to the local development of the area where this mining entrepreneur carries out his or her operations.

The aspiration is called “Minero 5”, which means to concretize a transformation of the sector in order to have mining entrepreneurs who, independently of their productive scale, comply with five fundamental attributes: legal, entrepreneurial, responsible, influential and reliable.

The first attribute is to be legal. This is the starting point and means that the miner conducts his or her mining operations under the protection of a mining and environmental instrument. Therefore, within the purpose of promoting a mining activity within the framework of legality, one of the axes of the government program of President Duque identified the need to establish conditions and instruments that encourage the entry and legal operation

of miners with a vocation for formalization. This considers different difficulties and gaps identified in the processes carried out in past years within the framework of the Mining Formalization Program, led by MinEnergía. To this end, MinEnergía included in Law 1955 dated 2018 (PND 2018-2022, "Pact for Colombia, Pact for Equity") tools that provide options for those miners who show vocation for working within the framework of legality.

Thus, Article 326 stipulates differential requirements for small-scale miners and ethnic groups to obtain a mining title, without relaxing the basic conditions of mining security and environmental responsibility. In the process of regulating this article, the ministry held nineteen workshops to gather inputs in eight regions⁷⁰ with different interest groups composed of sector unions, mining experts, territorial entities, representatives of ethnic communities, representatives of miners and miners in general, as well as, other actors from international cooperation.

As a result of this process, the draft decree, which has been published twice for public comment, establishes that the scope of application is for natural or legal persons who are small-scale miners and who do not have a Mining title, and for the beneficiaries of the return of areas for mining formalization. It also establishes the conditions for access, stating that these persons should not have mining titles and may only have access to a single Concession Contract through differential requirements.

The Terms of Reference of the differential requirements for the accreditation of economic capacity and the technical annex supporting the application of the mining Concession

Contract, which contains information of the minimum exploratory program, labor and environmental suitability, as well as, the estimate of the minimum investment for exploration, are under construction by the ANM.

Likewise, the draft decree establishes as a specific characteristic that these miners may request within one year of the issuance of the norm that the Concession Contract be granted in the exploration stage with anticipated exploitation. For this purpose, they must complement the technical annex with a diagnosis of the exploitation activities, basic geology, a mining plan and a closure plan. It must also consider the conditions that ensure compliance with the Mining Safety and Hygiene Regulations and process the Environmental License in accordance with the differential Terms of Reference established by MinAmbiente for these purposes. Without the approval of the technical annex and without obtaining the Environmental License for small scale, no construction and assembly activities and no exploitation may be carried out.

The small miners that access the Concession Contract through differential requirements will have 1) integral technical accompaniment by the national mining authority and 2) differential supervision, in accordance with the guidelines given by the national government. The proposed regulation applicable to differential requirements for ethnic communities is under construction.

On the other hand, Law 1955 dated 2020, in its article 325 of the PND, sought to attend to the requests for the formalization of traditional mining presented before May 10th, 2013, which amounted to almost 2,000 processes.

⁷⁰ Supía-Caldas; Medellín-Antioquia; Quibdó-Chocó; Tunja-Boyacá; Santa Rosa del Sur-Bolívar; Bucaramanga-Santander; Cúcuta-Norte de Santander, and Bogotá.

During this, the mining authority began to attend to the corresponding procedures for their respective evaluation.

Considering that the legality should not only be mining but also environmental, Law 1955 dated 2020 included regulations for temporary environmental license for formalization, differential environmental impact study for small miners and environmental authorization for mobile processing plants to obtain mercury-free gold. MinAmbiente adopted, through resolutions 447 and 448 of May 20th, 2020, the differential Terms of Reference for the Temporary Environmental License for Formalization and the Environmental Impact Study for small-scale mining.

The Temporary Environmental License for Formalization, established in Article 22, includes the mining activities that seek to obtain their mining title in the framework of the applications covered by the aforementioned Article 325; the delimited and declared Special Reserve Areas (ARE), the authorized and approved formalization subcontracts or those that seek to be covered through any of the mechanisms for formalization under the protection of a mining title in small-scale mining.

To do so, the miners have three months after the publication of the resolution with the Terms of Reference by MinAmbiente to file the application with the CAR. These environmental authorities must decide on the viability of the license within thirty days.

However, in order to strengthen the monitoring of mining activity to ensure that operations comply with technical, environmental, and life safety standards, Article 30 of Law 1955 dated 2020 extended the coverage so that all legal mining activities were subject to control, including those that have the prerogative to

exploit but do not have a mining title because they are covered by one of the transitional arrangements on the road to legality, such as the delimited and declared ARE, the requests for formalization of traditional mining of Article 325 and the requests for legalization of de facto mining.

Finally, Article 327 of Law 1955 dated 2020 addressed the conditions for subsistence mining, establishing the requirements for registration of such miners and the causes for cancellation and non-registration, as well as, monitoring and control of this activity.

Subsistence miners, considered as people who dedicate themselves to the extraction and collection of sand and gravel from rivers destined for the construction industry, clays, precious metals, precious and semi-precious stones, by manual means and tools, without the use of any type of mechanized equipment or machinery for their removal, must register personally with the Mayor's Office of the municipality where they carry out the activity.

The requirements for the mayor to proceed with the registration are 1) presentation of the citizenship card; 2) Single Tax Registration (RUT) with specific indication of the economic activity related to the mining activity; 3) certificate of affiliation to "Sisbén" or the document that serves as such; 4) indication of the mineral being exploited, and 5) description of the activity and the area where it will be carried out (municipality, township, hamlet, path, river). These miners may not be registered in more than one municipality at a time and must renew their registration annually on a personal basis.

For this registration, since March 31st, 2020, the ANM established the Genesis platform (<https://www.anm.gov.co/?q=genesis>), through which the renewal of the registration

of the subsistence miners must be made, with the fulfillment of the mentioned requirements within the following six months. This framework established in the PND, added to other

mechanisms already in place, offers options for miners to pursue their mining operations within the framework of legality (Table 22).

Table 22. Mechanisms of transit to the mining legality

Mechanism	Legal support	Requirement
Special Reservation Area	<ul style="list-style-type: none"> • Article 31, Law 685 dated 2001 • Article 22, Law 1955 dated 2019. Temporary environmental license for formalization. 	Free Area and demonstrate the tradition. They have the prerogative of exploitation and are subject to the temporary environmental license from the enactment of Law 1955 dated 2019.
Operation Contract	Article 221, Law 685 of 2001	The mining owners may subscribe to it, their title being valid.
Legalization of Fact	Article 165, Law 685 dated 2001	They had to have a free area to hire until January 1 st , 2005. They have the prerogative of exploitation until the mining authority resolves the issue and are subject to the temporary environmental license from the enactment of Law 1955 dated 2019.
Subcontract of formalization	<ul style="list-style-type: none"> • Law 1658 dated 2013 • Law 1753 dated 2015 • Article 22, Law 1955 dated 2019 (Temporary Environmental License for formalization) 	Mining exploitations developed before 2013 in titled areas; once the sub-contract is authorized, they have the prerogative of exploitation and are subject to the temporary Environmental License from the enactment of Law 1955 dated 2019.
Legalization of Traditional Mining	Article 325 and Article 22, Law 1955 dated 2019 (Temporary Environmental License for formalization)	Applications filed before May 13 th , 2013 and that on the date of issue of Law 1955 are in force at the mining authority. They have the prerogative of exploitation and are subject to a temporary environmental license for formalization.
Differential requirements for the granting of the concession contract for small miners	Article 326, Law 1955 dated 2019	In regulatory proceedings.

Source: Mining Formalization Directorate.

On this basis, processes of dialogue are activated within the framework of the function contained in numeral 3 of article 7 of Resolution No. 40129 of January 30th, 2015, which establishes: 1) the generation of spaces, mechanisms and tools to support the miners; 2) the identification with national and territorial entities of the problems associated with mining formalization, and 3) coordination with the different ministries and government entities to provide solutions to the problems of projects associated with mining formalization.

These processes can address the following approaches:

- Mediation between owners and small-scale miners who are carrying out exploitation activities in titled areas for third parties⁷¹, in accordance with the provisions of current regulations, seeking to ensure that these miners can work under the protection of a title without violating the rights of the mining owners. In this case, it is based on the premise of the express will of the parties to enter into a process of dialogue and their intention to reach agreements. In these cases, MinEnergía acts as a mediator or facilitator between the mining owner and the miner, operating without legality. The materialization of the agreement obtained in the mediation depends exclusively on the parties and MinEnergía follows up on this process, without being directly responsible.
- Processes generated by the demand of the mining community to carry out accompaniment in the identification of alternatives to develop their activity in free areas.

- Articulation with the mining authority to follow up on the procedures in which the mediations and/or the accompaniment provided by MinEnergía are carried out.

To date, it is estimated that there are more than 15,000 miners in transit to legality protected by the various tools mentioned:

1. 124 delimited and declared ARE, which allow the legal work of nearly 2,500 miners in 97 municipalities of 21 provinces.
2. 170 Subcontracts for the Formalization of Mining, which cover the legal work of nearly 3,000 miners in 40 municipalities in 10 provinces.
3. More than 1,300 requests for legalization of traditional mining under Article 325 of the PND, located on free areas in 496 municipalities of 29 provinces, which can cover the legal work of more than 9,500 small-scale miners.
4. More than 50 operating contracts, under which more than 2,000 miners work in 5 provinces.

As for the group of miners who have shown interest in entering the legal system, but are not yet covered by the above-mentioned arrangements, MinEnergía accompanies more than 250 processes aimed at determining the conditions under which they are currently operating in order to identify which of the tools described would be applicable to them. Thus, the following possibilities have been preliminarily

⁷¹ The spaces generated between small miners and owners are part of the mediation protocol, established in Resolution No. 40359 of April 8, 2016, "By which the Protocol is created to develop the mediation established in Chapter IV Article 2.2.5.4.1.1.3.2 of the Single Decree 1073 dated 2015 and other determinations are made".

identified: 170 Mining Formalization Subcontracts, 90 ARE, 9 Operation Contracts and 2 Area Returns for Mining Formalization, covering the legal work of more than 5,500 miners in 444 municipalities in 23 provinces.

Once the actions of the legal element of "Minero 5" have been addressed, this ministry is working on a Model of Mining Promotion aimed at generating the conditions and providing the services that will allow the miners, but particularly the small-scale miners, to become entrepreneurs, responsible, inclusive and reliable.

Being an *entrepreneur* means having the mentality of a company creator and having the decision and initiative to be on the path of improvement and risk management, identify business opportunities and organize the resources necessary to develop it, starting from being knowledgeable about your deposit to project and establish a sustainable mining project, economically viable and feasible, incorporating the scientific and technological component as a competitive factor for your business.

Being *responsible* means that it complies with technical and mining safety standards, considers the socio-environmental dimension of its activities and honors its environmental and social commitments; it complies with labor obligations; it generates formal employment, incorporating qualified and competent work teams; it ensures the payment of its tax obligations and royalty payments, and it acts within the framework of universal mandates on issues such as human rights, gender and climate change, among others.

Being *influential* is the attribute that begins to establish the relationship between the mining businessman and his environment; it means becoming a generator of value for the territory

where his or her mining project is developed, contributing to local economic development, strengthening the capacities of the inhabitants, coexisting with other productive sectors, maintaining an open and active attitude towards processes of citizen participation and linking his work with the local economies.

Being *reliable* refers to a mining entrepreneur who builds and maintains communication channels with stakeholders, is accountable with transparency, promotes oversight and control of their actions, generates truthful information that makes it visible, ensures ethical behavior, promotes traceability in its value chain and has an attitude of openness and proactivity in citizen participation processes.

In this sense, we are working with the support of the Inter-American Development Bank (IDB) in the creation of the foundations and the institutional arrangement that promotes a mining transformation based on the dimension of the mining resource, the management and the alliances with the territory and the strategic business vision. This is framed in the lines and strategies oriented to technical assistance, commercialization and traceability, financial inclusion, productivity and competitiveness, which lead the territories to receive benefits not only from the royalties as producing municipalities but also those derived from the linkages and articulation for the benefit of the communities.

Now, recognizing that access to the financial system is one of the current barriers for the mining sector to consolidate itself in the entrepreneurial pillar, MinEnergía is working on a comprehensive financial inclusion strategy. Thus, it has defined a series of actions aimed at increasing banking penetration, as well as improving access to credit and other financial products and services in the system. The

strategy is based on three basic pillars: trust, banking penetration and financing. Finally, this model will include a differential component for the ethnic communities, where there will be a differential chapter with a vision of mining business focused on providing services to these communities.

These efforts are complemented by joint actions between MinEnergía, MinAmbiente, the Ministry of Health and Social Protection (MinSalud) and the United Nations Development Program (UNDP) in the framework of the Integrated Management of Mercury project. This project has an execution horizon for the period 2019-2023; its actions are concentrated in eleven municipalities in the provinces of Antioquia, Cauca and (southern) Bolívar.

EVOA's monitoring data access model

Design of intervention strategies based on timely technical evidence

Since 2016, UNODC, in agreement with MinEnergía, has published figures, analyzed authorized arrangements for exploitation, socio-economic analysis and research related to data and territories with EVOA in Colombia.

The efforts made for the publication of the research, the timely delivery of data and analysis made for government entities and the presentation of the most outstanding findings seek that the design of interventions by the State and the construction of public policy are

based on technical evidence according to the reality of each of the territories.

In order to maximize the use of the information provided by the monitoring system, an access model to EVOA's data was designed and built with the use of new information technologies and UNODC's technological ecosystem. The result allows the visualization, consultation and analysis of EVOA's georeferenced information in Colombia.

The result is a web application designed and implemented on the ArcGIS Entreprice platform, ArcGIS Online and different modules such as Operation Dashboard and ArcGIS Web AppBuilder. The application centralizes the available geographic information related to EVOA from different institutions and allows visualization, consultation and analysis, promoting the use and exchange of data and information. The tool is aimed at any type of user who is not an expert in handling geographic data and, since it is available on the Internet, no specialized software is required. The access to the application is restricted; a user must have a registration in the platform.

Geographic information available in the application

The information collected as input for the application considers geographical data from different sources, related to the exploitation of alluvial gold. Table 23 displays the information used in the design and configuration of the application.

Table 23. Base information for building the application

Information	Description	Source	Validity
Evidence of alluvial gold exploitation (EVOA)	EVOA polygons corresponding to the detection of areas with evidence of alluvial gold mining	UNODC	2014, 2016, 2018, 2019
Provinces	Territorial information corresponding to the political-administrative delimitation of provinces	IGAC-DANE	2016
Municipalities	Territorial information corresponding to the political-administrative delimitation of municipalities	IGAC-DANE	2016
Indigenous Reservations	Special territorial information corresponding to the delimitation of indigenous reservations	ANT	2018
Community Councils	Special territorial information corresponding to the delimitation of Black, Afro-Colombian, "Raizal" and "Palenquera" communities	ANT	2018
National Natural Parks	Territorial demarcation of zones declared as national protection zones corresponding to the National System of National Natural Parks	PNN	2018
Regional National Parks	Territorial demarcation of areas declared as national protection corresponding to regional natural parks	SINAP	2018
RAMSAR Sites	Delimitation of moorland ecosystems and wetlands designated within the list of international importance of the RAMSAR Convention	Ministry of the Environment	2018
Forest Reserve Zones	Territorial demarcation of areas declared as national protection corresponding to Protected Forest Reserve Areas	RUNAP	2018
Populated centers	Territorial information corresponding to the delimitation of urban areas	IGAC-DANE	2016
Mining zones of ethnic communities (indigenous, black communities)	Territories recognized by law that belong to ethnic communities with autonomy for decisions on the use of their natural resources	ANM	2018
Environmental Licenses	Delimitation of the area that has the permission granted by the environmental authority (ANLA)	ANLA	2018, 2019

Information	Description	Source	Validity
Protection of exploitation and exploration titles	Delimitation of the area in which the right to explore and exploit the soil and subsoil is granted	ANM	2018, 2019
Special Reservation Areas	Delimitation of areas where there are traditional informal mining operations, at the request of a mining community	ANM	2018, 2019
Applications for legalization Law 685 dated 2001	Delimitation of the area that contemplates the legalization of exploitation activities by means of a concession to the operators of state-owned mines without a title registered in the National Mining Registry	ANM	2018, 2019
Applications for legalization Decree 933 dated 2013.	Delimitation of the area that contemplates the legalization of applications under this decree	ANM	2018, 2019
Ecosystem Map	Delimitation of continental ecosystems	Humboldt Institute	2016
Change in the area of natural forest (deforestation)	It corresponds to the cartographic delimitation of the change in the area of natural forest in Colombia	IDEAM	2017-2018

In addition to the information in the table above, it also includes mapping of roads and rivers in vector format. This information together with ArcGIS base maps allows spatial contextualization of the thematic information.

To facilitate the integration, spatial and statistical analysis of the data, the framework of areas of one square kilometer is used. Since the unit of analysis is the grids, changes and updates in the boundaries of territorial entities do not alter the results; therefore, updates of spatial information and spatial-temporal studies can be performed efficiently.

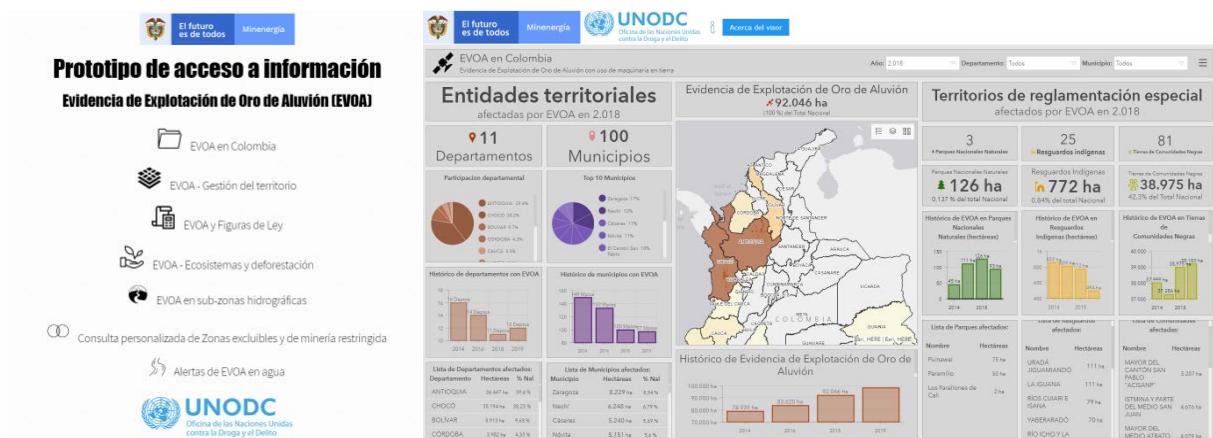
Application

EVOA's information access application was designed based on a thematic scheme that contemplates seven modules, according to the interest of the consultation. The access to these modules is carried out through an HTML interface that serves as a link to each application.

EVOA in Colombia

The first consultation module (Figure 63) provides a general overview of EVOA in Colombia and allows for the collection of EVOA data with land use machinery by province and municipality; it also presents the data by PNN, Indigenous Reserves and Black Community Lands. Currently, a four-year data series is available (2014, 2016, 2018 and 2019).

Figure 63. General view of the application

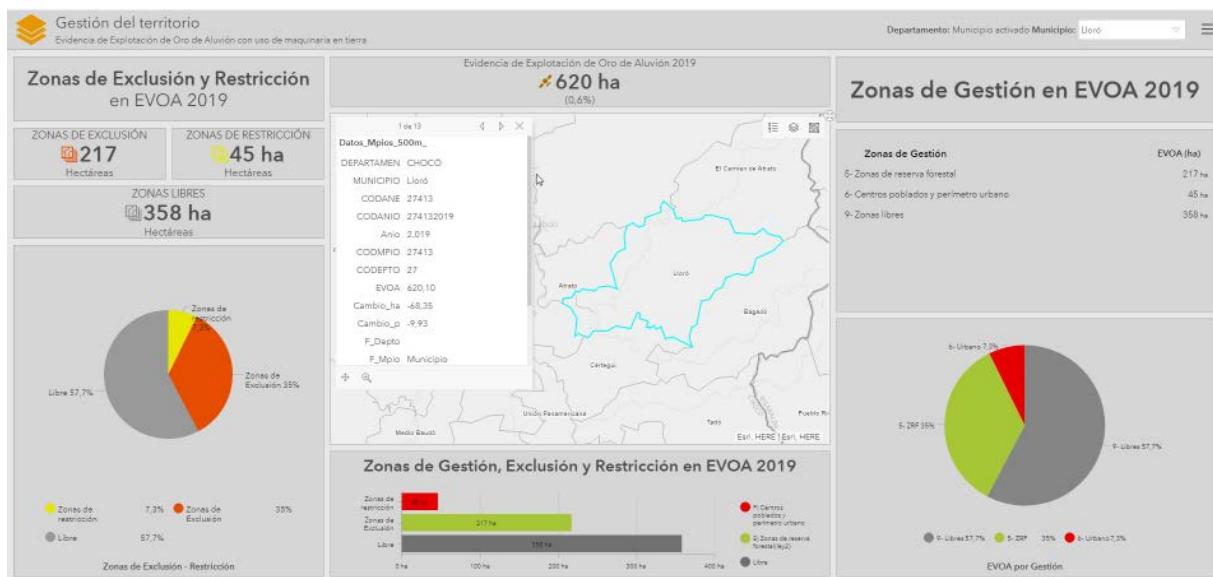


The application allows you to filter by year, province and municipality, customizing the query; also, the map allows you to visualize where is the highest density of EVOA detected.

EVOA and territory management

This module integrates the data of the management model for interventions in the territory (Figure 64).

Figure 64. Application, module for model of territory management

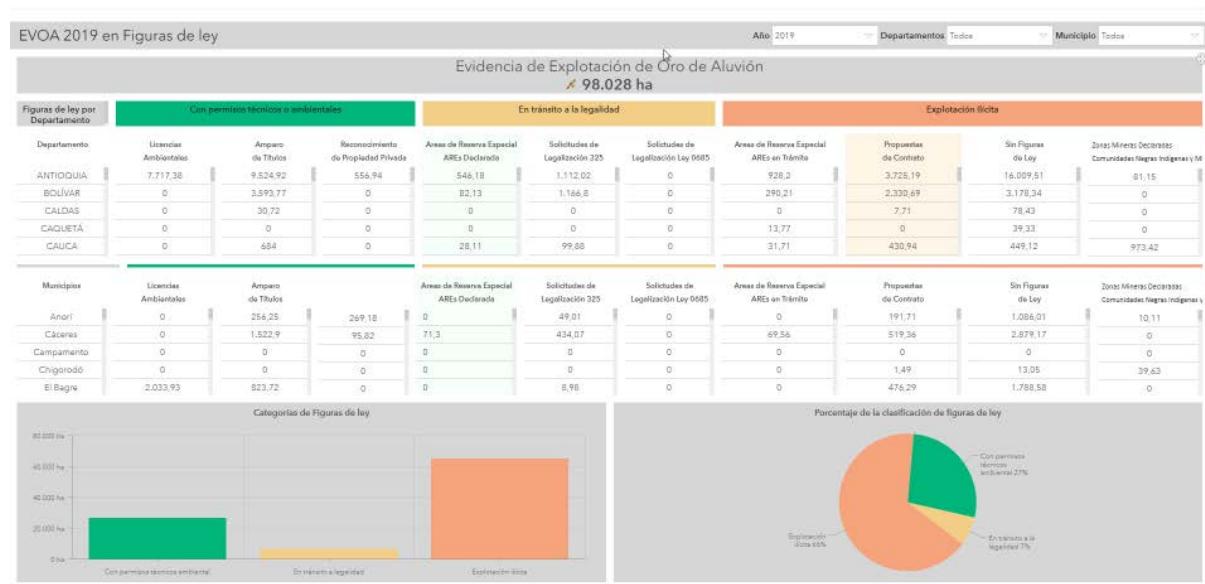


Like the first module of the application, this one allows to make consultations at province and municipality level; additionally, it shows the stakeholders, the Restricted mining zones and their respective subdivisions.

EVOA and law arrangements

The application allows you to consult, by province and by municipality, the amount of EVOA on land (2018 and 2019) that has one of the arrangements contemplated in the regulatory framework (Figure 65).

Figure 65. Application, module for law arrangements

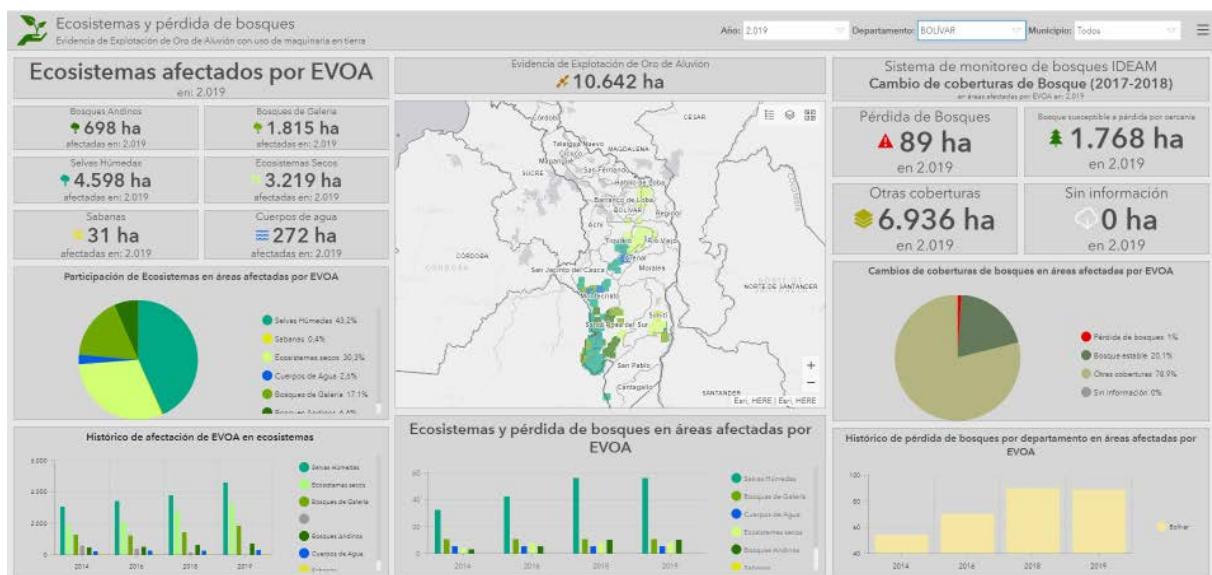


EVOA in ecosystems and deforestation

One of the impacts of mineral exploitation in alluvial lands is the loss of forest cover and the alteration of ecosystems. This viewer (Figure 66) allows, through the superimposition of EVOA, to know the intervened ecosystems and the change in the forest coverage.

The data can be consulted by province and municipality. For ecosystems, information from the Alexander von Humboldt Institute from 2016 was used, and for deforestation, data from the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) from 2018 was used.

Figure 66. Application, module for ecosystems and forest loss

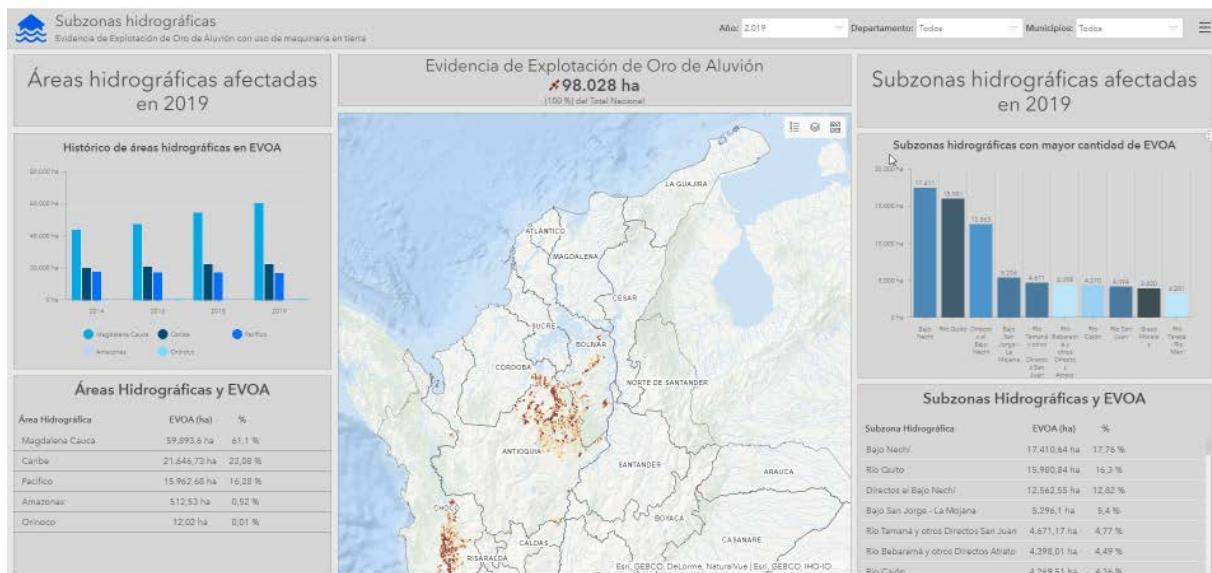


EVOA and Hydrographic Sub-Zones

The EVOAs are associated with river axes and their respective landscapes. By knowing the rivers with the presence of the phenomenon and the hydrographic dynamics, it is possible to establish the state of intervention of the basin and to integrate the information in

the management plans where the zones of exclusion, restriction or establishment of the mining activity and the measures to mitigate the effects of the activity are established. The viewer (Figure 67) allows to know by province and municipality which Hydrographic Sub-Zones and hydrographic areas have EVOA in four years (2014, 2016, 2018, 2019).

Figure 67. Application, module for Hydrographic Sub-Zones

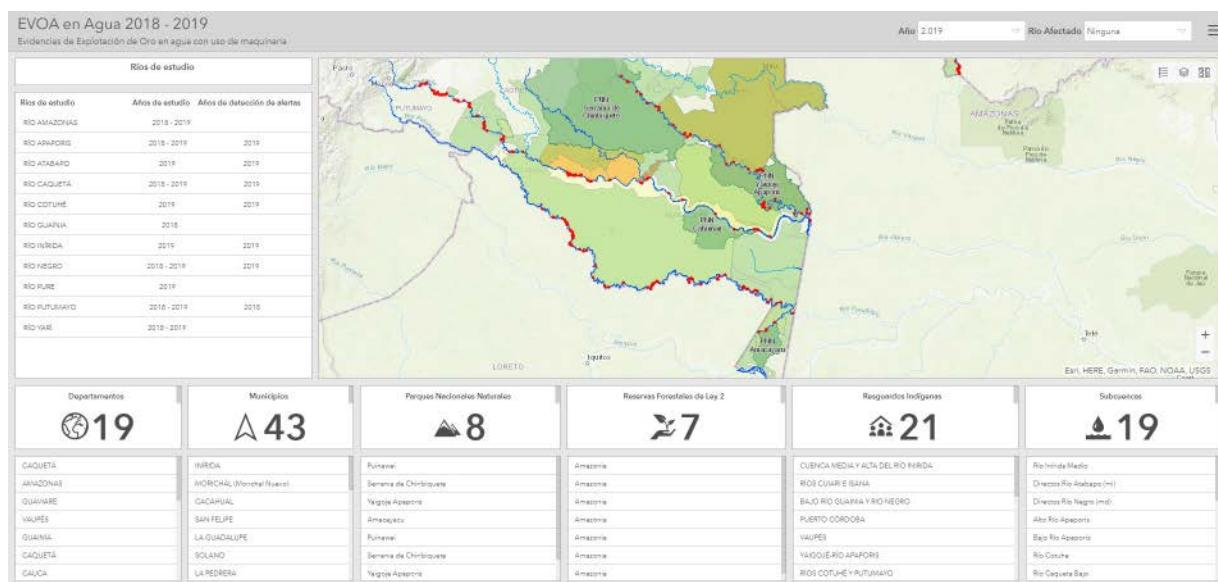


Alerts for EVOA in water

In order to complete the national panorama for EVOA detection with the use of machinery in water, the viewer links the geography of EVOA alerts in water in the rivers studied. Alerts are available for the years 2018 and 2019: in 2018, the Negro, Apaporis, Caquetá, Putumayo and

Amazonas rivers were analyzed; in 2019, the Amazonas, Apaporis, Atabapo, Caquetá, Cotuhé, Inírida, Negro, Puré, Putumayo and Yarí rivers. This viewer (Figure 68) allows for consultation by river identified through the detection of EVOA alerts in water and the proximity or inclusion with PNN, Forest Reserves and Indigenous Reserves.

Figure 68. Application, module for EVOA in water



Spatial query in Excludable zones from mining and Restricted mining zones

It allows for a personalized consultation by means of a spatial analysis (Figure 69). The user draws the polygon of interest on the screen

and it is intercepted with the Excludable zones from mining and the Restricted mining zones defined in the Mining Code. This can also be done by loading a polygon in *.shp format in WGS84 coordinates.

Figure 69. Applicative, module for Excludable zones from mining and Restricted mining zones



The result is a report in *.pdf format with the area report in square kilometers of all the Excludable zones from mining or Restricted mining zones containing the point or polygon of interest.

Alternative development and production models

This chapter addresses two work models: the first focuses on implementing joint actions between communities and authorities, from 2018 in the municipality of San José del Fragua (Caquetá), guides the organization of the community and the regularization of gold mining activity under the arrangement of ARE and has the participation of a traditional mining community, with the support of MinEnergía and UNODC. The second, with the participation of indigenous communities from the municipalities of Zaragoza, El Bagre and Segovia in Antioquia, the Secretary of Mines of Antioquia and the accompaniment and advice of UNODC, is oriented towards the regularization of subsistence mining activity

and the empowerment of the indigenous community through a productive mining model.

In Colombia, subsistence mining constitutes a large part of the extractive activity and sustains ancestral economic activity in several areas of the national territory. In addition, in the province of Antioquia there are levels of illegality or informality in this activity, which is why the Government of Antioquia (Indigenous Management and the Secretariat of Mines) and UNODC signed an international cooperation agreement in 2018⁷² with the aim of “co-financing strategies to improve mining activities in indigenous communities, seeking development and cultural recognition of the craft. In this context, actions were developed to regularize the gold mining activity for the subsistence of the indigenous communities of Antioquia.

The agreement focused on a business model for the strengthening of the indigenous communities linked to the extraction processes of minerals, gold in particular; this model considers the identification and structuring of a model

⁷² Cooperation Agreement No. 4600008930 of 2018.

that allows to consolidate the gold extraction activity in a productive way, incorporating principles aligned to the current market trends and promoting the culture of legality.

By virtue of the above, UNODC advanced the characterization of the factors related to the community of the indigenous reserves of Shoibado, Vegas de Segovia and Tagual La Pó, in the municipalities of El Bagre, Zaragoza and Segovia, respectively (table 24).

Table 24. Target population of the model

Municipality	Community	Families
El Bagre	Shoibadó	18
Segovia	Tagual La Po	32
Zaragoza	Vegas de Segovia	25
Total		75

This information produced the following scheme:

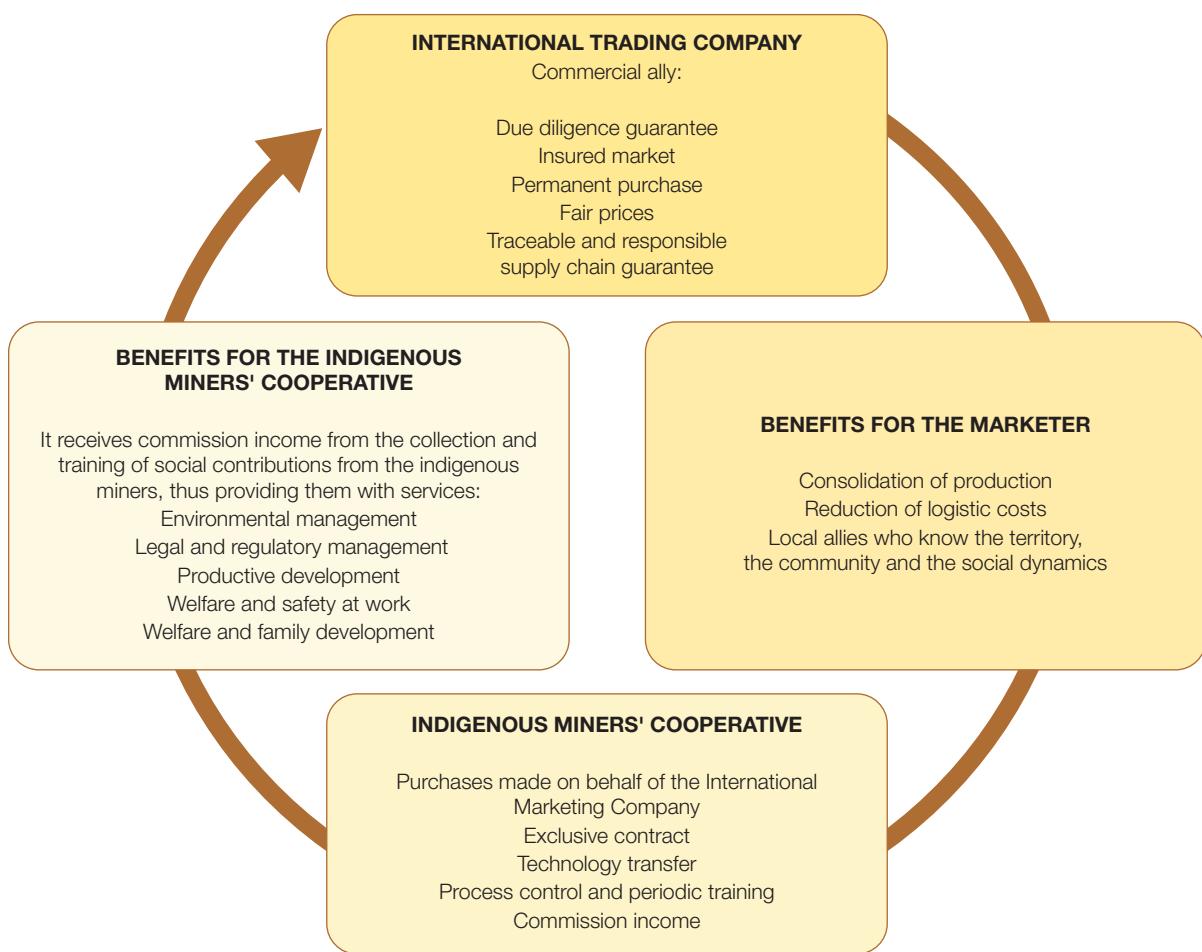
- In order to develop an adequate commercial process, it was recommended that a single cooperative be created, which would facilitate the socio-business organization of the communities and offer social benefits to these population groups, which would be derived from the income received from providing the service as a local collector, and from the social contributions that each indigenous subsistence miner would make, over a percentage of the total price increase that he would obtain for having his activity duly formalized and for being part of the cooperative.
- In order to link the production of indigenous subsistence mining communities to the international market for precious metals, it was recommended that a strategic alliance be consolidated between indigenous mining communities through the cooperative, as the entity that collects the mineral, and an international trading company that provides consumers with a safe, traceable and efficient supply chain, in compliance with international standards that certify that

the activity does not support or benefit the illegitimate armed conflict, or contribute to serious human rights abuses or violations of international humanitarian law. With the implementation of this strategy, the aim is for the beneficiary mining communities to obtain better income and thus improve their quality of life.

This alliance is framed in the Colombian mining legislation, with respect to legal requirements and forms of gold commercialization.

This is achieved through a commercial agreement signed between the “Cooperativa de Mineros Indígenas” (i.e. Indigenous Miners’ Cooperative) and an international marketing company through which the cooperative can participate in the commercial management, without contravening the legal requirements to have mining titles or concession contracts and to have a large economic capacity, as established in Resolution 171 of April 19th, 2018, aspects that in the short term are not easy with which to comply for indigenous mining communities. Figure 70 displays the general operating scheme of the proposed business model.

Figure 70. Operational model of commercial alliance between “Cooperativa de Mineros Indígenas” and international trading company



The international trading company, as a commercial ally, will be able to guarantee that all production and marketing is carried out within the legal framework and in accordance with due diligence. Likewise, it will facilitate the equipment, systems, processes, tools, training and guidance necessary to develop the commercial activity in compliance with national legal requirements and international demands. As a result of the above, the international trading company will have the consolidation of the

production, will reduce its logistic costs and will create links with local allies who know the territory, the community and the social dynamics, fundamental aspects to develop a stable and sustainable mineral supply in time.

The current production of the subsistence miners in the indigenous communities belonging to the municipalities of El Bagre, Segovia and Zaragoza can be seen in table 25.

Table 25. Current monthly gold production according to baseline survey, 2019

Current monthly gold production (g)		
Production/Indigenous reserve	Persons	Amount of gold
Shoibado	18	239
Vegas de Segovia	25	1,198
Tagual la Po	32	539
Total		1,976

Taking into account that an increase in production of up to 33% is estimated for each indigenous subsistence miner, and estimating that gold holdings remain constant in the

area according to the information collected in the baseline characterization, an estimated total recovery of 2,625 g of gold by subsistence miners is projected (see table 26).

Table 26. Expected production according to the production proposal

Expected monthly gold production (g)		
Production/Indigenous reserve	Persons	Amount of gold
Shoibado	18	630
Vegas de Segovia	25	875
Tagual la Po	32	1,120
Total		2,625

Currently, according to the characterization information collected by UNODC in these indigenous reservations, subsistence miners market the extracted gold at an average of

COP \$70,000/g; through the regularization of subsistence miners and their extraction activity, the value of gold will be established by current market prices (table 27).

Table 27. Obtaining greater income through mining regularization

Amount of gold (g)	Price without mining regularization (COP \$)	Legal price with mining regularization (COP \$)	Increase in income (%)
1	70,000	120,761	42

Source: UNODC.

If the gold is certified as green gold (certification granted by the Chocó Green Gold Corporation) and traded at fair prices on international markets, it can achieve an additional 15% increase over the legal sale price, thus benefiting indigenous subsistence miners by increasing their current income by up to 40%.

On the other hand, this business model contemplates a financial plan, which specifies the total costs and expenses, calculated from the sum of the personnel costs required for the operation of the cooperative and the costs per technological package.

It has been possible to strengthen the dynamics of the indigenous reservations in the commercial sphere, contributing in turn to the strengthening of the exercise of their competencies and the promotion of a favorable scenario, involving strategic allies of a private or public nature. This has been possible thanks to the implementation of the following strategy:

1. Registration of subsistence mining activity: the project achieved the articulation of territorial institutions, notaries and the DIAN, institutions that were linked with the purpose of contributing from their mission to strengthen the capacities or favor the processes so that these communities go from illegality to legality in a sustainable way. Each miner who is a beneficiary of the project was given the documentation that accredits their legal status (RUT and SI.Minero).
2. In coordination with the National Learning Service (SENA), the community of Vegas de Segovia was trained in basic principles of goldsmithing, with an intensity of 40 hours, in order to generate added value to their product and obtain greater income.
3. Socio-business strengthening: processes were carried out to raise awareness of governance and leadership issues, in order

to generate self-recognition of the role of participants within the indigenous reservation and the promotion of leaders who carry out actions for the benefit of the community.

4. Technical and productive strengthening: the project delivered equipment (gutters and fiberglass pans) to facilitate and improve the productivity of the “zero mercury” extraction processes; in addition, training sessions were held on gutter management, mining regulations and good mining practices.

This model also promotes important advances in aspects such as: empowering community leaders and business units; strengthening the principle of gender equity; and identifying new opportunities for marketing products under superior quality standards that directly impact the quality of life of each of the beneficiary families.

Aspects of prevention, control and prosecution of crime as part of a comprehensive territorial intervention strategy

In Colombia, environmental crimes have emerged in the last decade as part of the phenomena associated with the diversification and fragmentation of transnational organized crime operating in the country, with relevant security impacts in the affected territories.

Within this type of crime, illicit gold exploitation has stood out as one of the main subway economies that currently generates substantial challenges for the authorities in terms of prevention, control and criminal prosecution.

This activity has developed a complex system of value in which legal and illegal actors participate simultaneously and in which other crimes converge, including those that affect life, integrity, and patrimony of citizens.

Alluvial gold exploitation (EVOA): why is it attractive to organized crime?

Gold is a commodity par excellence. In recent years, spending on exploration of non-ferrous metal minerals has grown steadily, attracting nearly 24% of total (annual average) investment to Latin America [37]. Gold exploration has been, in this sense, the main recipient of this capital.

The growth in investment has been driven by the rise in prices of this metal during the period 2000-2010: according to the Global Initiative Against Transnational Organized Crime [38], in this period gold prices on the markets have increased by nearly 360%, thanks to which it is able to generate greater absolute monetary benefits in the production, distribution and commercialization of the mineral at the international level⁷³.

The exploitation of the mineral has thus become a significantly profitable activity, even when it is carried out illegally. In the country, these factors have favored the rise of EVOA, part of which has been permeated by organized crime. In turn, these groups have seen in EVOA a possibility to consolidate their structures and to facilitate the development of other illegal activities such as weapons' trafficking, human trafficking and, mainly, extortion.

In accordance with UNODC [39], 57% of alluvial gold exploitation with land-based machinery in Colombia is carried out outside of any legal arrangement, in scenarios that are favorable for the involvement of armed structures in this activity. In fact, the same source highlights that by 2018 in Colombia the two provinces with the greatest presence of this

phenomenon were Antioquia (40%) and Chocó (38%), territories in which the authorities have reported active presence of organized armed groups (GAO), such as the "Autodefensas Gaitanistas de Colombia" (AGC), the "Ejército de Liberación Nacional" (ELN) and dissidents of the "Fuerzas Armadas Revolucionarias de Colombia-Ejército del Pueblo" (FARC-EP) [40].

The presence of these groups in these territories has resulted in their involvement in all phases of the value system associated with the illicit extraction of gold (exploration, extraction, transport, and commercialization). In turn, these dynamics have generated the opportunity for the GAO to control various scenarios in the territory, linked to other illicit economies, through the exercise and use of armed violence and coercion (confinement and forced displacement of the population, extortion, legal and illegal economic activities, forced recruitment, etc.).

Impacts on public safety in territories with EVOA

Various sources cited in [37] have identified the statistical relationship between armed violence (homicide rates, armed confrontations), humanitarian impacts (forced displacement), effects on economic activity (extortion), and serious damage to natural resources through the exploitation of alluvial gold (EVOA).

Regarding homicide, in the country the areas that have registered EVOA active during the last decade have reported dynamic characteristics of the intersection between illicit economies and organized violence. The provinces of Antioquia⁷⁴ and Chocó are visible examples of these phenomena.

⁷³ According to the Global Initiative against Transnational Organized Crime, [38] "in Peru and Colombia-the largest producers of cocaine in the world-the value of illicit gold exports exceeds the value of cocaine exports" (p. 7).

⁷⁴ Antioquia contributes 47.83% of national gold production, although 79.1% (2011) of the mines operating in its territory do so without any type of title [40]. In addition, the National Mining Agency reports that by 2017 there will be approximately 34,784 artisanal miners or subsistence miners.

In the case of Antioquia, in the municipalities with the highest EVOA detection, such as Zaragoza, Nechí, Cáceres, El Bagre, Remedios, Segovia, Tarazá, Anorí, Caucasia and Amalfi (located in the regions of the Lower Cauca and Northeast Antioquia)⁷⁵, The Ombudsman's Office [40] has recorded the armed activity of dissidents from the FARC-EP (of the former 18th, 36th, and 57th fronts), the ELN, and other groups such as the AGC and "Los Rastrojos", whose violence is intrinsically related to the control of economies associated with the illicit extraction of gold. These criminal actors have energized the behavior of violence in the territory as homicide rates have fluctuated significantly over the last decade, with peaks in 2012 and 2015, followed by a relatively sustained reduction to date. For the last year of registration (2019) in all of the mentioned Antioquia municipalities, except for Zaragoza, Nechí and Remedios, the homicide rate exceeds the national average.

On the other hand, in the case of Chocó, in the municipalities with the greatest presence of EVOA detected, such as Nóbata, Cantón de San Pablo, Istmina, Unión Panamericana, Río Quíto, Condoto, Quibdó, Medio Atrato, Cértegui, Medio San Juan, Tadó, and Atrato⁷⁶, the Ombudsman's Office [40] has recorded the predominant activity of the ELN, a group that has had a certain hegemony in the control of illicit activities with which it has managed to permeate part of the activity associated with EVOA. Additionally, there are reports of violent incursions and disputes involving the extinct FARCEP, the AGC, "Los Rastrojos", and smaller criminal groups such as "La Empresa". In this way, homicide has presented during the last decade differentiated tendencies without patterns of sustained increase or decrease in

time. As in Antioquia, by 2019 all municipalities analyzed, except for El Cantón de San Pablo, Nóbata, Condoto and Atrato, have rates above the national average.

In this context, it is possible to consider as a primary hypothesis that the presence of armed actors with interest and capacity to control activities such as the illicit exploitation of minerals influences, as has been pointed out, the trends and scope of homicide in the territories. In the scenarios of a rise in armed violence - as evidenced by the increases in 2012 and 2015 in the entire province of Antioquia or in 2013 in the municipality of Nóbata in Chocó - the increase in homicides may be associated mainly with disputes between armed actors for control of the activity, considering that, as mentioned, the EVOA has some participation in a network of illicit markets at the service of transnational criminal networks that operate in territories with widely diversified portfolios.

Likewise, the transformations in the operation of crime, the fragmentation of the criminal structures that have been registered in the last five years and the possible pacts reached by criminal actors, related to the equitable usufruct of the illicit income derived from activities such as the criminally permeated EVOA, could explain the low homicide rates or the sustained tendencies in the levels of violence, as occurs in a great part of the municipalities of the province of Chocó since 2014. This, in the understanding that certain structures with greater operational capacity - e.g., the "Clan del Golfo/Autodefensas Gaitanistas de Colombia" or the "ELN" - have guaranteed control over part of the value systems associated with this criminal activity.

⁷⁵ According to the UNODC [39], these municipalities contribute 95% of EVOA on land in the province of Antioquia and 38% of the national figure (p. 67).

⁷⁶ According to UNODC [39], these municipalities concentrate 92% of the EVOA of the province and 35% of the national total (p. 69).

Finally, it is necessary to highlight that in terms of safety, one of the most serious impacts of the EVOA's lies in the environmental effects that this activity generates in the ecosystems. In addition to threatening the life and integrity of communities, it is an activity that contaminates water resources, including drinking water sources, and destroys virgin environments such as forests and moors. Illicit mineral extraction uses chemicals such as mercury and cyanide, which at high levels of concentration can pose imminent health risks to individuals and communities [38].

The illegal financial problem resulting from gold mining

All studies and analyses agree that gold mining is an increasingly important source of financing for illegal armed groups⁷⁷.

The following are the causal factors of this phenomenon:

- The achievements of the Colombian State in its fight against drug trafficking have increased the costs and risks associated with this activity [40].
- The volatility of international cocaine prices, derived in part from the paradoxically unfair competition that new psychoactive substances (NSP), opioids, and narcotics of chemical origin, such as alpha-methyl-fentanyl, generate for cocaine hydrochloride and even for the market for cocaine paste in its basic state.
- The operational complexity of drug trafficking, insofar as it involves international actors and markets.

- The controls on international transfers and on the cross-border movement of cash within the framework of the management of risks derived from the laundering of assets.
- The territorial coincidence between coca and gold [41].
- The increase in international gold prices [40].
- The need of illegal armed groups for cheaper and more secure sources of resources that generate quick and easy local liquidity in national currency.

The illegal armed groups participate directly in the gold mining value chain by exploiting the deposits located on the lands under their control. For this purpose, they acquire the necessary machinery and equipment, hire the required workers and proceed with the exploitation, obviously without complying with the records, reports or institutional requirements regarding the handling of chemicals, explosives and environmental protection. The establishment of front companies is one of the mechanisms by which they obtain mining concessions [37] [40] [41].

Indirectly, the illegal armed groups participate in the gold mining value chain through a criminal mechanism that is simpler, cheaper and more productive, and therefore more widespread than direct participation: extortion⁷⁸.

The Ombudsman's Office emphasizes that at the territorial level extortion is equivalent to that imposed in a formal economy, so that at the local level it moves between the parasitic

⁷⁷ They include: ELN, Grupo Armado Organizado Residual (GAO-R), Grupo Delictivo Organizado (GDO) and GAO.

⁷⁸ In 2012 it was estimated that, in the province of Antioquia, illegal groups could be receiving between COP \$650,000,000 and COP \$3,450,000,000 each month [41].

and the provision of a service: while resources are stolen from the civilian population, they are offered protection and security, not only with respect to the illegal armed group's own actions, but also with respect to the incursion of a rival group or the interventions of the Public Force and the customs and judicial authorities [42].

In this sense, the authorities have pointed out that extortion is an effective mechanism to coerce and control both the revenues of the value system that EVOA as a whole represents and other social and economic activities through threats and intimidation. Extortion guarantees territorial control, finances criminal structures, and generates resources that allow these groups to participate in other illicit activities, such as drug and weapons smuggling, and to subject the civilian population to their designs, to the point of resolving conflicts associated with the exercise of the activity and imposing restrictions on the way it should be carried out [37] [43].

Extortion has been present since the beginning of the business: they charge for the entry of machinery, equipment, and personnel. Then, they charge for access to inputs such as explosives, fuel, cyanide, or mercury, and finally they set a fixed or variable periodic fee when they can keep track of production [41], always taking care that the profitability of the business is not affected. Thus, their amount can be included within the cost structure by the miner [41].

Money laundering from drug trafficking and other crimes is also present in mining activity, through the contribution of machinery,

equipment and working capital of criminal origin, as well as through the purchase of production at prices above the market [40]. The absence of effective controls by the State over the business of buying and selling gold, especially in regions far from the main smelting and marketing centers, facilitates this criminal operation⁷⁹ [37] [41].

The absence of control over the marketing of gold has also led to the mismanagement of royalties: "There seem to be some municipalities that generate incentives to declare royalties in their name in order to increase them. These compensations can be in monetary terms through the return of money or simply by guaranteeing impunity", they emphasize [41]. In the same vein, [37] they warn that "there have been cases of mayors who have been willing to declare their gold production as their own and then distribute royalties or budget allocations with the AANE⁸⁰".

The diversion of royalties in turn produces sinister social effects, which negatively affect social coverage in the areas of education, health, potable water, sewage, environmental sanitation, electricity, sanitation, household gas, and public telephones, and therefore negatively affect poverty indicators at the municipal level.

The prevention, control and prosecution of EVOA from a public safety perspective

It is considered that the territorial entities should direct their intervention in matters of citizen security to the axes of prevention, control, and prosecution of crime, based on the following considerations.

⁷⁹ The Ombudsman's Office warns that the Certificate of Origin and the Declaration of Production used to monitor the commercialization process of the gold produced by the subsistence miners have not succeeded in ensuring that the commercialized gold is not contributing to the financing of the illegal armed groups, and therefore to human rights violations and breaches of international humanitarian law. [40]

⁸⁰ Armed non-state agents.

In the first place, the analysis of EVOA as a system susceptible to be incorporated to the criminal value, even with a greater logistic, financial and control capacity than drug trafficking, allows a differentiated approach of the different actors that participate in it. From this perspective, it is possible for the authorities to determine preventive actions aimed at: 1) the progressive formalization of activities related to mining with a vocation of formalization to prevent their co-optation by criminal structures; 2) the adoption, according to operational capacities, of codes of ethics and international standards for miners in the process of formalization in order to reduce the risks of involvement with criminal actors, and 3) the identification of other forms of organized crime that may develop in areas with EVOA's presence, such as sexual exploitation or human trafficking, in addition to weapons smuggling.

In terms of control, it is important that local authorities design strategies that allow them to monitor indicators related to homicide and other crimes such as extortion, in order to design adjusted strategies of response in the short and medium term. For this purpose, the inclusion of the situation of EVOA and its relationship with phenomena that affect security and coexistence in affected territories in the Integral Plans of Security and Citizen Coexistence (PISCC) can provide the territorial entities with greater financial, operational and

administrative capacities, within the framework of their autonomy, to face this activity.

Within the axis of control, it is indispensable to apply controls over the royalties, their uses and their sources, particularly in the areas where the EVOA is materialized, as well as the application of the regulations in force regarding the control of the entry of yellow machinery (National Police Code, art. 104.); the control of inputs used in the mining activity (National Police Code, art. 107), and the provision of information or technical instruments indispensable for the detection of substances, elements or chemical inputs used in the mining activity (National Police Code, art. 106). These provisions provide tools to local authorities for the imposition of sanctions such as restitution and protection of real estate, disablement of property, destruction of property, temporary or definitive suspension, confiscation and the imposition of fines.

Finally, the criminal prosecution of the EVOA phenomenon may be directed to the dismantling of criminal structures that control or participate in any of the phases of exploration, exploitation, distribution and illegal commercialization of gold. Likewise, international cooperation can be useful in determining the scope of world trade in this material and the relationship with other actors (including legal ones) involved in the entire network described.

Photograph:
Alluvial gold exploitation on water, Nariño



The last section, Annexes, presents more detailed information on some geographical analysis around EVOA.

SECTION V ANNEXES

ANNEX 1. EVOA IN WATER IN RESTRICTED MINING ZONES (POPULATION CENTERS)

Table 28. Areas within the urban perimeter of cities and towns with alerts for EVOA in water

Province	Municipality	Name of the population center
Amazonas	La Pedrera	La Pedrera
	Santander (Araracuara)	Puerto Santander
Caquetá	Solita	Solita*
	Curillo	Curillo*
	Curillo	Palizadas
	Solano	Solano
	Solano	Araracuara
	Solano	Peñas Blancas
	Solano	Mononguete
Putumayo	Puerto Leguízamo	La Tagua
	Puerto Guzmán	José María*
	Puerto Guzmán	Mayoyogue
	Puerto Guzmán	El Gallinazo
	Puerto Guzmán	San Roque

* The only population centers where EVOA in water alerts are less than 10 km upstream of the river or directly in front of the population.

In most cases, the alerts are less than 20 km upstream; however, there are others where the population center is between 50 km and 100 km downstream from the alert areas.

ANNEX 2. COVERAGE OF ENVIRONMENTAL VALUE

Figure 71. High environmental value coverage contemplated in the study

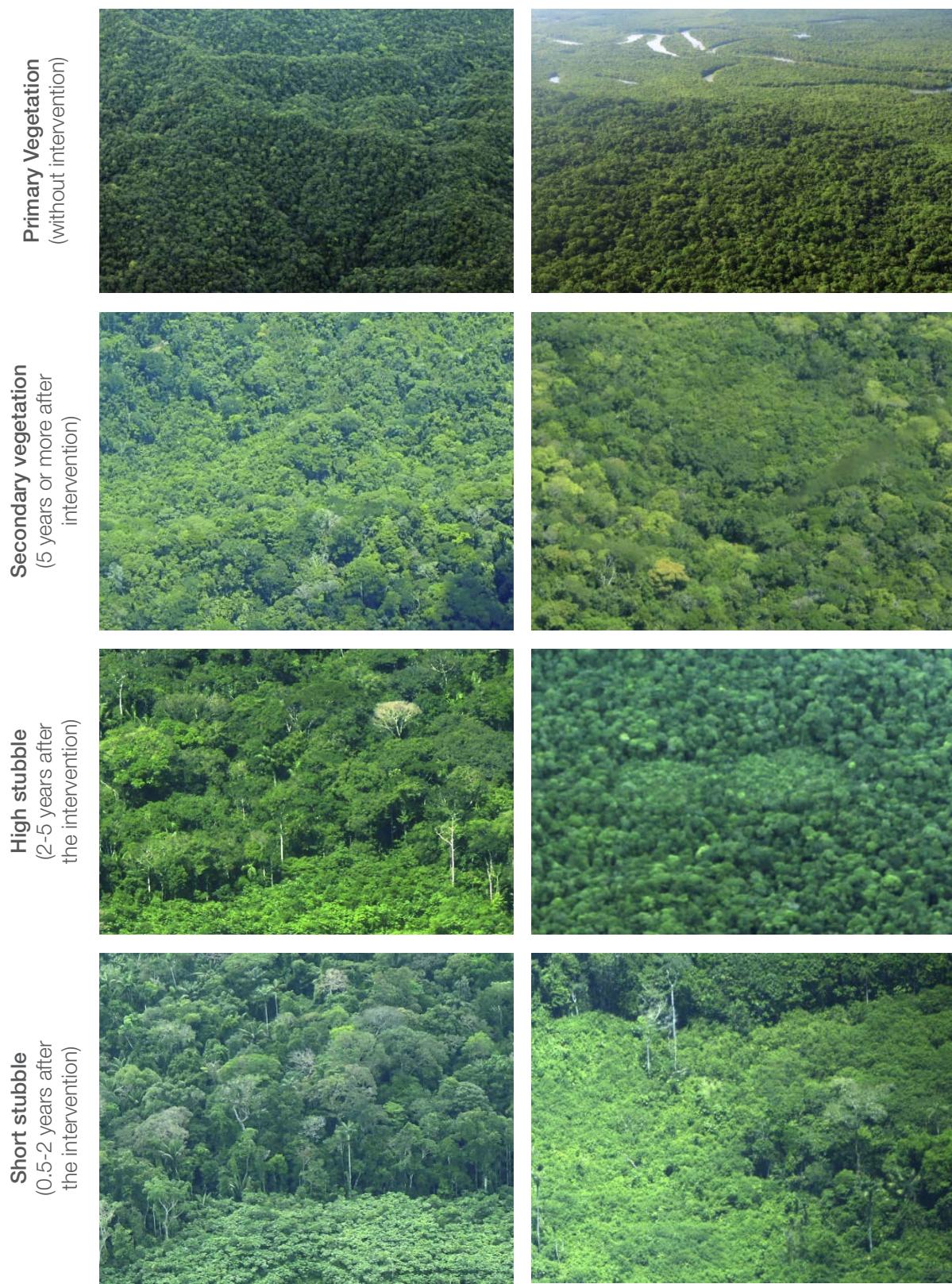


Table 29. Description of high environmental value coverage

Coverage	Description
Primary Vegetation	<p>This category includes natural forests and other plant cover that have not undergone any type of intervention, which is why their floristic heterogeneity and structural diversity (high layers from grass to trees) are characteristic [44]. These are mainly primary forests, whose presence as we know it today is the result of regeneration in the face of natural disturbances typical of ecosystem cycles, so that hundreds or even thousands of years must pass to reach their composition, structure, diversity, characteristics [45], because their annual growth rates of biomass are very slow [46].</p> <p>However, this reference goes beyond the cover composed entirely of a continuous mass of tree vegetation, since other types of plant communities are included. An example of this are those original covers integrated by non-woody species* that do not exceed 5 m in height, as is the case of the “arracachales” in the flood zones of the country [47], or by swamp palms such as the “morichales”, which do develop higher heights [48]. It should be noted that this category does not include forestry plantations.</p>
Secondary Vegetation	<p>This category corresponds to those vegetation coverings that have gone through different stages of natural succession until reaching a high recovery in areas where there was originally primary vegetation and that were intervened or destroyed by anthropic activities or natural events. After natural regeneration, the vegetation tends to its original state with the passage of several decades without achieving it completely, since fast growing woody species that exceed 5 m in height predominate but do not equate the structure of the canopy or the characteristic diversity of the primary vegetation; in these sites some small fragments of the original vegetation can be preserved, but they are already considered as secondary vegetation [44] [49]. For this type of cover to occur, about five years or more must pass after the intervention on the primary vegetation and generally there is no intervention that interferes with regeneration [50].</p>

Coverage	Description
High stubble	In this category are the covers in an intermediate stage of plant succession, i.e., bush vegetation characterized by a pioneer species (between 2 m and 5 m in height), resulting from the process of natural regeneration following an intervention of a primary vegetation cover; over time it can achieve heights and structures similar to those of the original vegetation without becoming equal [44] [51]. This type of vegetation is characteristic after two and up to five years after the intervention of the primary vegetation; after this time there is a transition to the category of secondary vegetation. For the purposes of this document, the concept of "stubble" differs completely from the connotation of the term in the agricultural field, related to the presence of herbaceous vegetation (weeds) that compete for nutrients with a cultivated species and that is presented by lack of mechanical or agrochemical cleaning practices.
Short stubble	It corresponds to the first stage of plant succession, once a primary vegetation cover has been intervened or affected by the causes mentioned. It is characterized by the early appearance of a high density of dominant herbaceous vegetation of high bearing and shrubby vegetation of low bearing (less than 2 m high) [44]. This type of vegetation is characteristic in a period of six months to two years after the removal of the original cover; after this the development of the succession will indicate its transition to the category of tall stubble. This category does not include pasture areas.

* Species characterized by the presence of a true stem containing wood (mainly trees and shrubs).

ANNEX 3. POPULATION CENTERS CLOSER TO EVOA

Alluvial gold exploitation generally takes place in isolated areas, where not only the availability of the material but also conditions of vulnerability of the population, institutional weakness and limitations to the development of productive capacities converge. One of the factors that reduce the impact of the actions to control illegal activities, observed in the monitoring exercise by UNODC, is that the actions tend to be focused at the municipal level and at the time of the intervention, priority is given to the municipal seats, so that the target population is not always covered. In this section we propose a more detailed level of micro-focusing based on the population centers. Annex 3 proposes a detailed level of micro-focusing based on population centers.

Some population centers in Colombia have been formed from the exploitation of minerals; however, field studies indicate that, in general, a direct relationship cannot be found between the sites with EVOA's presence and the living sites of the people associated with them. Most often, people working at EVOA have their dwelling site in the nearest population center.

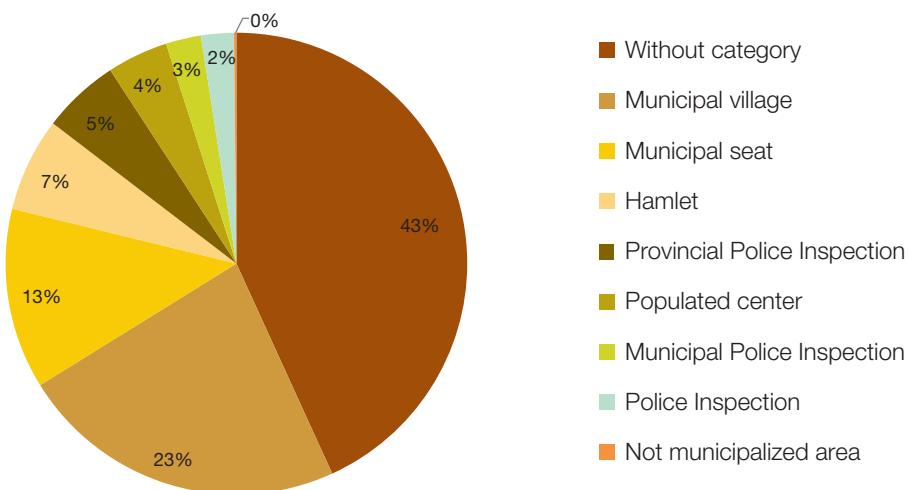
The grouping of dwellings that can be detected by medium resolution satellite images, which is at the shortest linear distance from the EVOA grids, constitutes the population

centers. It is important to mention that the identification of the nearest population center is done by a proximity analysis, which does not consider topographic features or connectivity infrastructure; therefore, when talking about distances in this section, reference is made to the linear distance.

Although some of the public policy actions should be developed directly on the areas with EVOA, others, especially those aimed at the population involved in the phenomenon, at the reduction of vulnerabilities and at the strengthening of institutional capacity, should include a focus on the closest population centers.

Of the 7,590 population centers identified in the cartography of the Agustín Codazzi Geographic Institute (IGAC) on a scale of 1:100,000, 609 population centers were identified that are closer than any other to EVOA (Figure 72). Of these only 77 correspond to municipal seats; the rest have a sub-municipal category and even close to half are not classified under any category of population center and only constitute groupings of houses identifiable by the satellite images without any level in the administrative hierarchy of the urban areas.

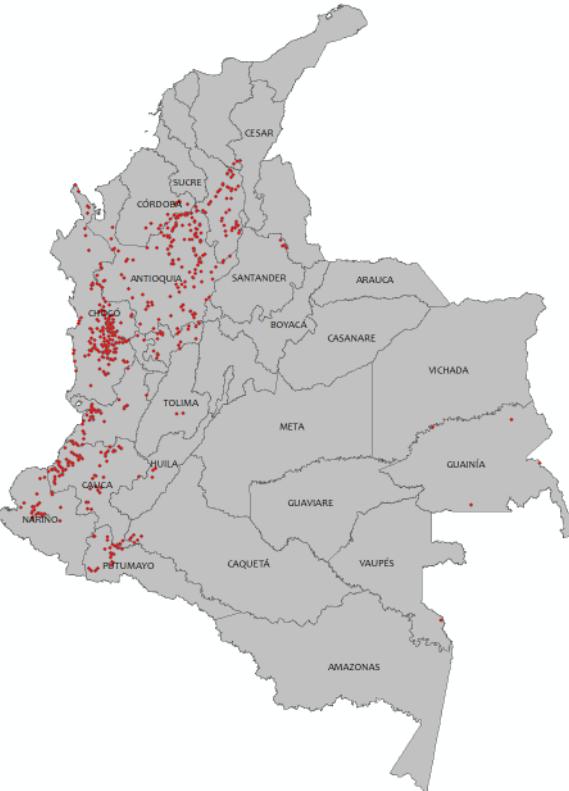
Figure 72. Distribution of the population centers closest to EVOA 2019



The population centers closest to EVOA generally do not have the conditions conducive to the development of capacities or a sufficiently strong institutional structure to support public policy strategies that promote mining activity within the framework of legality and environmental responsibility. To achieve this, comprehensive actions are required, beyond the “mining” strategies; this implies the commitment of diverse actors, social and institutional. Improving such conditions in the population centers closest to EVOA is, therefore, one of the challenges for the mining activity.

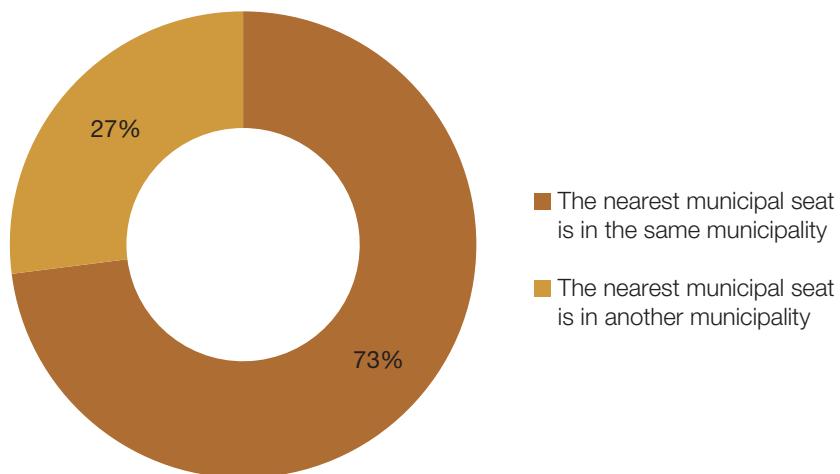
It is worth noting that the population centers closest to EVOA are not always in the same municipality where the phenomenon is located; in fact, 27% of the closest population centers are not in the same municipality as EVOA, even 70 of them are in a different province than EVOA. This constitutes an important limitation when focusing on the population to be served (Figure 73).

In the province of Antioquia, the one with the highest EVOA on land detection, 158



population centers were identified, of which 18 are in another province. In Chocó, the second province with the greatest presence of the phenomenon, 175 population centers were found, of which 5 are in another province; this means that EVOA is in one province, but the people live in another.

Figure 73. Percentage of population centers with municipal seat in the same municipality



The 609 population centers are dispersed throughout the country; however, as can be seen in Figure 74, a quarter of all EVOA in Colombia are associated with only 10 of the 609 closest population centers. The list is led by the population center La Concha, in the

municipality of Nechí, where nearly 4,000 ha of EVOA will be registered in 2019; it is followed by Vegas de Segovia in the municipality of Zaragoza and Puerto Perbel in the municipality of El Cantón de San Pablo.

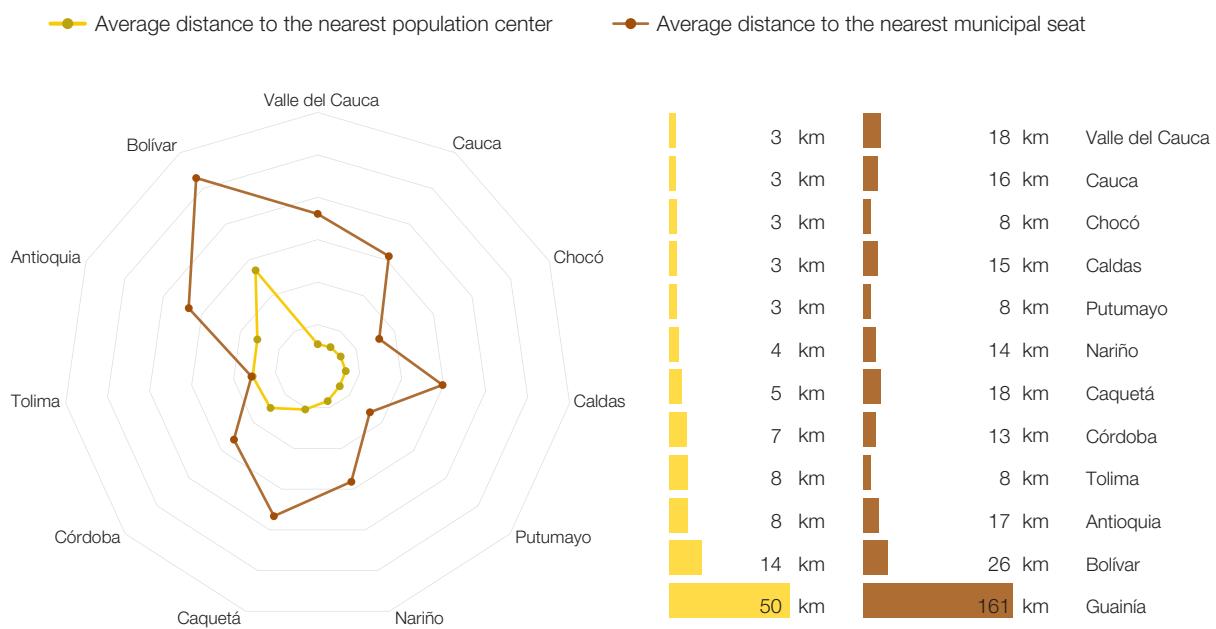
Figure 74. Ranking of the 10 population centers closest to EVOA (ha) 2019

La Concha 3,944	Vegas de Segovia 2,777	Cañaveral 2,270	Zaragoza 2,202	La Corona 2,029	Los Almendros 1,975
Puerto Perbel 2,338	Puerto López 2,221	Managrá 2,049	Cargueros 1,811		

Although the closest population centers are relatively near EVOA (1 km-10 km), the average for municipal seats is between 5 km and 20 km, except in Guainía, where both the population

centers and the municipal seats are far away from the phenomenon (figure 75). In Antioquia the EVOA is further from the population centers than in Chocó.

Figure 75. Average distance from EVOA to nearest municipal seats and population centers by province



There is a consensus that the solution to the problems associated with alluvial gold exploitation requires an approach beyond that of mining, in order to bring the population involved in this activity into the legal and formal economies. In this sense, understanding the dynamics of territories with a presence of alluvial gold exploitation contributes to the best design of public policy interventions and a better focus

of efforts. The spatial and geographic relations between the closest population centers, municipal seats, provincial capitals and in general the country's productive structure, should be considered not only to focus mining control or formalization interventions, but also to promote a more efficient presence of the State in these territories.

ANNEX 4. BIODIVERSITY IN TERRITORIES WITH ILLICIT EXPLOITATION⁸¹

Alluvial gold exploitation is a practice that can generate impacts on different natural systems and the biotic and abiotic components of ecosystems, which alter to different degrees the development of ecological processes and natural cycles that provide ecosystem services. The development of this activity generates impacts from the beginning of its execution by the construction of roads and access routes to the area of exploitation, generating deforestation, soil loss and erosion processes, among other changes. On site, during the stages of search, construction of test pits and exploitation, soil alteration is generated, which can produce erosive processes and debris that if not well managed end up being deposited in bodies of water, which generates turbidity and problems in water quality.

One of the most evident impacts of mining exploitation is the change in the vegetation cover, in the relief and in the constitution of the landscape. Alterations in the landscape are caused by the loss of natural elements that make up the ecosystems and the appearance of visual interruptions such as new reliefs, colors, mass movements and fragmentation of the continuity of the forest.

Taking into account this, it is important to mention that the legal mining exploitation must have an Environmental License in which an Environmental Management Plan is approved as a tool for the implementation of prevention, mitigation, remediation and compensation measures from the planning phase of the project until its closure.

The results and analysis presented in this section were developed based on the EVOA detected for 2019, where all the areas with presence of the phenomenon are identified for this year, emphasizing those where the exploitation is carried out in an illegal way. Table 30 identifies the areas and ecosystems with the presence of alluvial gold exploitation in Colombia. These ecosystems are found in 12 provinces, in a total of 96 municipalities within which there is an area of 98,028 ha. of exploitation, where 64,727 ha. correspond to illicit exploitation. The ecosystems with the greatest presence of licit and illicit exploitation are rain forests, gallery and riparian forests, and bodies of water. Map 21 presents the species richness in areas with EVOA.

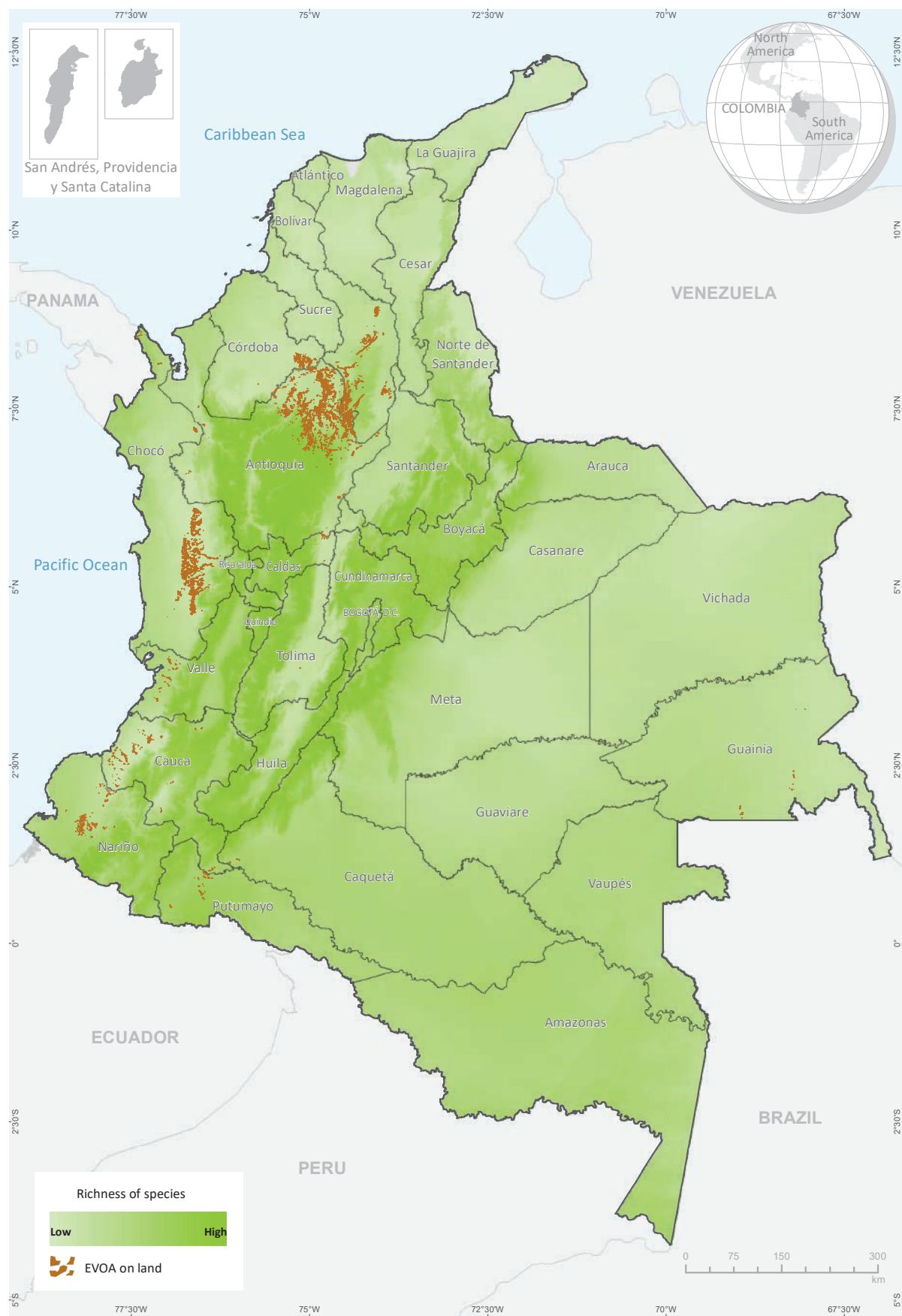
Table 30. Ecosystems with a presence of alluvial gold exploitation in Colombia

Ecosystem	EVOA (ha)	Illegal exploitation of gold (ha)
Andean forests	2,267	1,685
Gallery and riparian forests	27,284	19,311
Water bodies	5,966	4,159
Dry ecosystems	5,433	3,480
Savannahs and rocky outcrops	172	134
Rain forests	56,905	35,957
Total	98,028	64,727

Source: [63].

⁸¹ This analysis was developed by the Alexander von Humboldt Biological Resources Research Institute and the Ministry of Mines and Energy.

Map 21. Colombian species richness and areas with EVOA



Source: Government of Colombia - Monitoring system supported by UNODC, for richness of species in Colombia: Biological Resources Research Institute Alexander von Humboldt. The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

The provinces that report most of this illicit activity are Chocó (27,543 ha.), Antioquia (20,744 ha) and Bolívar (5,799 ha.), which

together account for 84% of the country's total illicit gold exploitation (Table 31).

Table 31. Figures on illicit mineral exploitation by province in Colombia

Province	Municipalities	Province area	EVOA 2019	Illicit gold exploitation	Illicit exploitation (%)
Chocó	22	4,835,301.4	35,105	27,543	43
Antioquia	22	6,280,471.4	40,201	20,744	32
Bolívar	13	2,671,674.2	10,642	5,799	9
Córdoba	3	2,508,654.7	4,976	4,723	7
Nariño	8	3,149,736.3	3,171	2,862	4
Cauca	11	3,124,295.1	2,697	1,885	3
Valle del Cauca	2	2,066,551.6	608	608	1
Putumayo	6	2,597,628.4	291	285	0
Guainía	3	7,128,931.6	135	135	0
Caldas	4	742,527.0	117	86	0
Caquetá	1	9,010,300.8	53	53	0
Tolima	1	2,342,127.3	30	3	0
Total	96		98,028	64,727	100

In the case of Antioquia, the most intervened ecosystem is the rain forest with 13,411 hectares with illicit exploitation, representing 64.6% of the illicit exploitation of the province, followed by the gallery and riparian forests with 4,763 hectares, equivalent to 22.9% of the illicit exploitation. A similar situation occurs in Chocó,

where 14,831 ha of rain forests are registered, equivalent to 53.8% of the illicit exploitation of alluvial gold in the province, followed by gallery and riparian forests with 10,329 ha intervened, equivalent to 37.4% of this illicit activity (Table 32).

Table 32. Ecosystems intervened by illicit exploitation in Chocó and Antioquia

Ecosystem	Chocó (ha)	Antioquia (ha)
Andean forests	-	1,233
Gallery and riparian forests	10,329	4,763
Water Bodies	2,342	835
Dry ecosystems	42	421
Savannahs and rocky outcrops	-	80
Rain forests	14,831	13,411
Total	28,718	19,685

Source: [63].

To better understand the impact that alluvial gold exploitation has on biodiversity, estimates of the potential distribution of species were used through the models developed by the Biodiversity Informatics team (BioModels) of the Instituto Humboldt [52], with the aim of determining the number of potential species in areas where gold exploitation is present.

The analyses of potential species distribution were complemented with the downloading of available biological records for areas with alluvial gold exploitation in the provinces of Antioquia and Chocó. This information was obtained from the download of all biological records of animal species present in the Global Biodiversity Information Facility (GBIF)⁸².

The diversity of animal species calculated from the biological records present in the above-mentioned areas is summarized below, highlighting the number of endemic species in

each group and the state of conservation of each one. Emphasis is placed on those species that are in the categories of threat: vulnerable (VU), endangered (EN), critically endangered (CR) and invasive species.

Chocó

In total, 380 animal species were recorded within the main faunal groups, of which 61 are endemic to Colombia (Table 33). It is important to highlight the registration of 7 invasive species in the area of interest which, given the transformations of these territories, could become another problem for the conservation of the biodiversity of these areas; there are also 16 species that are under some degree of threat according to the red list of species of the International Union for the Conservation of Nature (IUCN), 3 in EN, 6 VU and 7 near threatened (NT) (map 22 and table 34).

Table 33. Species registered at GBIF for the province of Chocó

Biological Group	Number of species	Endemic species	Invasive species
Fishes	105	42	5
Birds	192	2	2
Amphibians	42	7	0
Reptiles	83	9	0
Mammals	63	1	0
Total	380	61	7

Source: [63].

⁸² The fauna records published by the GBIF were consulted (<https://www.gbif.org/>, base updated to March 2020). This database is the most complete source of biological records available: it contains all presence records published by the Humboldt Institute and other Colombian institutions, integrated into the Colombian Biodiversity Information System (SIB Colombia, <https://www.sibcolombia.net/>), as well as all those species records in Colombian territory published by institutions and organizations from abroad.

Table 34. Endemic and endangered species reported in Chocó

Class	Order	Family	Species
Birds	Passeriformes	Thraupidae	<i>Bangsia aureocincta</i> (Hellmayr, 1910)
Actinopterygii	Siluriformes	Loricariidae	<i>Chaetostoma lepturum</i> (Regan, 1912)
Amphibia	Anura	Hemiphractidae	<i>Gastrotheca aureomaculata</i> (Cochran & Goin, 1970)

Source: [63].

Of the total species recorded in Chocó, 32 are in some category of threat, according to the IUCN, and 12 in the Resolution 1912 of

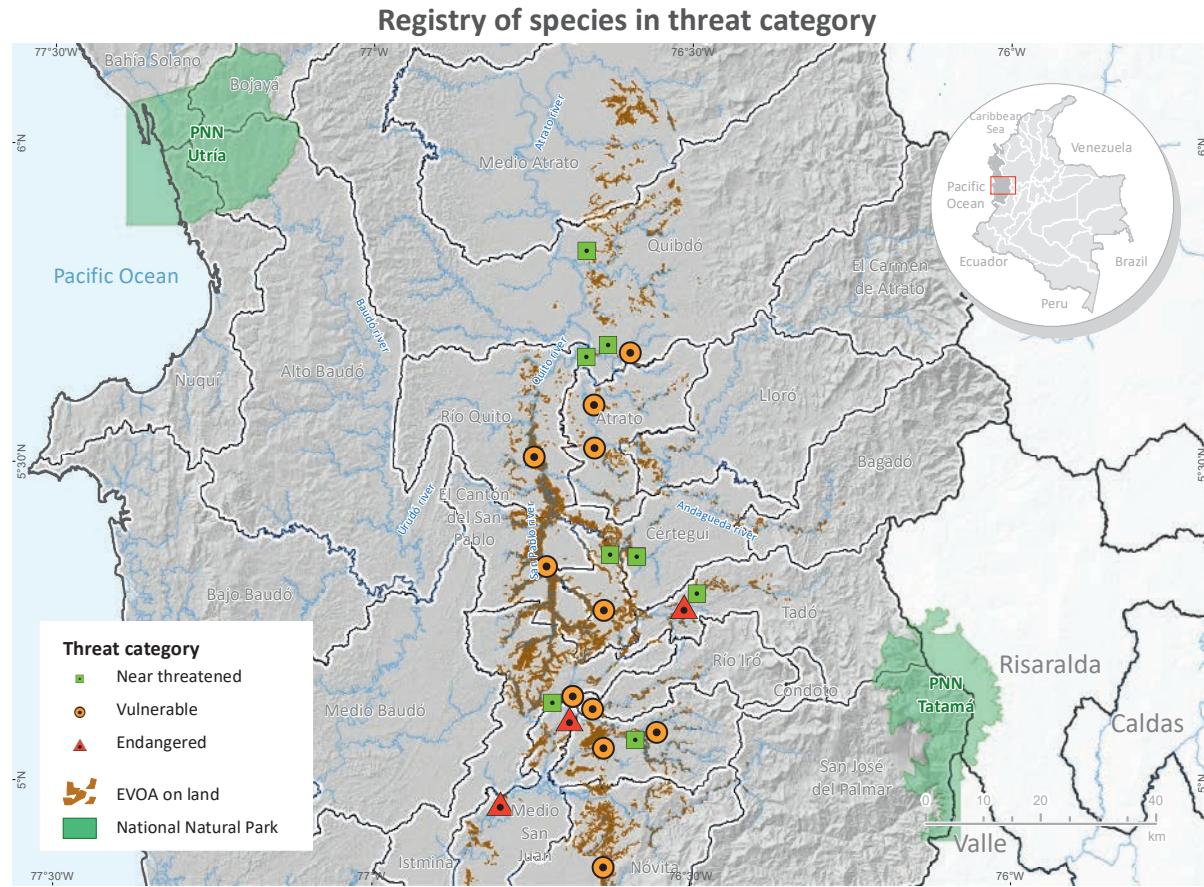
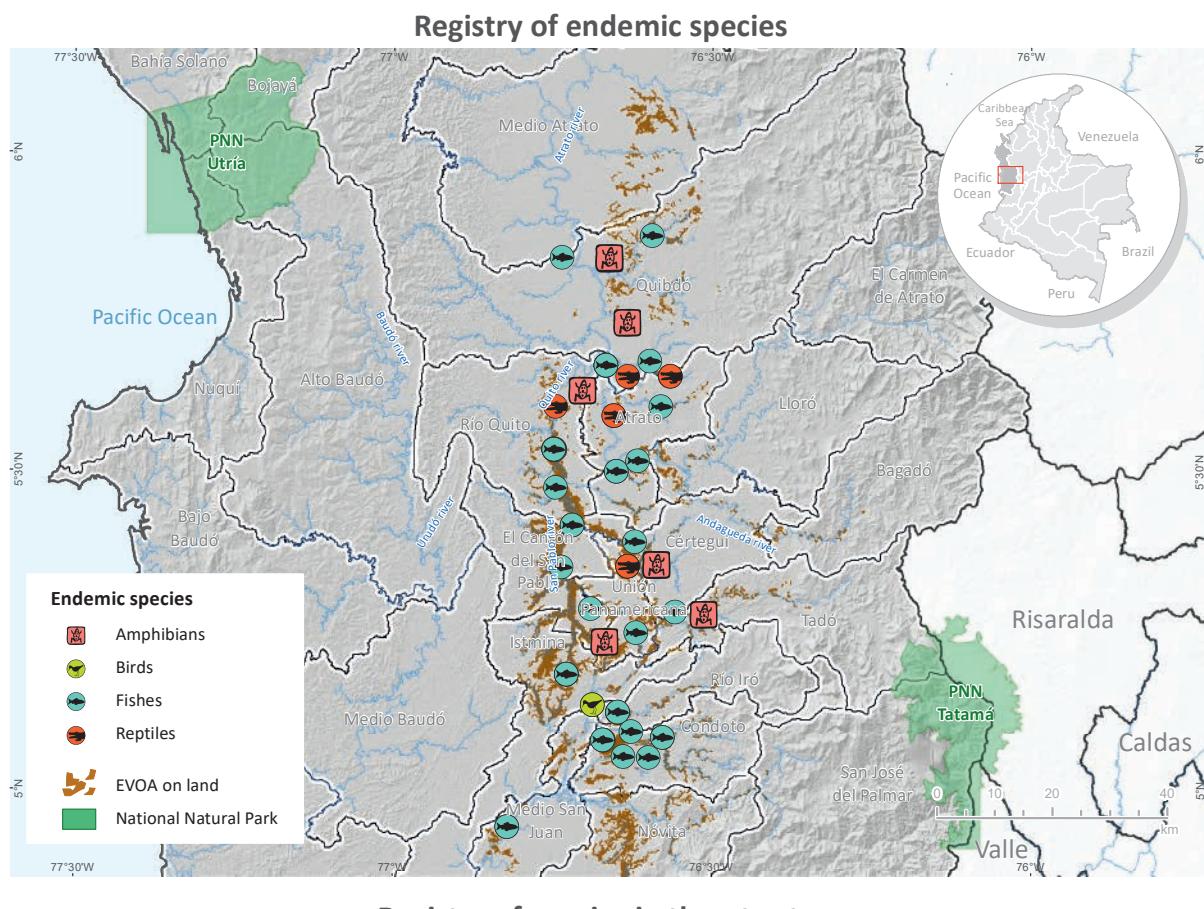
the Ministry of Environment and Sustainable Development (MinAmbiente) (table 35).

Table 35. IUCN threat categories obtained from all records for Chocó

Category*	IUCN	Resolution MADS N. ° 1912 dated 2017
CR	0	0
EN	5	2
VU	14	10
NT	13	0
Total	32	12

* Endangered (EN), vulnerable (VU), near threatened (NT).

Source: [63].

Map 22. Records of endemic and endangered species in the province of Chocó

Source: Government of Colombia - Monitoring system supported by UNODC, for endemic species and species categorized as threatened: Alexander von Humboldt Biological Resources Research Institute, 2020
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Figure 76 shows some of the species under some degree of threat, registered for alluvial gold exploitation areas in Chocó.

Figure 76. Species with some degree of threat according to the IUCN in Chocó

Bangsia aureocincta (Hellmayr, 1910)

EN



Julian Zuleta

www.apatierradeaves.jimdo.com

[www.apatierradeaves.jimdo.com - Julián Zuleta](http://www.apatierradeaves.jimdo.com)

Atelopus spurrelli (Boulenger, 1914)

EN



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Anolis ventrimaculatus (Boulenger, 1911)

EN



[https://co.pinterest.com/ - Angélica ZamCe](https://co.pinterest.com/)

Tremarctos ornatus (F.G. Cuvier, 1825)

VU



[https://bioweb.bio/ - Santiago R. Ron](https://bioweb.bio/)

Chlorochrysa nitidissima (P.L. Sclater, 1874)

VU



[https://www.icesi.edu.co/ - Daniel Orozco](https://www.icesi.edu.co/)

Antioquia

According to biological records in this province, 580 species within the five main

faunal groups were found in the alluvial gold exploitation areas of the province of Antioquia. Of these, 43 species are endemic to Colombia (table 36 and map 23).

Table 36. Species registered in the Province of Antioquia

Biological Group	Number of species	Endemic species	Invasive species
Fishes	51	22	3
Birds	416	9	1
Amphibians	32	11	0
Reptiles	34	0	0
Mammals	47	7	1
Total	580	49	5

Source: [63].

Of the total number of endemic species registered in the gold exploitation areas of the province of Antioquia, 15 are under some degree of threat according to the IUCN red list of

species, 3 NT, 8 VU, 1 endangered and 3 CR. Table 37 shows the endemic species with the highest degree of threat to the area.

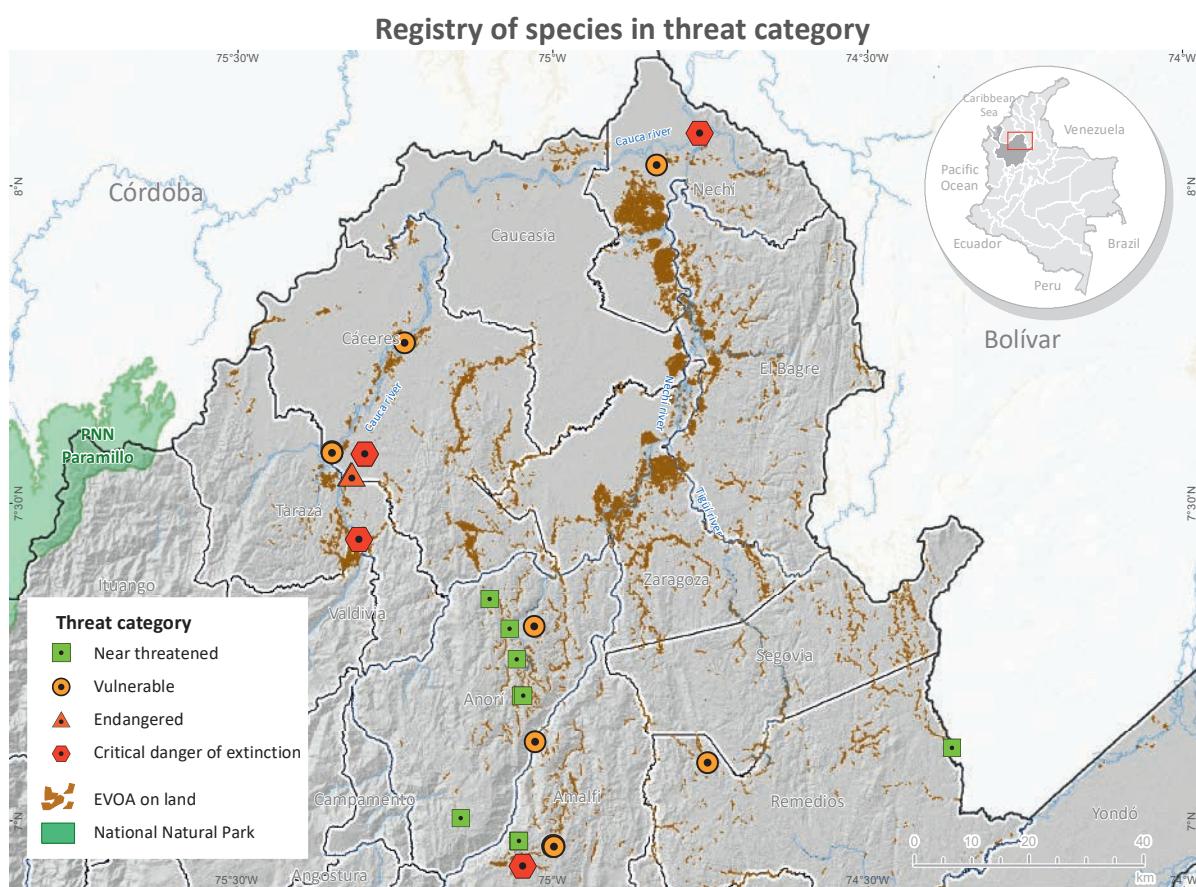
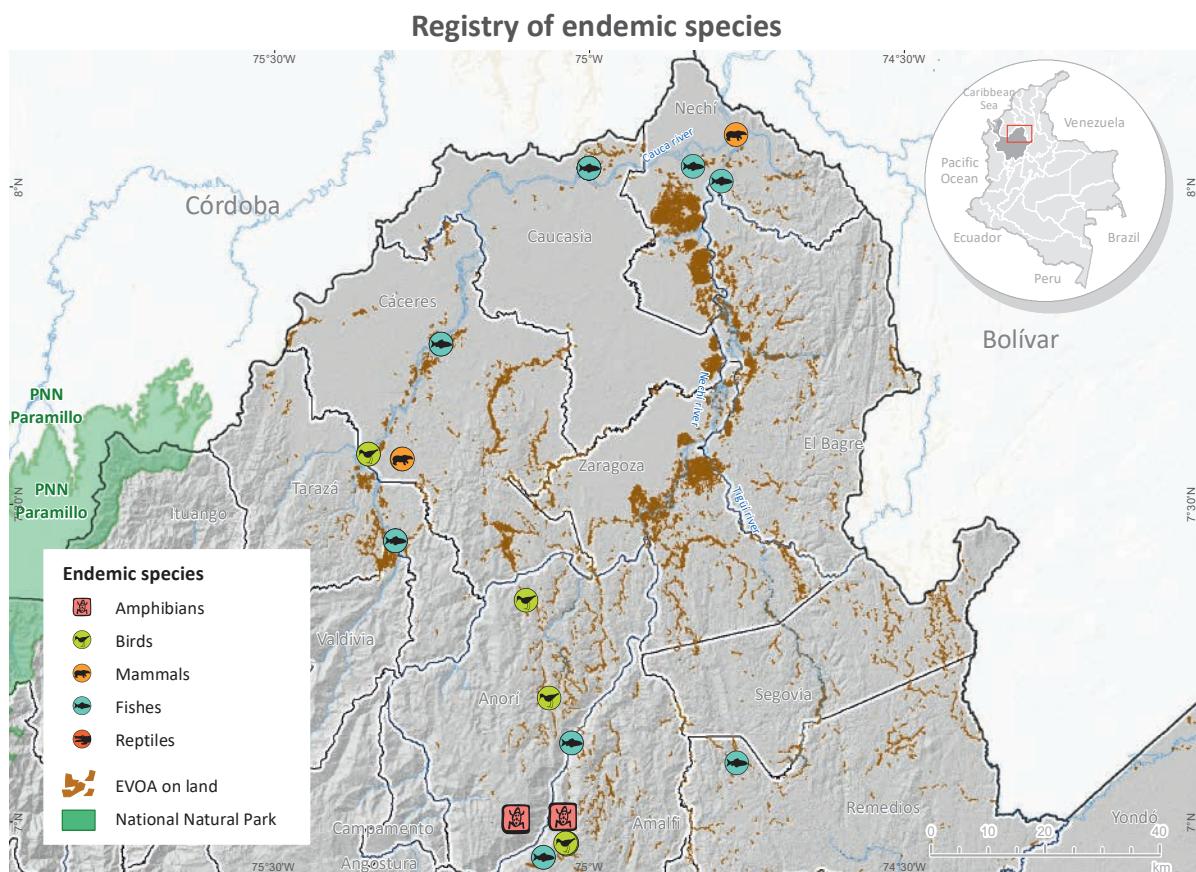
Table 37. Endemic species in danger of extinction and in critical danger registered in Antioquia

Class	Order	Family	Species	UICN*
Birds	Passeriformes	Cotingidae	<i>Lipaugus weberi</i> (A.M.Cuervo, P.G.W. Salaman, T.M.Donegan & J.M.Ochoa, 2001)	CR
Actinopterygii	Siluriformes	Pimelodidae	<i>Pimelodus grosskopfii</i> (Steindachner, 1879)	CR
Mammalia	Primates	Callitrichidae	<i>Saguinus leucopus</i> (Günther, 1877)	EN
Mammalia	Primates	Callitrichidae	<i>Saguinus oedipus</i> (Linnaeus, 1758)	CR

* Endangered (EN), vulnerable (VU), critical danger (CR).

Source: [63].

Map 23. Records of endemic species in zones with EVOA in the province of Antioquia



Source: Government of Colombia - Monitoring system supported by UNODC, for endemic species and species categorized as threatened: Alexander von Humboldt Biological Resources Research Institute, 2020.

The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

Of the total species registered for the province, 35 are under some degree of threat according to the IUCN. Table 38 shows the

categories registered for the IUCN and for Min-Ambiente Resolution 1912.

Table 38. IUCN threat categories obtained from all records for Antioquia

Category*	IUCN	Resolution MADS N. ° 1912 dated 2017
CR	5	2
EN	2	4
VU	15	10
NT	13	-
Total	35	16

* Critical danger (CR), Endangered (EN), vulnerable (VU), near threatened (NT).

Source: [63].

Figure 77 shows some of the species under some degree of threat recorded for areas with alluvial gold exploitation areas in Antioquia.

Figure 77. Species with some degree of threat according to the IUCN in Antioquia

Saguinus oedipus (Linnaeus, 1758)

CR



MinEnergía

Lipaugus weberi (AM. Cuervo, P.G.W. Salaman, T.M. Donegan & J.M. Ochoa, 2001)

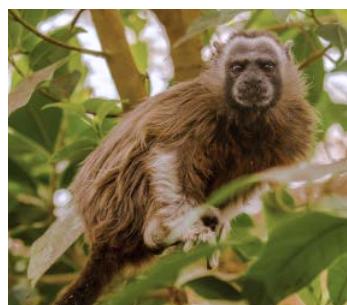
CR



<https://www.icesi.edu.co/> - Diego Calderón-F.

Sanguinus leucopus (Günther, 1877)

EN



MinEnergía - Juan González

Andinobates opisthomelas (Boulenger, 1899)

VU



MinEnergía - Juan González

Hypopyrrhus pyrohypogaster (Tarragon, 1847)

VU



<https://ebird.org/> - Jorge Muñoz García

Habia gutturalis (P.L. Sclater, 1854)

NT



<https://ebird.org/> - Peter Hawrylyshyn

Harpia harpyja (Linnaeus, 1758)

NT



<https://birdscolombia.com/> - Carlos Mario Bran

While the data presented here generates an alarm about threats to the conservation of species, already highly vulnerable, it is considered appropriate that in future publications can be made more in-depth analysis that considers not only broader territorial contexts, but more particular in relation to the ecosystems in which these species have their areas of distribution, making the collection of biomodels developed by the Humboldt Institute and groups of experts on these taxa. Likewise, it is convenient to evaluate the socioeconomic and cultural contexts in which the licit and illicit transformations in the territory take place.

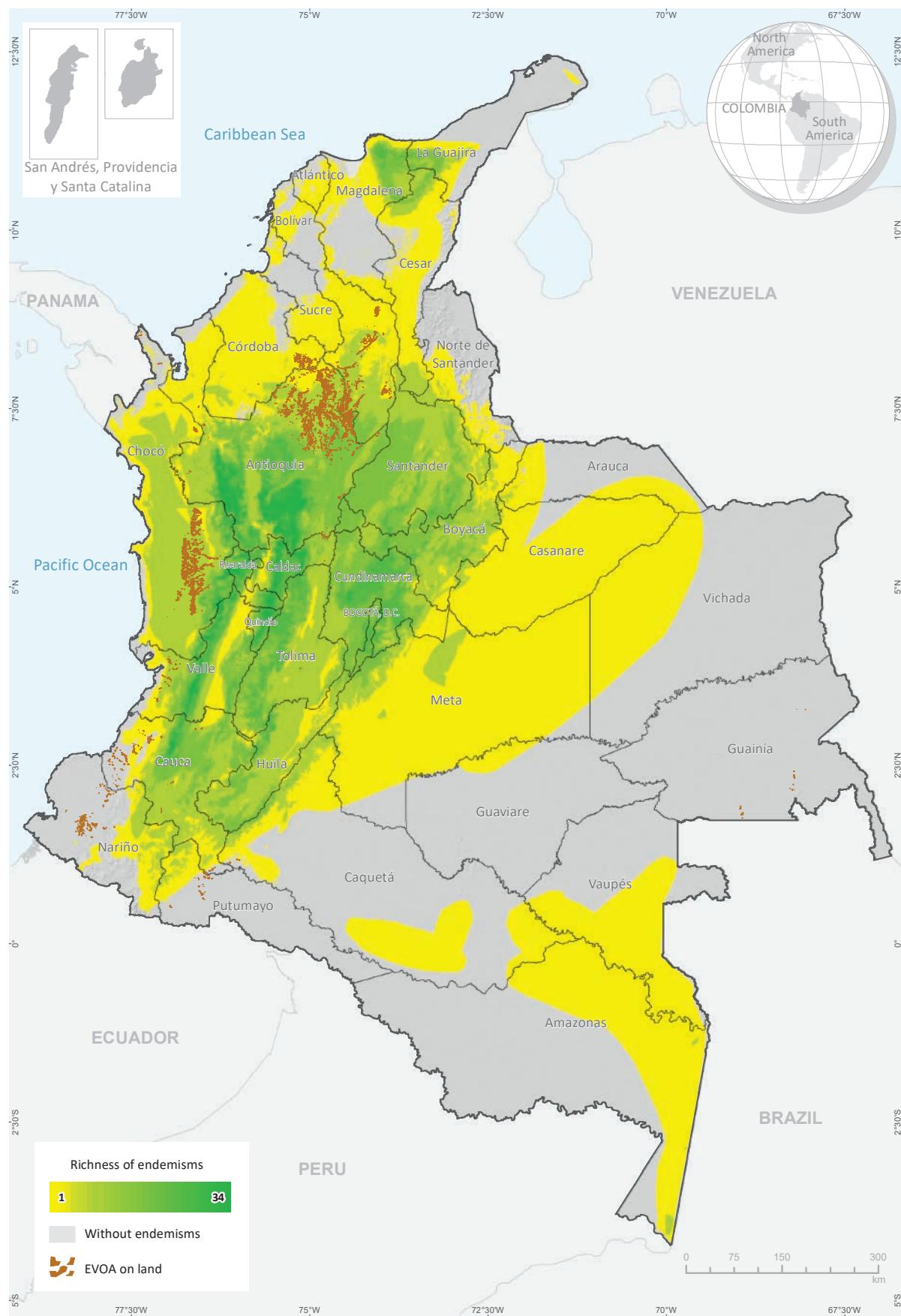
It also raises the need to evaluate the historical contexts of the transformation of the territory, the predominant production models, the practices and uses of natural resources, as well as the future visions of the local populations. All of the above could be integrated into the approach of socio-ecological transitions towards sustainability, the conceptual framework of the National Development Plan, in which extractive activities are considered one of the most important drivers of biodiversity loss, on the same scale as the transformation

of ecosystems, the introduction of invasive exotic species, pollution and climate change.

On the other hand, the examples presented are very different due to the degree of knowledge of the areas of the provinces of Chocó and Antioquia, as the latter is one of the territories with the most biodiversity records, while the former is one of the most unknown in the country, so they are not comparable, unless the knowledge gaps and uncertainty associated with biodiversity records and assessments are also evaluated. Unfortunately, much of the biological diversity that is lost is not known.

This information should, therefore, be part of systems that support decision-making and are based on territorial modeling, so that future scenarios can be established in which desirable or undesirable thresholds of change are identified, so that it is the environmental and sectoral authorities, in broad consensus with local communities, who decide on their future of greater or lesser well-being. Map 24 presents the richness of endemic species in Colombia.

Map 24. Richness of endemic species of Colombia and areas with EVOA



Source: Government of Colombia - Monitoring system supported by UNODC for richness of endemic species in Colombia; Alexander von Humboldt Biological Resources Research Institute, 2018.

The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

ANNEX 5. RIVER BASINS AS MANAGEMENT UNITS IN TERRITORIES WITH EVOA

The hydrographic basin is considered the management unit par excellence of the water resource, and in it the interrelation and interdependence between the physical and biotic systems and the socioeconomic and cultural system is produced. Rivers constitute a hierarchical, dynamic, complex and integrating circulation system, which fulfills diverse ecosystemic functions when conforming the hydrographic basin: provision of water for human beings; self-purification of water; control of floods and droughts; habitat for fishes, birds and other wild life manifestations, and maintenance of sediment, nutrients and salinity flows in estuaries [53]. In addition, given the scarce road infrastructure, they are considered axes of development: river transport occupies first place as a means of mobilizing passengers, agricultural products, food and wood in many regions of the country.

In this sense, changes in the use of natural resources, mainly land, lead upstream of the watershed to a modification of the hydrological cycle that has downstream effects in terms of quantity, quality, opportunity and location. The physical characteristics of water generate an extremely high, and in many cases unpredictable, degree of interrelationship and interdependence between water uses and users in a basin [54].

From the above, the importance of integrated and coherent territorial planning is derived,

considering the relationship between the natural supply of the basin's natural resources and the development needs of the human beings living in the area. The spatial characterization to improve the understanding of the phenomenon of alluvial gold exploitation must involve these units as independent areas with homogeneous characteristics that can identify specific dynamics and actors.

By 2019, EVOA on land was found in the five Hydrographic Areas or macro basins, 18 Hydrographic Zones or basins and 66 Hydrographic Sub-Zones or sub-basins. The macro-basin with the highest EVOA detection on land is the Magdalena-Cauca: 57% of the total area, or 55,800 ha, is concentrated in this territory. It is followed by the Caribbean (22%) and Pacific (20%) macro-basins with areas of 21,647 ha and 20,056 ha, respectively. The Amazon and Orinoco macro-basins represent 1% of the total figure with an area of 512 ha and 12 ha, respectively.

The greatest concentration of territories with EVOA on land in the Magdalena-Cauca macro-basin is located in the northeast of the province of Antioquia and the south of Bolívar, in the Nechi⁸³ and Bajo Magdalena-Cauca-San Jorge and Medio Magdalena river basins, which, added together, reach 50,209 ha, or 51% of the total national area (Table 39).

⁸³ Nechi is a word of Catío origin that means "natural gold": *Ne* means "gold" and *Chi* "natural"; in the Yameese language it means "river of gold".

Table 39. Hydrographic Zones and Sub-Zones with EVOA on land, Magdalena-Cauca Hydrographic Area

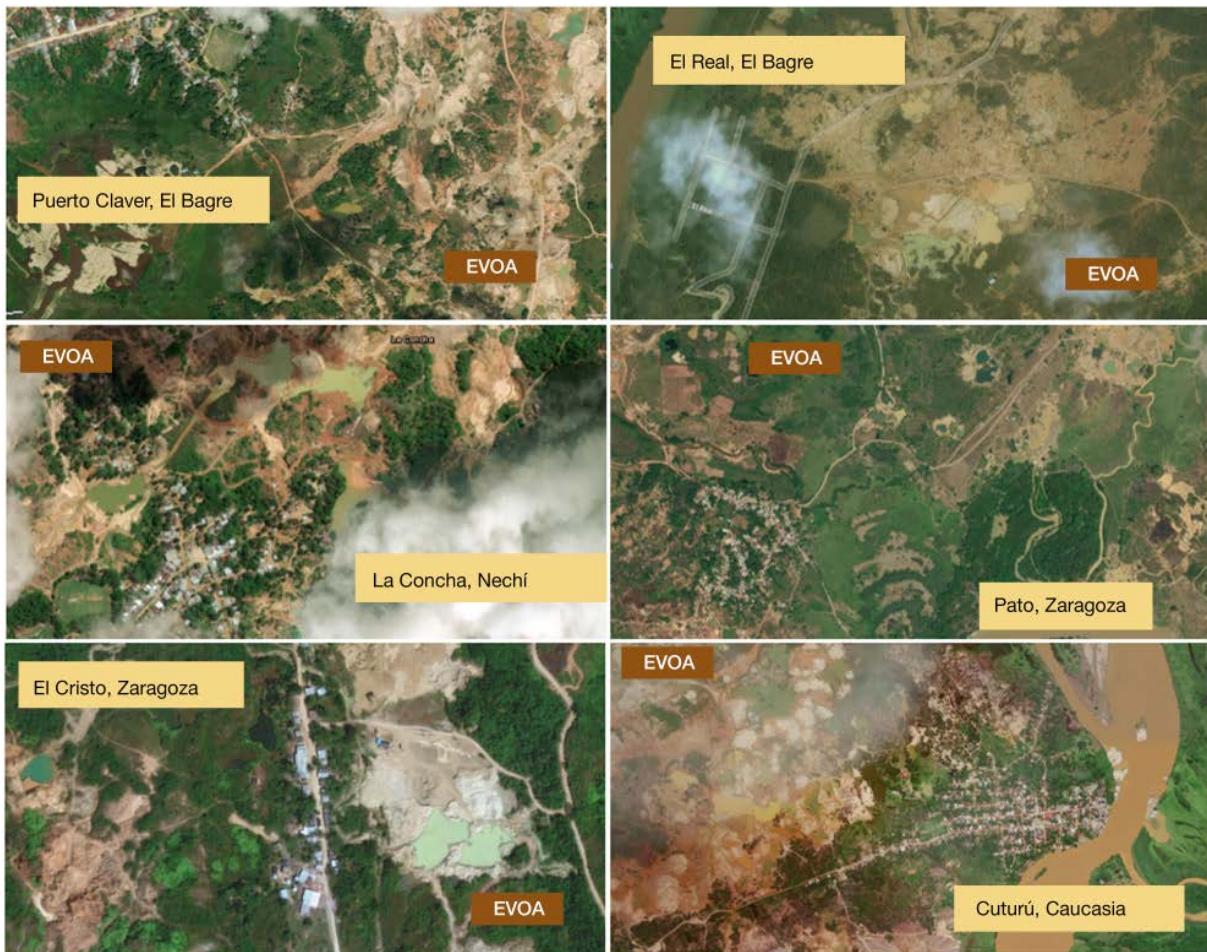
Hydrographic Area (macro-basin)	Hydrographic Zone (basin)	Hydrographic Subzone (sub basin)	EVOA on land (ha)
Magdalena-Cauca	Bajo Magdalena	Directos Bajo Magdalena	723
		Alto San Jorge	120
		Bajo San Jorge-La Mojana	5,296
		Directos Bajo Cauca-Ciénaga La Raya	2,288
	Cauca	Directos al Cauca	1,532
		Río Quinamayo y otros directos al Cauca	105
		Río Tarazá-Río Man	3,201
	Medio Magdalena	Brazo Morales	3,820
		Directos Magdalena	39
		Directos Magdalena Medio	14
		Río Cimitarra	1,893
		Río Samaná	348
		Río Nare	121
		Río San Bartolo y otros directos al Magdalena Medio	765
	Nechí	Alto Nechí	3,120
		Bajo Nechí	17,411
		Directos al Bajo Nechí	12,562
		Río Porce	2,410
		Bajo Saldaña	30
Total			55,800

The Nechí river basin⁸⁴ has a surface area of 320 km²; in 2019 35,503 ha of EVOA on land concentrated especially in the Bajo Nechí sub-basins (17,411 ha) and Directos al Bajo

Nechí (12,562 ha), which have a direct or indirect influence on populations settled on the banks of these rivers (Figure 78).

⁸⁴ The Nechí River originates in the jurisdiction of the municipality of Yarumal and flows into the Cauca River in the municipality of Nechí, being its most important tributary.

Figure 78. EVOA closest to hamlets or urban centers



Note: Worldview images.

The Bajo Nechí and Directos al Nechí sub-basins are categorized as areas with a high threat from mercury contamination, according to the priority index for determining ecological restoration plans for ecosystems that have been intervened and abandoned by mineral exploitation described in the Magdalena-Cauca Macro-basin Strategic Plan [55], which was prepared taking into account gold production in the sub-basin and, with it, its potential contamination by mercury.

The increase in suspended solids that reach these rivers from the washing of material from the exploitation areas has decreased the availability of food and the possibilities

of catching fishes such as bocachico, tiger catfish, maiden, pacora and gilthead bream. For all these species, a progressive reduction has been registered not only in the volume of fishing, but also in the size and weight of the catch [56].

For its part, the Caribbean macro-basin has a high concentration of EVOA in the north of the province of Chocó, in the municipalities of Medio Atrato, Río Quíto, Cantón de San Pablo and Unión Panamericana, in the Atrato-Darién basin. In 2019, 21,647 ha of EVOA were detected on land in this Hydrographic Area (Table 40).

Table 40. Hydrographic Zones and Sub-Zones with EVOA on land, Caribbean Hydrographic Area

Hydrographic Area (macro-basin)	Hydrographic Zone (basin)	Hydrographic Sub-area (sub-basin)	EVOA on land (ha)
The Caribbean	Atrato-Darién	Alto Atrato	111
		Directos Atrato	19
		Río Andágueda	516
		Río Bebaramá y otros Directos Atrato	4,398
		Río Murindó-Directos al Atrato	245
		Río Murri	37
		Río Quito	15,981
		Río Sucio	159
		Río Tanelá y otros Directos al Caribe	38
	Caribe-Coast	Río Tolo y otros Directos al Caribe	67
		Río León	75
		Total	21,647

The Atrato-Darién basin contributes 99% of the total area detected in the Caribe Macrobasin with 21,571 ha; it has an approximate surface area of 38,500 km² and is limited by the Western Cordillera, the Baudó mountain range and the prominences of the São Paulo isthmus.

The Río Quito Sub-basin is the sub-basin with the highest detection rate, with 15,980 ha of EVOA on land; it is located 30 km from Quibdó and is home to the poorest people in the country, who bear the same name. Its three

townships, Villa Conto, San Isidro and Paimadó, register 98% of unsatisfied basic needs (NBI) according to [64]. Alluvial gold exploitation has intensified in the last ten years, fragmenting the course of the river, diverting its course, and causing floods by destroying its meanders [57]. Water pollution from alluvial gold exploitation activities has deteriorated fish production, due to the high sedimentation of the Quito river; species such as the bocachico, dentex and mojarra have registered a progressive reduction [57] (Figure 79).

Figure 79. EVOA's presence on land in the Sub-basin of the Quito river, Paimadó sector



Note: images Worldview 2; left: 2014, right: 2017.

With respect to the Pacific Macrobasin, two foci of high concentration are observed: the first in the northern part, in the municipalities of Istmina, Medio San Juan, Nóvita, Condoto and Tadó and the basin of the Río San Juan in

the province of Chocó, and the second in the southern part of the municipalities of Barbacoas and Magüí, in the province of Nariño, in the Patía basin (table 41).

Table 41. Hydrographic Zones and Sub-Zones with EVOA on land, Pacific Hydrographic Area

Hydrographic Area (macro-basin)	Hydrographic Zone (basin)	Hydrographic Sub-area (sub-basin)	EVOA on land (ha)
Pacific	Baudó - Directos Pacífico	Río Baudó	49
		Río Guachicono	127
		Río Patía Alto	82
		Río Patía Bajo	32
		Río Patía Medio	816
		Río Telembí	1,910
	San Juan	Río Cajón	4,269
		Río Capoma y otros directos al San Juan	4
		Río San Juan	4,094
		Río Sipí	642
		Río Tamaná y otros Directos San Juan	4,671
		Río Calima	172

Hydrographic Area (macro-basin)	Hydrographic Zone (basin)	Hydrographic Sub-area (sub-basin)	EVOA on land (ha)
Pacific	Tapaje-Daguadirectos	Río Dagua	135
		Río Anchicayá	106
		Río Guapi	498
		Río Iscuandé	356
		Río Saija	397
		Río San Juan del Micay	536
		Río Tapaje	56
		Río Timbiquí	907
		Ríos Cajambre-Mayorquín-Raposo	194
		Total	20,056

The Río San Juan basin contributes 69% (in an approximate area of 13,853 ha) of EVOA's total land area in the Pacific Macrobasin; this river originates in the high zone of the municipality of Mistrató, in the province of Risaralda, in the Caramanta Hill, in the Western Cordillera.

On the other hand, the two types of detection converge in the Amazon Macro-basin: EVOA on land and EVOA in water. In 2019, 512 ha of EVOA on land were recorded in this territory, concentrated mainly in the Río Caquetá basin (256 ha) (Table 42).

Table 42. Hydrographic Zones and Sub-Zones with EVOA on land, Amazon Hydrographic Area

Hydrographic Area (macro-basin)	Hydrographic Zone (basin)	Hydrographic Sub-area (sub-basin)	EVOA on land (ha)
Amazon	Caquetá	Alto Caquetá	150
		Río Caquetá medio	53
		Río Mecaya	52
	Guainía	Bajo río Guainía	70
		Río Cuiary	53
	Putumayo	Alto río Putumayo	124
		Río Putumayom	10
	Total		512

Mining in the Colombian Amazon has increased considerably, due to the wealth of minerals such as gold, cadmium, cobalt, copper, tin, iron, and molybdenum, among others, that this region presents. This activity has negatively impacted the health of indigenous communities and the sustainability of aquatic ecosystems. In

the region, areas with EVOA water alerts are located on sections of the Caquetá, Apaporis, Negro, Putumayo, and Cotuhé rivers, with negative effects on increased turbidity of currents, loss of habitat, and availability of hydrobiological resources (Table 43).

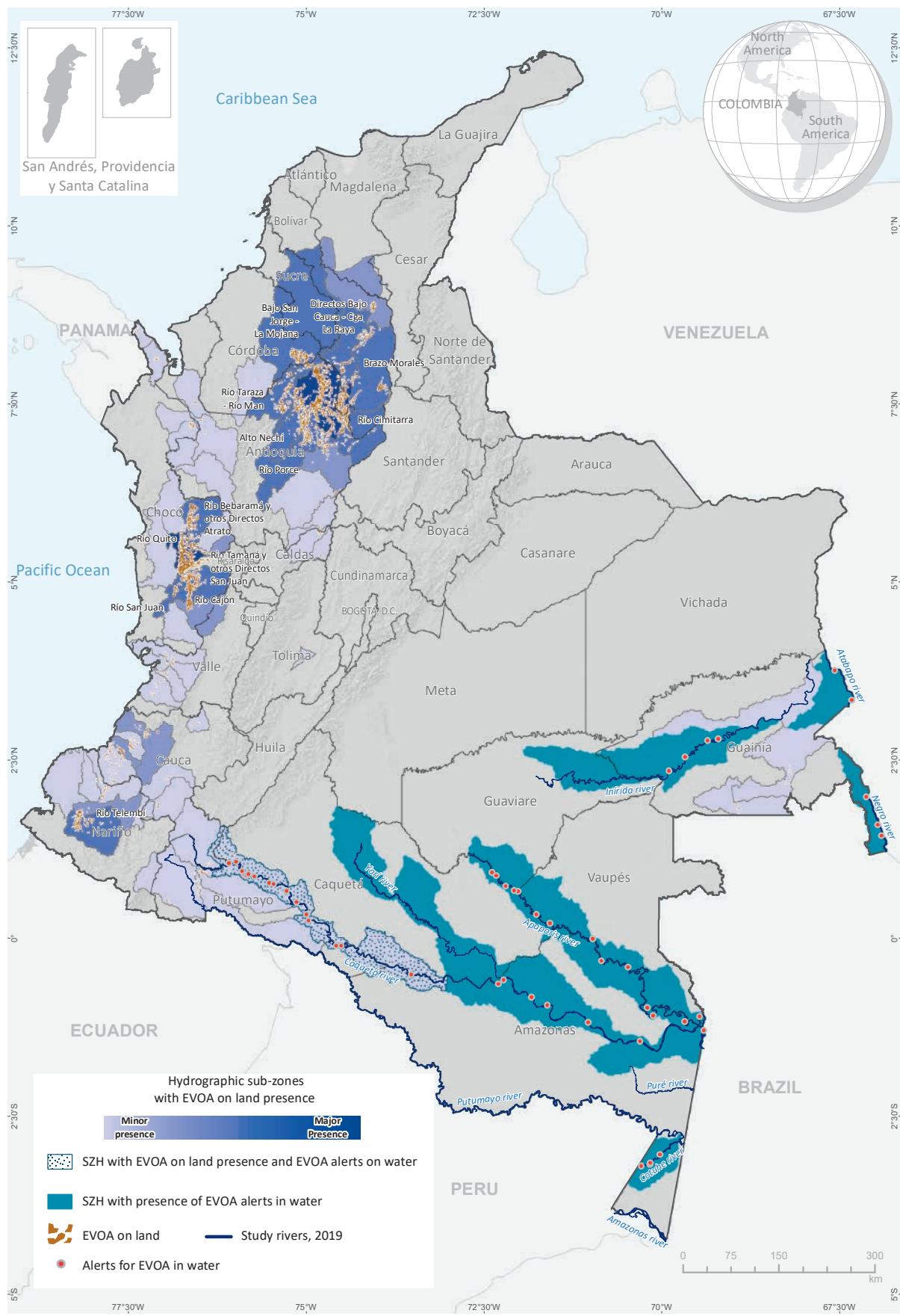
Table 43. Hydrographic Zones and Sub-Zones with alerts for EVOA in water, Amazon Hydrographic Area

Hydrographic Area (macro-basin)	Hydrographic Zone (basin)	Hydrographic Sub-area (sub-basin)
Amazonas	Apaporis	Alto río Apaporis
		Bajo río Apaporis
	Caquetá	Río Caquetá medio
		Río Caquetá bajo
	Guainía	Directos Río Negro
	Putumayo	Río Cotuhé

Finally, in the Orinoco Macro-basin, 12 ha of EVOA were identified on land in the Río Inírida basin, in the sub-basin of the Inírida river between the Bocón and Las Viñas rivers, near the municipality of Puerto Inírida, province

of Guainía. Likewise, EVOA alerts were also detected in water in the Orinoco (Directos Río Atabapo sub-basin) and Inírida (Río Inírida Medio sub-basin) basins. Map 25 presents the sub-basins with EVOA in the country.

Map 25. Hydrographic Sub-basins and EVOA, 2019



Source: Government of Colombia - Monitoring system supported by UNODC, for hydrographic subzones: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM). The boundaries, names and titles used on this map do not constitute endorsement or acceptance by the United Nations.

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The logo for the Sustainable Development Goals (SDGs) is shown. It features the UN emblem to the left of the text "SUSTAINABLE DEVELOPMENT GOALS". The word "SUSTAINABLE" is in a smaller, dark blue font, while "DEVELOPMENT GOALS" is in a larger, bold, light blue font. The "O" in "GOALS" is replaced by a circular graphic composed of various colored segments, representing the SDGs.

