



COLCIENCIAS



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NUEVO PAÍS
PAZ EQUIDAD EDUCACIÓN



Biodiversity,
our greatest treasure

2016



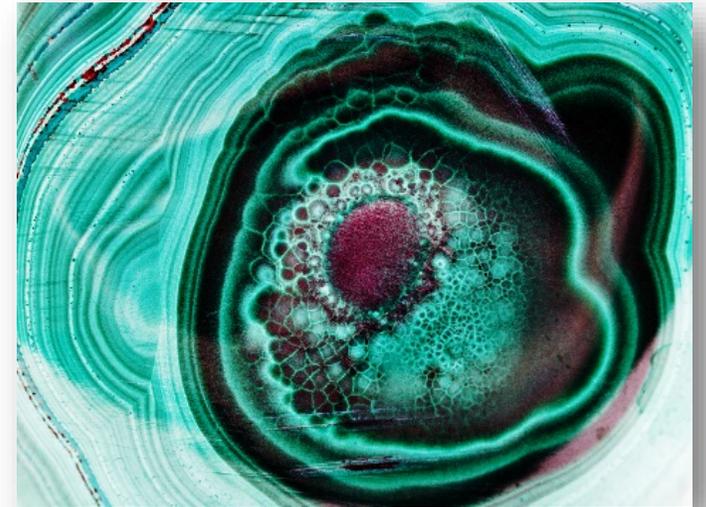
Bio Value Chain



Bio Expedition



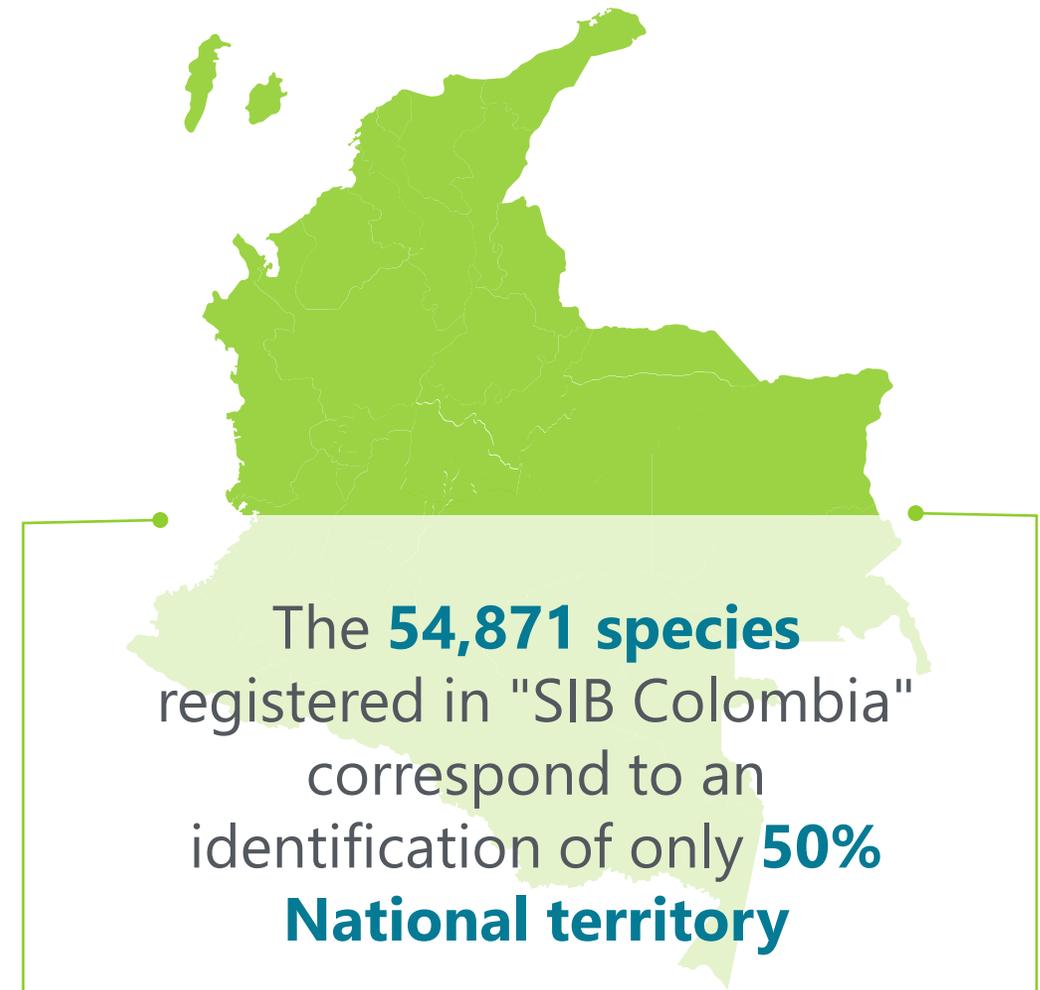
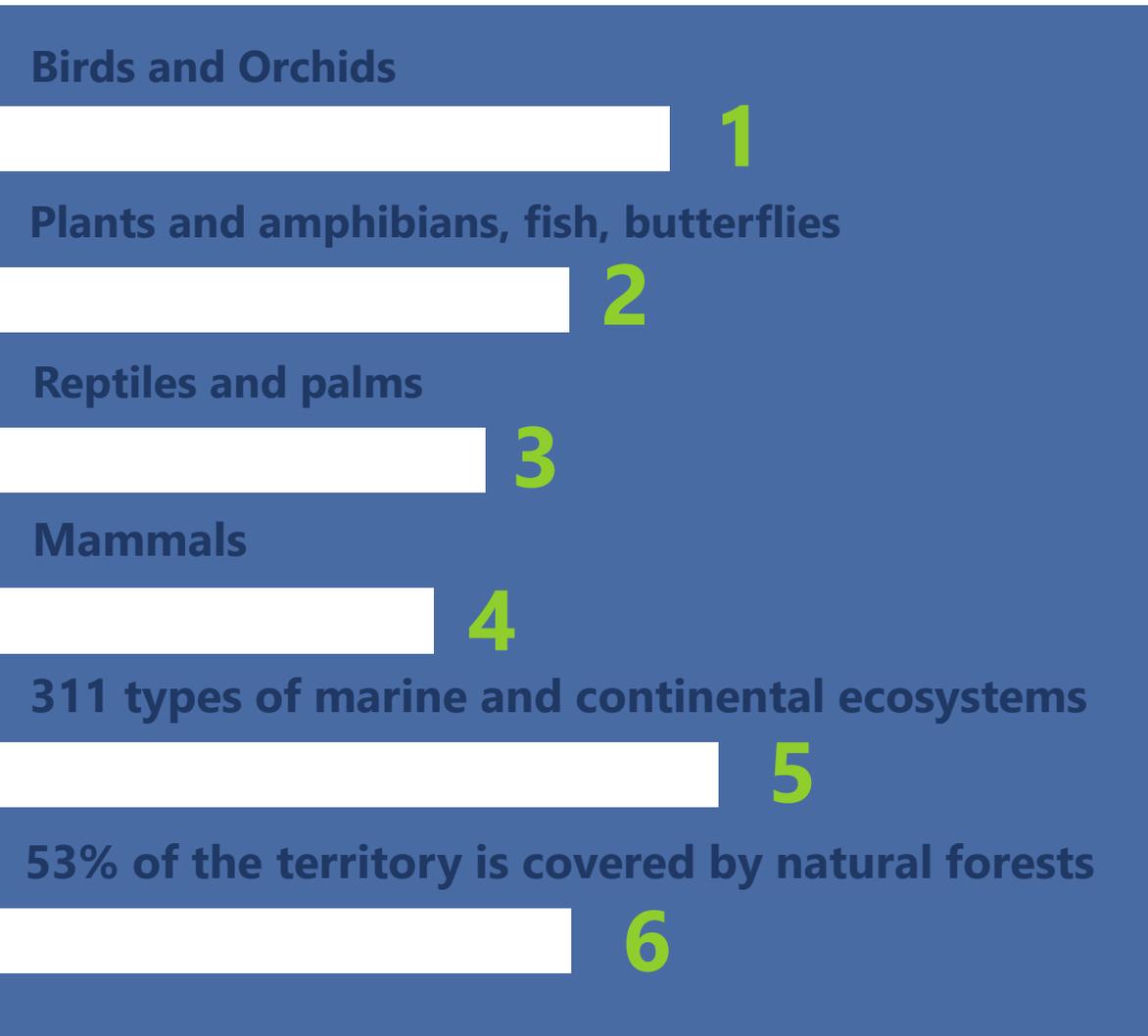
Bio R&D



Bio Products

Panorama Bio Colombian

World position:





vs.

Percentage of records in SIB

Vertebrates

66.469

11%

Invertebrates

1.305.250

1%

Plants

327.442

10%



CTel capabilities BIO in the country



Research groups
in life science



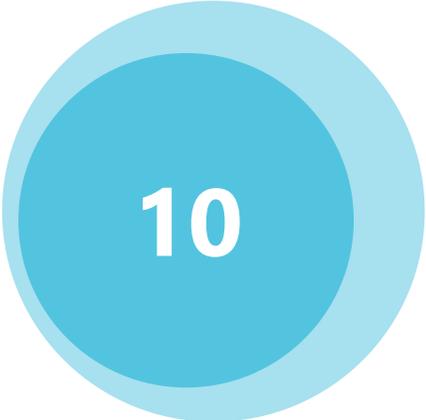
Researchers in life
science



PhD 2010-2014



**Research
centers**

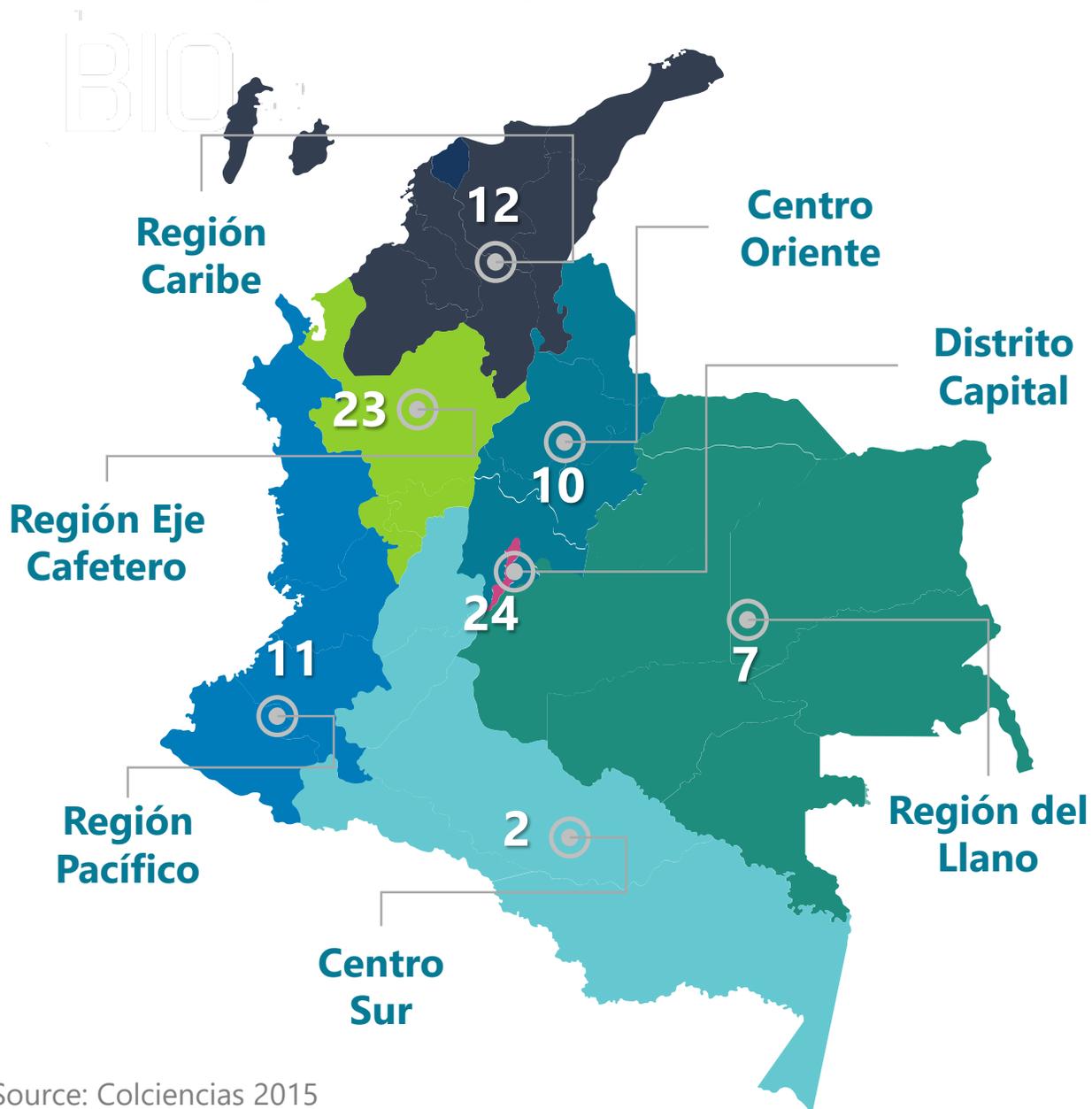


**Technologic Development
Centers** (Majority in Health,
Agriculture and Biodiversity)



Regional specialization: ST&I Capabilities in Biotechnology

Grupos de investigación por región



We have outstanding regions:

1. **Bogotá D.C.** with **Health (28%)** and **Agricultural biotechnology (28%)**
2. **Antioquia** with most of its projects in **Industrial (48%)** and **Agricultural biotechnology (34%)**
3. **Valle del Cauca** with **Agricultural (38%)** and **Industrial biotechnology (30%)**

The world is changing... Changes to 2030



Industry **39%**



Agricultural **36%**



Health **25%**

Opportunities and challenges in some sectors



Cosmetics industry

Growth of 6,4% to 2020



Biopharmaceutical industry

Growth of 25% to 2020



Biosimilars industry

Growth of 172% to 2020

Greatest Opportunities

Bio Expedition

1 Colombian Biodiversity

- Colombia is the **2nd country in Biodiversity in the World**, in just 1% of the whole earth surface.
- **53% of the continental territory** is covered by forests
- The country has **311 types** of continental and marine ecosystems.

2 Microorganisms

Less than **0.5%** has been characterized in the Biodiversity Information System of Colombia (SIB Colombia).

Bio R&D

1 Critical mass qualified but small, and growing every day

Almost **50%** of the research groups correspond to areas of Life Sciences

2 Accessible technologies

Sequencing of the human genome: In 6 years, its cost went down since 10 million USD to 1000 USD

Bio Products

1 Growing interest of industry and consumer in bio-based products

- More than **30%** of the pharmaceutical market in Colombia belongs to **bio-technological drugs (El país, 2016)**.
- In Colombia, it is estimated that between **30% and 38% of plants** have any economic use (**UNAL, 2007**).
- Annually, the sector of natural ingredients for the industry has a **growth rate of 50%** (**UJTL, 2009**).

Low Biodiversity record

The most sampled areas in the country are only **the half** estimated of **possible records** for an acceptable documentation of biodiversity (IAvH, 2014)



Colombia

• 3.565.757 Records



Costa Rica

5.786.118 Records



Brazil

7.581.730 Records

GBIF

The **Orinoco**, the **Amazon** and the **Caribbean** are the regions with more biological data gaps Colombia



Regional heterogeneity

Levels of ST&I, CEPAL 2015 (Scale of 0 to 100)

Extra leader	Leader	High	Medium high	Medium low	Low	Behind	Lagging
Bogotá D.C. (96.1)	Caldas (71.1)	Risaralda (50.1)	Boyaca (39.9)	San Andres (31.0)	Norte de Santander (22.4)	La Guajira (11.4)	Vichada (0.2)

Given that:

- There are limited and concentrated STI capacities in the regions.
- The most biodiverse Departments ("hotspots") are those with lower capacities in STI.
- According to the **Project Management Index Royalties (DNP)** departments such as San Andres and Providencia, Choco, Caqueta, Sucre and Santander have a critical performance.

Towards a territorial specialization



Some constraints through the Bio value chain

Bio Expedition

Bio R&D

Bio Products

Legal Development

Financial Sustainability

Inventory for research

Inventory to commercial purposes



- Permit harvesting of wild species
- Information Register
- Biological Collections

- Scanning and sampling
- Selection
- Isolation of components of interest
- Proofs of Concept
- Transformation and scaling
- Conversion and field tests
- Industrial property and technology transfer
- Pre-launch
- Commercialization
- Launch
- Business development
- Benefit-Sharing

Access to genetic resources



Lack of business initiatives in **Life Sciences** areas

iNNpulsa identified only **35 projects** related to the uses of **biotechnology**, presented by start-ups or as a vehicle for technology transfer (2013)

- **55%** of these were presented by Universities and Research centers
- In 2015 DNP identified **157 active companies** in Biotechnology

iNNpulsa has identified some gaps related to the lack of biotechnological companies:

- **Lack of capacity building** in the interface between knowledge and business
- Absence of **national specialized funds** in the early stages of investment

Main limitations

Bio Expedition

- Insufficient biodiversity inventory.
- Biological collections facing structural weaknesses
- Low capacities in many regions.

The most registered areas in Colombia represent just a **half of all registers estimated** in order to have an acceptable biodiversity documentation. (IaVH).

Bio R&D

- Low connection between research and private funding.
- Low valuation of research results

Less than **20% of private investment** in R&D in Colombia comes from the private sector (OCDE, 2014).

Bio Products

- Difficulties in marketing technology
- Lack of prospective and market intelligence

A recent market study identified just **35 biotechnology enterprises**.
Innpulsa (2013)



Our Structural Goals

Bio Expedition

Bio R&D

Bio Products

Cross-cutting goals

Institutional Coordination

Institutions, researchers, companies and law firms will develop a complete analysis and recommendations of the entire value chain of sustainable use of biodiversity

Communication and culture

Sensitization more than 10 million Colombians

Territorial management

Custom projects and posconflict agenda



A national project

Bio Expedition



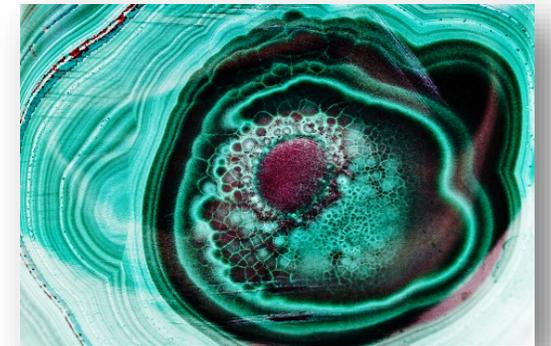
- Ministry of Environment and Sustainable Development

Bio R&D



- Ministry of Agriculture
- Ministry of Health and Social Protection

Bio Products



- Ministry of Trade, Industry and Tourism

Ministry of Technology, Information and Communication -
- Ministry of Education -



Institutional Articulation & Regulatory Development



Derivados de la biodiversidad

Biodiversity access and collect

Review topics:

- Biodiversity access
- Information management
- Traditional knowledge
- Biological collections
- Fair and equitable sharing
- Collect and storage
- Amnesty

Support entities:

MADS, ANLA, ASOCARS, MININTERIOR, PNN.

Research stage

Review topics:

- Research standards
- Laboratory tests
- Import of reagents and equipment
- Transfer of biodiversity samples
- Preclinical and clinical trials
- Effectiveness and biosafety
- Biosecurity
- Bioethics

Support entities:

Colciencias, INVIMA, ICA, MINJUSTICIA, MINAGRICULTURA, MINSALUD, MADS, DIAN.

Product development

Review topics:

- Intellectual property
- Good manufacturing practices
- Good environmental practices
- Quality standards
- Environmental seals
- Life-cycle management of the product

Support entities:

SIC, ICA, MADS, MINCIT, MINSALUD, INVIMA, ONAC, ICONTEC.

Commercialization

Review topics:

- Companies incorporation
- IP transfer
- Tax incentives
- Taxes
- International agreements

Support entities:

Procolombia, DIAN, Cámaras de Comercio, Superintendencia de Sociedades, DNP, Confecámaras.

Mindset, culture and communication

Our goals

- **5 millions people** aware
- **4.000 users** in our Bioered
- **3.000 children aware** and participating on Bio projects
- More than **50 media partnerships** with regional and national actors
- More than **200 video capsules** posted on social networks
- At least **3,000 mentions** in social networks
- More than **20 scientific publications**

What do we want to do?

Chain construction of relationship between the specialized public in biodiversity and the general public, **using communication strategies to recognize biodiversity as one of the main assets of the country**



Value Chain Goals

For each strategic line

Bio Expedition

- Basic information for applied research
- Information for decision making
- Information for generating processes applied to goods and services

- 20 Expeditions of XXI Century.
- Strengthen 20 Biological Collections.
- Genetic Library: 40.000 sequences.

The expeditions will have innovations to strengthen taxonomic levels with lower information: fungi, microorganisms and some groups of arthropods.

Bio R&D

- Great network of omic sciences with a focus.
- Exponential knowledge: 100 prototypes through alliances with universities and private companies, national or international.

Bio Products

- Portfolio 100: Launch of 100 Bio based products to market.

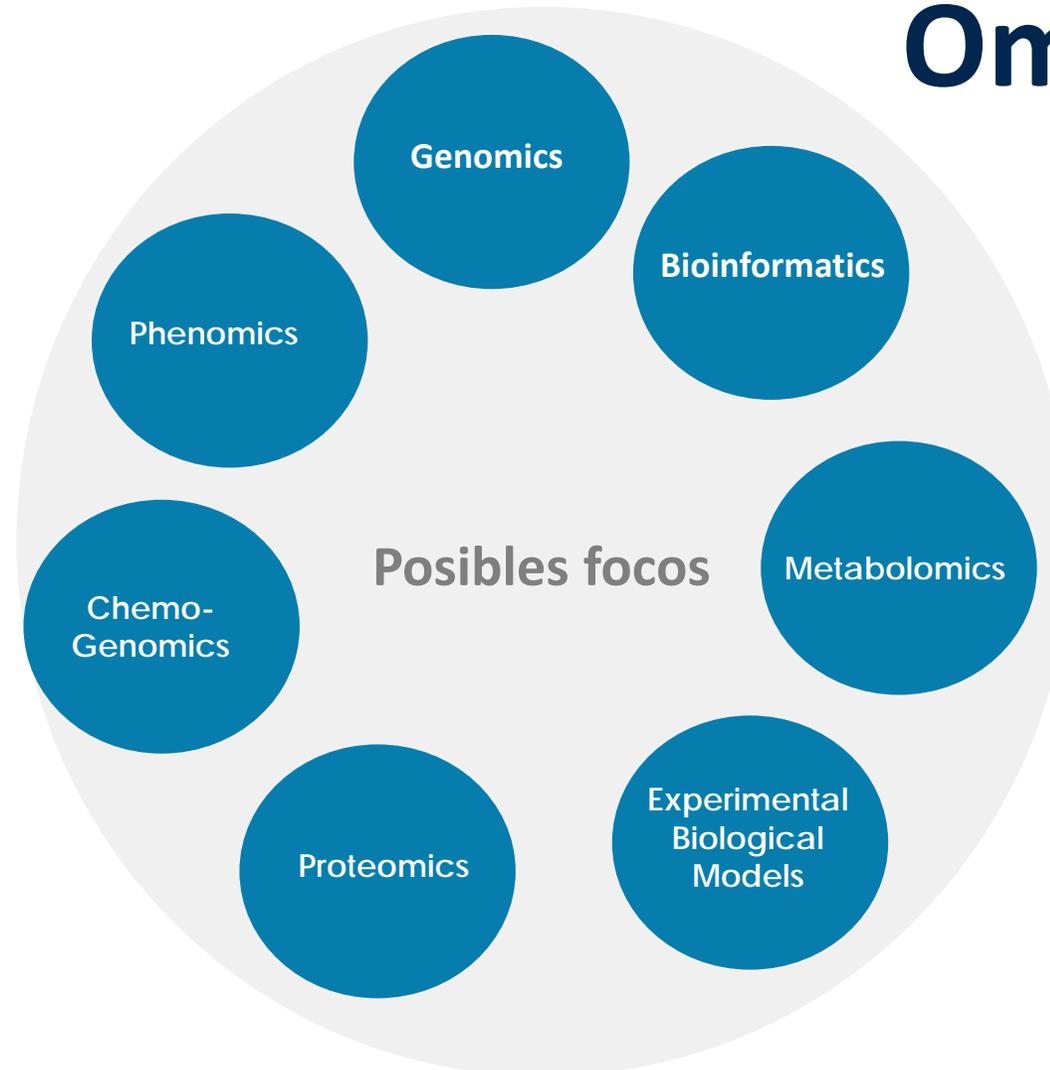
Proofs of Concepts Fund



Omic Sciences Network

1. **Leverage** existing capabilities.
2. **Encourage** networking oriented to one purpose.
3. **Accelerate** knowledge of Colombian biodiversity and its potential uses.
4. **Promote** value-added chain.
5. COS Model

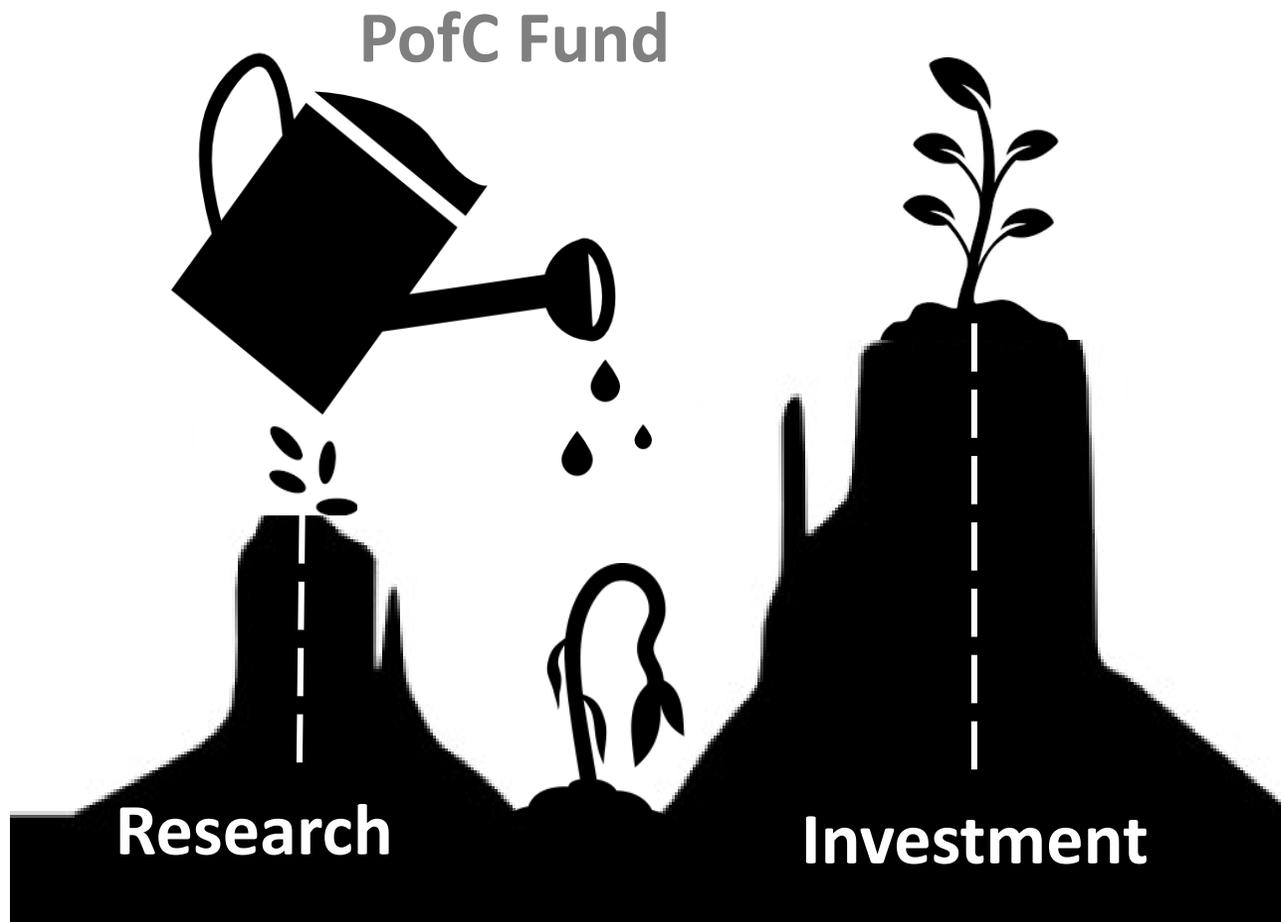
<http://omicscentre.com/services-applications/integrative-biological-models-of-experimentation/#>



It requires:

- Define Research focus
- Look expected impact on the generation and capacity building: human talent, infrastructure and services
- Census on technological infrastructure available in the country and capabilities of existing human talent
- Establish training needs at the doctoral level, technical and technological
- Feasibility Study (6 months, COP \$600.000.000)

Why a Proof of Concept Fund?



- Lack of private investment
- High transaction costs
- High risk
- Difficulty assessing opportunities

The fund is initially funded by the public sector and it will be sustainable by refinancing through a licensing income ratio or equity fund.



Some examples

Bio Products Requirements

Raw materials that are of biological origin (native and non-invasive)

Product transformed by organic and non-biological technologies.

- From Biodiversity.

As a result of ST&I processes

Containing incremental innovations and / or disruptive.

- New foods, new products or new uses.

Under schemes and sustainable practices

Through Biotechnology



Biotech drugs



Bioremediation



Biofertilizers

Through other technologies



Natural Ingredients



Nutraceuticals



Fortified foods



Colombia BIO: Towards a National Strategy of Bio-economy for 2025

“Biodiversity is to Colombia what oil is to Saudi Arabia”

E.O. Wilson



Main Objective

Colombia BIO is a national project that aims to promote the conservation, knowledge, and sustainable use of biodiversity, contributing to an economical, social and inclusive development of the country.



It'll permit us:

- Colombia Bio will be a **World** referent of the bio-scientific map.
- Recognize the **Biodiversity** as a national Active.
- Increase the add value of our **Products**.
- To impact the whole **Value Chain**.
- **Toward a sustainable development and socially inclusive in a postconflict scenario**



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