
	ENVIRONMENTAL IMPACT ASSESSMENT FOR THE RUMICHACA - PASTO DIVIDED HIGHWAY PROJECT, SAN JUAN - PEDREGAL SEGMENT, CONCESSION AGREEMENT UNDER APP SCHEME No. 15 OF 2015	
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## 5 CHARACTERIZATION OF THE AREA OF INFLUENCE





### 5.4 ECOSYSTEM SERVICES

The analysis of ecosystem services aims to understand the relationship between ecosystems and humans, analyzing how the interaction and relationship of the different ecosystem elements give rise to well-being conditions in people. Along these lines, this analysis identifies and describes the ecosystem services observed for the area of influence of the Rumichaca-Pasto Divided Highway in the San Juan-Pedregal Segment, also determining the importance or dependence on these services by the local communities, the impact that the project would have on ecosystem services (impact of the project), and the level of dependency of the project on ecosystem services, in accordance with the guidelines established by Terms of Reference M-M-INA-02 Version No. 2 of 2015.

The concept of ecosystem services encompasses all the cultural, economic and ecological benefits that humans receive directly and indirectly from biodiversity, resulting from the interaction of the different elements, components, structures and functions of ecosystems, being the bridge that substantially connects human beings with their surroundings. This human being-biodiversity relationship generates well-being conditions, while the services provided somehow contribute to the development of all human activities in terms of production, extraction, settlement and consumption, as well as in the quality of life. Hence, biodiversity and ecosystems are recognized as the basis of the flow and provision of services to the human being, defining the different components of biodiversity, including ecosystems, as units providing services and welfare to the community (MEA, 2003).

With this, ecosystem services have been categorized according to the benefit relationship they bring to the human being, either by direct provision of services or by the benefit derived from interactions, relationships and ecological flows. The classification of ecosystem services is presented below (MEA, 2003):

- *Provisioning Services:* It groups all those services, including goods and products, directly obtained from the ecosystems as a supply for their benefit. This includes provision of water resources, wood, fiber and resins, food from agricultural activities, hunting and fishing products, mineral and energy source (oil, gas, coal) utilization, and all those elements that are supplied by human beings for their daily activities, among other supply services.
- *Regulatory services:* These cover services derived from ecosystem processes, i.e. all those resulting from the flow, interrelationships and interactions among the different components of ecosystems. Regulatory services include processes of climate regulation, maintenance of air quality, water purification, disease and pathogen control, soil fertility, and erosion control, among other processes affecting wellness conditions of the human being.
- *Support services:* These include all those ecological processes that underpin and support the operation and provisioning of other ecosystem services, and which depend directly on the existence thereof. In this sense, this category would group processes such as biogeochemical cycles (water cycle, and cycling of nutrients such as phosphorus, carbon, nitrogen, among others), soil formation processes, primary production (photosynthesis), and habitat support - all of them essential for maintaining biodiversity, ecosystems and other services associated therewith.

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- **Cultural services:** This category encompasses all those non-material and intangible benefits received from ecosystems, whether through spiritual enrichment, cognitive development, reflection, cultural identity and aesthetic experiences. This category also includes recreation, tourism, and visual appreciation of landscapes, as a set of natural elements that provide satisfaction and environmental enjoyment.

On the other hand, as mentioned above, the importance of identifying ecosystem services lies in the strong link among quality, availability and access thereto, the conditions of well-being and satisfaction of the needs of the beneficiaries, i.e, the way that ecosystems, their functionality and structure contribute to the well-being of people. According to the MEA (2003), ecosystems, in addition to providing for basic aspects of life (water, air, land as support, food), are related to other aspects of people's livelihoods, such as livelihood strategies, health, income, migration, safety (physical, food, choice) and social relations - all of them strongly linked to well-being.

For the area of influence of the project, the identification and description of the Ecosystem Services was highly relevance, as it allowed to make a diagnosis on the set of provisioning, regulation, support and cultural services provided in such a context, apart from the fact that it allows knowing their status, threats and relationship with the project. This exercise also allowed the general approach to the different beneficiaries related to the services identified, recognizing the existing dynamics between the communities and their environment, understanding the patterns of use, management and valuation on biodiversity.

Thus, the analysis of ecosystem services presented below was made based on the methodologies proposed by Rincón-Ruiz et al. (2014), and Landsberg et al. (2013), and responds to the analysis of ecosystem services required as part of the EIS for the area of influence of the project.

#### 5.4.1 General context of the analysis.





A brief description of the socioecological system is made, including the area of influence, which represents the set of spaces of use that directly and indirectly provide the ecosystem services identified. The description of the beneficiaries who use the ecosystem services differently is also presented, with a general explanation on how the analysis developed is presented.

- **General description of the socioecosystem.**

The socioecological context where the area of influence analyzed is immersed is characterized by being a high Andean ecosystem, where the landscape has been modified by different agricultural activities, which were historically represented by cereal crops (barley, wheat, oats, among others). With the passage of time, these productive models have been successively replaced by small-scale crops, setting up an agricultural landscape, where pasture mosaics are predominant (intended for small-scale, dual-purpose and self-consumption cattle farming) and fruit trees (papayuela, tree tomato, lulo, blackberry, etc.), potatoes, corn, beans and vegetables. These productive systems constitute the spaces of use which offer ecosystem services for provisioning purposes.

As far as the conservation spaces, hedges are maintained, which support the productive plots, as well as some strips of riparian forest and patches of secondary vegetation, which are closely related to the provision of regulation and support ecosystem services, standing out as other types of spaces for use

- **Description of beneficiaries.**

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The group of beneficiaries identified for the area of influence analyzed, within the framework of the analysis of ecosystem services identified mainly correspond to:

- Rural peasant and indigenous communities: Rural population whose productive units do not exceed 5 ha, where agricultural activities are carried out for self-consumption and for local trade production, mainly towards the market squares of populated centers such as Ipiales, Iles, Imués and Pasto. Some of these peasant communities are grouped in indigenous communities (indigenous village of Aldea de María, indigenous council of Iles and Colonial Indigenous Reserve of San Juan), who have rescued some practices of the traditional system of beliefs and uses of the territory, but without significant differences in the model of rural production, customs or relationship with the territory.
- Inhabitants of urban sectors: They are related to other types of spaces for use (populated centers and settlements), so they are differentiated by rural peasant and indigenous communities in terms of their economic and subsistence activities, which are mostly related to the supply of goods and services, and trade. They are mainly settled in populated centers like Pilcuan, San Juan and Pedregal.
- Floating population: This group is represented by people who use the main and secondary roads as part of the road corridor between Ipiales and Pasto, whether as passage area, or also as a place for tourism and recreation activities, especially in the area of Pilcuan. They correspond to local, regional population, and even people from other parts of the country, neighboring countries, and foreign tourists.
- **Analysis of ecosystem services (description sheet).**

The following is the result of the identification of the ecosystem services in the area of influence analyzed, where the main characteristics of the ecosystem services will be described, the beneficiaries related to the service and their level of dependency thereon. Likewise, the project is presented in terms of the dependence on the service, based on information on demand, use, utilization and affectation on the natural resources according to the projected activities; as well as the potential impact thereon based on the identification of impacts assessed as severe, carried out as part of the Environmental Assessment chapter of this EIS. In this sense, the analysis will be presented by the service categories described in the introduction of this section. Likewise, at the end of the section, the general conclusions of the analysis will be presented.


#### 5.4.1.1 Provisioning services.

As mentioned in the introduction of this section, this group of services is related to the direct provision of benefits by the ecosystems, which play the role as supply units, representing the basis of communities' livelihoods, such as water, food and physical support for everyday activities. For the area of influence analyzed, six (6) ecosystemic supply services were identified, which are described below:





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- Ground water.

Table 5.1 Ground water supply.


TYPE OF SERVICE	Provisioning						
ECOSYSTEM SERVICE	Surface water use						
DESCRIPTION							
BENEFICIARIES	Rural peasant and indigenous communities, and inhabitants of urban sectors						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	HIGH	Surface water sources provide water resources to communities for domestic activities and agricultural consumption, being highly important for the accomplishment of daily activities.					
<b>RELATIONSHIP WITH THE PROJECT</b>							
<b>DEPENDENCY</b>				<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
X					X		
<p>The project requests the granting of collection sources on 11 points, in the surface waters of the Guáitara, Boquerón and Sapuyes rivers, and the La Humeadora, Modelores, San Francisco, El Macal, Yamurayán, San Francisco, Culantro and El Manzano streams.</p> <p>For collection, an estimated maximum flow rate of 1.95 L / s per point (0.45 L / s for domestic use and 1.5 L / s for Industrial use) will be requested.</p>				<p>According to the impact assessment carried out, the surface water supply could imply specific and temporary alterations due to the hydraulic work Construction activities (including riverbed occupations), Construction and Operation of Debris and Excavation Material Management Areas (ZODME in Spanish) and Earthworks (Excavations and Landfills), which could lead to the Alteration of the groundwater flow network, Alteration of recharge zones and Alteration of riverbeds, leading to changes in the water dynamics of the water bodies immersed in the Aol.</p>			

Source: GEOCOL CONSULTORES S.A., 2017.





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- Physical support for the establishment of agroecosystems (crops and livestock).

Table 5.2 Physical support for the establishment of agroecosystems (crops and livestock).


TYPE OF SERVICE	Provisioning						
ECOSYSTEM SERVICE	Physical support for the establishment of agroecosystems (crops and livestock)						
DESCRIPTION	 <p>This ecosystem service is related to the food supply, represented in the presence of agroecosystems, where the biophysical conditions necessary for the establishment of crops (papayuela, tree tomato, lulo, blackberry, potato, maize, bean and vegetables) and cattle-farming areas (dual-purpose production) converge.</p>						
BENEFICIARIES	Rural peasant and indigenous communities						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	HIGH	This ecosystem service is one of the most relevant for rural peasant and indigenous communities, as they represent their living and livelihood means, and agricultural production economic activities, which provide food for self-consumption and marketing.					
<b>RELATIONSHIP WITH THE PROJECT</b>							
<b>DEPENDENCE</b>				<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
X				X			
The completion of the project requires the use of a maximum of 1,409.37 ha of crop mosaics, pasture mosaics and forest crops and plantations, which represent the space for use by agroecosystems, related to the food supply. Of these, an average utilization volume of 5.2 m <sup>3</sup> per hectare is estimated, with a maximum volume of 7,330.65 m <sup>3</sup> with respect to the projected area of affectation. In this sense, the dependence of the project is considered high, since a high proportion of area to be intervened, necessary as physical support to carry out the project activities, spatially matches these spaces.				The Construction and Operation of the Debris and Excavation Material Management Zone (ZODME) and the Earthworks (Excavations and Landfills) may generate changes in soil use and potential, due to the change in agricultural use, turning it as the means for vehicle transport. To this extent, the areas currently destined for agricultural, livestock and forestry production will be replaced by the road network and associated territories, changing their current use, leading to high effects, since the affected area may reach 1,409.37 Ha.			

Source: GEOCOL CONSULTORES S.A., 2017





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• Medicinal use of flora and fauna.

Table 5.3 Medicinal use of flora and fauna.


TYPE OF SERVICE	Provisioning						
ECOSYSTEM SERVICE	Medicinal use of flora and fauna						
DESCRIPTION	 <p>Corresponds to the medicinal use of flora and fauna, although it is limited to the treatment of minor ailments and discomforts, since the use thereof has been reduced with the passage of time, as traditional medicine has been replaced by the health service provided by the State. The following are the most relevant medicinal species raised by the community:          Medicinal flora in peridomiciliary spaces: Peppermint, lemon verbena, rosemary, mint, chamomile, marigold.          Medicinal flora in hedges or patches of natural vegetation: Chilca blanca (<i>Baccharis latifolia</i>), White elder (<i>Cestrum racemosum</i>) and Black elder (<i>Sambucus nigra</i>).          Other plant species: Eucalyptus (<i>Eucalyptus</i> sp.)          Medicinal fauna: Fox (<i>Didelphis marsupialis</i>; <i>Didelphis pernigra</i>)</p>						
BENEFICIARIES	Rural peasant and indigenous communities						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	LOW	It corresponds to an ecosystem service used as an alternative to the public health system, and is linked to the system of beliefs and traditional use of the territory. Hence, species with medicinal properties are used, although their dependence is low and has been reduced with the passage of time.					
<b>RELATIONSHIP WITH THE PROJECT</b>							
<b>DEPENDENCE</b>				<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
			X				X
There is no dependence of the project on this ecosystem service.				Although the project activities require forest utilization, no affectation is foreseen on this ecosystem service, since most of the plants used are in the peridomiciliary spaces, and have spaces for use or complementary sources of supply for their use.			

Source: GEOCOL CONSULTORES S.A., 2017.





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- Raw material for craftwork.

Table 5.4 Raw material for craftwork.


TYPE OF SERVICE	Provisioning						
ECOSYSTEM SERVICE	Raw material for craftwork						
DESCRIPTION	 <p>It corresponds to the use of vegetation material (leaves and stems) and fauna byproducts (wool of sheep), for the elaboration of craftwork, which also includes carpentry work. This activity is currently relegated to the elderly people of the communities, who keep the inherited tradition of basket, furniture and clothing manufacture (ponchos and sweaters), which has been diminished over the years, while the younger population has lost interest in the activity.</p>						
BENEFICIARIES	Rural peasant and indigenous communities.						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	LOW	It corresponds to an economic alternative that the older population uses to obtain extra income, supported by the local trade of the craftwork they make. However, it is not a frequent or common activity, and very few people are still involved in it.					
<b>RELATIONSHIP WITH THE PROJECT</b>							
<b>DEPENDENCE</b>				<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
			X				X
There is no dependence of the project on this ecosystem service.				Although the project activities require forest utilization, no affectation is foreseen on this ecosystem service, since most of the plants used are in the peridomiliary spaces, and have spaces for use or complementary sources of supply for their use.			

Source: GEOCOL CONSULTORES S.A., 2017.

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- Firewood and other uses of vegetation.

Table 5.5 Firewood and other uses of vegetation.

TYPE OF SERVICE	Provisioning						
ECOSYSTEM SERVICE	Firewood and other uses of vegetation						
DESCRIPTION							
BENEFICIARIES	Rural peasant and indigenous communities						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	LOW	Given the low supply of native vegetation, the use and utilization thereof has diminished by the communities, who mainly use the species present in hedges, dry stakes and fallen branches, without significantly depending on the supply and availability of the resource.					
<b>RELATIONSHIP WITH THE PROJECT</b>							
<b>DEPENDENCE</b>				<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
X							X
The implementation of the project requires the use of maximum 102.07 ha of natural vegetation cover (Dense forest, riparian forest and high secondary vegetation), with a maximum volume of 5,717,59 m <sup>3</sup> . Said use should be made to have space and physical support to carry out the project activities, and to build the dual carriageway; therefore, its dependence is considered high as it conditions the availability of space to carry out the project.				Although the project activities require forest utilization, no affectation is foreseen on this ecosystem service, since most of the plants used are in the peridomiciliary spaces, and have spaces for use or complementary sources of supply for their use.			


Source: GEOCOL CONSULTORES S.A., 2017.



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- Construction material.





Table 5.6 Construction material.

TYPE OF SERVICE	Provisioning						
ECOSYSTEM SERVICE	Construction material						
DESCRIPTION							
BENEFICIARIES	Inhabitants of urban sectors						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	LOW	Carried out by a small group of people, without representing a relevant economic activity in the general context of the area of influence.					
<b>RELATIONSHIP WITH THE PROJECT</b>							
<b>DEPENDENCE</b>				<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
		X					X
As part of the construction activities, permission is requested for the acquisition of materials in existing sources, through third parties, in extraction sites having the respective mining permits and / or environmental licenses granted by the entities and the competent authorities.				The use of material sources that are already in operation with their respective environmental regulations in force and according to the conditions of the area is foreseen; so there will be no specific or direct impact thereon by the project.			

Source: GEOCOL CONSULTORES S.A., 2017.


#### 5.4.1.2 Regulatory services.

These services are related to the maintenance of the cycles and dynamics of the ecosystems (soil, air, water, among others), which condition the supply and availability of provisioning services, as well as security conditions that reduce natural threats, such as mass removal, floods, droughts, and other phenomena that could occur due to the ecosystem characteristics of the area of influence. For the AoI, three (3) regulatory ecosystem services were identified, which are described below.





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- Maintenance of air quality and climate regulation.

Table 5.7 Maintenance of air quality and climate regulation.


TYPE OF SERVICE		REGULATION					
ECOSYSTEM SERVICE		Maintenance of air quality and climate regulation					
DESCRIPTION		The regulation of climate and air quality is important for both thermal comfort of domestic and household units, as well as for providing shadow areas for livestock in pasture lands. In addition to the above, the contribution of GHG related to livestock activity and the presence of roads as a source of particulate matter and pollutant gases associated to the vehicles passing, leads to a positive effect of the maintenance of tree cover on their capture and storage, providing an important ecosystem service to the beneficiaries.					
BENEFICIARIES		Rural peasant and indigenous communities, inhabitants of urban sectors and floating population.					
LEVEL OF DEPENDENCE BY THE BENEFICIARIES		MEDIUM	The maintenance of natural carbon capture and storage processes is highly important for the beneficiaries, since, given their proximity to emission sources such as vehicles, and under the influence of roads, there is a greater risk of developing health effects. Due to this the presence of barriers and patches of vegetation, it becomes relevant to reduce these effects.				
RELATIONSHIP WITH THE PROJECT							
DEPENDENCE				INCIDENCE			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
		X				X	
The project's dependence on this service is conditioned by activities involving atmospheric emissions (machinery and equipment operation, and vehicles passing by), while requiring the assimilation, capture and storage of pollutants by the vegetation.				The process plant installation and operation activities (asphalt, concrete, crushing) during the construction phase may lead to the modification of air quality due to the Particulate Material and the Variation in sound pressure levels.			

Source: GEOCOL CONSULTORES S.A., 2017.





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- Hydrological regulation and water purification.

Table 5.8 Hydrological regulation and water purification.


TYPE OF SERVICE	REGULATION	
ECOSYSTEM SERVICE	Hydrological regulation and water purification	
		
DESCRIPTION	This service is related to the aquifer runoff, recharge and discharge processes and other hydrological dynamics that influence the water cycle and the supply of water resources in the area of influence. It also includes the ability of water systems to self-clean and be resilient to external sources of pollution, purifying the source and naturally treating liquid waste.	
BENEFICIARIES	Rural peasant and indigenous communities, and inhabitants of urban sectors	
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	LOW	The majority of housing units have a septic tank to collect domestic liquid waste, with very few people discharging directly on the surface bodies of water. Likewise, due to the relief conditions, there have been no floods or prolonged periods of drought in the area, which means that the levels of dependency are kept low.
RELATIONSHIP WITH THE PROJECT		
DEPENDENCE		INCIDENCE
HIGH	MEDIUM	LOW
NIL	HIGH	MEDIUM
LOW	LOW	LOW
NIL	NIL	NIL
X		
		X
It is estimated the discharge on four (4) spots corresponding to the Boquerón River, La Humeadora Creek, Guáitara River and Sapuyes River represents 0.44 L / s each during the time of camp operation.	The discharge to be carried out must comply with the pertinent environmental regulations; therefore, no water source affectation is expected where discharges are made.	

Source: GEOCOL CONSULTORES S.A., 2017.

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• Soil retention and purification.





Table 5.9 Soil retention and purification.

TYPE OF SERVICE	REGULATION						
ECOSYSTEM SERVICE	Soil retention and purification						
							
DESCRIPTION	This ecosystem service responds to the processes of organic matter and nutrient cycling, naturally taking place in the soil, offering benefits to the community as it receives domestic wastewater (septic wells) and domestic solid waste, which are usually buried because of the lack of garbage collection by the municipality. In this measure, the soil fulfills the purpose of receiving the organic matter and incorporating it in its natural cycles, which is important to preserve the hygiene and health conditions in the domestic environment.						
BENEFICIARIES	Rural peasant and indigenous communities, and inhabitants of urban sectors						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	HIGH	Its importance is related to the support provided to the agricultural activities, which is one of the most important activities in the regional economy. Likewise, the maintenance thereof affects the control of erosion processes and terrain instability.					
RELATIONSHIP WITH THE PROJECT							
DEPENDENCE				INCIDENCE			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
X							X
As part of the construction activities of the project, a soil discharge of 0.44 L / s, per camp is estimated.				The discharge to be carried out must comply with the pertinent environmental regulations; therefore, no soil affectation is expected where discharges are made.			

Source: GEOCOL CONSULTORES S.A., 2017


5.4.1.3 Support services.

This type of services is related to the maintenance of the ecological and functional dynamics of ecosystems, from which processes such as Primary productivity, pollination, seed dispersal, regeneration and natural control of vegetation, presence of exotic species and maintenance of trophic networks, among others, take place; which together condition the characteristics of ecosystems and affect the supply, quality and availability of provisioning and regulation ecosystem services. For the area of influence analyzed, these services were grouped into one, related to the supply and maintenance of habitat, which is explained in Table 5.10.

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- Habitat supply and maintenance.





Table 5.10 Habitat supply and maintenance.

TYPE OF SERVICE	SUPPORT						
ECOSYSTEM SERVICE	Habitat supply and maintenance						
							
DESCRIPTION	Corresponds to the basis for the direct and indirect supply of other cultural regulatory and provisioning ecosystem services, as it is the source for the maintenance of trophic networks, processes of plant succession, pest control and management in productive systems, primary productivity, among others. It is represented by the spaces for use that offer habitat for the native fauna and flora.						
BENEFICIARIES	Rural peasant and indigenous communities, and inhabitants of urban sectors						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	HIGH	Although indirectly, dependence on the service is considered high, as it significantly influences the availability, quality and access to the other ecosystem services on which the different beneficiaries depend.					
RELATIONSHIP WITH THE PROJECT							
DEPENDENCE				INCIDENCE			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
			X		X		
There is no dependence of the project on this ecosystem service.				With the projected activities, there could be modifications in the characteristics of ecosystem services, mainly due to changes in the structure, extent and availability of wildlife habitats, affection of the structural and functional connectivity of wildlife habitats, alteration of the habitat of hydrobiological communities and alteration of the edaphic fauna due to the Construction and Operation activities of the Debris and Excavation Material Management Zone (ZODME), changes in the structure, extension and availability of habitats of the wild life and removal of vegetation cover, topsoil stripping and clearing.			

Source: GEOCOL CONSULTORES S.A., 2017.

#### 5.4.1.4 Cultural services.


These ecosystem services are related to the intangible benefits obtained from ecosystems, to the extent they represent historical and cultural values, as well as active and passive enjoyment and contemplation, including

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places used for education and research, for example. As to the area of influence analyzed, three (3) cultural ecosystem services were identified, which are described below:

- **Tourism and recreation.**

**Table 5.11 Tourism and recreation.**

TYPE OF SERVICE	CULTURAL		
ECOSYSTEM SERVICE	Tourism and recreation		
			
DESCRIPTION	Corresponds to the scenic and recreational enjoyment of sites with special attractions, such as spas on the rivers, swimming pools, sports areas, ecological trails and other attractive elements that attract visitors and tourists from different places. One of the most interesting places in the area of influence of the project is the town center of Pilcuan, located at the Guáitara river level, with a higher ambient temperature than areas such as Pedregal, San Juan, Pasto, Ipiales, and other surrounding municipalities, which are highly appealing for visitors. Also, in the urban center of San Juan, it is common to have a high gastronomic offer in the main square, which attracts local visitors, promoting the economy related to tourism.		
BENEFICIARIES	Rural peasant and indigenous communities, inhabitants of urban sectors and floating population.		
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	HIGH	Corresponds to a line of the local and regional economy in constant growth, which also involves different types of actors, both in the rural and in the urban sector, becoming an economic alternative which covers all other ecosystem services identified.	
<b>RELATIONSHIP WITH THE PROJECT</b>			
<b>DEPENDENCE</b>			
HIGH	MEDIUM	LOW	NIL
			X
<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL
			X
There is no dependence of the project on this ecosystem service.		No direct or short-term impact on the ecosystem service is foreseen by the project, although in the medium and long term it could contribute to the strengthening of tourism activity in the region, by positively influencing the infrastructure needed to increase the flow of visitors, considering the border location of the project and the offer of sites of tourist interest in the region.	

Source: GEOCOL CONSULTORES S.A., 2017.

- **Enjoyment of the scenic beauty of the landscape.**










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Table 5.12 Scenic beauty of the landscape.


TYPE OF SERVICE		CULTURAL	
ECOSYSTEM SERVICE		Scenic beauty of the landscape	
			
DESCRIPTION		Corresponds to the presence of sites with an interesting landscape associated with the scenic appeal of the environment, which are used as spatial and cultural references, or which are rooted in the daily life of the communities and give rise to well-being and pleasure. Among the sites identified in the Aol we may include the Iscuazán hill, the waterfall of La Humedora and the Guaitara River.	
BENEFICIARIES		Rural peasant and indigenous communities, inhabitants of urban sectors and floating population.	
LEVEL OF DEPENDENCE BY THE BENEFICIARIES		MEDIUM	It is part of the set of spatial and cultural references that give rise to well-being and sense of belonging in the territory, as it is part of the daily life and traditional environment of the beneficiaries.
<b>RELATIONSHIP WITH THE PROJECT</b>			
<b>DEPENDENCE</b>			
HIGH	MEDIUM	LOW	NIL
			X
<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL
	X		
There is no dependence of the project on this ecosystem service.		As part of the project activities, an increase in the number of discordant elements is foreseen, associated with the necessary infrastructure for the construction and operation of the project; therefore, the ecosystem service can be affected by changes in the landscape integrity, as set out in the matrix. Such changes would be related to the construction of a superstructure for bridges and viaducts, foundation and piloting for bridges and viaducts, construction and operation of the Debris and Excavation Material Management Zone (ZODME), demolition and removal of existing infrastructure in the areas to be intervened and removal of vegetation, topsoil stripping and cleaning.	

Source: GEOCOL CONSULTORES S.A., 2017.

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· Cultural Identity.

Table 5.13 Cultural Identity.





TYPE OF SERVICE	CULTURAL						
ECOSYSTEM SERVICE	Cultural Identity						
							
DESCRIPTION	Corresponds to the presence of cultural historical relevance in the territory, which are benchmarks in the traditional system of practices and beliefs associated with the territory. These sites include, among others, the La Humeadora creek and waterfall, the Iscuazán hill, the Los Monos rocks and the Los Lobos rocks, identified as part of the interviews and semi-structured interviews conducted on site.						
BENEFICIARIES	Rural peasant and indigenous communities.						
LEVEL OF DEPENDENCE BY THE BENEFICIARIES	HIGH	All indigenous and peasant groups are undergoing a recovery and strengthening process in their traditional practices and beliefs' system; therefore, the presence of these relevant archaeological sites has gained relevance each day, engaging the community in terms of knowledge, rescue and conservation.					
<b>RELATIONSHIP WITH THE PROJECT</b>							
<b>DEPENDENCE</b>				<b>INCIDENCE</b>			
HIGH	MEDIUM	LOW	NIL	HIGH	MEDIUM	LOW	NIL
			X				X
There is no dependence of the project on this ecosystem service.				Since these are areas of socio-cultural importance with archaeological evidence, no intervention or affectation from project activities is envisaged.			

Source: GEOCOL CONSULTORES S.A., 2017.

5.4.2 General outcomes of the ecosystem service analysis.

A summary table of the analysis of ecosystem services carried out for the area of influence of the project is summarized below (Table 5.14).







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**Table 5.14 Dependence and incidence relationships identified for ecosystem services in the area of influence of the project.**





ECOSYSTEM SERVICE CATEGORY	ECOSYSTEM SERVICE	PROJECT IMPACT (HIGH, MEDIUM OR LOW)	DEPENDENCE OF COMMUNITIES (HIGH, MEDIUM, LOW)	PROJECT DEPENDENCE (HIGH, MEDIUM, LOW)
Provisioning	Surface water use	Medium	High	High
	Physical support for the establishment of agroecosystems (crops and livestock)	High	High	High
	Medicinal use of flora and fauna	Nil	Write-off	Nil
	Raw material for craftwork	Nil	Write-off	Nil
	Firewood and other uses of vegetation	Nil	Write-off	High
	Construction Materials	Nil	Write-off	Write-off
Regulation	Maintenance of air quality and climate regulation	Write-off	Medium	Write-off
	Hydrological regulation and water purification	Nil	Write-off	High
	Soil retention and purification	Nil	High	High
Support	Habitat supply and maintenance	Medium	High	Nil
Cultural	Tourism and recreation	Nil	High	Nil
	Scenic beauty of the landscape	Medium	Medium	Nil
	Cultural Identity	Nil	High	Nil

Source: GEOCOL CONSULTORES S.A., 2017.

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