

Land Use and Land Cover change: Context for promoting SLM in the Andes

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Definitions



Definitions

- Land cover
 - Biophysical characteristics of earth Surface
 - Vegetation, water bodies, infrastructure, bare soil, ...
- Land use
 - Human activities to create, maintain or modify land covers
 - Require ecosystem conversion or alteration
- Relationships
 - Land cover → Multiples land uses
 - Forest → (Non timber forest products, tourism)
 - Land Use → Multiple land covers
 - Residential → (Urban forest, grasslands, housing infrastructure)

Definitions

■ Land use and land cover change

● Modification

- Change in the conditions maintaining the land cover
- E.g. selective logging, extensive grazing lands

● Conversion

- Forest → pasture

Old growth forest



Selective logging



Secondary forest



Tree plantation



Degraded forest land

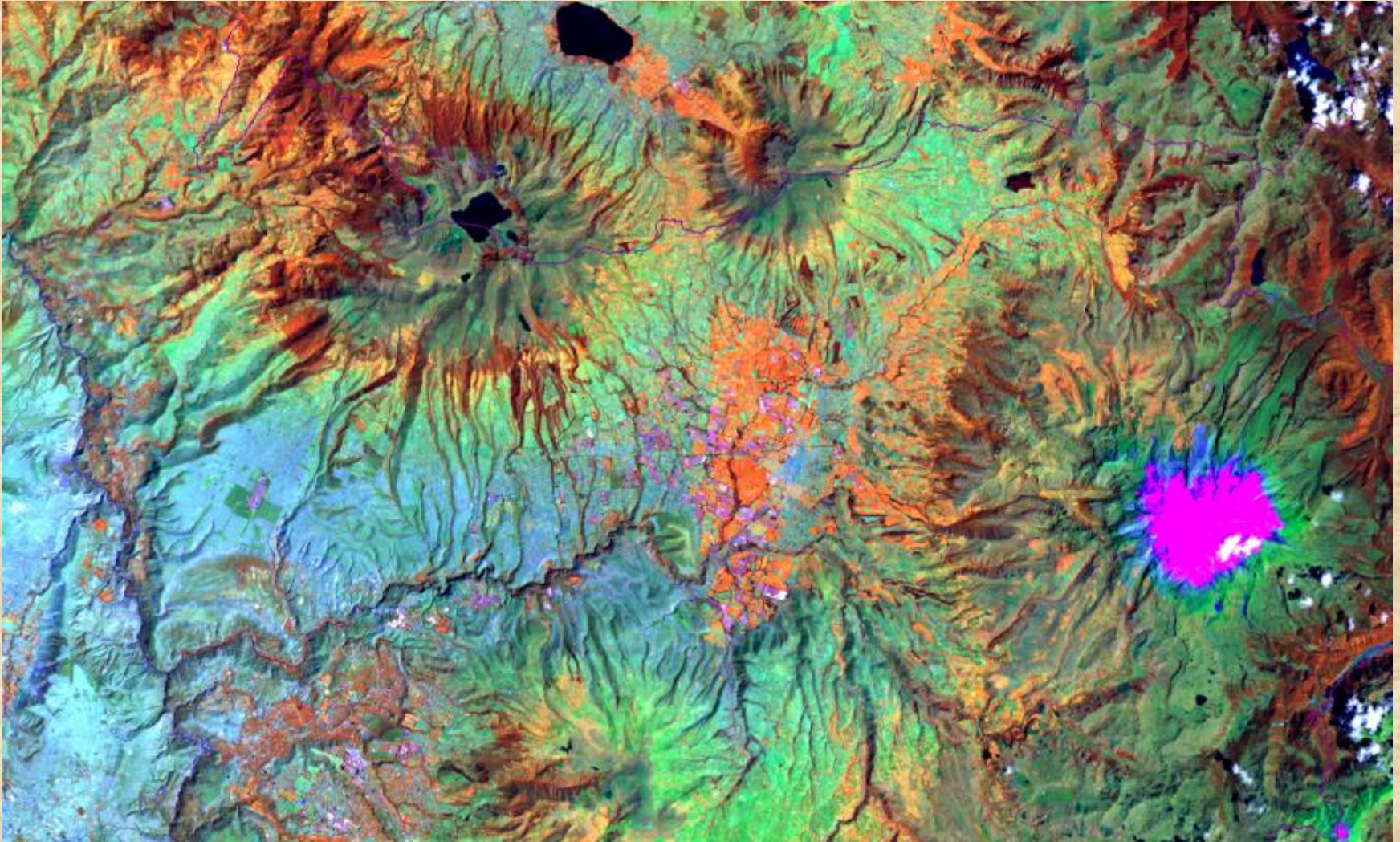


Land use in mountain areas

- Specificities of mountain landscapes (Kasperson et al. 1995)

Dimensions	Description
Morphology	Relatively closed systems, difficult to manage pressure over scarce resources (e.g. land, water)
Fragility	High sensitivity to irreversible changes under intensive production systems
Marginality	Tend to present endemic poverty
Diversity	Narrow environmental niches, steep gradients, heterogeneous adaptive responses
Livelihoods	Complex institutional and technological systems, sensitive to external shocks

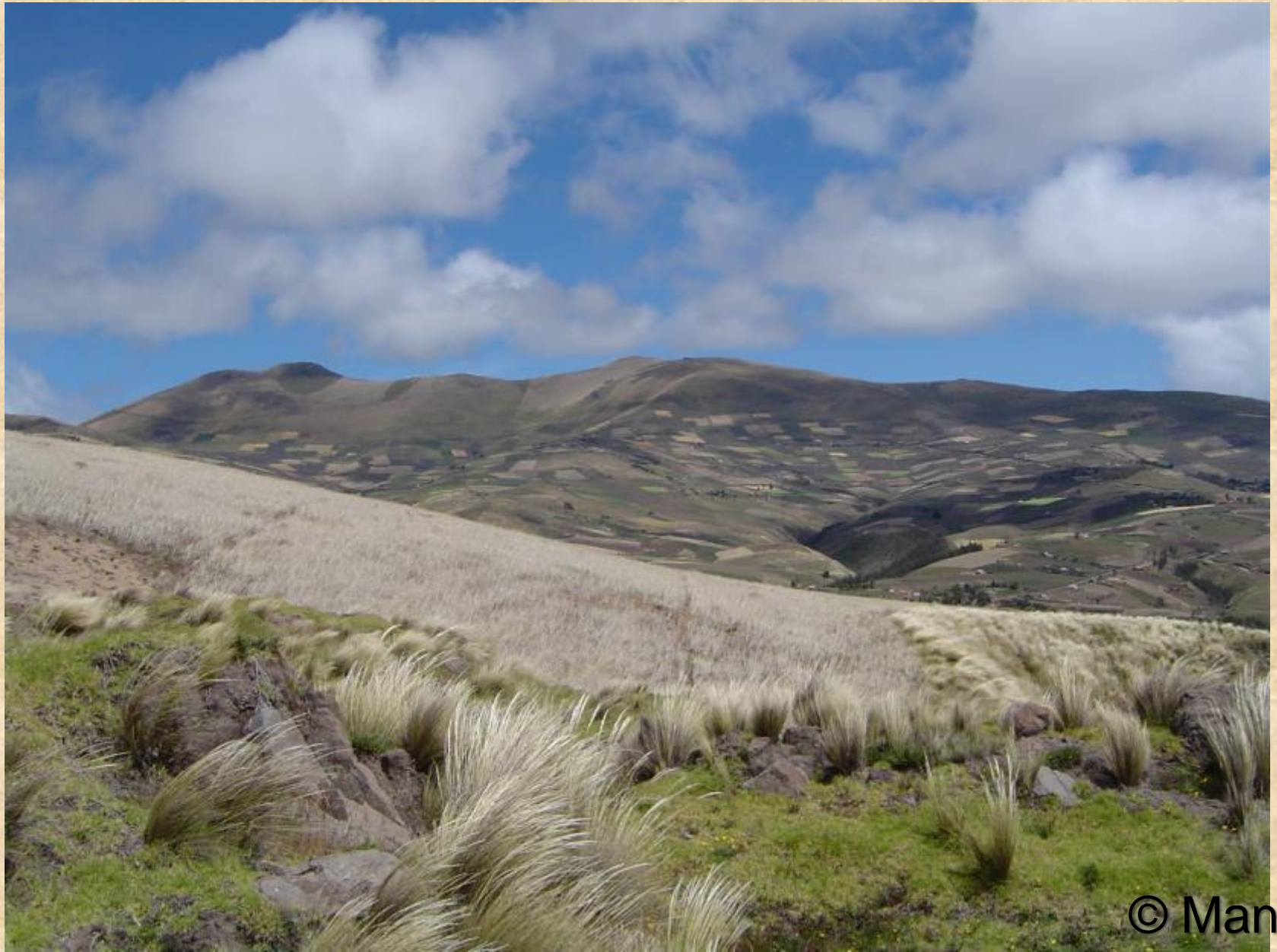
Andean land use systems - Northern Ecuadorian Andes



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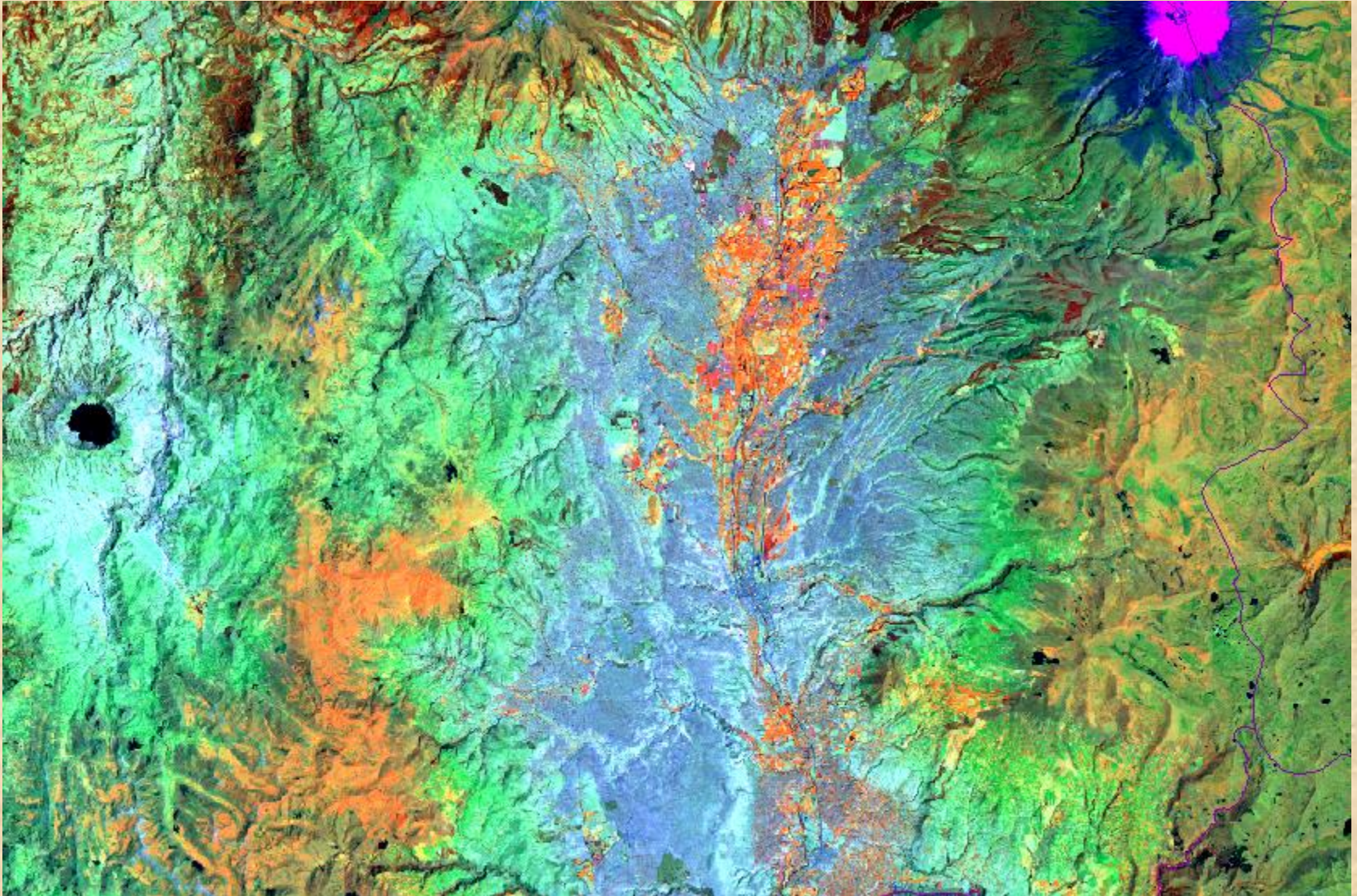
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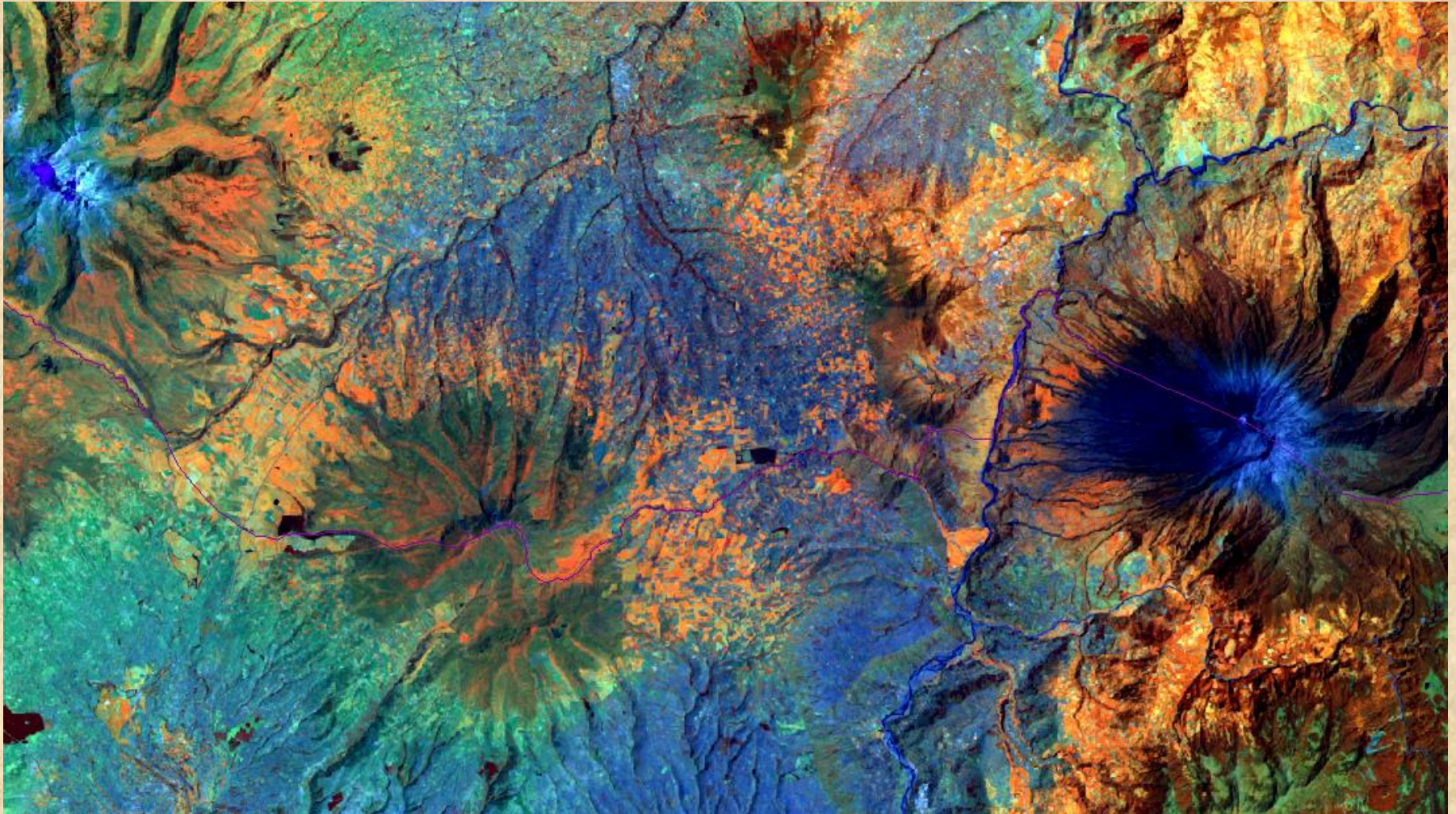
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Andean land use systems - Central Ecuadorian Andes



Andean land use systems - Central Ecuadorian Andes



Impacts of forest change on hydrological services

Hydrological parameters	Effects of land-cover changes on hydrological parameters			Major links between hydrological parameters and hydrological services		
	 Conserved grassland  Exotic tree plantation	 Degraded land  Exotic tree plantation	 Native forest  Degraded land	Water supply	Water regulation	Erosion control
Total water yield	--	-	+	+		
Rainfall interception	+	+	-	-		
Transpiration	++	+	-	-		
Base flow	--	+/-	-		+	
Peak flow	-	-	+		-	
Infiltration	+	++	--		+	+
Soil organic matter	-	+	-		+	+
Diffuse erosion	+	--	++			-
Landslides	?	?	+			-

++ Strong increase

-- Strong decrease

+/- Controversy

Consensus

+

 Positive link

- Decrease

? Knowledge gaps

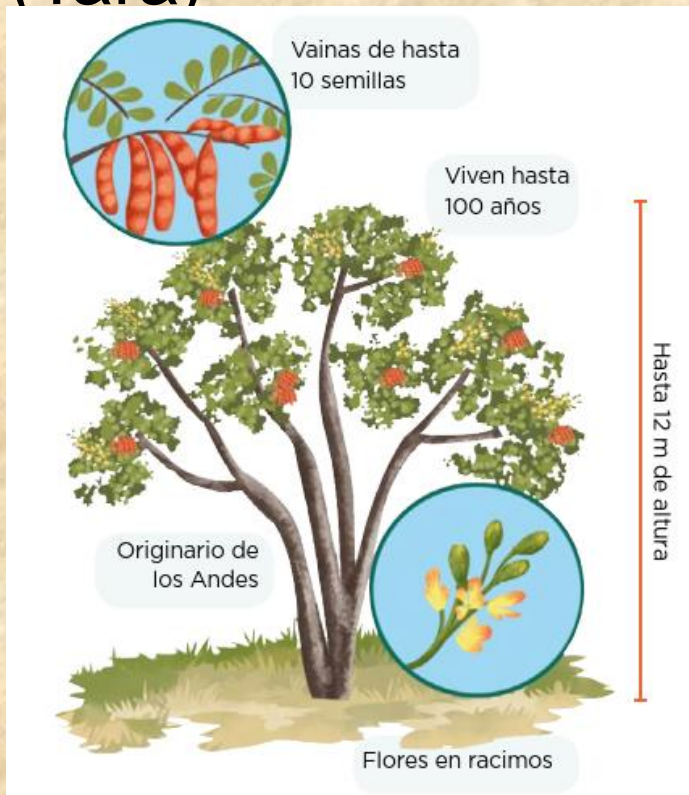
No consensus

-

 Negative link

Economically valuable species

Caesalpinia spinosa (Tara)



... as tools for landscape restoration?



Initial situation

- Degraded grassland in steep slope
- Seasonally exposed soils, evidence of erosion/compaction
- Disperse trees of tara and chirimoya

Goal

Soil restoration through the establishment of a tara agroforestry system

Actividades realizadas

Manual removal of exotic Grass (Brachiaria). Establishment of a maize – tara system. Protect existing tara trees. Application of organic soil amendments, maintain soil cover.

Accounting for landscape complexity



SLM in harsh landscapes



Wetland and grassland restoration in alpaca systems

Manage grazing areas	Vegetation recovery	Water management
Temporal grazing exclusion	Revegetation of degraded soils	Infiltration channels
Pasture rotation	Seed banks	Irrigation systems
Animal selection	Weed control	Check dams



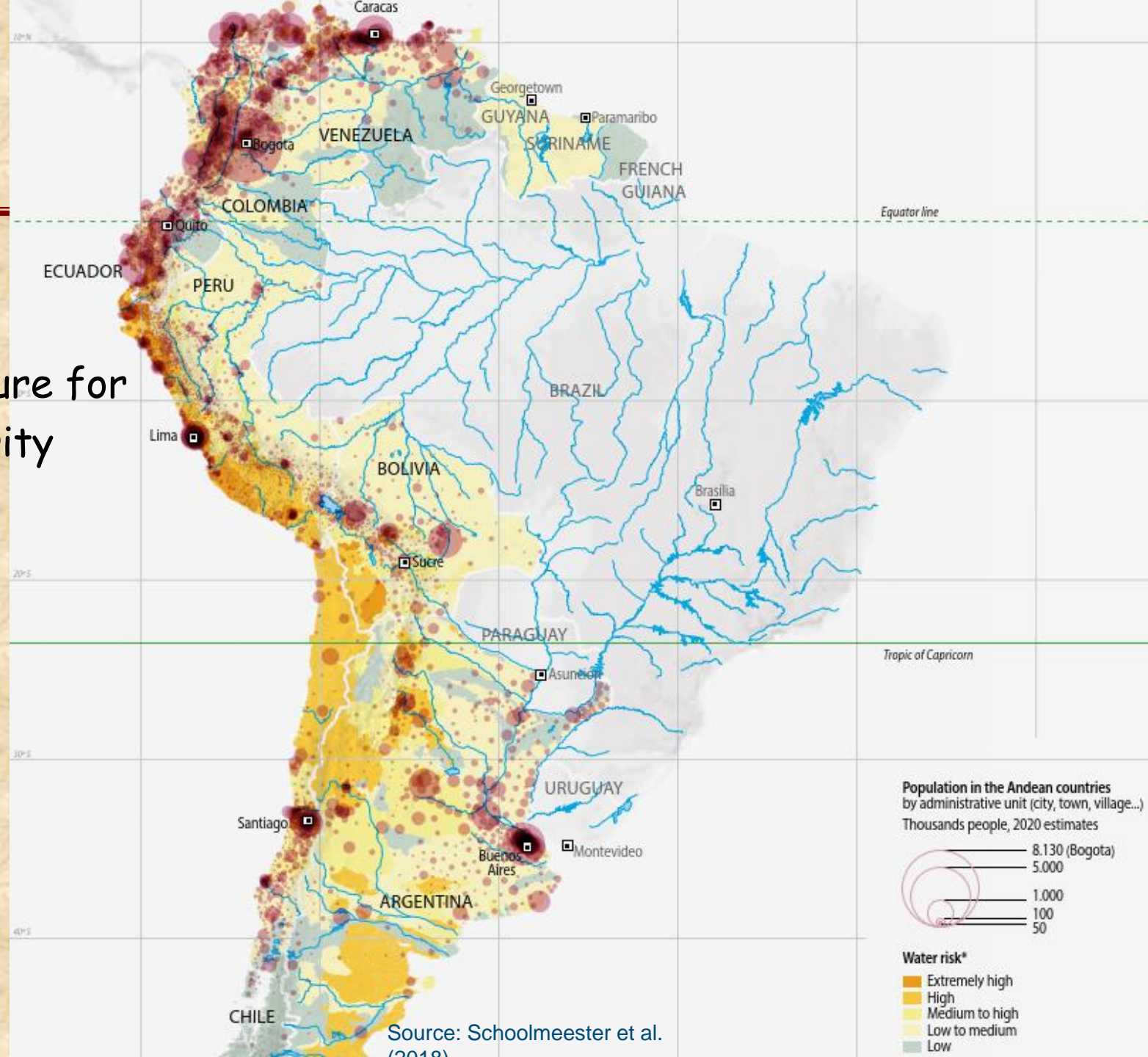
Wetland and grassland restoration in alpaca systems

- **Micro reservoirs (Qochas):**
 - Using the micro topography in the landscape
 - Downstream pastures enriched by slow water seepage
 - Combined with grassland enrichment with native species

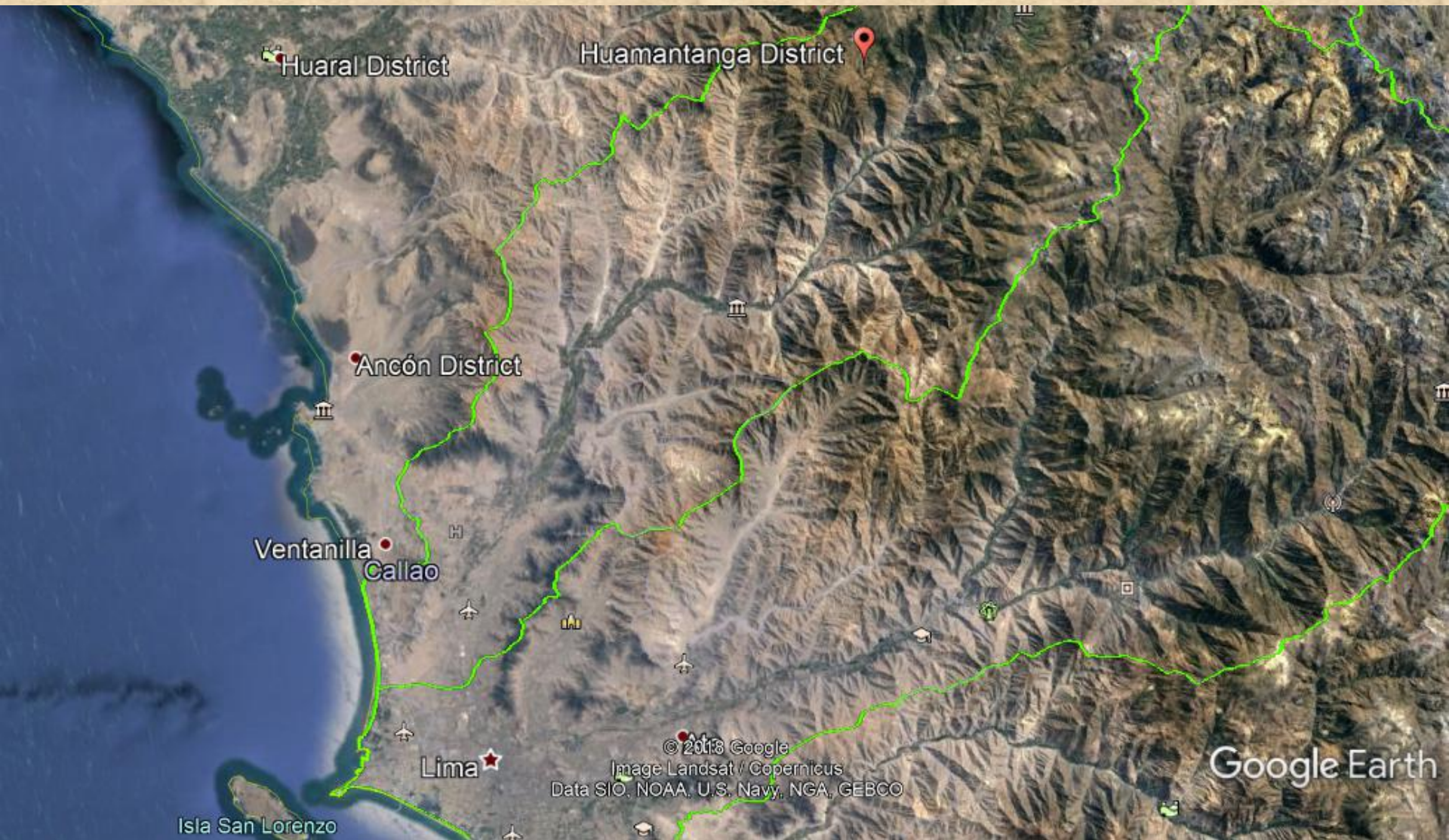


Sitios de intervención en
Pilpichaca

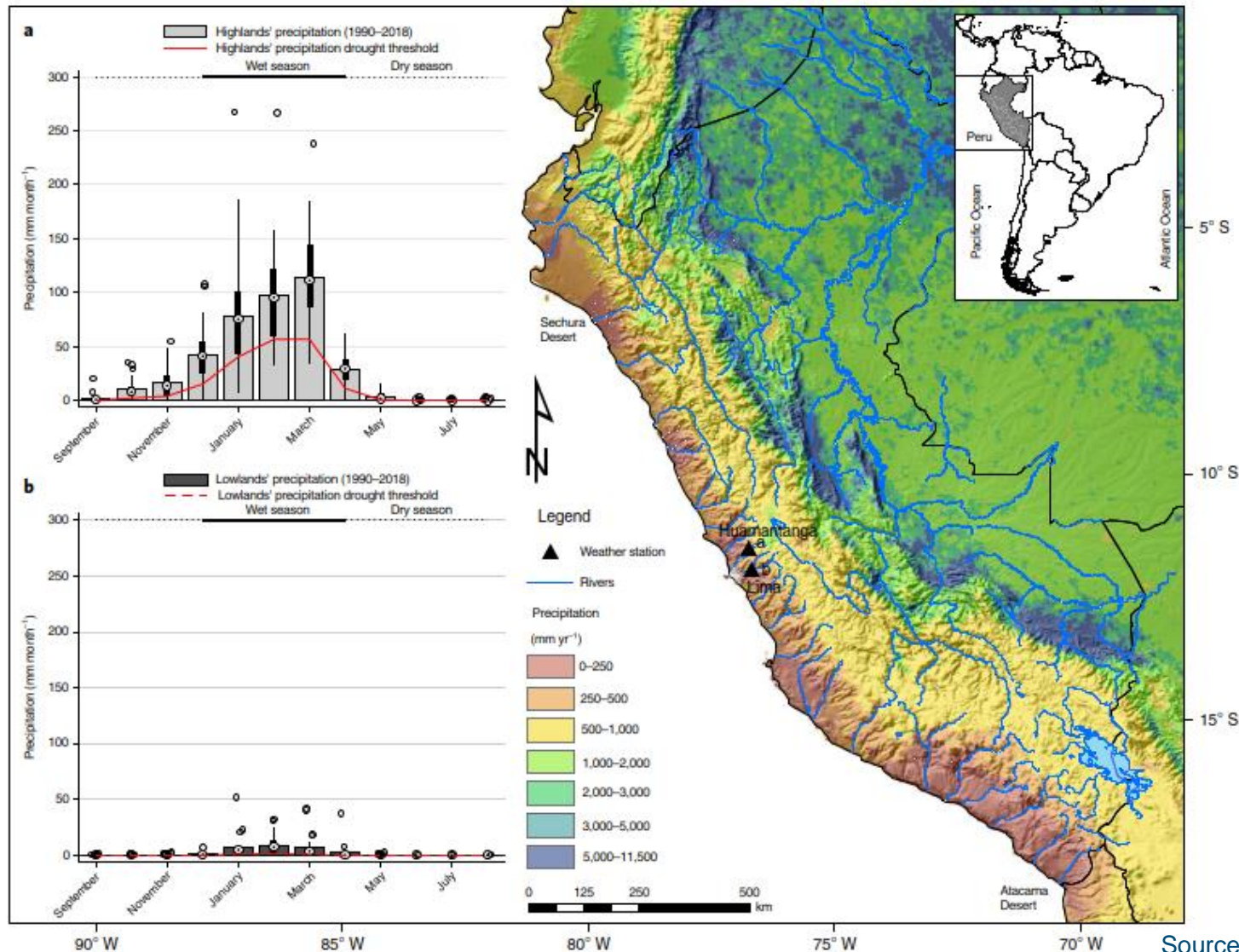
Natural infrastructure for water security



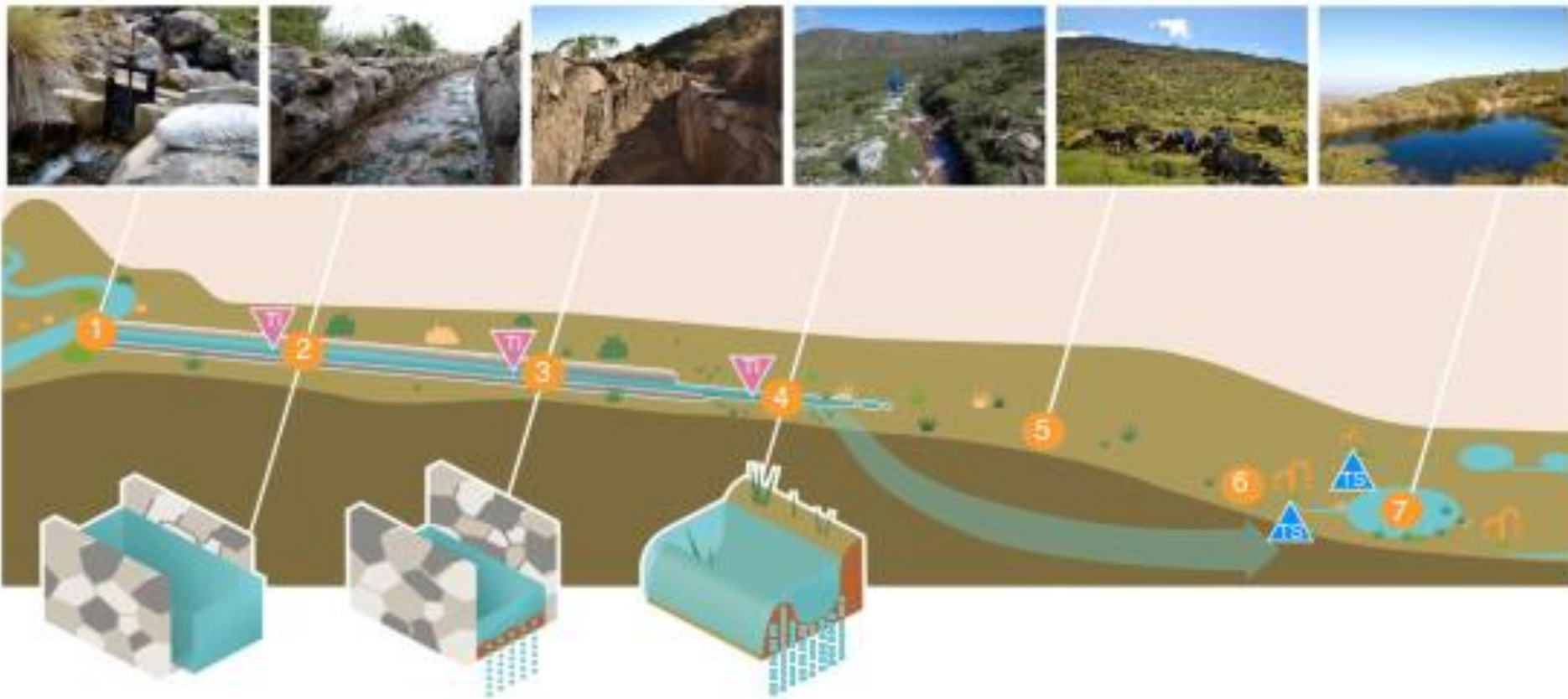
Natural infrastructure for water security



Natural infrastructure for water security



Natural infrastructure for water security



Future perspectives for Andean LU systems

- SLM and reversal of degradation
 - Increase SOM
 - No tillage cultivation
 - Vegetative barriers, contour protection
- Improved access to land
- Effective CBNRM + technical assistance and incentives for adoption
- Demonstrate short term benefits from SLM
- Water management to increase resilience
- Sustainable livelihood diversification

Instruments to promote SLM

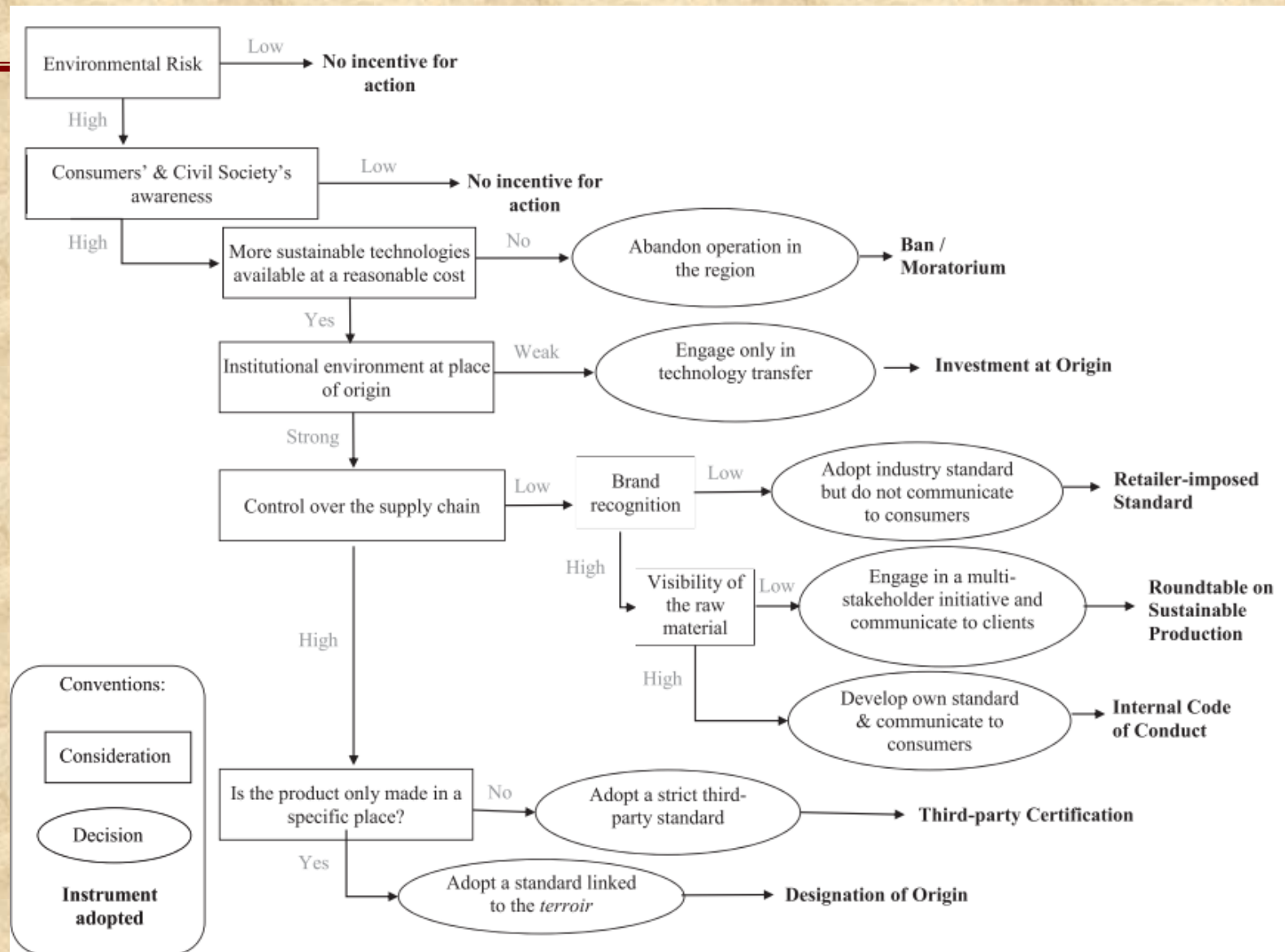


Fig. 2. Decision tree for firms' selection of a sustainability instrument.

