Ecotourism in the Equatorial Andes

P5 Presentation
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Graduation studio
Explorelab + TiSD

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Introduction
Background

Tourism is a fast growing industry

1.5 million people visited Ecuador in 2014, many to experience natural landscapes

Tourism is a prioritized sector in the productive matrix of Ecuador

Many protected areas have been created with the aim of protecting natural resources and ecosystem services

Intensive agriculture and cattle farming form a threat to the Páramo landscape

Areas surrounding the Páramo face a challenge due to imposed restrictions on landuse

Ecotourism has the potential to bring benefits to the tourism sector, local communities and natural landscapes
Research question

How can the implementation of eco-touristic facilities in the areas surrounding the Ilinizas Ecological Reserve bring environmental and social benefits?

And,

How could the facilities be designed?
Relation of studied themes
Ecotourism

“Environmentally responsible travel to natural areas, in order to enjoy and appreciate nature (and accompanying cultural features, both past and present) that promote conservation, have a low visitor impact and provide for beneficially active socio-economic involvement of local peoples.”

Definition by IUCN
Ecotourism cases

**Bomboli**
- Private reserve
- 11 km of paths covered in orchids
- Orchid nurseries
- 204 hectares
- 55 km from Quito

**Pasochoa**
- National Park
- Last remnant of interandean forest
- Environmental education programs and recreation
- 500 hectares
- 45 km from Quito

**Papallacta**
- Private reserve
- Thermal baths from a natural source
- Spa and recreation
- 260 hectares reserve
- 50 km from Quito
Vernacular architecture in Ecuador

Bahareque

Straw & Adobe huts

Bamboo frame
Map (fragment) of the meridian measured in the Kingdom of Quito by Ulloa 1744
Altitude range in Mejia
from: Plan de desarrollo y ordenamiento territorial, Mejia
Life zones in Mejia
from: Plan de desarrollo y ordenamiento territorial, Mejía
Landuse in the Parrish of Aloag, Canton Mejia
from: Plan de desarrollo y ordenamiento territorial, Mejia
Main threats to the Andean Forests & Páramo

Illegal extractive practices of both flora and fauna

Extension of agriculture and cattle farming into the protected landscapes

Fires

Others related to climate change
Desirable Future

The site is developed as an ecotouristic project which promotes the conservation of the natural landscapes in which it is embedded and brings benefits to local communities contributing to sustainable development.

Key aspects

Experience of the natural landscapes for visitors
Conservation & Reforestation with native species
Community involvement
Research on Andean Forests & Páramo
Agroforestry
Sustainable construction using materials from the region
Closing cycles (Water, Materials, Food, Energy)
Biodiversity bank

 Recovered Forest

 Native plants nursery

 Native plants production, trails, lodging, research in the forest

 Cattle

 Forestal pastures

 Native plants

 Agriculture

 Dwelling

 Improved dwelling

 Sustainable cattle farming in forestal pastures, lodging

 Sustainable cattle farming and lodging and trails in recovered forest

 Transition to Agroforestry and Ecotourism
Site area is 66 hectares
The average slope is 20 degrees
The average mean temperature is 8°C
It has a daily range of 0-16°C
The average yearly rainfall is 2000 mm
Solar irradiation is 4.5 KWh/m²
Cleared forest (pastures) 3300 masl
Siteplan overview
Lower cluster of buildings
Upper cluster of buildings
Landscape design
Horizontal path: Gravel/ Wooden raised path
Dislocated Stairs: Gravel/ Stone steps, 2m rise
Páramo path: Raised path/ Reflective posts
Winding path: Gravel, 15% grade
Garden: Living fences, “Rooms in the forest”
Flat ground
Beam on pin foundations

On slope
Beam + post on pin foundations

Raised Path Axo
Lookout tower
Winding path and gardens in the recovering forest
Orchid growing on moss on a living fence
Architecture design
<table>
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<th>Conditions</th>
<th>Principles</th>
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<td>Cold humid climate with daily temperature</td>
<td>Warm and dry interior spaces</td>
</tr>
<tr>
<td>fluctuations between 0-16 c</td>
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<td>Delicate soil top layer (sponge like) with</td>
<td>Lifting the building from the ground and</td>
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<tr>
<td>stable compacted soil (cangahua) and</td>
<td>placing the foundations on stable soil or</td>
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<tr>
<td>basaltic andesite stone bedding</td>
<td>stone bedding</td>
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<td>Slope from 1:1 (100%) to 1:5 (20%)</td>
<td>Blending into the slope</td>
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<td>Earthquake prone area</td>
<td>Strong retaining wall, and a light structure</td>
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<tr>
<td>Peacefull natural surroundings</td>
<td>anchored to the foundations</td>
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<td>Experience of place through in-between spaces</td>
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A clearing is made

The building contains a void
It is confronted with its context from outside and inside
Experience of place in 3 moments
Buildings on site
Sauna and cabins

Dwelling, Visitor Center and Plant Nursery

Plans and Sections
Sauna                              Cabin 4p            Cabin 6p            Residence            Visitor Center            Plant Nursery

Sections

Floorplans

Topviews

Design 48/69
Sauna
Saunas 6m²
WC 1.4m²
Shower 0.8m²
Changing room 2m²
Massage room 6m²
Central space 10m²
Veranda 24m²
Covered terrace 50m²

Cabin 4p
WC 2m²
Bathroom 6m²
Double room 24m² + 10m²
Single room 14m² + 5m² (x2)
Central space 35m²

Cabin 6p
WC 2m²
Bathroom 6m²
Double room 20m² + 6m²
Single room 9m² + 9m² (x2)
Central space 35m²

Residence
WC 2m²
Bathroom 6m²
Storage 6m²
Living room 24m² + 10m²
Bedroom 14m² + 5m² (2x)
Central space 35m²

Visitor Center
WC 12m²
Reception 6m²
Storage 5m²
Kitchen 7m²
Laundry room 18m²
Cafe 19m²
Terrace 50m²
Expo A 10m²
Expo B 25m²
Conversation pit 35m²
Covered entrance

Plant Nursery
Anden terraces 120m²
Green house 35m²
Office 10m²
Seed storage 30m²

Design 49/69
Plant Nursery

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Green house 35m²
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Sauna

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Cabin 4p

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Design 54/69
Cabin 6p
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Bathroom 6m²
Double room 20m² + 6m²
Single room 9m² + 9m² (x2)
Central space 35m²
Building Technology
Enclosure of climatized spaces
Lightweight mineral loam
DIY solar collector
PET bottles + PE pipe
Shingles cladding
Heat treated eucalyptus
Frame structure
Guadua bamboo
Foundations
Andesite Stone + concrete
Retention wall
Andesite Stone (+concrete)
Building site
Removed soil 273m³
Openings
Wooden frames
Enclosure of climatized spaces
Lightweight mineral loam
Exploded View Axo
Detailed section
Cabin 6p
Exposed external wall
- 10 mm Shingles (heat treated eucalyptus) 350mmx150mm
- 10/50 mm Counterbattens 150mm centre to centre
- 1mm EPDM watertight membrane
- 10 mm Split guadua bamboo mat
- 90 mm Ventilated cavity
- 100 mm Myco Foam (Ecovative Mushroom insulation)
- 100 mm Guadua bamboo frame with lightweight mineral loam infill (with pumice stone aggregate)

Covered external wall
- 100 mm Guadua bamboo frame with lightweight mineral loam infill
- 100 mm Myco Foam (Ecovative Mushroom insulation)
- 100 mm Guadua bamboo frame with lightweight mineral loam infill

Internal wall
- 100 mm Guadua bamboo frame with lightweight mineral loam infill
- 100 mm Cavity (or mycofoam infill)
- 100 mm Guadua bamboo frame with lightweight mineral loam infill

Roof
- 10 mm Shingles (heat treated eucalyptus) 350mmx150mm
- 20/50 mm Counterbattens 150mm centre to centre
- 20/50 mm Battens 600mm centre to centre - cavity
- 1mm EPDM watertight membrane
- 20 mm Split guadua bamboo mat double layer
- 100-350 mm ventilated cavity
- 200 mm Myco Foam between bamboo roof beams
- 10 mm Split guadua bamboo mat + vapour barrier
- Woven mat finishing

Exterior Floor
- 25/50 mm wooden flooring planks
- 100 mm Guadua bamboo counter beams 350mm
- 100 mm Guadua bamboo secondary beams

Interior Floor
- 50-100 mm loam floor with hydronic pipes
- 50-100 mm Pre fab bamboo floor element
- 100 mm Myco Foam between bamboo secondary beams
- 10 mm Split guadua bamboo mat

Other
- 1 Concealed perimeter gutter EPDM
- 2 Central gutter zinc
- 3 Bamboo (treated) reinforced concrete ringbeam
- 4 Rain water pipe
- 5 Solar collector made of PE pipe and repurposed PET bottles
- 6 Insects net
- 7 Stainless steel net parapet
DIY Solar Collector

Solar Collectors

Solar Pump & Controls

Home Heating System

Solar Storage Tank

Home Domestic Hot Water

Design 66/69
Conclusion
Opportunities in the lifecycle of the project

Project Definition:
+ Learn from precedents
+ Clearly state intention

Project Design:
+ Involve local knowledge where relevant
+ What are the needs?
+ How does the design address them?

Project evaluation:
+ How does the project perform?
+ Are there lessons applicable to other projects?

Building construction:
+ Capacity building in construction
  (alternatives to mainstream concrete)
+ Collaborative work
+ Positive impacts on local ecosystem and communities
  (and minimum negative impacts)

Building disassembly:
+ Continuation of material flows

Building Maintenance
+ Alternative construction workshops
+ Learning from deterioration & weathering
+ Improvement of buildings and paths
+ Collaborative work, cyclical celebration!

Building use:
+ Program & facilities make it possible to run the project
+ Conservation-Reforestation-Education
+ Experience of the natural setting by visitors
+ Changing perception of Nature-Architecture relation