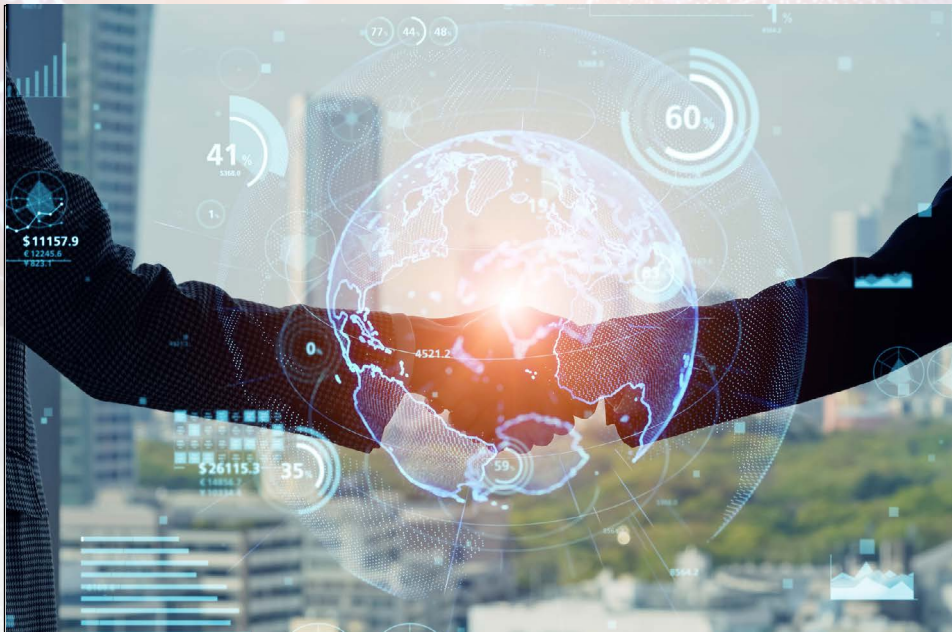


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Fernanda Navas-Camargo



Scientific Diplomacy: An Opportunity for Security and National Defense in Colombia

Fernanda Navas-Camargo*

Universidad Católica de Colombia (Bogotá, Colombia)

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Abstract

The present paper introduces the concept of Science Diplomacy for Security and Defense in Colombia as a means to pursue Soft Power activities that can contribute to both the perception of security by the community, and the development of Defense strategies for the country. For this purpose, the document begins by making a review of the definition of Scientific Diplomacy for Security and National the Defense and continues into highlighting emblematic cases from Colombia, as the central argument into recognizing the great potential this area has for Security and National Defense in the domains of land, sea, air and cyberspace. The scope of the research is descriptive, as its intention is to be a starting point for further analysis on the subject. The problem identified is the lack of recognition of the potential that science diplomacy represents both in terms of competitive advantage for geopolitics and as a contribution to the image of the military forces as an organization whose functions go beyond purely war activities to include important scientific developments. The paper concludes by issuing general recommendations to achieve such recognition.

Keywords: national defense; scientific diplomacy; security.

* Abogada y Administradora de Negocios Internacionales. Doctora en Educación para la Integración y el Desarrollo Humano y Sostenible. Investigadora de la Facultad de Derecho de la Universidad Católica de Colombia. Contacto: jfnavas@ucatolica.edu.co. Código ORCID: <https://orcid.org/0000-0002-4032-7070> Scopus ID: 57206269059

Diplomacia científica: una oportunidad para la seguridad y la defensa nacional en Colombia

Fernanda Navas-Camargo*

Universidad Católica de Colombia (Bogotá, Colombia)

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Resumen

El presente trabajo tiene como objetivo hacer una introducción al concepto de diplomacia científica para la seguridad y la defensa en Colombia, como un medio para llevar a cabo actividades de Poder Blando que puedan contribuir tanto a la percepción de seguridad por parte de la comunidad, como al desarrollo de estrategias de defensa para el país. Para ello, el documento comienza haciendo una revisión de la definición de diplomacia científica para la seguridad y la defensa nacional y continúa destacando casos emblemáticos de Colombia, como argumento central para reconocer el gran potencial que tiene esta área para la seguridad y la defensa Nacional en los dominios de tierra, mar, aire y ciberespacio. Para la conclusión, se hacen recomendaciones generales. El alcance de la investigación es descriptivo, ya que su intención es ser un punto de partida para un análisis posterior sobre el tema. El problema identificado es la falta de reconocimiento del potencial que representa la diplomacia científica, tanto en términos de ventaja competitiva para la geopolítica como de contribución a la imagen de las fuerzas militares como una organización cuyas funciones van más allá de las actividades puramente bélicas para incluir importantes avances científicos.

Palabras clave: defensa nacional; diplomacia científica; seguridad.

Introduction

The use of force and methods of warfare has been the publicly known focus in dealing with Colombia's armed conflict. However, war brings more war, and that is a problem. The armed conflict in Colombia has been sustainable over time because of the economic gains that insurgent actors manage to maintain through the development of different forms of crime,¹ such as human trafficking,² drug trafficking, and most every way of illegal businesses one can think of. These activities have allowed them to uphold and expand their *modus operandi* for several decades. On the other hand, the military forces have also managed to develop new strategies for dealing with the several problems and situations that derive from the armed conflict, many of which are to be recognized as scientific developments. Nevertheless, the mastery of scientific development that Military Forces have acquired throughout history is still an unexplored topic and an issue that is largely ignored by the population. Science rationally investigates recurrent associations of phenomena by assessing them through quantitative methods and formulating "laws" from its findings, using experimentation to systematically check them with experience.³ No one has more field experience of the armed conflict than the members of the Military Forces: The Army in relation with everything that happens on ground and is related to ground operations, the Navy on the fluvial and maritime scenario, and the Airforce for all matters related to air and space. None of them watch over one or another scenario exclusively, but mostly work together in all the possible settings to enable the rule of law and the operation of institutions in innovative ways.⁴ They find the problem, develop a strategy, put a solution into action and systematically prove and experiment even with their lives suitable options for facing the situation at hand. Meaning to portray a general perspective of those scientific developments that have well served to improve both the internal order and the international threats through diplomatic actions, one emblematic case of each one of the forces will be presented in this paper.

¹ Germán Silva García & Johana Barreto Montoya, "Avatares de la criminalidad de cuellos blanco transnacional", *Revista Científica General José María Córdova* 20, no. 39 (2022): 609-629.

² Gabriel Andrés Arévalo Robles, Fernanda Navas-Camargo & Lady Andrea Beltrán Cárdenas, "La suspensión excepcional de la dignidad humana: migración intrarregional sudamericana en clave de estigmatización", *Derecho Penal y Criminología* 43, no. 115 (2022): 73-110.

³ Edgar Zilsel, "The Genesis of the Concept of Scientific Progress", *Journal of the History of Ideas* 6, no. 3 (1945): 325-49. <https://doi.org/10.2307/2707296>.

⁴ Germán Silva García, "¿El derecho es puro cuento? Análisis crítico de la sociología jurídica integral". *Novum Jus* 16, no. 2, (2022): 49-75.

Scientific Diplomacy for Security and National Defense

The concept of science diplomacy is the union of two terms that are enormously relevant in their own right. On the one hand, there is diplomacy, which is considered a process of negotiation, dialogue and agreement between States in favor of peaceful relations, intent on building a shared agenda delimited by a government's foreign policy. It is a tool of international relations, whose objective is to lead processes in the international system, establishing guidelines generally related to national interests embodied in a rational logic of power. Science could be defined as the systematic study of a phenomena using a specific methodology that allows it to prove, improve or deny a hypothesis, and that implies⁵ the possibility of replicating the procedure given the standardized methodology used.

When Science and Diplomacy come together, we have a new concept that involves encountering the best of each world. Science Diplomacy is the strategic use of science, technology, and innovation to strengthen foreign policy processes. It is a concept that encompasses interdisciplinary and inclusive processes, which allows us to understand and provide solutions to global problems and national strategic interests.

Science Diplomacy is a recent and still fluid concept, differently defined according to the context and the perspective or role that is exercised (one is a scientist, one is a diplomat or a politician). Therefore, it is necessary to find common points of agreement and deploy strategies that promote collaboration and global competitiveness. Likewise, this process requires institutions to coordinate and collaborate to overcome the idea that science and diplomacy are different paths.⁶ This way of making international relations is highly related to the labor of diplomats in terms of gathering information, promoting the image of the country, and negotiating and managing the implementation of policies, treaties and agreements.⁷

Globalization has allowed for greater interaction between nation-states and their various key actors in the political, social, and environmental spheres. Together

⁵ Fernanda Navas-Camargo, *Diplomacia científica para la seguridad y defensa nacional de Colombia* (Bogotá: Editorial ESDEG, 2024) 13-15.

⁶ Marga Gual Soler, "Diplomacia científica en américa latina y el caribe", in *Estrategias, mecanismos y perspectivas para fortalecer la diplomacia de la ciencia, tecnología e innovación* (Montevideo: UNESCO-CIAL, 2020), 9-11.

⁷ Ian Speller, *Understanding Naval Warfare*, 2nd Ed., (London: Routledge, 2020).

with them, scientists, academics and all those who build bridges of cooperation through culture have been invested with relevance as the fact that development based on the generation of new knowledge can be used as a deterrent method to generate coalitions and alliances between States has been realized. Part of this new knowledge has been aimed at creating awareness about future threats and the need to have a common strategy among States that support each other.⁸

There are countless threats against the Nation-State, climatological, transnational, technological, ecological, political, economic, terrorist, among others, which directly or indirectly affect them and the balance of the mutant International System. Over the years and the appearance of new threats such as cybernetics or space, human beings have generated different ways to create or materialize the aggrandizement of powers, through the destruction of humans. Nuclear weapons and weapons of mass destruction are just a *click* away from being deployed and can eradicate a continent and end human, animal and plant life altogether. Cybernetic weapons enable the reproduction of chaos on the network and influence the way in which the actions of State Institutions are perceived, leading to social destabilization through human weapons and the so-called cognitive warfare⁹ in a field in which the reality of good or bad cannot be perceived. The above examples are just a brief exposition of the positive and negative consequences that have an impact on the way in which nations interrelate, transforming geopolitics in general and the possibilities of action of Colombia through the different mechanisms that are possible if "the whole" is considered as a Grand Strategy. The Grand Strategy would be based on all the military, diplomatic, cultural and economic means at the disposal of the State; in simpler terms, it would refer to a long-term multidimensional plan to secure (and improve) the power and prosperity of a state.¹⁰

In the current context, it is relevant to address problems associated with democracy, human rights, their protection systems, the governance of international

⁸ Erika Ramírez Benítez & Nicolás Antonio López Pulgarín, "La cooperación de Colombia con el Triángulo Norte: la diplomacia para la seguridad como antecedente en el desarrollo de la diplomacia científica", in *Diplomacia científica para la seguridad y defensa en Colombia*. (Bogotá: Editorial ESDEG, 2024), 147-172.

⁹ Cognitive warfare is the art of using technological tools to alter the cognition of human targets, who are often unaware of any such attempt, as well as those charged with counteracting, minimizing or managing its consequences, whose institutional and bureaucratic reactions are too slow or inadequate. Alonso Bernal et al, *Cognitive Warfare Project: an attack on truth and thought* (Baltimore: Johns Hopkins University, 2020).

¹⁰ Carlos Enrique Álvarez Calderón et al, "Hacia una gran estrategia en Colombia, construcción política en seguridad y defensa", in *La "Gran Estrategia": instrumento para una política integral en seguridad y defensa*, Vol. 1. (Bogotá: Sello Editorial ESDEG, 2018).

institutions,^{11,12} international trade and its dynamics, the evaluation of the different scenarios in which there are currently armed conflicts, the configuration and geopolitical reconfiguration of the world, and the new emerging actors such as military or economic powers, among others.¹³

Having a better understanding of what Scientific Diplomacy as a concept and as actions mean in matters of national security, it is safe to say that it plays an important role for the stability of a country. So, it is decisive to describe the activities that are carried out in the field of Security and National Defense, where there are numerous initiatives that lead to the generation of new knowledge and that have placed Colombia as a reference for the fight against certain threats, placing the Public Force in the context of what Science Diplomacy is, specifically in the field of Security and National Defense with geopolitical transcendence.

It is still safe to ask if there a difference between scientific diplomacy for security and national the defense, and the long-known concept of Defense Diplomacy. Defense diplomacy has its essence in generating cooperation activities in the field of doctrinal learning, technologies and exchange of experiences. It is comparable to the traditional strategy of the Military Forces.¹⁴ Moreover, the geostrategic vision sets the path for the Military Forces to touch on security topics under this configuration where traditional strategy is limited and in need of new elements that allow for the present society to successfully face new challenges. Modern strategy consists of defeating the opponent in a devastating way and leading it to a place where conflict resolution can take place, but not necessarily using warfare. In other words, security is the final purpose and the ways to reach that security can range from an electronic or internet breakdown, which does not have anything to do with warfare as we know it, but which can easily lead to a systematic and social breakdown. In that sense, security objectives are defined, and ways to reach them are established. This, in turn, drives such ways to become diplomatic and coercive

¹¹ Jaime Cubides-Cárdenas, Fernanda Navas-Camargo & Laura Milena González Montes, “El Nuevo Constitucionalismo Latinoamericano”, *Derechos Democráticos & Estado Moderno*, no. 2 (2021): 03-14.

¹² César Castillo Dussán, Fernanda Navas-Camargo & Jaime Cubides-Cárdenas, “Reflexiones en torno a la cotidianidad e integralidad de los Derechos Humanos”, *Novum Jus* 16, no. 1 (2022): 23-50.

¹³ Sergio Andrés Fernández Salas, “Democracia Liberal y Derechos: Desafíos Y Perspectivas”, *Novum Jus* 18, no. 1(2024): 9-15.

¹⁴ Carlos Alberto Ardila Castro, Jonnathan Jiménez-Reina & Henry Mauricio Acosta Guzmán, “Diplomacia científica en el sector del soft power en Colombia”, in *Diplomacia científica para la seguridad y defensa en Colombia*. (Bogotá: Editorial ESDEG, 2024), 147-172.

within a democratic framework.¹⁵ Science diplomacy is based on new knowledge development and, when brought together with National Defense and Security, it is expected to develop Soft Power activities that serve the nation's best interests.

The objective from here on is to present some scenarios in which the Military Forces of Colombia have dealt with threats without the use of force and should be framed as activities that contribute to Science Diplomacy in the field of National Security and Defense. These have been used as a crime prevention strategy, together with public policy programs and military assistance of a non-belligerent nature.

Three are the main military forces: The Army, the Navy and the Airforce. These constitute the team that have led the development of Scientific Diplomacy through different activities. Even though there are many examples that should be highlighted, only one that represents the different domains will be presented. The selection was made given the significant impact each one of them has in terms of national and international community. Examples of this are humanitarian and risk management activities, cybersecurity issues, environmental concerns social conflicts, among others.

The National Army and the Humanitarian Problem of Anti-Personal Mines

Territory: Guarantee for Free Movement (Humanitarian Demining)

Anti-personnel mines are explosive devices buried underground or camouflaged, which aim to kill or disable the victim and whose devastation may be difficult to endure. These have been used extensively, especially in poor rural areas such as Colombia as a way of holding permanent terrorism acts, at low cost and unbearable negative impact. People injured by mines often have extreme difficulty in obtaining medical care, and if they do, the medical services offered are very limited. The victims of Anti-personnel Mines generally require a lifetime of care that puts even more burdens on families who have few economic resources and even more so to the Military Forces that cannot afford to have forbidden areas for them to access. This issue is of great relevance for Colombia because, unfortunately, the number of civilian and military victims resulting from the explosion of these devices has

¹⁵ Fernando Chavarro Miranda, Manfred Grautoff Laverde & Julián David Riaño Cruz, "Model for Economic Growth and Public Spending Focused on Security: the Colombian Military Strategy Approach (2002-2009)", *Revista Científica General José María Córdova* 15, no. 20 (2017): 27-45.

historically placed Colombia in first or second place with the highest number of victims, year after year. This terrible situation has provided the country with expertise and has positioned it as a benchmark for demining actions.

Figure 1. Figures 2018 - 2023 – victims of explosive devices



Source: International Red Cross Committee (2024)

In this context, the National Army was tasked to deal with the Anti-Personnel Mines (APMs) and the Unexploded ordnance bombs (UXBs), resulting in the conformation of the Explosives and Demining groups of the National Army. The members of these units receive instruction on techniques, tactics and procedures to locate and destroy APMs. It is important to note that the Force can carry out all kinds of

simulated exercises in assigned terrain very close to the reality that must be faced in military operations, looking to improve their competencies in demining, ruling out the presence of Explosive Devices in the extraction area, and preserving the integrity of personnel and aircraft.

Indeed, Colombia is getting closer and closer to have the entirety of its territory demined. Although the challenges of demining may seem completely daunting, it is an achievable goal. Since the Mine Ban Treaty became binding on March 1, 1999, dozens of countries have achieved the goal of being free of antipersonnel mines.

The Humanitarian Demining Battalions

In compliance with the international conventions ratified by the Colombian State, the Ottawa Convention in particular, the first humanitarian demining operations began in 2004 and were carried out throughout the country. The first military bases where these efforts took place were in Bogotá and in the different departments of the country, and more than 3,562 devices were destroyed.

In fact, this type of operation was carried out by the Humanitarian Demining Company, currently the Humanitarian Demining Battalion (BIDES60), thanks to the permanent monitoring of the Organization of American States (OAS) and the international community, tasked with the oversight of these operations. Their mission is to use technical and tactical capacities for national development in projects and roads, and to lead humanitarian demining operations with the purpose of supporting the eradication of APMs and UXBs throughout the national territory.¹⁶

Therefore, for this type of work, all kinds of programs must be designed, aimed at the social and economic development of the regions with population in a state of defenselessness or vulnerability with the purpose of providing all kinds of well-being to them, fully complying with the essential purposes of the State. The peace agreement supported the use of a matrix that classifies territories where mines are suspected to be deployed and determines the order in which they should be cleared. In addition, it authorized the start of demining work in 22 million square meters of Colombian territory. These goals have been successfully implemented, as can be proven by the fact that the victims of APMs and UXBs within the National Army have been reduced to almost zero. However, another latent reality is that the

¹⁶ Information on the number of people who were victims of anti-personnel mines (APMs) or unexploded ordnance (UXO). Bogota, Cundinamarca, Colombia: ArcGIS (2017).

entirety of APMs and UXBs that were deployed during more than 5 decades of armed conflict have not been successfully deactivated, for which Military Units continue to face the risk of becoming new victims of this silent enemy in the development of military operations.

For decades, APMs and UXBs were unconventional weapons used by insurgent groups, and these silent weapons are still found in many of the municipalities that suffered the horrors of the conflict first-hand. Despite the efforts of the current government to develop demining plans and the fact that the territories with a high record of incidents with APMs and UXBs have been declared mine-free, troops and soldiers continue to face the risk of activating one of these devices while carrying out military operations in these territories. When a war is over, weapons leave the battlefield with the combatants. Anti-personnel mines do not. They remain in position and continue to claim lives and limbs for decades after the end of a conflict.

Likewise, Anti-personnel Mines can also render large areas inaccessible because the civilian population is unsure of where these may be and do not dare to use the territory. Land without productive use can paralyze communities and have a negative impact on the development of areas that are mined or feared to be mined, so Military Units must be prepared to face the challenge of APMs and UXBs in the post-conflict, facing it in the most professional and prepared way possible.

Decontamination Operations of the Territory

Based on the strategic plan from 2020 to 2025 "Colombia free of antipersonnel mines", nowadays it is safe to say that there are more than 475 municipalities without any suspicion of mines throughout the country, where joint efforts of humanitarian demining operations and municipal security councils have been carried out. The National Government has recorded the effects of APMs and unexploded ordnance unexploded bombs (UXBs) and the interventions of Humanitarian Demining Operations from 1990 to the present, based on various governmental and non-governmental sources, including the media, which have also recorded accidents and incidents involving such devices. One of such records was carried out in cooperation with the Agustín Codazzi Geographic Institute – IGAC in 2002.

Who Carries Out Humanitarian Demining in Colombia?

The National Navy's Explosives and Demining Group of the Marine Corps and the National Army's Brigade of Humanitarian Demining Engineers N01 have carried out most of the demining efforts since 2005 in the municipalities affected by APMs and UXBs. With the implementation of Law 1421 of 2010 it was determined that any type of Non-Governmental Organization of a national or international nature whose purpose is the exercise of humanitarian demining tasks is to be empowered to do so as long as it complies with international standards and provide certifications and endorsements. When such criteria are met, demining missions may be assigned to them by the National Government.

This procedure was regulated in Decree 3750 of 2011, as well as the IMAS (International Mine Action Standards), demanding civilian Humanitarian Demining companies to comply with Colombian regulations on labor, environmental, safety and workplace health regulations, so they have the imperative obligation to hire their personnel through the rules and procedures enshrined in national legislation.

In turn, the Colombian State has seven (7) Humanitarian Demining organizations: **governmental** 1. Humanitarian Demining Engineers Brigade No. 1; 2. Marine Infantry Explosives and Demining Group -AEDIM. **Non-governmental** 3. Halo Trust; 4. International Handicap Federation; 5. Colombian Mine Action Campaign; 6. Danish Demining Group; 7. Humanicemos.

Antarctic explorations and their strategic and geopolitical contributions from the Airforce

Human beings and their constant need for expansion and discovery have generated the so-called expeditions or explorations throughout history, looking to expand the territorial possibilities of a nation and the different continents.

The search for new natural and mineral resources, as well as the sudden changes in navigation courses, led several expeditionary to glimpse land in the southern hemisphere of the American continent between the fifteenth and seventeenth centuries, approximately. It was this territory that they would later call *Antarctica*

or *white continent*. Ferrari and Auza (2017),¹⁷ for example, describes it as a strategic asset. One of the differences that characterizes Antarctica compared to the North Pole is the existence of continental land, this land being one of the richest on the planet, since it has 80% of the world's freshwater reserves. Getting and staying there is no easy enterprise. Therefore, several expeditions have been deployed by many countries, including Colombia, which have been conducted by their Military Forces.

Its inhospitable geography, its large hydrographic sources, its oceanographic multi-biodiversity, among others, are some of the aspects that arouse curiosity and attention of several countries, which over time and after its discovery, wanted to have a presence in this continent. Unfortunately, in the absence of a defined ethnic settlement and the existence of needs from different states, territorial claims began to arise from the states that wished to obtain territories within this new continent. In 1959, after having several disputes over the white continent, the Antarctic Treaty was signed, containing the measures agreed upon by 12 countries in order to not create a conflict by colonizing these lands. On the contrary, the treaty sought to generate cohesion among members that would lead into scientific and technological development for the conservation of flora, fauna and natural resources for the good of humanity. The philosophy on which the Antarctic Treaty is built demonstrates the generation of advanced consciousness, in favor of the protection of biodiversity and nature as finite goods of humanity. By virtue of the above, in addition to the 12 States that were original signatories, 37 States have acceded, thus forming a group of 49 States members of the Antarctic Treaty divided into two categories: Consultative Parties and Non-Consultative Parties.¹⁸

In this context territorial claims in Antarctica were suspended, creating protection for a natural source, which, in the future, would have the capacity to generate resources of vital importance for all humanity. The solidified and fresh water found in these lands represents almost 80% of the world's reserves. In volumetric terms, comparing km³ with other continents, and according to the US Geological Survey (2016), it estimated that Antarctica would contain just over 30,000,000 km³ of freshwater in solid state (57%), compared to 2,600,000 km³ in Greenland (7.91%), 91,000 km³ in America (0.27%), 60,984 km³ in Asia (0.19%) and 18,216 km³ in Europe (0.06%).¹⁹

¹⁷ Ariel Ferrari H. & Francisco J. Auza, *La evolución del escenario Antártida y los procesos de liderazgo en el sector* (Buenos Aires: Escuela Superior de Guerra Aérea, 2017): 1-115.

¹⁸ Fernando, Villamizar Lamus. Tratado Antártico y mecanismos de protección del territorio Antártico. 21 *International Law, Revista Colombiana de Derecho Internacional*, 255-295. (2012).

¹⁹ Carlos Enrique Álvarez Calderón & Eduardo, Namen Mesa. Geopolítica del Polo Sur: Intereses y necesidades de Colombia en el Tratado de la Antártida. *Revista Científica General José María Córdova* 17, no. 28 (2019): 721-748.

Contextualizing the geopolitical importance of Antarctica, it can be stated that "If the right technology is available, this body of solid water could supply for a total of 500 million people"²⁰ if required in times of scarcity in the future or imagining a scenario of imperative necessity. Colombia has served as a member of the United Nations (UN) since 1945, which is one of the requirements that a country must comply with to join the Antarctic Treaty as a consultative member. Just by recognizing the dimensions of this continent, one can imagine the magnitude of its influence at the global environmental level. Thus, Colombian Antarctic explorations and their contribution to science diplomacy in the strategic and geopolitical spheres are of vital importance in the development of the objectives proposed for the country in terms of both environmental conservation and National Security and Defense from the perspective of Science Diplomacy.

According to the report made by Colombia's first scientific expedition in Antarctica states that the Nation, aware of the importance of Antarctica, has been a signatory to the Antarctic Treaty since 1989 and has since carried out activities that made to envision the change the country's status from adherent to consultative status of the Treaty.²¹

To address this issue of importance for the Grand Strategy and the fulfillment of national interests, it is necessary to review some of the scientific expeditions or campaigns that Colombia has carried out towards the White Continent. To date, nine of such expeditions have been carried out. The last one is currently under development within the white continent. The leadership that the Military Forces have had in the execution of the expeditions is a reliable example of the scope of Science Diplomacy.

The expeditions have been given the name of "Colombian Scientific Expedition to Antarctica" and some of them were also named after an Admiral: the expedition 2015 – 2016 was named Admiral Lemaire; 2016-2017, Admiral Padilla, among others. The "Colombian Scientific Expedition to Antarctica Southern Summer 2023-2024", recently took place.

All expeditions have been supported by COTECMAR, the Colombian state-owned defense shipbuilder and engineering company that provides services to the Ministry

²⁰ Ferrari, *Evolución Antártida procesos liderazgo*, 1–115.

²¹ Ricardo Morales Babra, *Primera Expedición Científica de Colombia en la Antártida, Verano Austral 2014/2015*, (Bogotá: Comisión Colombiana del Océano, 2016).

of National Defense of Colombia and other domestic and international customers. In every expedition several research projects are developed on the topics of physical, chemical and geomorphological oceanography, as well as hydrography, oriented towards maritime safety in the Antarctic continent. Some of the research topics include:

1. The Study of the Relationship Between the Surface Temperature of the Tropical Pacific Ocean and Temperature Change in the Antarctic Peninsula.
2. The connection between the El Niño Southern Oscillation and changes in Antarctica's climate.
3. The hydrodynamics and water masses of the South American Pacific and connection with Antarctic waters in the austral summer.
4. Antarctic marine mammals, with special attention to cetaceans migrating to Colombian waters.

As the expeditions materialized, it became necessary to create organizations to seek and provide the support needed by the activities that derive from these important initiatives at the national level. In 2017, the Public Policy "National Policy of the Ocean and Coastal Spaces" (PNOEC) was issued, projecting a vision up to 2030 and seeking the promotion of National Maritime interests, such as the appropriation and recognition of the maritime territory, the sustainable use of resources, the conservation of the environment, the planning and governance of the territory, the permanent surveillance and control of jurisdictional spaces, and the growth and competitiveness of the sectors that develop maritime activities safeguarding related resources for current and future generations, increasing the quality of life of the inhabitants of coastal areas and promoting national development. In addition to being visionary, it integrates different spheres such as the public sector, academics and the private sector; all of them aimed at providing the support required for the scientific strengthening of the country and promoting national development.

Every year, new research topics and new forms of cooperation have been incorporated. For the 3rd expedition, the expected scope was achieved in different projects on issues and contributions to safety in Antarctic navigation, deploying 206 scientific activities and the hydrographic survey of 12,177 new hectares along the South American Pacific coast and the Gerlache Strait in Antarctica. The expedition lasted 84 days, gathering crucial data for the preparation of nautical charts and data acquisition elements for geospatial surveys not only for Colombia but for

other South American countries. Among the topics covered by the expedition one may highlight hydrocarbon collection for studies, as well as the evaluation and analysis of the construction of a scientific station, which must operate under extreme conditions of temperature and relative humidity, be self-sustainable, and be subject to the restrictions of geographical and geopolitical location depending on the agreements that are reached.

The research cruise of the V Scientific Expedition of Colombia to Antarctica "Almirante Campos" was attended by twenty-three (23) institutions and eleven (11) research projects in different disciplines not only related to the ocean. In sum:

1. In oceanography (physical, chemical and biological) 17 stations were deployed, which gathered around 874 samples of different parameters.
2. In near-shore sampling, work was carried out in seven (07) areas around bases, deploying 37 stations and collecting around 160 samples for microbiological and chemical analysis.
3. In marine mammals, eleven (11) boat trips, thirteen (13) biopsies, 23 krill samples were gathered, and more than 500 hours were dedicated to species sighting.
4. In glaciology, 29 oceanographic stations were deployed, which installed three (03) beacons with temperature sensors and six (06) photogrammetry. In addition, a bathymetric survey was carried out in front of the Lange glacier.
5. For a study related to climate change, 26 stations were made with a vertical microstructure profiler and 36 specific meteorological records for the study of teleconnections with different ocean-atmospheric phenomena.
6. A multibeam bathymetric survey of 174 km² was carried out in Wilhelmina Bay, as a contribution to the nautical mapping of the area in association with the United Kingdom Hydrographic Office (UKHO).²²

The percentage of compliance with the agenda for this campaign was 80%.

Up to date, ten expeditions have taken place, all encountering marvelous results in terms on scientific research and development, even in relation to space analog missions. Space analog missions are an economical alternative for conducting research

²² Juan Manuel Soltan Ospina, *Informe de la V Expedición Científica de Colombia a la Antártica Verano Austral 2018- 2019*. (2019).

and training for space missions versus space itself. This method is used by different agencies and organizations in the space sector around the world and has allowed for more than 50 years to develop training and research programs for different missions and the Antarctic is suitable for such missions.

Altogether, the Antarctic expeditions show that the Navy's efforts allowed for the materialization of high-impact scientific achievements that can generate valuable resources for the country. These campaigns also yielded the added bonus of providing training for spatial exploration, culminating in the possibility of having the first Colombian astronauts, further broadening the horizons, faith and importance of carrying out each of these expeditions to Antarctica by Colombia and the different institutions that support them.

Cyber Diplomacy and Information Operations

Technology and modern-day life have contributed to the mutation of how wars operate, as well as the definition of which objectives must be achieved. Based on the use of technologies, contemporary history shows us new types of actions that mark a real turning point: the emergence of new material conditions – especially technological – as well as social and cultural reconfigurations and their global tensions, have also redefined the ways of waging war, to the point of giving them a new name where, due to the variety of mechanisms they include for their execution, are to be referred to as "hybrid wars".²³

Hybrid warfare has also "been linked to cyberattacks, espionage, propaganda and information tasks, destabilization campaigns to depose governments (as is the case with the so-called Color Revolutions) as well as the use of non-military tools to extraterritorially promote the interests of the states that use them (economic warfare, diplomatic pressure, forms of cultural penetration, etc.) among others".²⁴

²³ Rogério Barbosa Marques, Murillo de Oliveira Dias & Fernanda Navas Camargo. "Literature Review on Multi-Domain Battle", *International Journal of Development Research* 12 (2022).

²⁴ Luis Alexander Montero Moncada, Jonnathan Jiménez Reina, & Carlos Alberto Ardila Castro, "Efectos geopolíticos de la guerra de Ucrania", *Novum Jus* 17, no. 1, (2023): 205–235.

Information Operations in Colombia

Manipulating people's consciousness to influence, disorient and divide the population can in turn block the response capacity of a government through the ineffectiveness and limitation of action of its institutions and the state apparatus in general. Such is the purpose of information operations that have been positioning themselves as strategy in contemporary conflicts. Although somewhat reckless, information operations are extremely effective as a recent phenomenon worldwide.

Faced with a volatile, uncertain, complex and ambiguous scenario that has been operating for a little more than a year, enhanced by an unprecedented event of unpredictable proportions such as the COVID-19 pandemic, all countries and economies in the world were affected, trade collapsed, small and medium-sized enterprises in many cases were forced to close and large companies began to reflect enormous losses. There was a shortage of food, debt problems and a resounding blow to the social structure of nations, some of which were and still are facing serious flows of migration.²⁵

In mid-April 2021, Colombia's Government presented the initiatives that could help the country to withstand this situation. Among the measures were subsidies, elimination of interest, extension of debt terms, generation of credit lines for investment, among others. All activities were based on the aim of improving the conditions of the country, but at the same time surrounded and influenced by uncertainty, ignorance and the expected nervousness of the situation.

Some of the activities worked, others did not; but still the National Government presented to Congress a tax reform as a measure to support the economic deficit of the State and face the internal situation of the Country. The reform did not go down very well among the labor unions, social sectors, opposition political groups and some ethnic groups, so a national strike was called for April 28 to demonstrate disagreement. Hundreds of people mobilized and concerted from the massification of content and sharp digital messages that questioned what was really happening. People from all comings went out to protest, acting against the established biosecurity protocols and containment measures of the pandemic.

²⁵ Fernanda Navas-Camargo, Jeisson Andrés Bermúdez Guerrero & Claudia Patricia Garay Acevedo. "Puntos de acción desde la migración en el marco de la Seguridad y Defensa Nacional", *Novum Jus* 17, no. 3 (2023): 237-65.

During the strike, when listening to each party express their opinions, what was observed was a repetition of claims that had already been outspoken months ago, on November 21, 2019, where a national strike was generated along the same lines, making it clear that everyone had a different version, there was talk of corruption, there was talk of deaths of social leaders, there was talk of education, among many others.

As in other countries, what began as a peaceful march and protest, quickly became a pitched battle, at which point a group calling itself "the front line" appeared, who oversaw the unleashing of a scenario of massive destruction, blockades, fires, destruction of state infrastructure, destruction of local shops and businesses, breaking windows, graffiti, restriction of access to main roads, attacks and aggressions against the Public Force, among others. This situation began to be replicated in throughout the country, where people claiming to belong "the front line" also appeared: some cities were more affected than others, but in general the atmosphere of fear, anxiety and ungovernability became too strong until the public force, specifically the National Police, were deployed.

The National Police is the guarantor of civil security, trained and prepared to deal with this type of situation. However, when facing a group of people who are in high spirits and adrenaline at its maximum, the provocations, attacks and excesses against the uniformed are not long in coming. Rocks, potato bombs and other series of harmful and incendiary improvised devices are thrown against the National Police, whom for their protection use a robust uniform, helmet and shield, in addition to using their operational capabilities defined for this type of cases such as tear gas, traumatic weapons, pressurized water jets, special formations and other series of operational techniques that make the demonstrators mobilize or deconcentrate from the point they have controlled. The way they act can be confusing, it can even be compared to a tangram²⁶ or a puzzle where each part is meticulously considered to have the best results.

Confrontation is the moment awaited by vandalism groups and digital content generators, because amid confrontations there are abuses of force on both sides that the abuse to create biased content, previously studied and prepared in order to affect the institutional image, the legitimacy of the State and its organizations and above all to sell at the local, regional and international levels an image of barbarism that

²⁶ Jorge Enrique León Molina, "El tangram del derecho: neguentropía y proceso jurídico", *Novum Jus* 18, no. 1 (2024): 127-154.

forces international human rights institutions²⁷ to take an interest in the situation and to offer help from a biased "neutral position", agreeing with the demonstrators and condemning the State.

Bots²⁸ are used to massify the information in the different social network accounts they have associated "which are defined by programming code that runs continuously and can activate itself. They make and execute decisions without human intervention and perceive and adapt to the context in which they operate".²⁹ The structure often has a main content generating account and millions of replicating accounts that can reach all the connected users in the world in just milliseconds.

The outcome of this situation is the same as in other countries: the tax reform falls, the government retracted the measures, the protests continued for a few more days, social discontent increased, encouraged once again by propaganda and in the end the population ended up influenced, disoriented and divided right before the then upcoming presidential race of 2022 where, once again, the discontent with traditional models and worn-out Colombian politics would favor a candidate who represented change in the consciousness of the people, regardless of what their actual platform may have been.

Main components that influence the development of Information Operations in the Colombian context

It is vital to understand the chain reaction generated by this series of information operations which generally begin with a trigger that affects minorities among the civilian population, usually issues of money, inequality or unsatisfied basic needs, which then turn in matter of hours and days into a great social demonstration.

Once the social outbreak has been generalized, massified and visualized, both locally and internationally, the requests, proposals and possible solutions of some actors, political groups and organizations who claim to hold only well-being of the country at heart, but at the same time portray themselves as the future political solution to avoid the repetition of these factors of social instability.

²⁷ Fernanda Navas-Camargo, Jaime Cubides-Cárdena & Jesús Enrique Caldera Ynfante, "Human Rights encouragement through peaceful resistance initiatives in rural Bogotá", *Opción* 34, Special No.18 (2018):2102-2126.

²⁸ Apherisis shortening of the word Robot.

²⁹ Milena Tsvetkova, Ruth García-Gavilanes, Luciano Floridi & Taha, Yasseri, "Even Good Bots Fight: The Case of Wikipedia", *PLOS ONE* 12, no.2 (2017): e0171774.

However, these multiple options or possible solutions will always be associated with activities that help to favor a political project, a new constitutional order protected by banners such as social awareness, the political, economic and social exhaustion of the State, as well as disagreement with the current government and the reluctance on the part of some segments of the population, particularly young people or the armed or military forces, who due to their role must attend to and deal with all public security activities in the country (rallies, marches, violent protests, vandalism, looting, damage to public property, etc.).

To generate greater impact in terms of transparency and legitimacy, each of these proposals is accompanied by the almost immediate intervention of third-party validators, people, organizations or governments, in some cases previously warned, who seek to be that neutral and mediating line that, through their good offices, could bring the actors in conflict closer to meeting points to achieve political, social and economic stability, allowing the crisis to give way and ensuring the restitution of the rights allegedly violated. The cities are to be prepared³⁰ and provide safe conditions to improve the perception of security.

This scenario is being copied and repeated in various world contexts and in Latin America, specifically in Chile, Colombia and Ecuador. The behavior is almost a carbon copy, a social trigger, the beginning of the disagreement that leads to demonstrations, concentrations, the development of media content and opportunistic propaganda of some political actors of the day who are extolling the spirits of the demonstrators and who later give way to acts of vandalism and violent demonstrations as a justification for the protest. These outbursts are supported by the creation of digital content and the massification and viralization of propaganda leveraged by revolutionary slogans, short phrases of impact and fake news which tend to show a use of excess force from the public force when operating against the acts of vandalism.

Actors behind an Information Operation usually have enough material covering several areas, which undoubtedly helps to generate impact and instability and, in turn, accomplishing its purposes. In contrast, the traditional political system was required to deal with these new challenges with worn-out and old-fashioned systems, as well as a broken institutionality, a lack of credibility in the rulers and a poor representation of society. The social system, on its side, took advantage of the

³⁰ Laura C. Gamarra, Fernanda Navas-Camargo & Paula A. Barreto Cifuentes, "Tort Liability for Unsafe Sidewalk Conditions: A Comparative Study Between Colombia and New York City", *Opción* 35, no. 25 (2019): 605-639.

fatigue product of multiple affectations, unsatisfied basic needs, taxes, increases in the family basket, tax reforms, elimination of subsidies, corruption and several social feelings protected by social inequality.³¹ The economic system, on the other hand, suffered affectations by the collapse of blockades, material damage, physical effects and, at the time, the appearance of the COVID-19 pandemic, which substantially affected industry and world trade.

In sum, Hybrid Warfare activities that contribute to the development of information operations are:

1. Exploitation of unsatisfied basic needs and common social problems.
2. Messages, calls and incitement not to be indifferent.
3. Rallies, marches, protests, protest symbolisms.
4. Vandalism, destructive acts and generation of an environment of fear and anxiety.
5. Operation of the capacity of the State through the Public Force.
6. Creation of false and biased digital content.
7. Massification of messages, content and information campaigns through technical means (Bots and Botnets).
8. Reputational attacks and generation of rejection and hatred of institutions through technical means (Trolls, Bots and Botnets).
9. Paralysis of the State's capacity for action.
10. Intervention of international verification bodies and third-party validators.
11. Generation of the appropriate environment to achieve the initial general objective.

Cyber Diplomacy as a strategy or line of effort to mitigate the impact of risks and threats in and through cyberspace

Cyber diplomacy seeks to find mutually acceptable solutions to common challenges, knowing that everything related to the cyber world represents a threat capable of affecting countries, organizations, economic groups, etc. The Global Risks Report issued annually by the World Economic Forum has been registering cyberattacks on Cyber Critical Infrastructure, Cyber Insecurity and Cybercrime has been among

³¹ Germán Silva García & Vannia Ávila Cano, "Control penal y género ¡Baracunátana! Una elegía al poder sobre la rebeldía", *Revista Criminalidad* 64, no. 2 (2022).

the top 10 risks for more than 5 consecutive years and its projections show that this phenomenon, instead of decreasing, tends to grow rapidly and constantly.

It is important to affirm that cyber diplomacy should focus on governance, on the definition of agreements, understandings, international cooperation mechanisms and treaties signed by countries and of mandatory compliance. Best practices carried out at the cyber level are to become the protocols of maximum compliance. All the above leveraged and supported by a national strategy that contemplates the development and strengthening of cybersecurity and cyber defense capabilities of the Armed Forces, which have the mission role of guaranteeing national security and defense, with the primary purpose of defending the sovereignty, independence, integrity of the national territory and the constitutional order.

Similarly, and to advance in the development and execution of comprehensive strategies that commit the entire State and strengthen cyber diplomacy, a proposal of a local, regional and international cybersecurity strategy is to be considered, which may begin with the academic preparation of diplomatic agents in cyber matters. The establishment of treaties, cooperation mechanisms, agreements and understandings to establish key points to mitigate the actions of cyber threats are to be prioritized as well, in addition to the determination of secure protocols that allow the protection of national institutions against critical cyber infrastructures. In terms of security or cybersecurity, there will never be a mechanism that mitigates a threat on its entirety, however, the definition of governance mechanisms such as strategies, policies, laws, cooperation agreements, treaties and other means will integrate different layers of security that may result in better behavior and mitigation capacity in cyberspace.

Conclusions

Science Diplomacy in the field of Security and National Defense should be considered a tool of soft power for the country through activities linked to the development of new knowledge by its Military Forces. This instrument encompasses the use of influence, persuasion, incentives, and other resources by the State to achieve its objectives without the need to resort to coercive activities, and still manage to generate positive influence in favor of a perception of security on the part of the community that is aligned with those other forms of power that are developed within the Military Forces. A latent competitive advantage is being underutilized. The application of Science Diplomacy and Soft Power in Colombia has become

increasingly relevant to achieve the security, stability and sustainable development of the country, without necessarily yet making public recognition of the way in which the Armed Forces have contributed to this purpose. Science Diplomacy must be inserted as a national strategy to face the threats and prevent the proliferation of the different manifestations of organized crime that sets the bases for the perpetuation of armed conflict.

Some authors indicate that no other aspect of modern warfare has been more studied than that concerning the conceptualization, development, production and use of science-based weapons, considering that in the last century war became a project based on science and technology. However, it is only recently that countries have begun to institutionalize science, technology, and innovation as fundamental elements within their foreign policy to improve international relations and prevent conflict-related acts. The consolidation of a joint conceptual idea supporting Science Diplomacy as a real Soft Power tool, would make it possible to improve military strategy. In addition, it would contribute to the generation of new knowledge based on military experiences within the national context.

In the last Defense and Security Policy PDS – For Legality, Entrepreneurship and Equity, the development of diplomacy for Defense and Security that strengthens alliances with countries with common interests and participation in cooperative security models was established as one of its strategic objectives. It is important to include society as the center of the problem, since there are sources of security not derived from military spaces, namely, domestic, economic and environmental factors, which will also have a general impact that should be considered from the field of military strategy for a better development of new knowledge that can be used within the scope of Science Diplomacy for National Security and Defense.

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