COLOMBIA – NATIONAL PROGRAM

ACCOUNTING FOR ECOSYSTEM SERVICES- COLOMBIAN PILOT STUDY

WAVES Global Partnership Meeting
2-4 April 2012

CESAR AUGUSTO RUIZ AGUDELO
CI – COLOMBIA




Wealth Accounting and Valuation of Ecosystem Services

CONSERVATION INTERNATIONAL

OUR A… …EEN ECON…

What is the "…

Definition of a gr… …an well-being and social equity, … …s and ecological scarcities.

In its simplest ex… …one which is low carbon, resour…

Practically speaki… …e and employment is driven by *…* …*n emissions* and pollution, *enh…* …*ent the loss of biodiversity an…*

These investment… …*ublic expenditure*, *policy reforms …*

This development… …ry*, rebuild natural capital as a cri… …specially for poor people whose l…*

FAVORABLE CONDITIONS FOR A TRANSITION TO GREEN ECONOMY

Nationally, some of these favorable conditions are:

Changes in National Fiscal Policy.

Reform and reduction of subsidies with adverse effects on the environment.

Use of new instruments market-based.

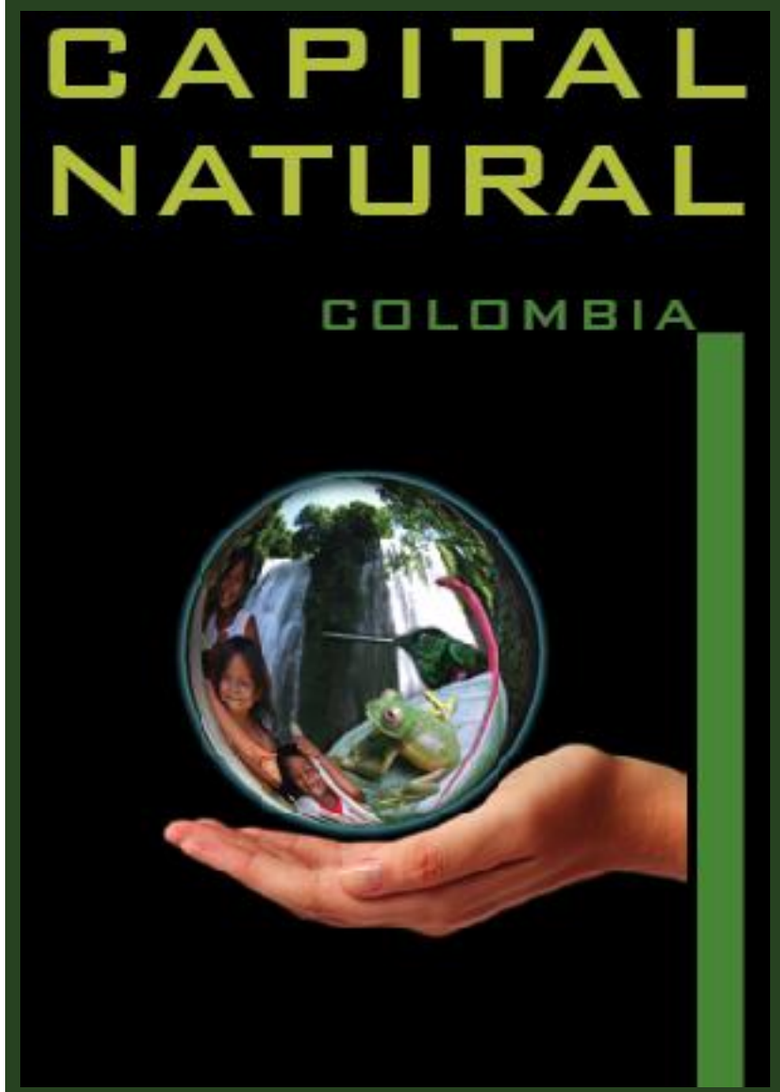
Public investment addressed to greening key sectors.

Introduction of environmental criteria in public procurement, and implementing regulations that favor the environment.

Internationally to improve market infrastructure and promote international cooperation.

ESTRATEGIA CAPITAL NATURAL COLOMBIA
-COLOMBIA'S NATURAL CAPITAL STRATEGY-

https://sites.google.com/site/capitalnaturalcolombia/iniciativa-capital-natural-colombia



Capital Natural
COLOMBIA

Libertad y Orden

CONSERVACIÓN INTERNACIONAL
Colombia

Presidencia de la República
Alta Consejería para la Gestión Ambiental,
la Biodiversidad, Agua y Cambio Climático
República de Colombia

FONDO PARA LA ACCIÓN AMBIENTAL Y LA NIÑEZ

GLOBAL AIMS:

- **Understand and learn about the importance of ecosystems in the social, economic and environmental order to generate mechanisms that enable decision makers to integrate the value of Colombia's Natural Capital in the various socio-economic actions related to the country's development and the welfare of its inhabitants.**

-Conserve the country's Natural Capital and acknowledge the importance of ecosystem services in all economic and social sectors.

What is Natural Capital?

The concept of Natural Capital that was adopted in this project was based on modifications made to the definitions advanced by of Constanza & Daily (1992) and Gómez-Baggethun & de Groot (2007). It was defined as follows:

"Natural Capital is made up of an ecosystem's components (its structure) and the processes and interactions that exist between them (ecosystem function) and that determine its ecological integrity and resilience. This capital generates a constant flow of goods and services that are useful for the humankind, and can be measured in economic, environmental or social terms, looking for the sustainability of natural resources"

WHY IS THE VALUATION OF NATURAL CAPITAL IMPORTANT TO THE COUNTRY?

Studies may show a clear and undeniable relationship between ecosystems and human welfare, even when it is priced at zero.

These studies can be made in different ecosystems to determine the economic, social and environmental importance.

The relevance of economic valuation is that it provides an appropriate framework to justify or criticize a cost-benefit decision, where trade-offs in relation to a set of decision-making alternatives are to be made in a particular ecosystem.

The failure to conduct such an assessment makes an ecosystem more prone to degradation.

PHASE I: BASELINE

1. BUILDING A CONCEPTUAL BASE LINE

2. REVIEW OF EXPERIENCES IN OTHER COUNTRIES

3. ANALYSIS AND DESIGN FOR THE COLOMBIA CASE

4.METHODOLOGY FOR ECOSYSTEM SERVICES CHARACTERIZING

5. SOFTWARE REVIEW AND TYPE OF INFORMATION

6. SOCIALIZATION OF THE STRATEGY

BASE KNOWLEDGE OF TRANSFORMED ECOSYSTEMS
- Agricultural activities, mining, human settlements. etc.

BASE KNOWLEDGE OF ECOSYSTEMS
-Protected areas, relatively untransformed areas

Species, ecosystems, genetic diversity

Studies in functional ecology

DESCRIPTION OF THE ECOSYSTEM SERVICE
- Understand and quantify how ecosystems provide services and their spatial expression.

INVEST, dinamic EGO, SWAT, FIESTA, ARIES, etc.

VALUATION
- Economic valiation of ecosystem services

TOAT, OSIRIS, INVEST, ARIES, etc.

MODELLING UNDER FUTURE SCENARIOS
- Climate change and economic development.

PLANNING TOOLS
- How are ecosystem services used in landscape management.

POT´s, PMA, EOT, PGA, POMCA, land property planning

DECISION - MAKING TOOLS
- Use of ecosystem services within a stakeholder analysis.

Stakeholder analysis, negotiation and participation tools.

PUBLIC POLICIES
- Joint, modification and / or development of policies and regulations.

FINANCING STRATEGIES
- Financing sustainable use of ecosystem services.

ENVIRONMENTAL ACCOUNTING AND WELFARE INDICATORS

Capital Natural
COLOMBIA

What are the components of human wellbeing?

Untangling the Environmentalist's Paradox: Why Is Human Well-being Increasing as Ecosystem Services Degrade?

CIARA RAUDSEPP-HEARNE, GARRY D. PETERSON, MARIA TENGÖ, ELENA M. BENNETT, TIM HOLLAND, KARINA BENESSAIAH, GRAHAM K. MacDONALD, AND LAURA PFEIFER

Environmentalists have argued that ecological degradation will lead to declines in the well-being of people dependent on ecosystem services. The Millennium Ecosystem Assessment paradoxically found that human well-being has increased despite large global declines in most ecosystem services. We assess four explanations of these divergent trends: (1) We have measured well-being incorrectly; (2) well-being is dependent on food services, which are increasing, and not on other services that are declining; (3) technology has decoupled well-being from nature; (4) time lags may lead to future declines in well-being. Our findings discount the first hypothesis, but elements of the remaining three appear plausible. Although ecologists have convincingly documented ecological decline, science does not adequately understand the implications of this decline for human well-being. Untangling how human well-being has increased as ecosystem conditions decline is critical to guiding future management of ecosystem services; we propose four research areas to help achieve this goal.

Keywords: ecosystem services, human well-being, time lags, sustainability, adaptation

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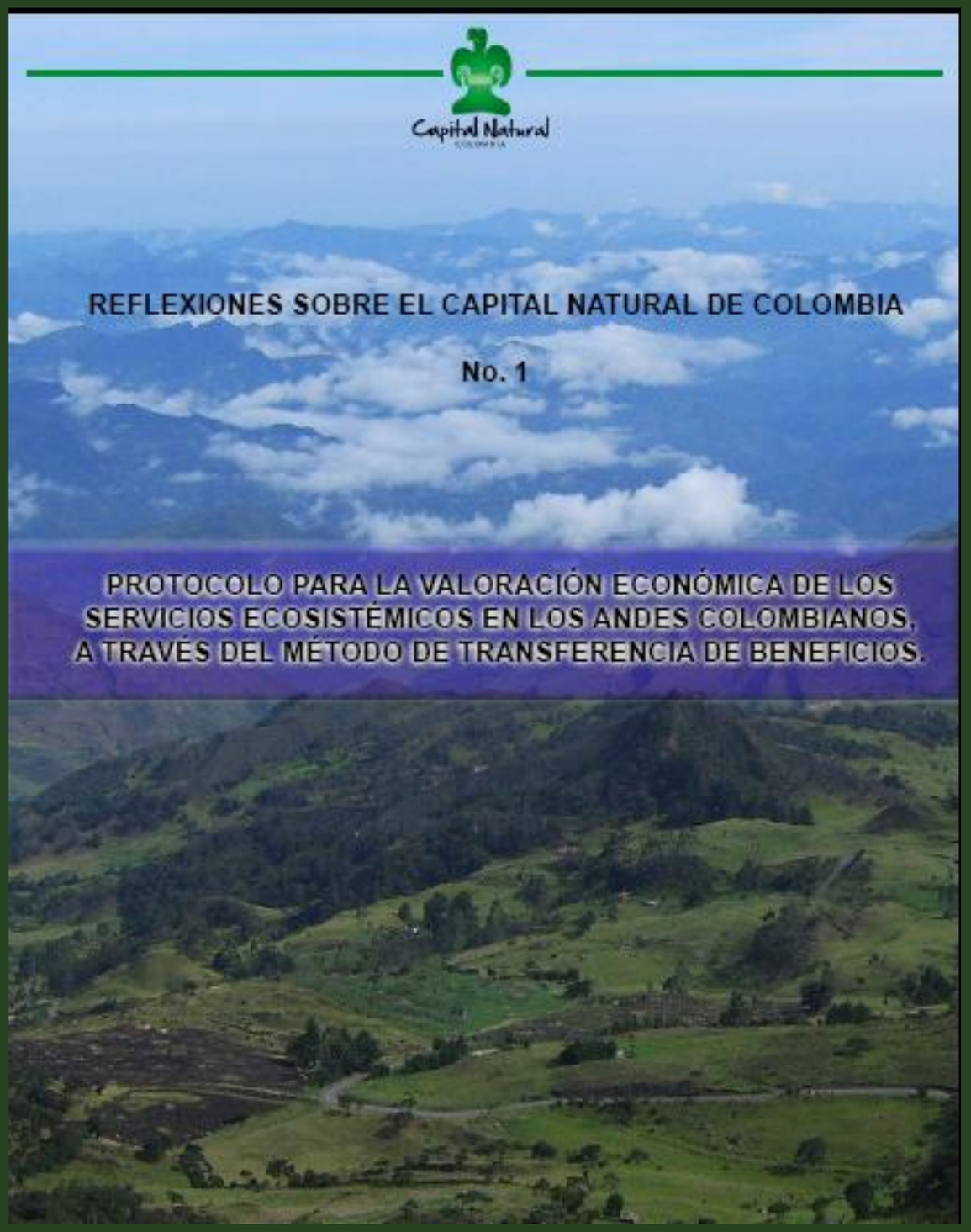
CONSTRUCTION OF THE COUNTRY BASELINE.

USE OPTIONS AND ANALYSIS OF INFORMATION AVAILABLE

CONSERVATION INTERNATIONAL

WAVES
Wealth Accounting and Valuation of Ecosystem Services

PROTOCOL USING BENEFIT TRANSFER METHOD FOR AN ECONOMIC VALUATION OF ECOSYSTEM SERVICES IN THE COLOMBIAN ANDES REGION



1. DEFINING THE CONTEXT OF POLICY

2. BOOKS

3. DATA CODING

4. DETERMINING THE META-REGRESSION FUNCTION

5. APPLYING THE META-REGRESSION FUNCTION TO OTHERS PLACES OF COLOMBIAN ANDES

6. CALCULATING TOTAL VALUE OF ECOSYSTEM SERVICES FOR EACH STUDY AREA COVERAGE, THROUGH TRANSFER OF BENEFITS.

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7 SUMMARIZE THE VALUE OF ECOSYSTEM SERVICES THROUGHOUT THE AREA FOR POLICY DECISIONS

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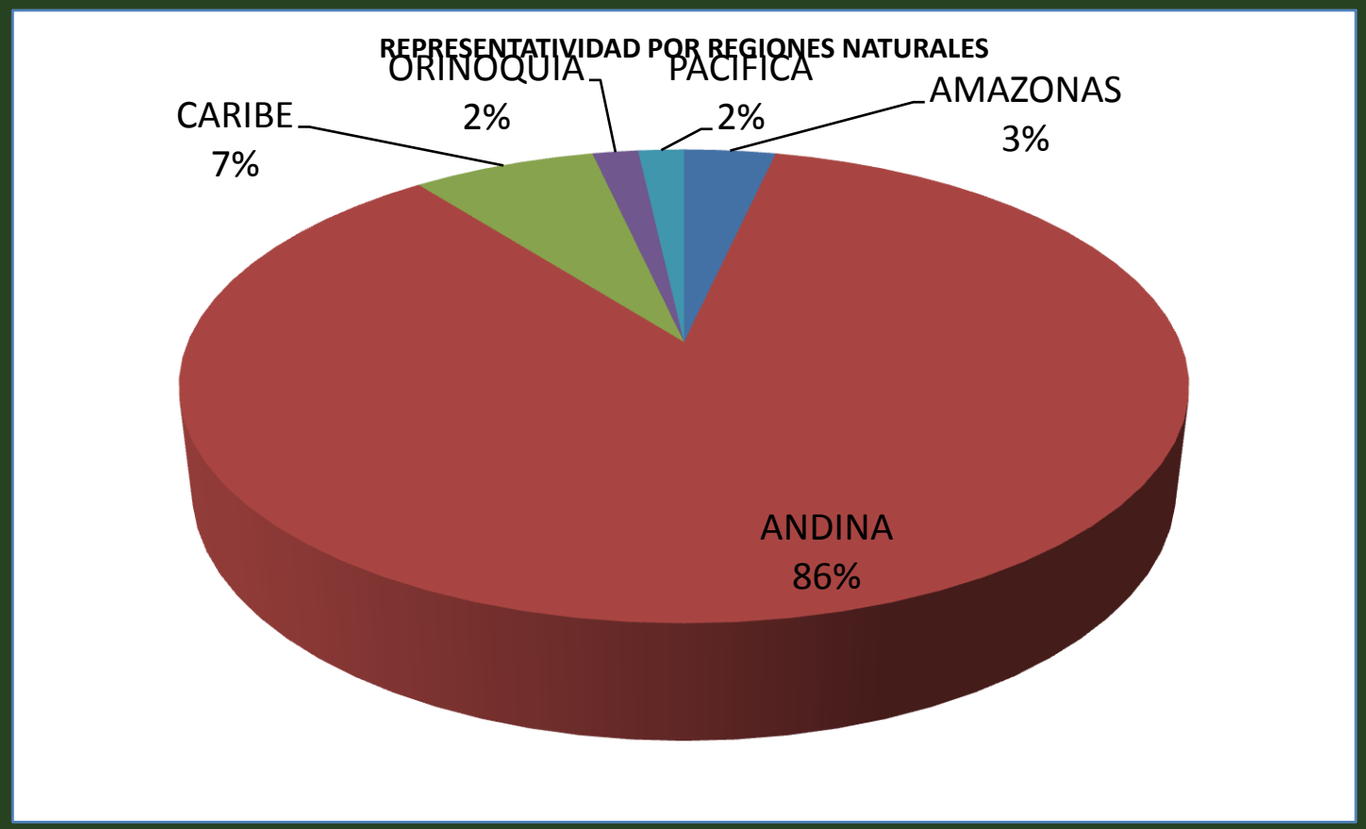
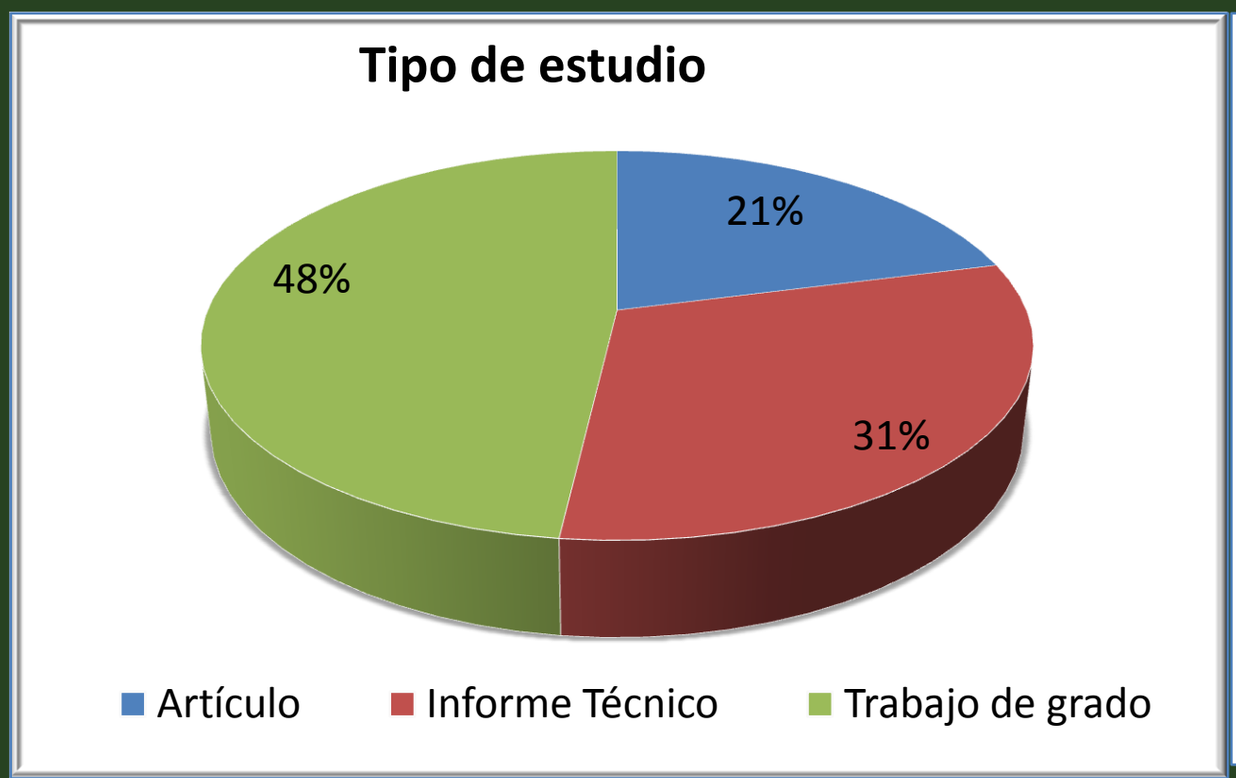
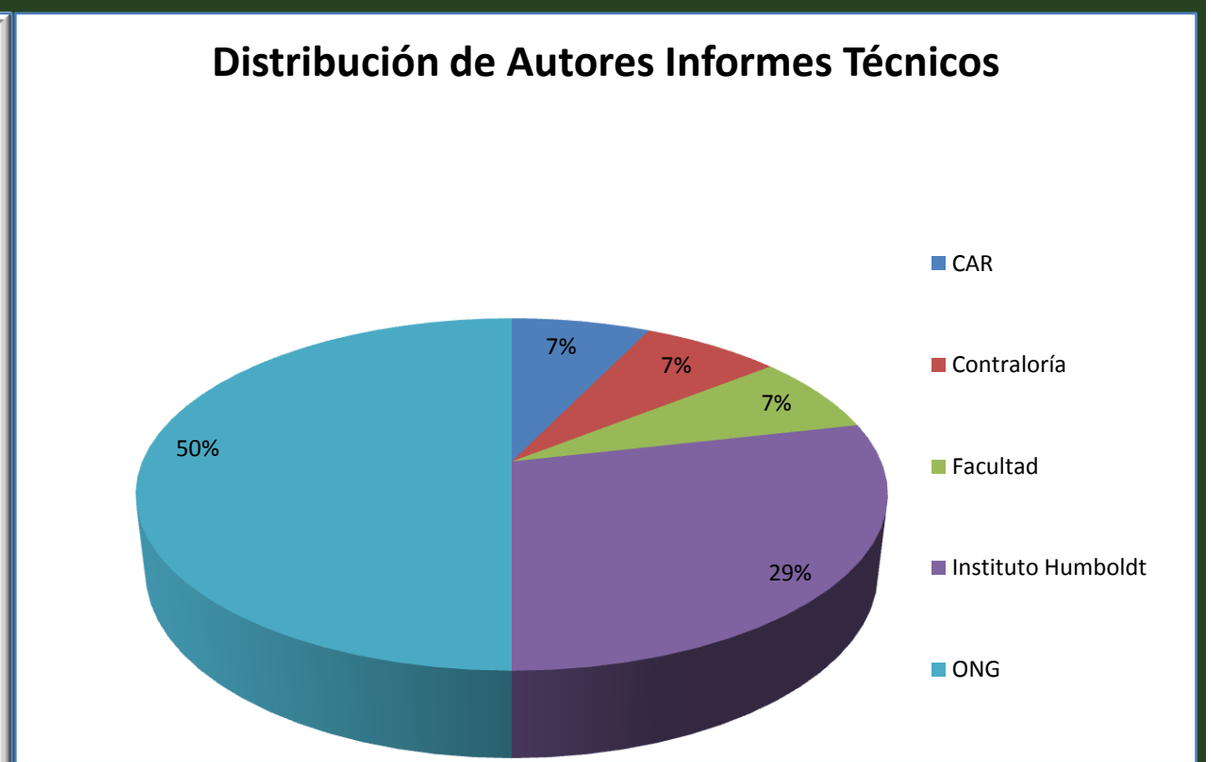
LITERATURE REVIEW

ECONOMIC VALUATION STUDIES







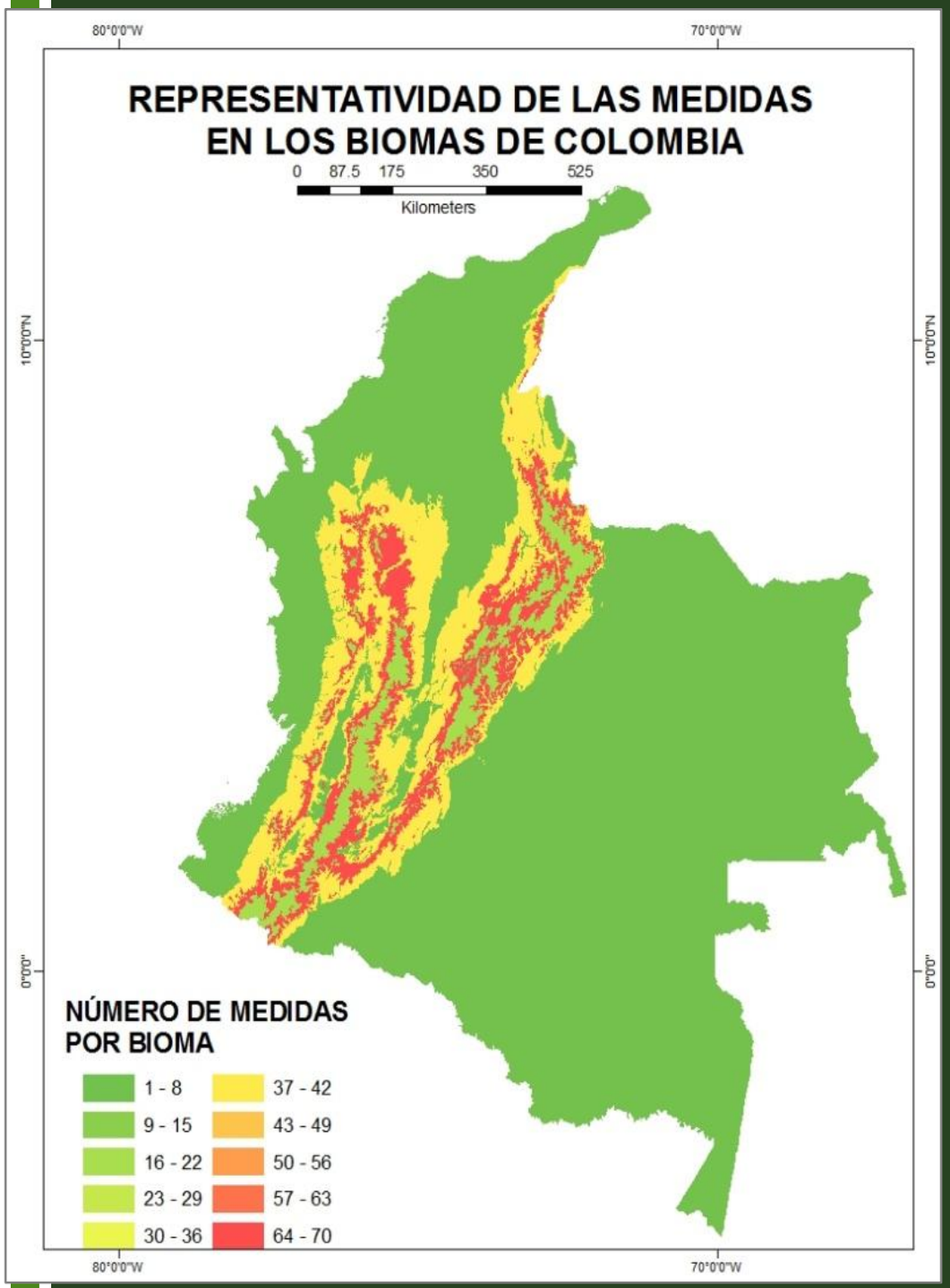
LITERATURE REVIEW

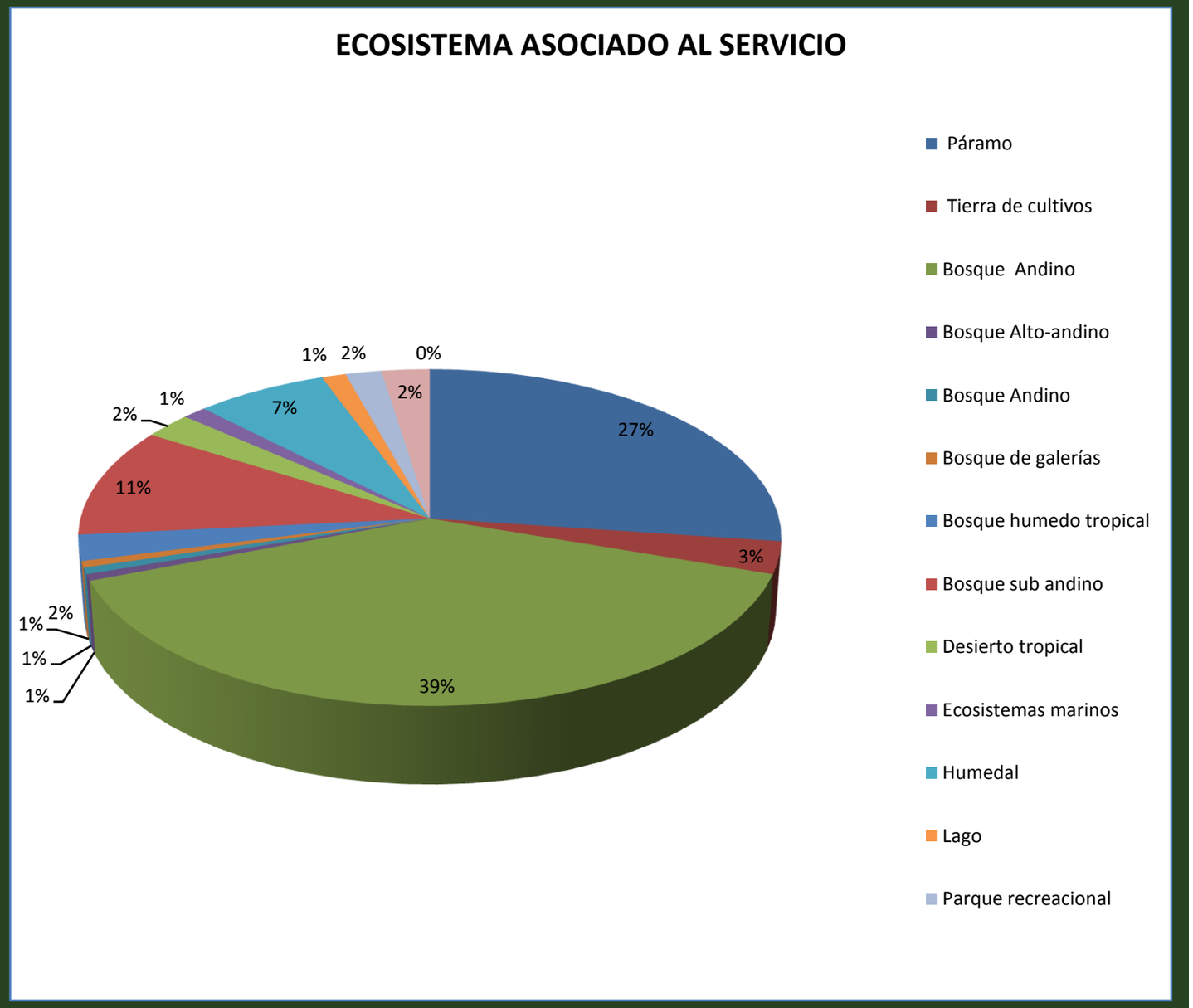
78 NATIONAL STUDIES - 169 Measures

58 STUDIES IN THE ANDES - 139 Measures

Measures

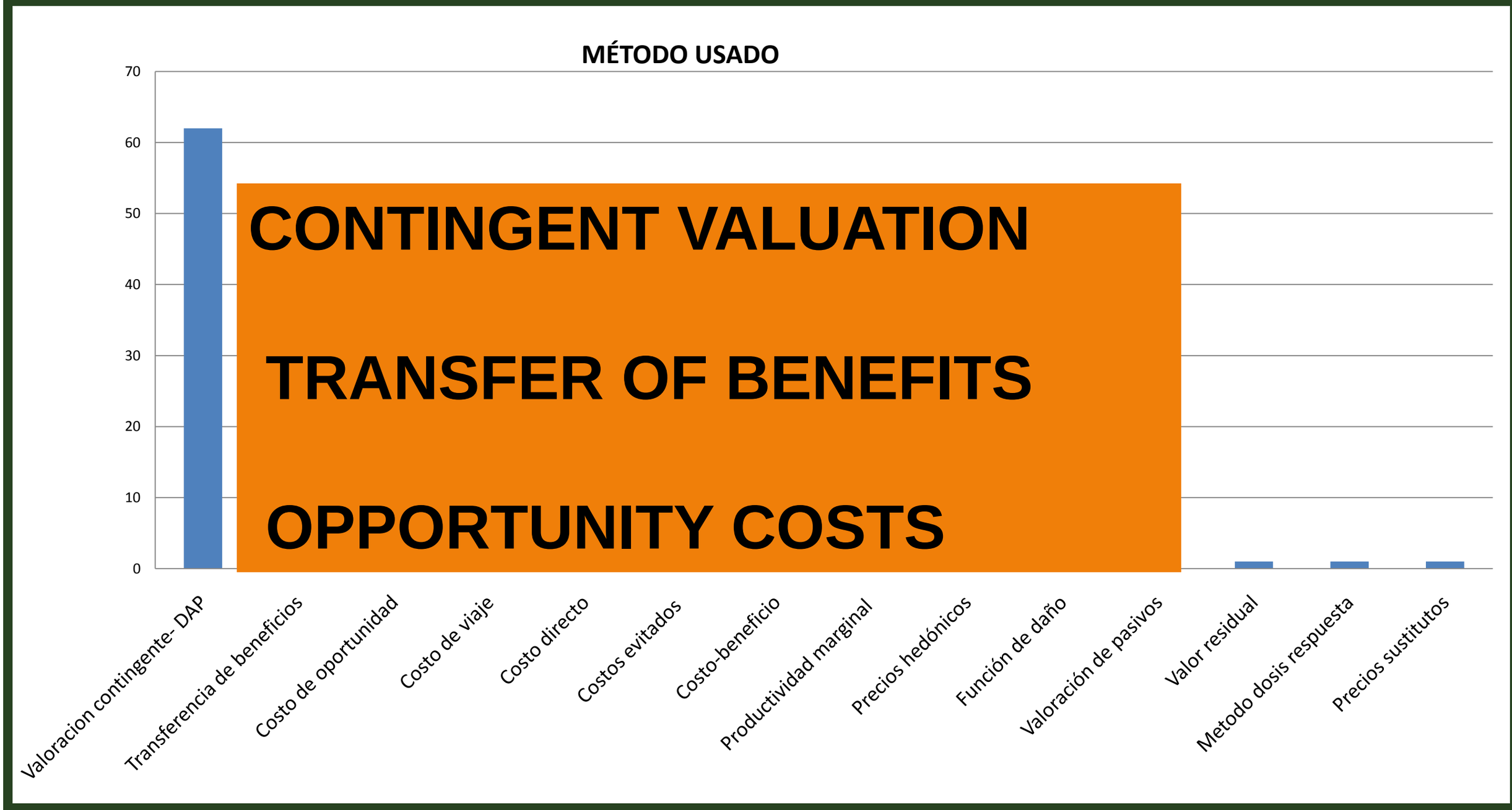
(Costo de oportunidad, DAP, costos de viaje,…)





ECOSYSTEM SERVICES VALUATED IN THE COLOMBIA BASELINE

ECONOMIC VALUATION TECHNIQUES IN THE COLOMBIA BASELINE



$$M = \frac{\sum_{i=1}^{k} Wi*Yi}{\sum_{i=1}^{k} Wi} \qquad Wi = \frac{1}{V_{Yi}} \qquad V_{Yi} = V_{xi} + T^2$$

$$T^2 = \frac{Q-df}{C} \qquad Q = \sum_{i=1}^{k} Wi * Yi^2 - \frac{\left(\sum_{i=1}^{k} WiYi\right)^2}{\sum_{=1}^{k} Wi} \qquad df = k - 1$$

$$C = \sum Wi - \frac{\sum Wi^2}{\sum Wi} \qquad I^2 = \left(\frac{Q-df}{Q}\right) x\ 100\%$$

Vxi=.

Analysis of variance for each of the studies

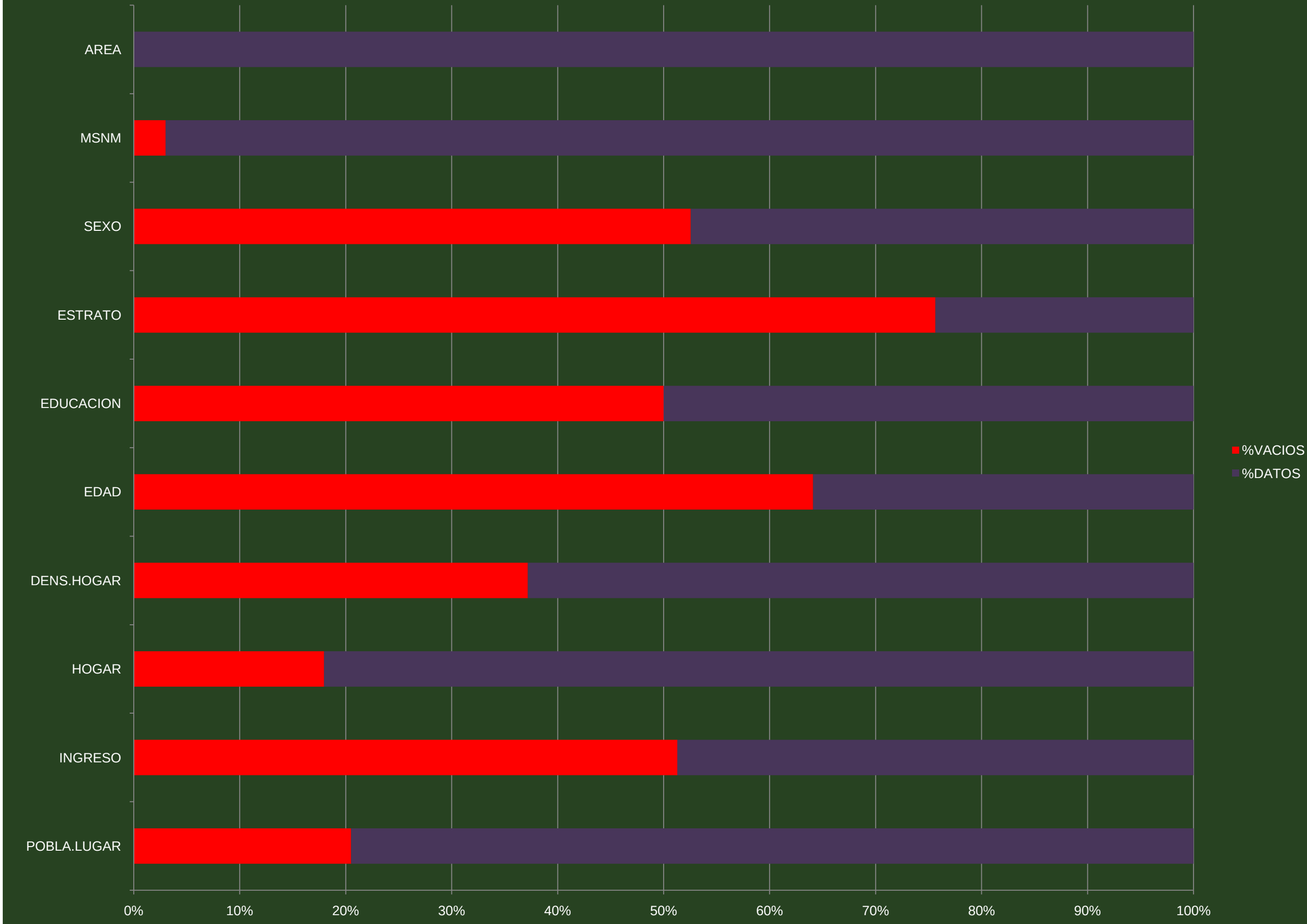
OVERALL RESULTS

1. The set of studies is characterized by very heterogeneous, gaps in terms of representativeness in the study area, the representativeness of valued services and the amount of information reported.

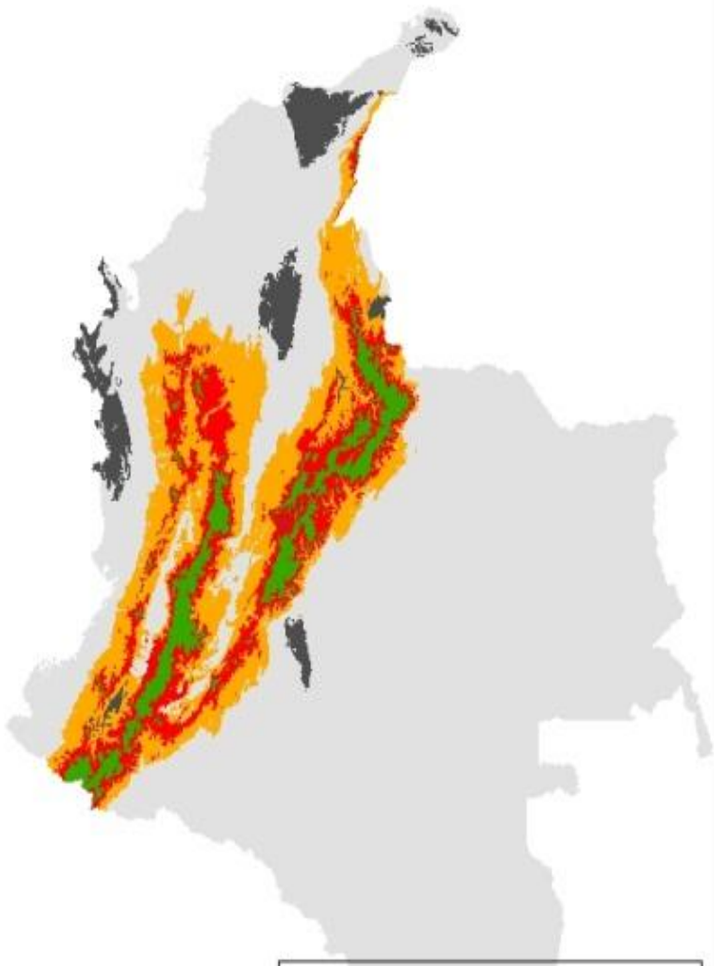
2. The analysis of representation in the study area, shows that of the 14 biomes of the Andes are represented only 3 biomes (high orobioma, medium and low of the Andes). These biomes represent 86% of the study area.

3. In the representativity of the study area departments, that 44% of departments have at least one study. In the Andean region the department with the largest number of studies is Cundinamarca, with over 30% of the studies, followed by Boyacá, Antioquia and Santander

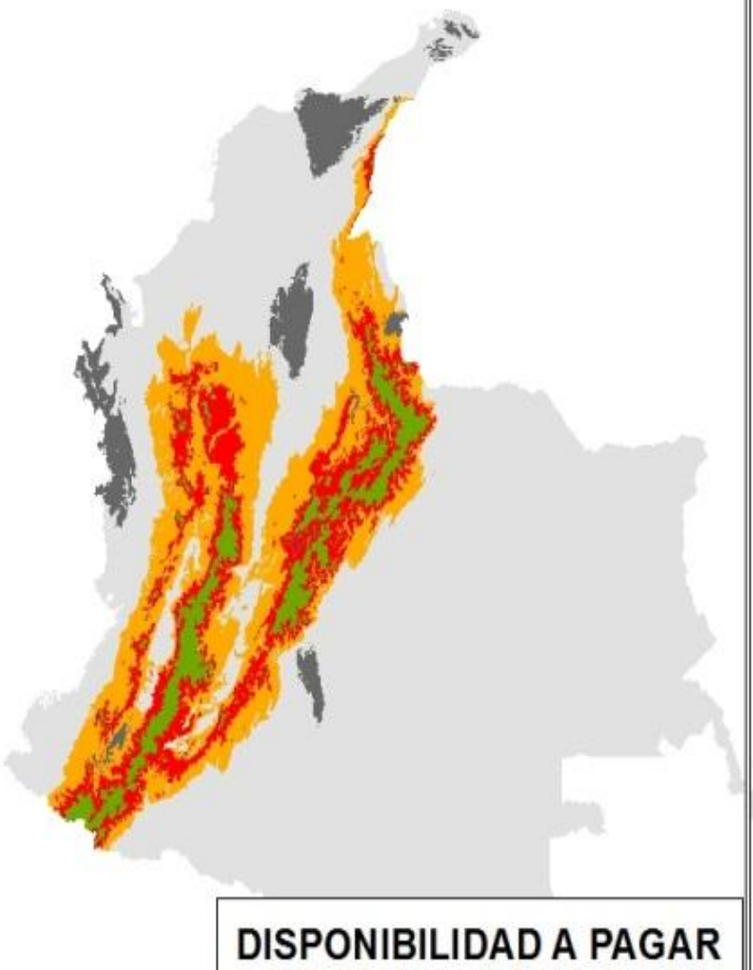
AVAILABILITY OF INFORMATION EXPLANATORY VARIABLES



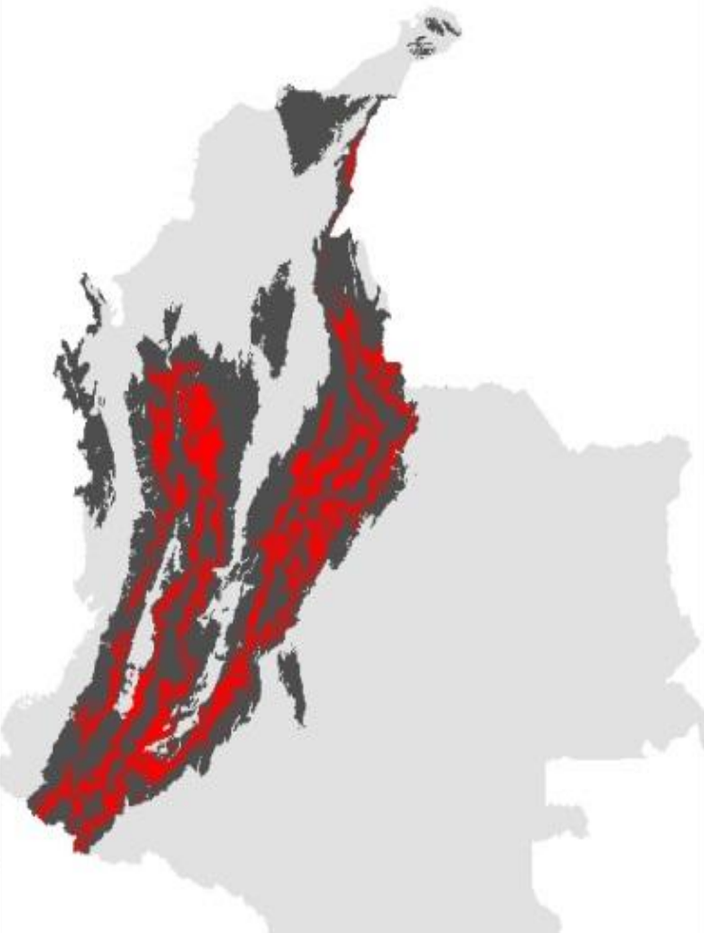
DISPONIBILIDAD DE AGUA DAP (mes/hogar)



DISPONIBILIDAD DE AGUA DAP (Ha/mes)



DISPONIBILIDAD DE AGUA COSTOS DE OPORTUNIDAD

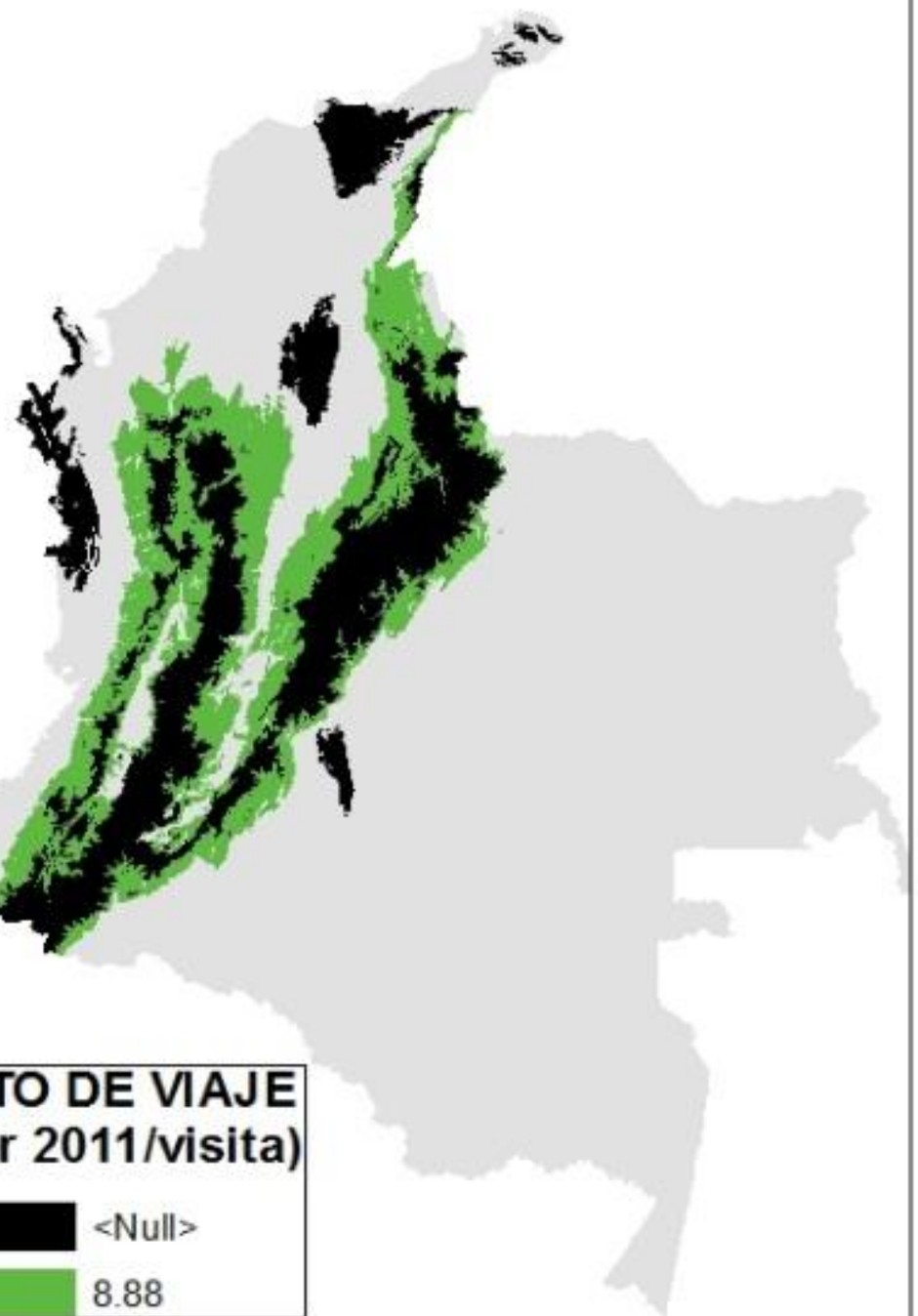


RECREACION
DAP

DISPONIBILIDAD A PAGAR
(Dolar 2011/visita)

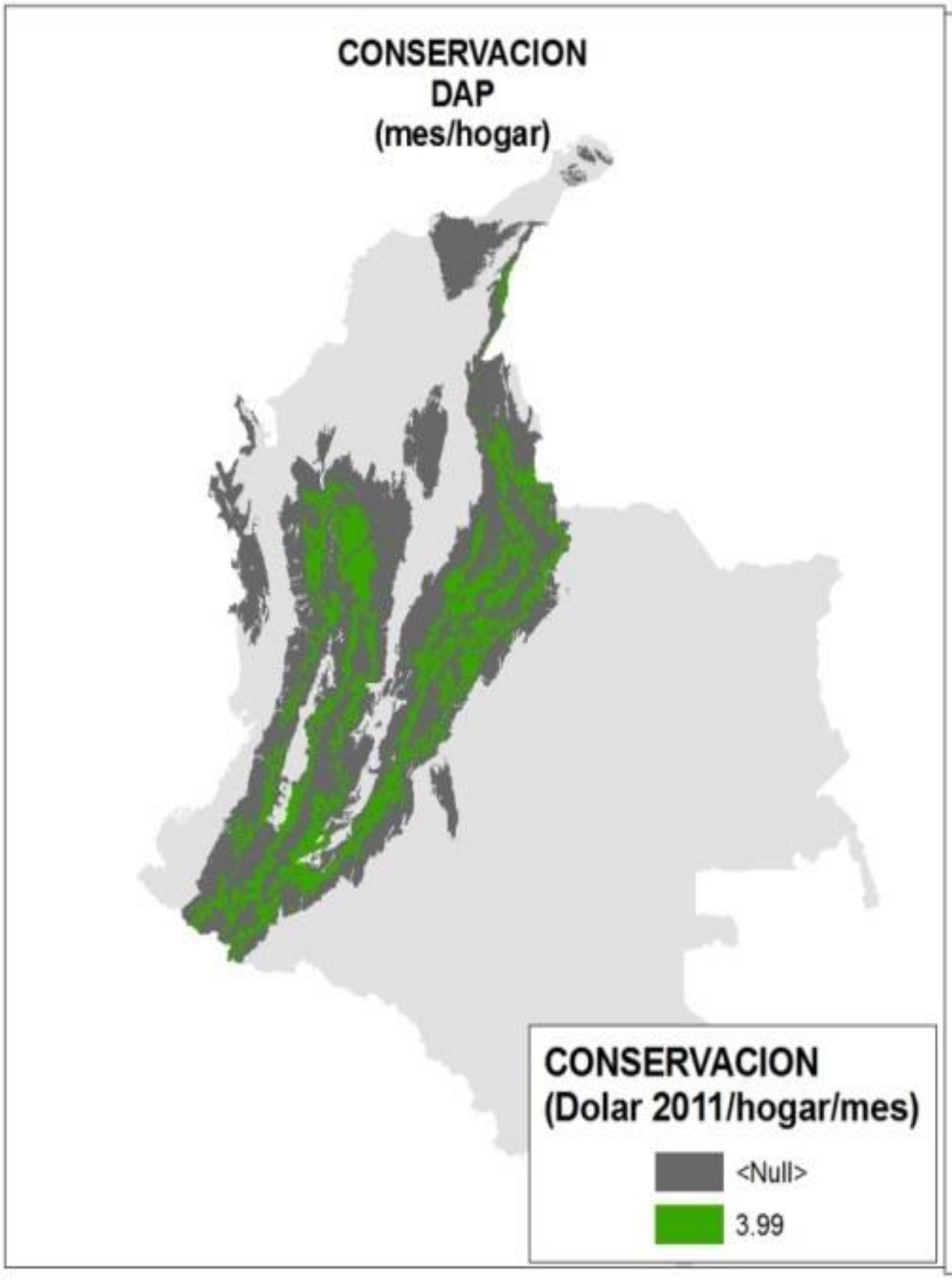
- <Null>
- 3.79
- 10.049

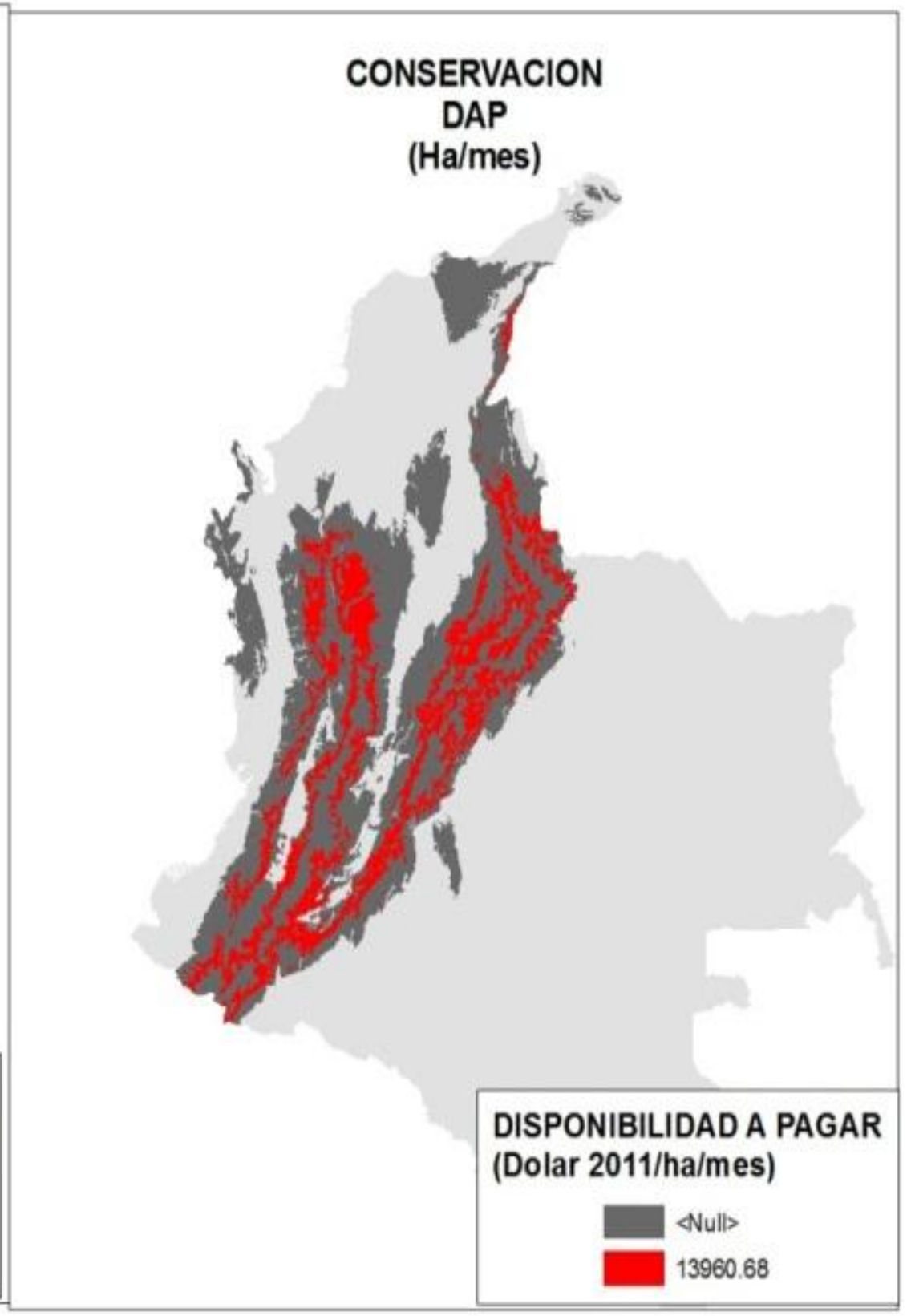
RECREACION
COSTOS DE VIAJE



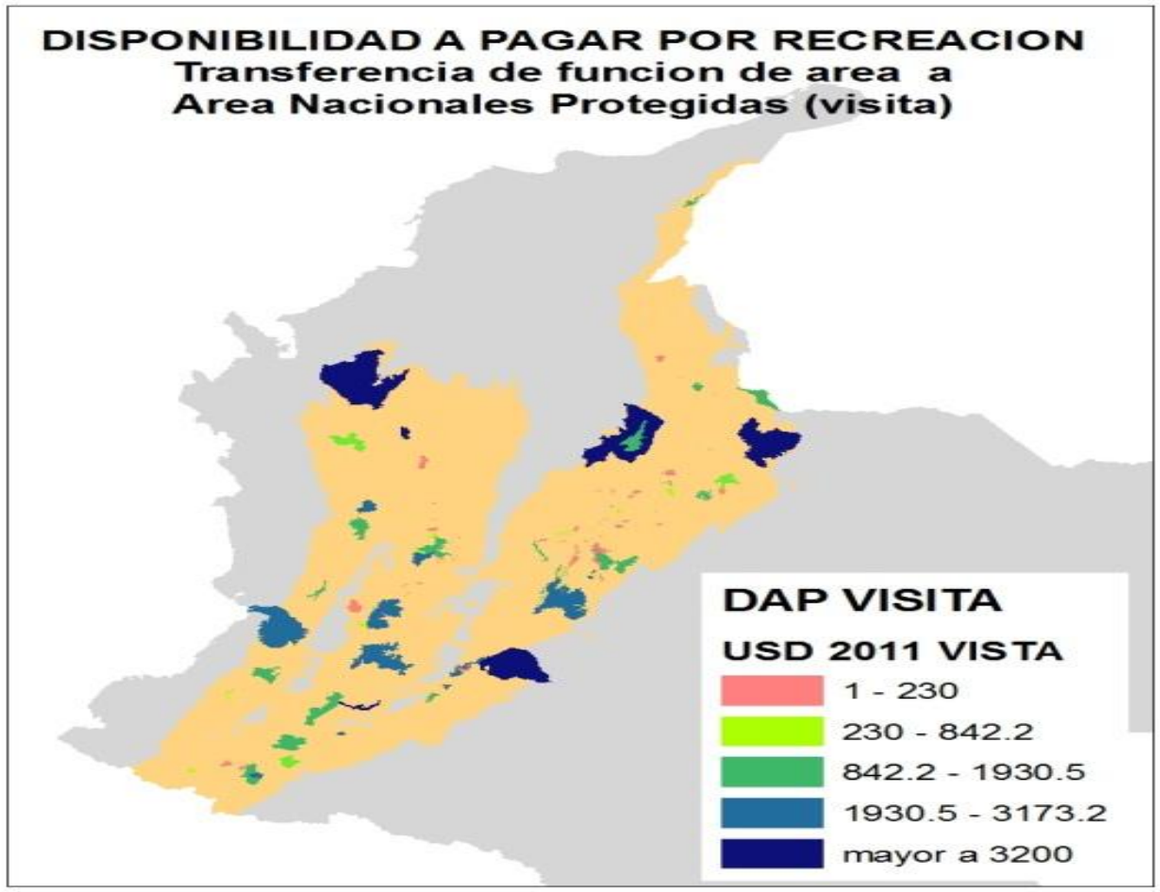
COSTO DE VIAJE
(Dolar 2011/visita)

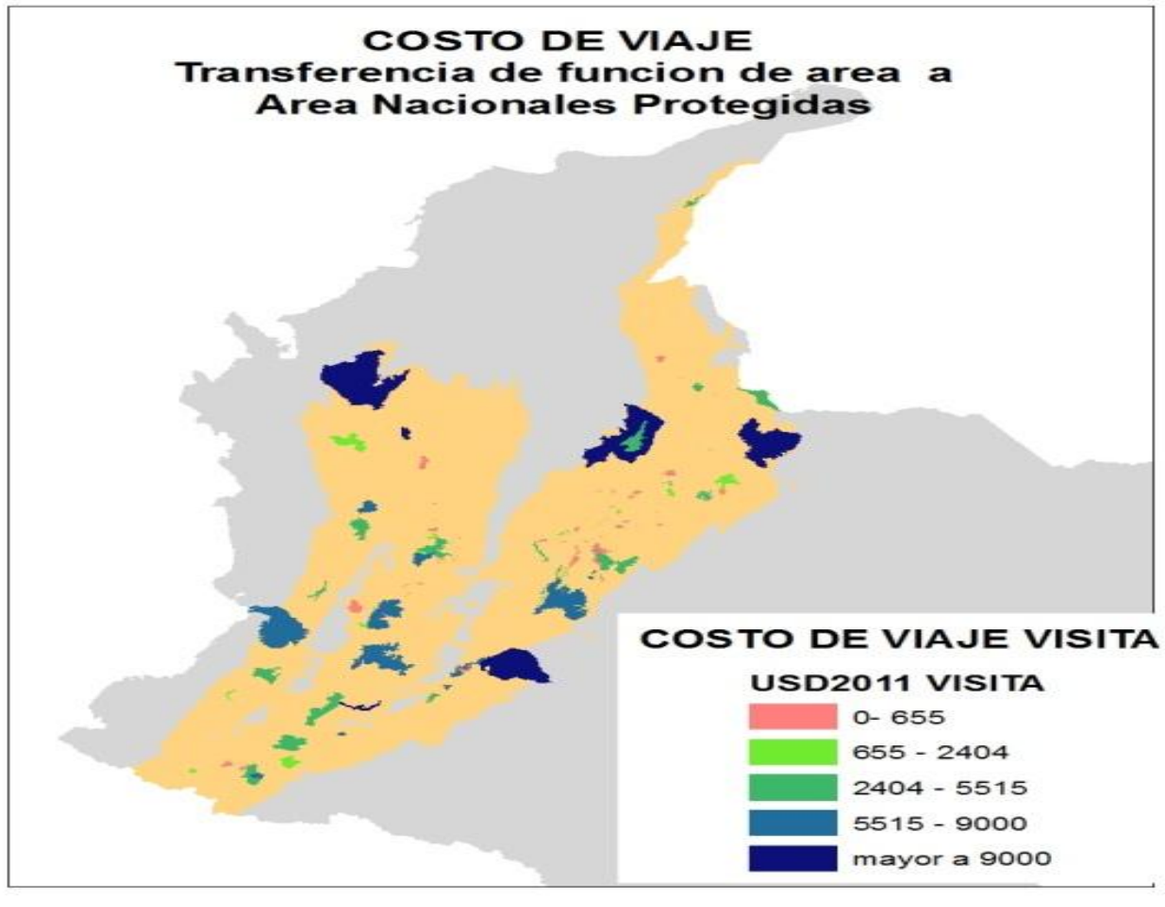
- <Null>
- 8.88

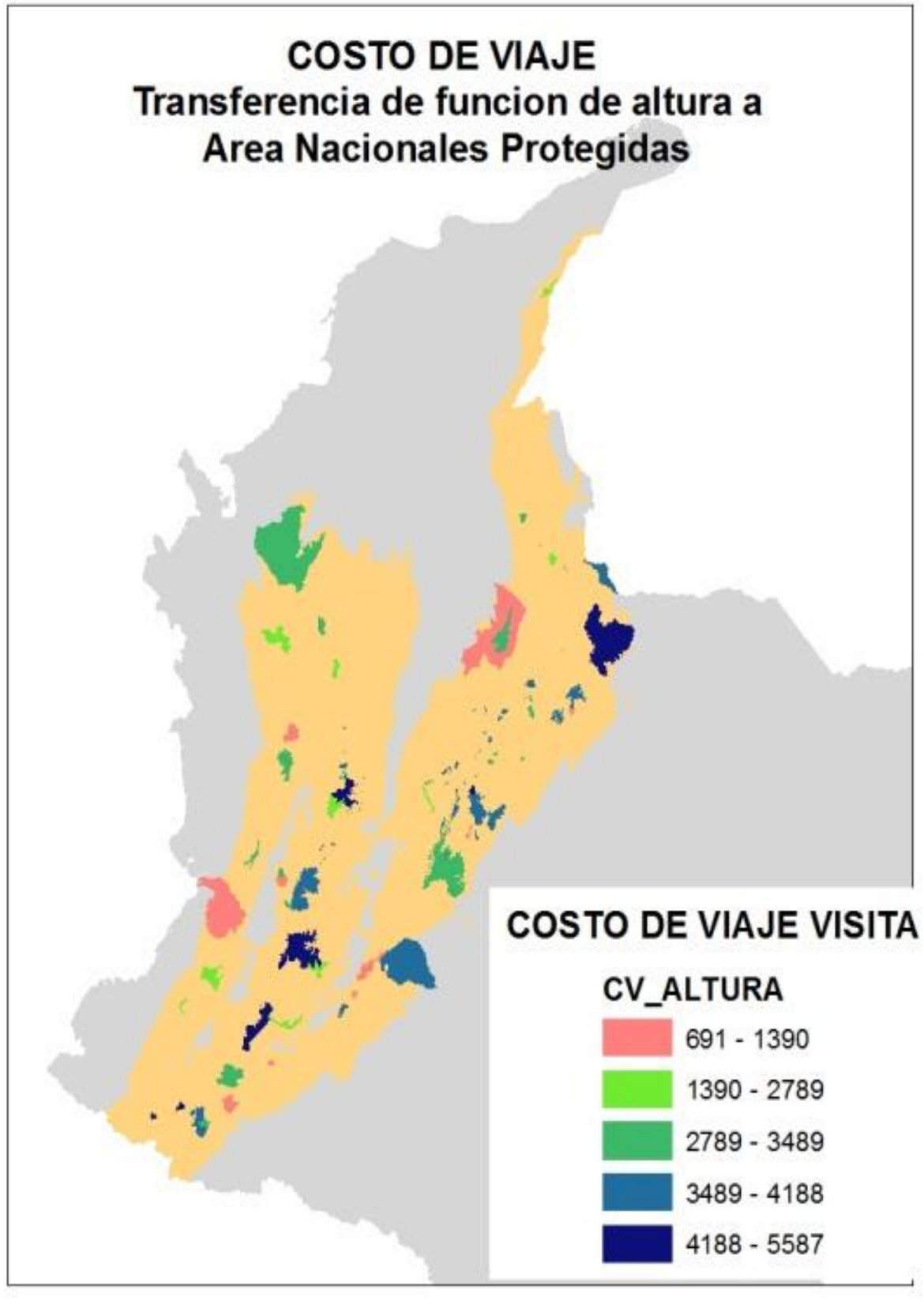

CONSERVACION
DAP
(mes/hogar)
CONSERVACION
(Dolar 2011/hogar/mes)
<Null>
3.99


CONSERVACION
DAP
(Ha/mes)
DISPONIBILIDAD A PAGAR
(Dolar 2011/ha/mes)
<Null>
13960.68

OROBIOMA	Ha	WILLINGNESS TO PAY FOR WATER		WILLINGNESS TO PAY FOR RECREATION		WILLINGNESS TO PAY FOR CONSERVATION		TOTAL ANDES OROBIOMAS
		Average USD 2011/ha/mes	Orobioma value USD2011	Average USD 2011/ha/mes	Orobioma value USD2011	Average USD 2011/ha/mes	Orobioma value USD2011	
Orobioma bajo de los Andes	14,035,898	$ 2.43	$ 34,107,232.14					$ 34,107,232.1
Orobioma medio de los Andes	7,566,165	$ 5.57	$ 42,143,539.05	$ 3.79	$ 28,675,765.4	$ 13960.68	$105,628,808,392.20	$ 105,699,627,696.60
Orobioma alto de los Andes	4,178,394	$ 0.06	$ 250,703.64	$10.05	$ 41,988,681.3			$ 42,239,384.9
TOTAL		**$**	**76,501,474.83**	**$ 70,664,446.7**		**$105,628,808,392.20**		**$ 105,775,974,313.69**


DISPONIBILIDAD A PAGAR POR RECREACION
Transferencia de funcion de area a
Area Nacionales Protegidas (visita)
DAP VISITA
USD 2011 VISTA
1 - 230
230 - 842.2
842.2 - 1930.5
1930.5 - 3173.2
mayor a 3200


COSTO DE VIAJE
Transferencia de funcion de area a
Area Nacionales Protegidas
COSTO DE VIAJE VISITA
USD2011 VISITA
0- 655
655 - 2404
2404 - 5515
5515 - 9000
mayor a 9000


COSTO DE VIAJE
Transferencia de funcion de altura a
Area Nacionales Protegidas
COSTO DE VIAJE VISITA
CV_ALTURA
691 - 1390
1390 - 2789
2789 - 3489
3489 - 4188
4188 - 5587

APPROACH

The total value of the ecosystems of the Andes is ***$ 338,937,632,975.54*** dollars of 2011. The major contribution is the willingness to pay for conservation, while water availability alone is ***$ 1,190,115,047.11 USD 2011***.

	TOTAL VALUE (USD 2011)	
WATER AVAILABILITY	$	1,190,115,047.11
CONSERVATION	$	337,747,517,928.43
TOTAL COLOMBIAN ANDES	$	338,937,632,975.54

PILOT IMPLEMENTATION

CONTINGENT VALUATION
PARTICIPATIVE VALUATION

CONSERVATION INTERNATIONAL

WAVES
Wealth Accounting and Valuation of Ecosystem Services

PHASE II: PILOT IMPLEMENTATION

CARIBBEAN: Guajira Department

1. Corpoguajira. WATERSHED MANAGEMENT
2. CERREJON-MPX (COMPENSATION MEASURES ENVIRONMENTAL PROJECTS)

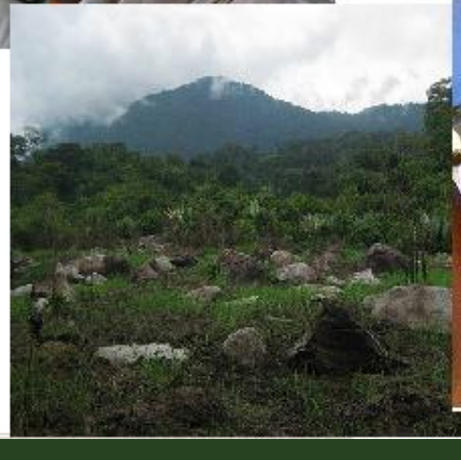
ANDES: Conservation Corridor

1. CLIMATE CHANGE EFECTS: ADAPTATION AND MITIGATION MEASURES.

AMAZON

1. WATERSHED MANAGEMENT

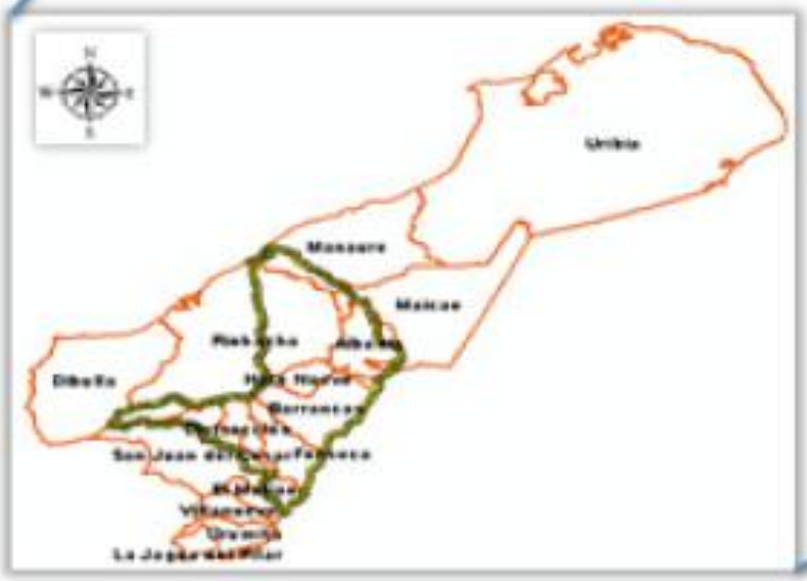
ADVANCES IN THE FIELD MODELS



Corpoguajira

CONSERVACIÓN INTERNACIONAL COLOMBIA

POMCA RIO RANCHERIA-COLOMBIA



e planning territory.

CONSERVACIÓN INTERNACIONAL Colombia

LEYENDA

ZONA DE CONSERVACIÓN

CATEGORIA

- Áreas de restauración
- Áreas de preservación hídrica y biológica
- Áreas de recuperación Falla de Oca
- Áreas de ronda hídrica Río Ranchería
- Areas Naturales Protegidas Declaradas
  - RFP - Montes Oca
  - PNN - Sierra Nevada de Santa Marta
- Areas Naturales Protegidas Propuestas
  - Bañadero
  - Cañaverales
  - El Cercado

ZONA DESARROLLO SOCIOECONOMICO

- Áreas preservación cultural
- Áreas Urbanas
- Áreas de manejo especial bajo saberes locales
- Áreas de producción sostenible
- Áreas de uso múltiple restringido actividades bajo impacto
- Áreas de uso múltiple restringido actividades impacto moderado
- Rehabilitación posterior a Extracción Minera

1175000

MAPA ZONIFICACIÓN - POMCA RANCHERÍA
2011 - 2021

Corpoguajira

CONSERVACIÓN INTERNACIONAL Colombia

LOCALIZACIÓN GENERAL

CONVENCIONES

- Casas
- Escuelas
- Cementerio
- Curvas de Nivel
- Hidrografía
- Limite Ranchería
- Limite Municipal
- Drenajes Dobles
- Bancos de Arena
- Cerca del embalse
- Cuerpos de Agua
- Centros Poblados
- Falla Montes de Oca
- Ferrocarriles
- Gasoducto Subterraneo
- Linea Ferrea
- Gasoducto
- Caminos
- Pista de Aterrizaje
- Linea de Alta Tensión
- Vías Pavimentadas

INFORMACIÓN DE REFERENCIA

Proyected Coordinate System: Colombia_Bogota_Zone
Projection: Transverse_Mercator
Geographic Coordinate System: GCS_Bogota
Datum: D_Bogota
Prime Meridian: Greenwich

Fuente : Corpoguajira Fuente Resolución Escala Digital ESC 1: 25.000

Escala Gráfica : 1: 100.000

LEYENDA

PARTICIPATIVE VALUATION

CONSERVATION INTERNATIONAL

WAVES
Wealth Accounting and Valuation of Ecosystem Services

PARTICIPATORY VALUATION

1. Participatory Valuation, is an ideal tool for sensitization and approach an estimated value of ecosystem goods and services within a region.

2. This can be recognized: the importance, frequency of use and valuation of the SE by the communities selected for the feasibility analysis of schemes and programs for conservation (PES-Water).

SE Rating:

Capacity Building: SE-services nature. What are they?, How are they classified?, And their relation to welfare.

WATERFALL OF THE ECOSISTEM SERVICES

ECOSYSTEMS AND BIODIVERSITY

Bosques de la Sierra Nevada de Santa Marta

FUNCTION

- Control of the flow velocity
- Water storage in the short and long term
- Environmental Filtration (pathogens, nutrients, salinity, sediment)
- Soil Stabilization

SERVICE

- Water Supply (Quantity)
- Acceptable Water Quality
-Reduction of flood damage

Human Welfare

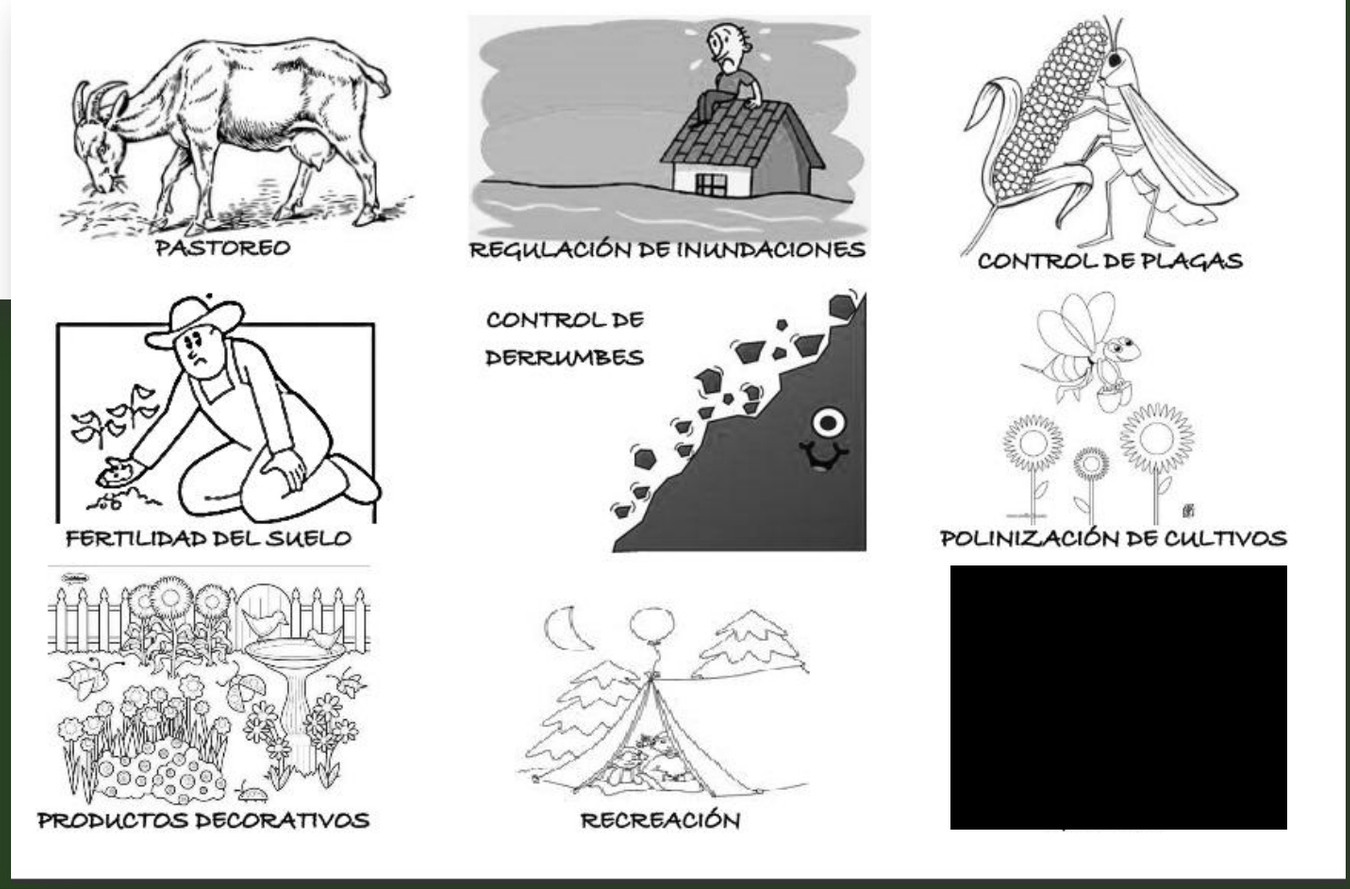
BENEFIT

Use for domestic use, irrigation of crops, activities' economic, etc.).

Capital Nat

FUENTE: Adaptado de Hannes – Young y Postching (2010)

1. VALUED ECOSYSTEM SERVICES

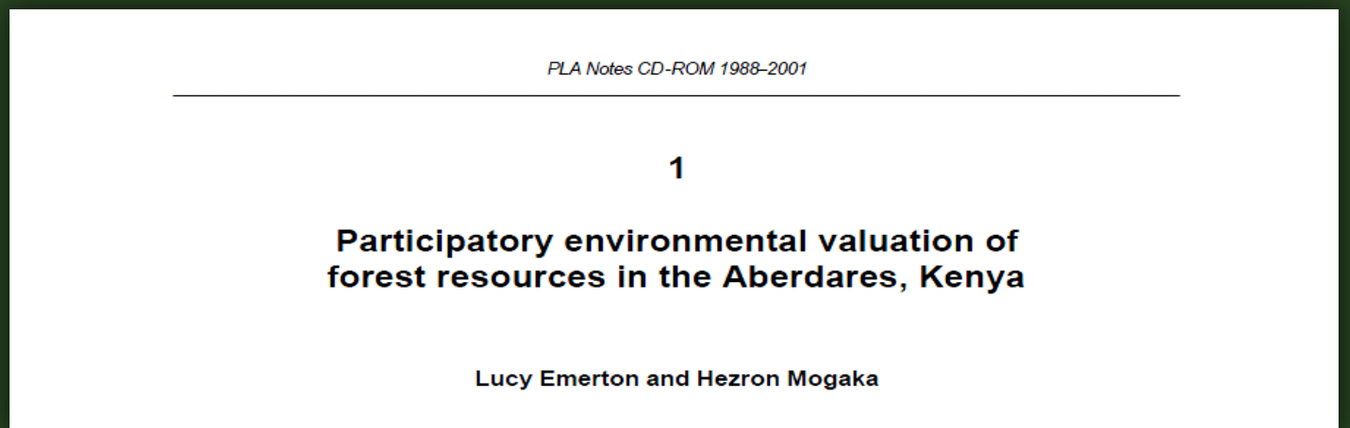


2. IMPORTANCE AND FREQUENCY OF USE OF THE ES

SERVICE	IMPORTANCE	FREQUENCY OF USE
Air Quality		
Water Supply		
Agricultural		
Building materials		
Grazing		
Pollination of crops		
Wood (wood)		
Soil fertility		
Medicines		
Flood Control		
Recreation and contemplation		
Slipt control		
Pest Control		
Fishing		
Hunt - wild Protein		
Ornaments, Ornamental		

importante		**Frequency of Use**	
Little	**1**	Infrequent	**A**
Average	**2**	Frequent	**B**
High	**3**	Very frequent	**C**

3. VALUATION



PLA Notes CD-ROM 1988–2001

1

Participatory environmental valuation of forest resources in the Aberdares, Kenya

Lucy Emerton and Hezron Mogaka

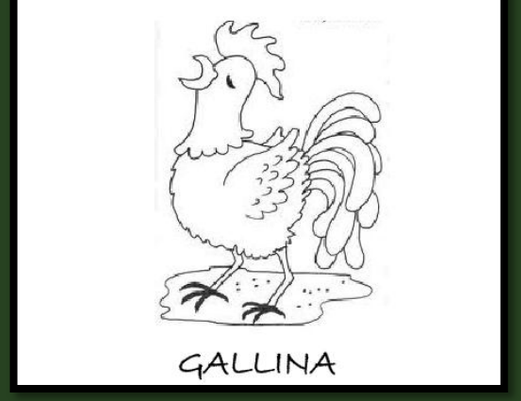
Well Reference (Hen)

Maximum seed Rating: 20

Economic value of good reference (ask community)

VALUATION

ECOSYSTEM SERVICES	VALUE grain	Grain equivalents in the reference well (chicken)		FINAL VALUE
Wood	2	2/3	0,67	20000
Hunting	1	1/3	0,33	10000
Water supply	5	5/3	1,67	50000
Agricultural products	5	5/3	1,67	50000
Air Quality	5	5/3	1,67	50000
Building Materials	4	4/3	1,33	40000
Fishing	3	3/3	1,00	30000
Medicinal products	5	5/3	1,67	50000
Grazing	5	5/3	1,67	50000
Flood control	5	5/3	1,67	50000
Soil fertility	5	5/3	1,67	50000
Control of landslides	1	1/3	0,33	10000
Pollination of crops	5	5/3	1,67	50000
Pest Control	5	5/3	1,67	50000
Recreation	4	4/3	1,33	40000
Decorative products	3	3/3	1,00	30000
CHICKEN	***3***			***30000***
Value of the grain	**Each grain is $10.000 (COP)**			
Total value of the chicken	**30000**			



MEETING WITH THE AGRICULTURAL SECTOR

Water supply
agricultural
Air Quality
Flood control

HIGHEST RATINGS:
$30.000
$35.000

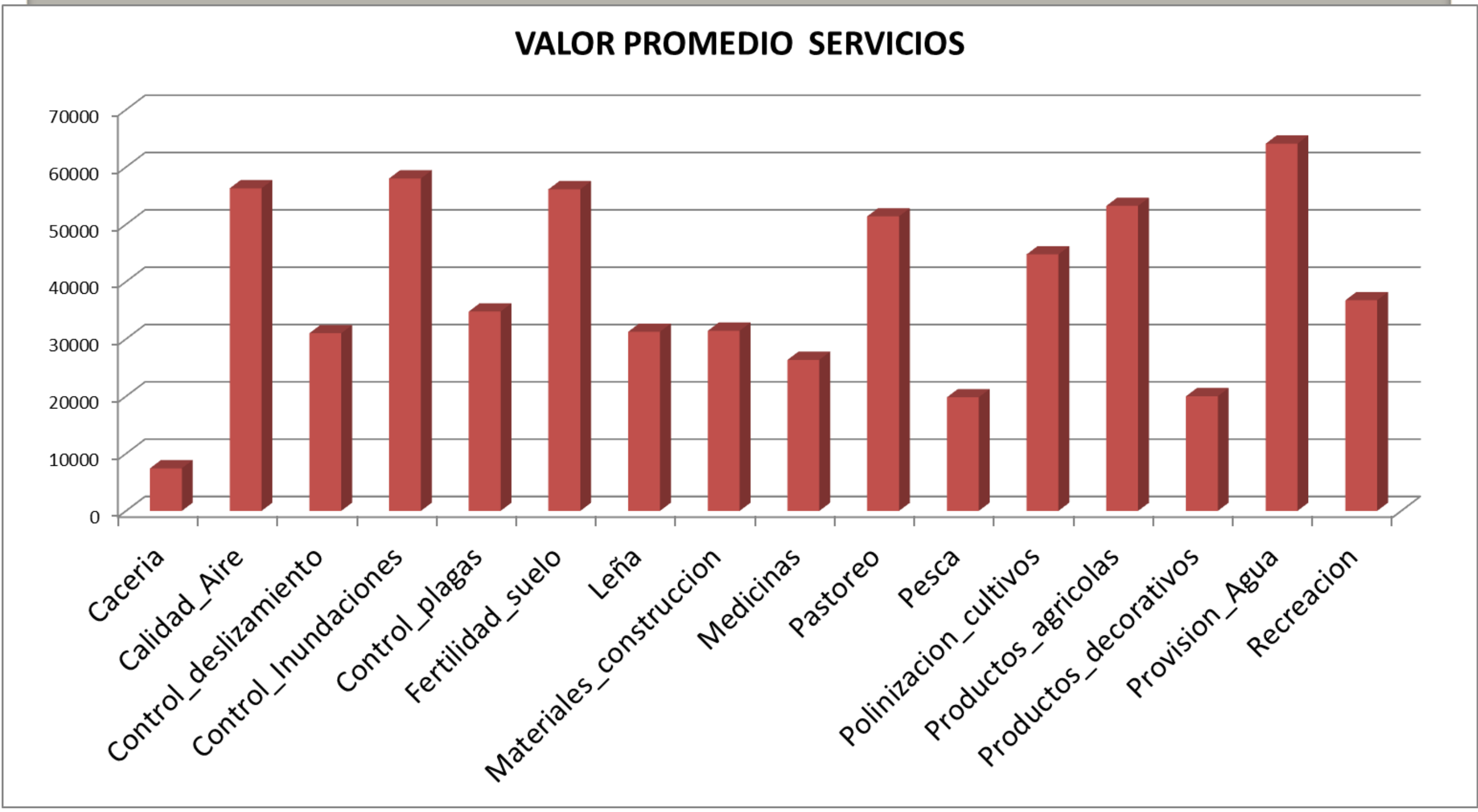
MEETING WITH COMMUNITIES

Water supply
agricultural
Air Quality
wood

HIGHEST RATINGS:

$63.000

$75.000


VALOR PROMEDIO SERVICIOS
70000
60000
50000
40000
30000
20000
10000
0
Caceria
Calidad_Aire
Control_deslizamiento
Control_Inundaciones
Control_plagas
Fertilidad_suelo
Leña
Materiales_construccion
Medicinas
Pastoreo
Pesca
Polinizacion_cultivos
Productos_agricolas
Productos_decorativos
Provision_Agua
Recreacion

TOTAL ECONOMIC VALUE

Total Economic Value = Use Value + Not Use value

Use value is given by:

USE VALUE = VALUE USE DIRECT + VALUE USE INDIRECT.

.

Use value = $ 268,500 + $ 391,500

Use value = $ 660,000

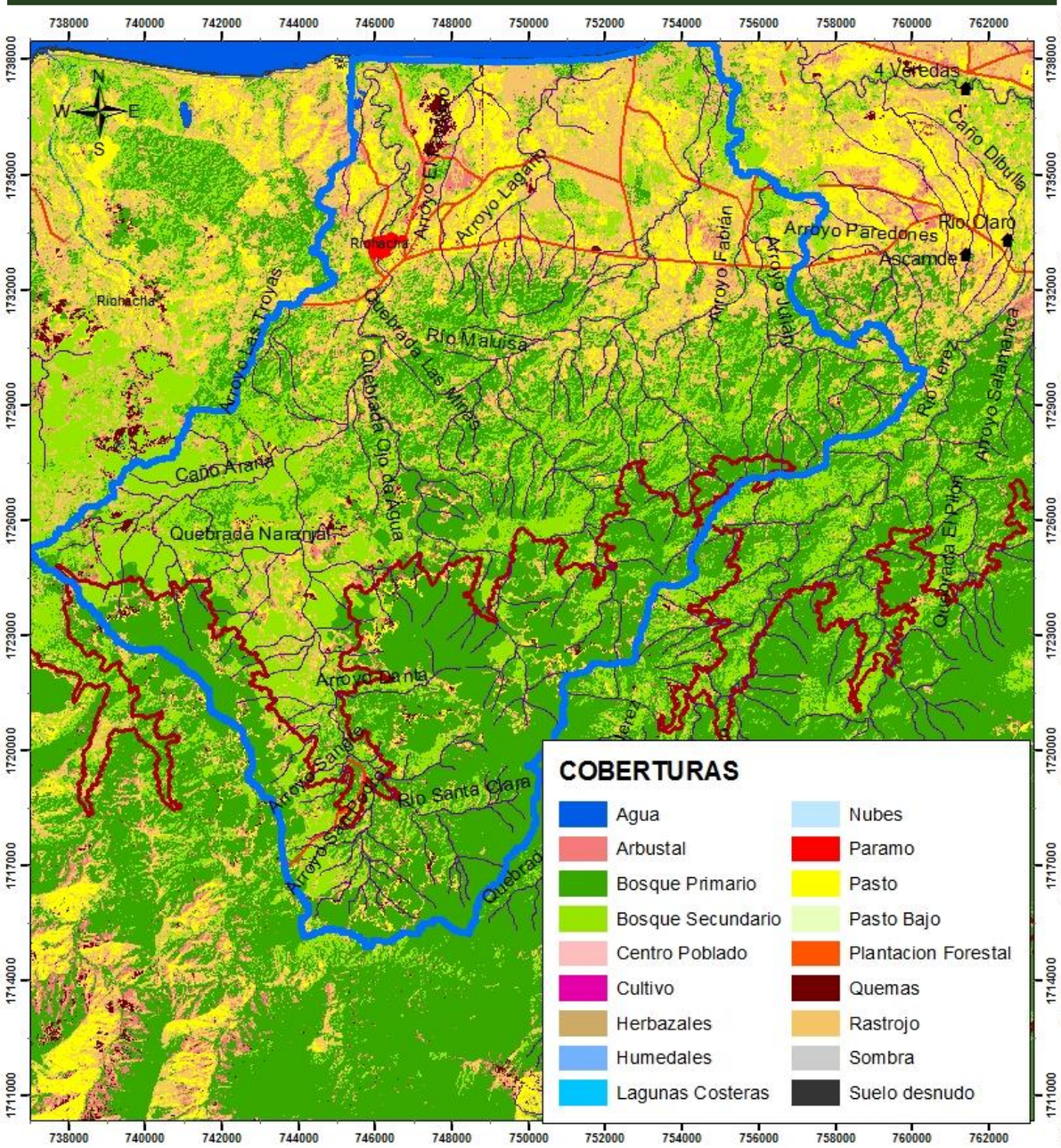
ASSESSMENT OF COVERAGE

COVEREAGE	C	CP	FS	L	MC	PA	PD	PM	PA	R	R I	Total general
Bosque Primario	3000	33000	60000	60000	108000	60000	21000	60000	60000		120000	585000
Bosque Secundario			60000	120000		120000	21000					363000
Pasto					108000				60000	36000		204000
Rastrojo			120000		108000	180000						492000
Total general	3000	33000	240000	180000	324000	360000	42000	60000	120000	36000	120000	1518003

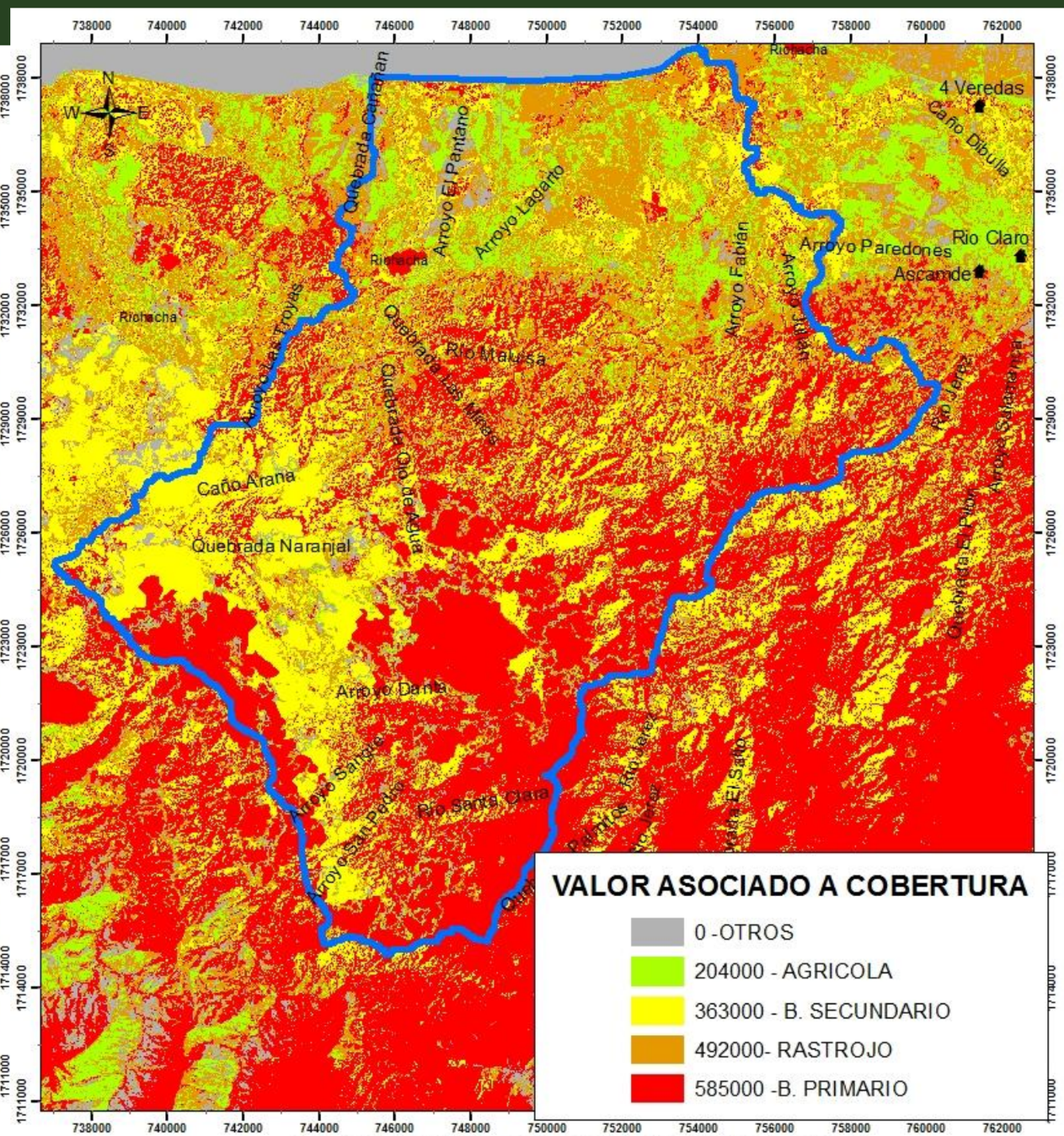
C = hunting
CP = Pest Control
FS = Soil Fertility
L = Firewood
MC = Building Materials

PA = Agricultural Products
PD = Decorative Products
MP = Medicinal Products
PA = Water Supply
R = Recreation
RI = Adjustment of Floods

VALUE ASSOCIATED WITH COVER



COBERTURAS CUENCA LAGARTO



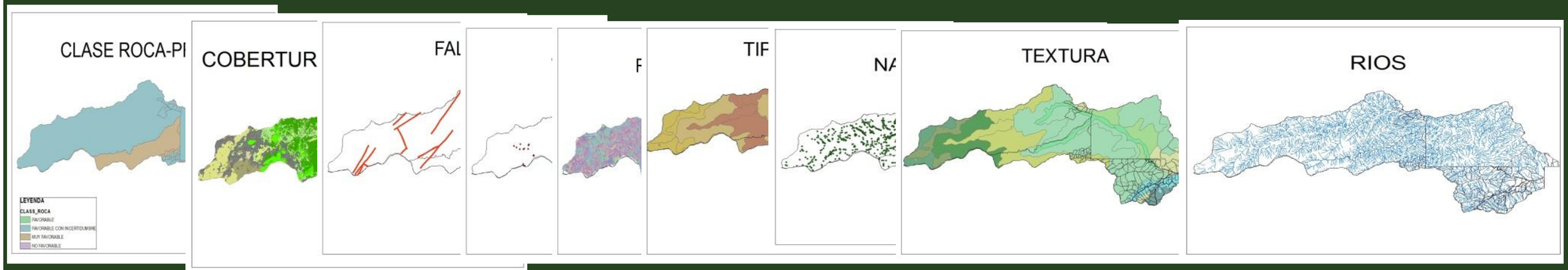
VALORACION COBERTURAS CUENCA LAGARTO

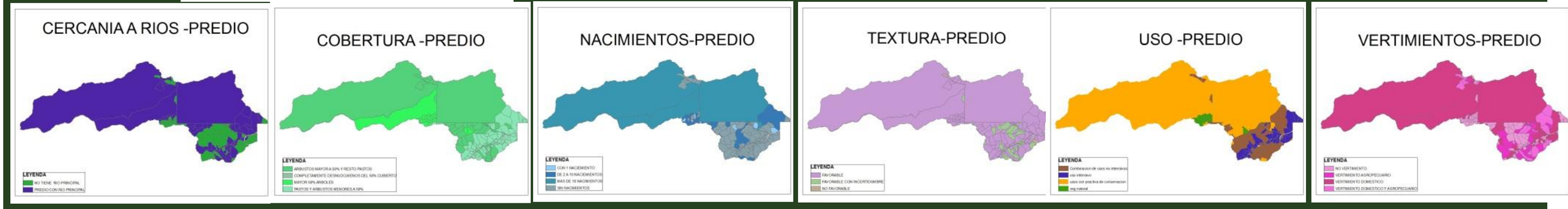
CONTENJENT VALUATION

CONSERVATION INTERNATIONAL

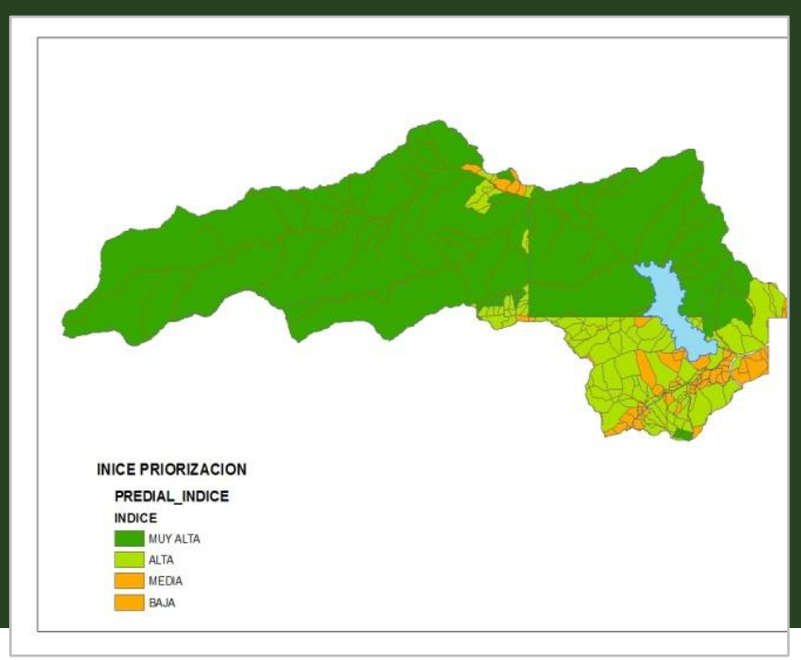
WAVES
Wealth Accounting and Valuation of Ecosystem Services

RURAL LAND PRIORITIZATION





INDEX = 0.159COB P+ 0.159 NAC +0.127 USO+ 0.127 AGUA+ 0.079 FALLAS + 0.127 VERTI +0.063 TEX + 0.079 PEND + 0.032 MICRORELIEVE + 0.048 ROCA



2 - ECONOMIC ANALYSIS OF THE OFFER (Cost of implementation, Opportunity Cost and Cost of follow-up)

3 - ECONOMIC ANALYSIS OF DEMAND (willingness to pay and Participatory Evaluation)

Negotiations-conservation agreements (pay per ES). Establishment of payment and technical capacity of service providers.

March 7 de 2012. Auditorio CREM. Fonseca –La Guajira.


EJES DE TRABAJO
PROYECTOS PSA HIDRICO
ANÁLISIS OFERTA/DEMANDA DEL RECURSO HIDRICO
VALORACIÓN ECONÓMICA
DISEÑO DEL ESQUEMA PSA
FACTORES TENSIONANTES
FACTIBILIDAD ESQUEMA PSA
ACUERDOS VOLUNTARIOS

SIGNING OF THE AGREEMENT

¡Gracias por su atención!

THANK YOU!!!!!!

THANK YOU!!!!!!

CONSERVATION INTERNATIONAL