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Ambangal Mini-Hydropower Project
Ifugao - Philippines

2000 years old Ifugao Rice Terraces: ***"Stairway To Heaven"***

Ifugao Rice Terraces of the Philippine Cordilleras
(Northern part of Luzon Island in the Philippines)

1995: Registered on UNESCO World Heritage List

2001: Listed as World Heritage in Danger

⇒ **Reasons: Insufficient maintenance, reduced farm labor force, etc.**

To ensure the continuation of rice terrace conservation activities, financial support is necessary.


Ifugao
site
Claveria
Aparri
Laoag
LUZON
Bontoc
Roxas
Baguio
Solano
San Carlos
Paniqui
Angeles
Manila
Philippine Sea
PACIFIC OCEAN
Balayan
Lucena
Batangas
Naga
Virac
Sablayan
Catarman
Masbate
Busuanga
Ugnisan
Coron
Kalibo
Roxas
Calbayog
MALAY ARCHIPELAGO
Tacloban
Iloilo
Cebu

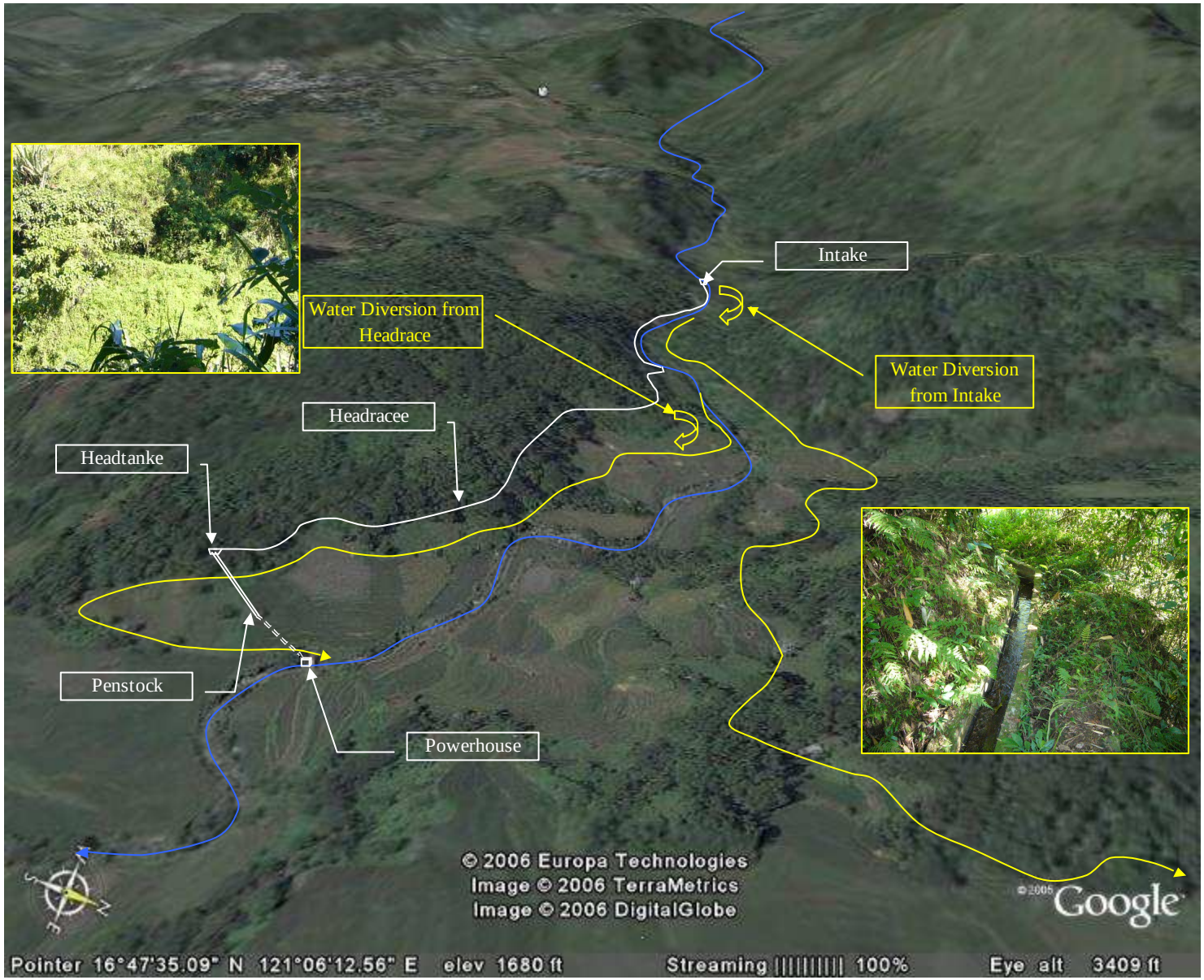
Ifugao – Ambangal Mini-HydroPower Project

Project Stakeholders

- GSEP Project Leader and Major Financial Contributor: TEPCO
- GSEP Members' Participation: KANSAI, EDF, ENEL, RWE, HQ
- Philippines Department of Energy (DOE)
- Provincial Government of Ifugao (PGI)
- Kiangan Municipal Government
- Ifugao Cultural Heritage Office (ICHO)
- UNESCO National Commission of the Philippines

Project Schedule

- Start Construction: December 2008
- Commercial Operation/Ownership Transfer to DOE: January 2010
- Ownership Transfer to Ifugao Provincial Government: December 2011

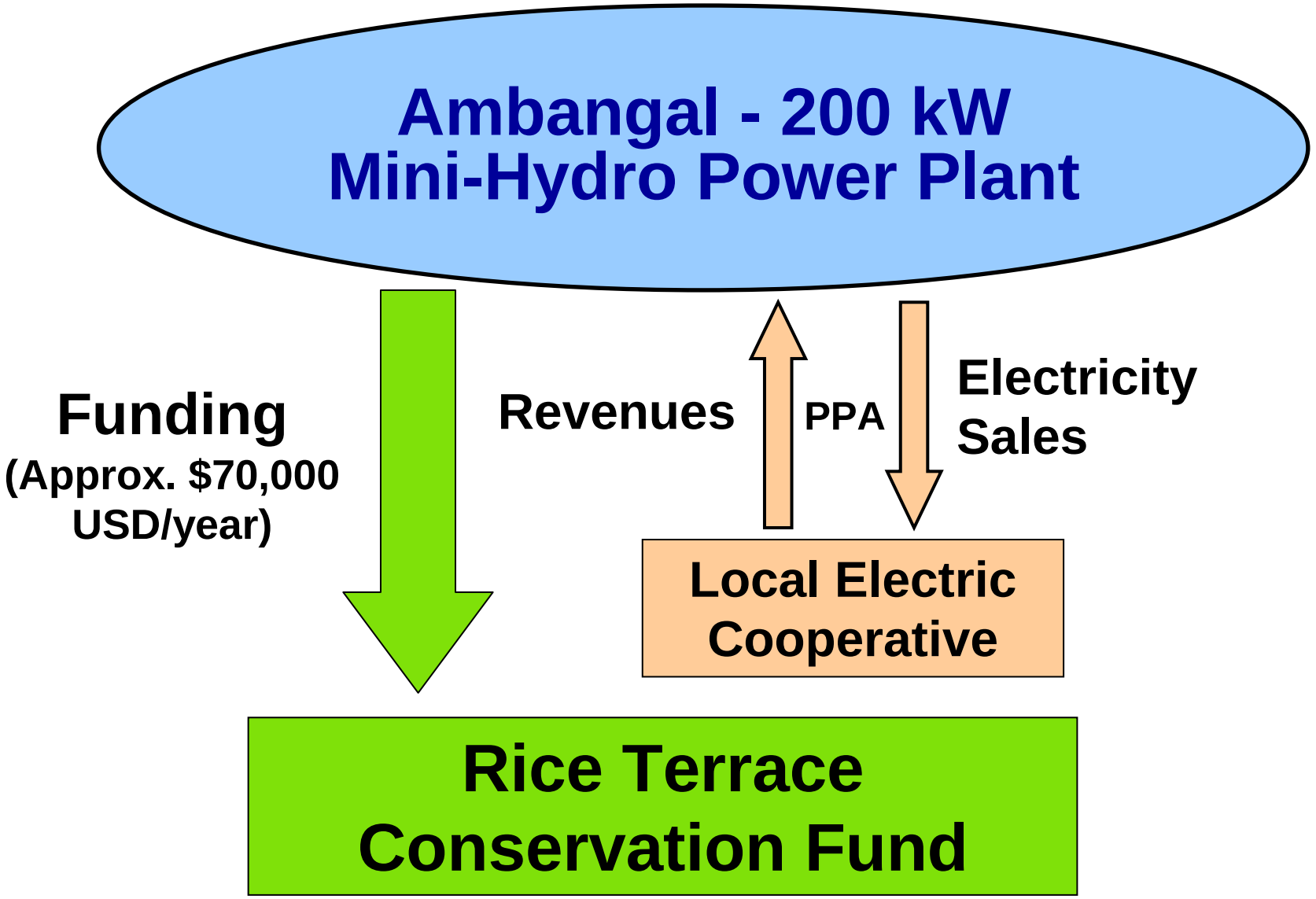


Project Site is located outside the Rice Terrace Area

Ifugao – Ambangal Mini-Hydropower Project

Name of River	Ambangal Brook
Generation type	Run-of-river hydropower
Installed capacity	200kW
Effective head	63.5m
Maximum discharge	0.425m3/s
Plant factor (expected)	82.4%
Annual electricity generation (expected)	1,443MWh

Water Usage: Priority Given to Irrigation of Rice Terraces


Ambangal - 200 kW
Mini-Hydro Power Plant
Funding
(Approx. $70,000
USD/year)
Revenues
PPA
Electricity
Sales
Local Electric
Cooperative
Rice Terrace
Conservation Fund

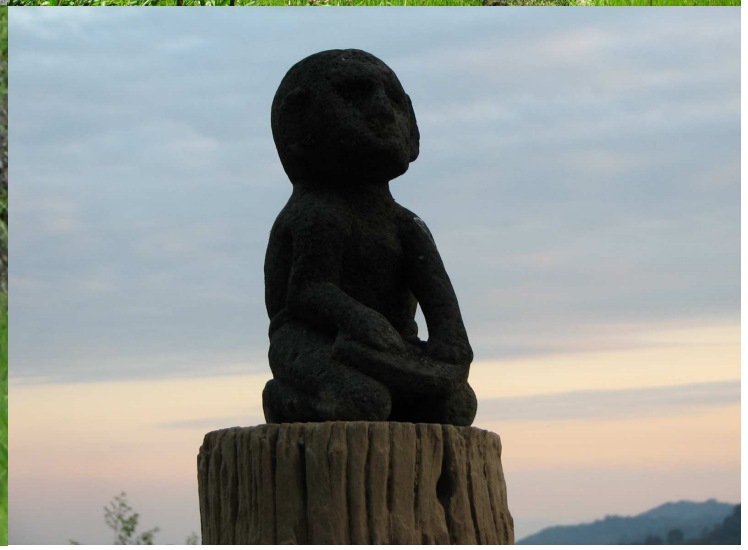
Recent Status of the Ambangal Mini-HydroPower Plant Operation

- Smooth operations after the monitoring
- Soundness of the facilities (Generator, Tank, Headraces etc.)
- Stable workforce
- Steady implementation of rice terrace conservation work

Conservation Works Funded By AMHP

In June 2012, UNESCO World Heritage Committee decided to remove the Rice Terraces of the Cordilleras from the List of World Heritages in Danger thanks to the contributions from UNESCO, the Philippines Government and the Ambangal Mini-HydroPower Plant



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San Cristóbal Wind Project
Galápagos - Ecuador

First Wind Power Generating Plant in Ecuador

Eólica San Cristóbal S.A.
EOLICSA

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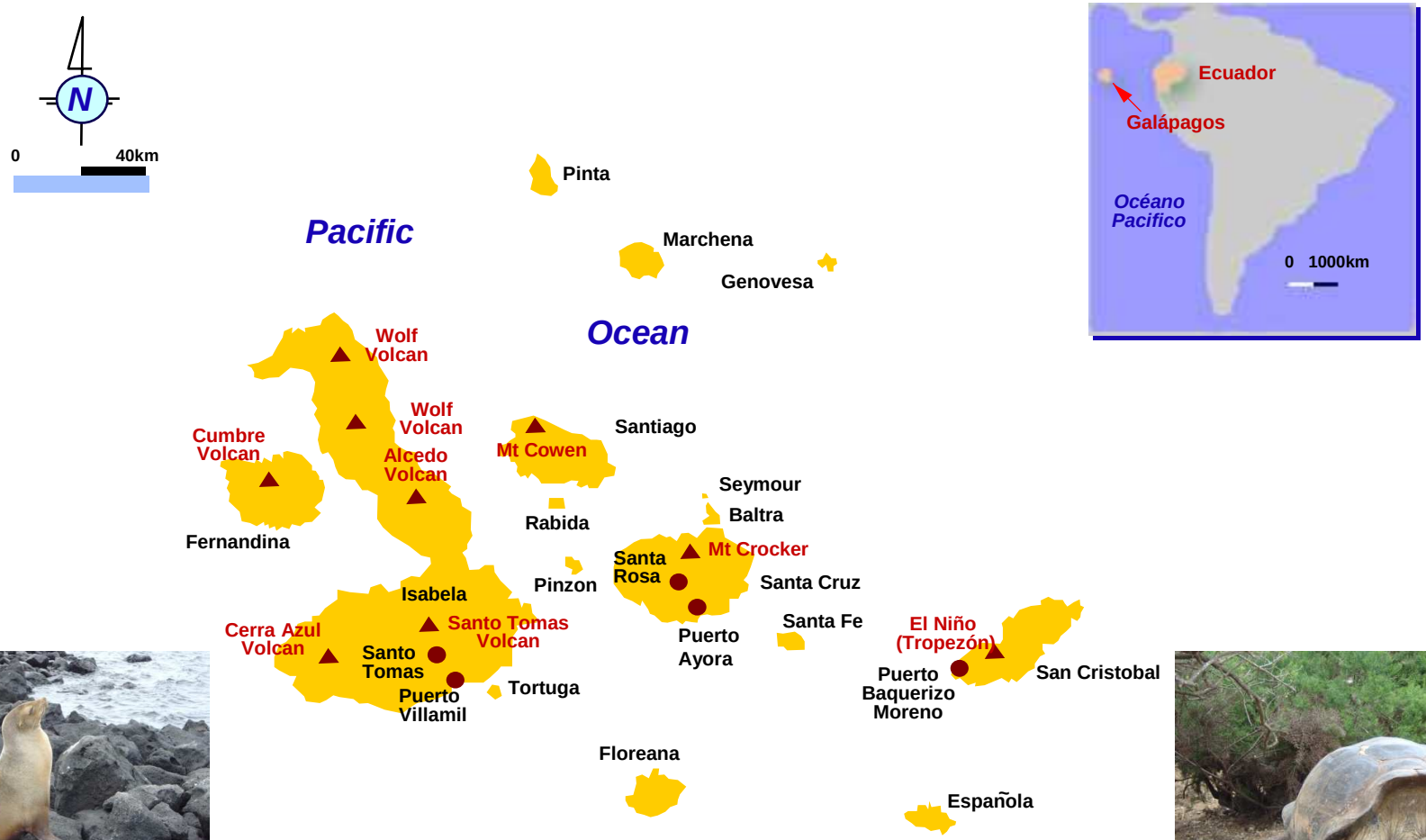
Galápagos Islands: World Heritage Site



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Galápagos: Geograpic and Demographic Data

- 13 large Islands – 5 medium – 215 small
- 4 inhabited Islands: San Cristóbal, Santa Cruz, Isabela, Floreana
- 25,124 inhabitants (Censo INEC - 2010)
- Emerged land area: 7.995 km2
- National Park: 97% - Inhabited Area: 3%
- San Cristóbal Island: 70% Protected National Park – 30% unprotected area

Island	No. Inhabitants (Censo 2010)	Maximum Load 2013 (kW)	Annual Generation 2013 (MWh)				Diesel Consumption 2013 (gal/año)
			Wind	Solar PV	Diesel	Total	
San Cristóbal	7 475	2 109	3 451	17	7 984	11 452	624 903
Santa Cruz	15 393	4 555			25 073	25 073	1 694 487
Isabela	2 256	665			3 656	3 656	281 993
Floreana	*	58		0	206	206	14 709
TOTAL	25 124	6 365	3 451	17	36 919	40 387	2 616 092

NOTE. Information Elecgalápagos S.A.

(*) Floreana inhabitants included in San Cristóbal

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First Alert: 2001
The “Jessica” Tanker
150.000 gallons (567,000 liters) fuel spill

This event accelerated the initiative to replace electricity generation based on diesel, with clean renewable sources (wind and solar) energy by the Government, UNDP and GSEP

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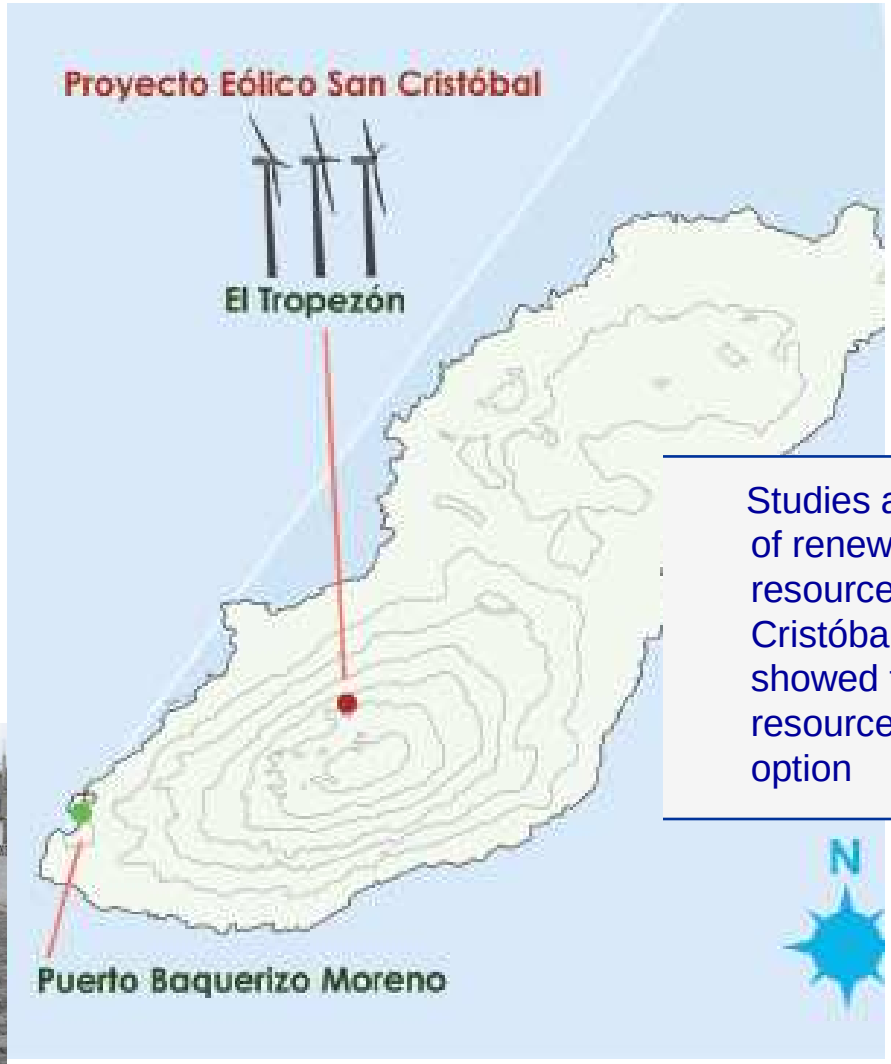
San Cristóbal Island



Studies and inventory of renewable energy resources on the San Cristóbal Island showed that the wind resource was the best option

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Project Objectives

- Reduce fuel comsumption from electricity generation on the Island
- Reduce the risk of fuel spills in the very sensitive environment of the Galapagos
- Limit GHG Emissions
- Reinforce the technical capacities of the local Power Utility ELECGALÁPAGOS to operate and maintain power generating facilities based on non conventional renewable energy technologies
- Promote the efficient use of electricity by the local population

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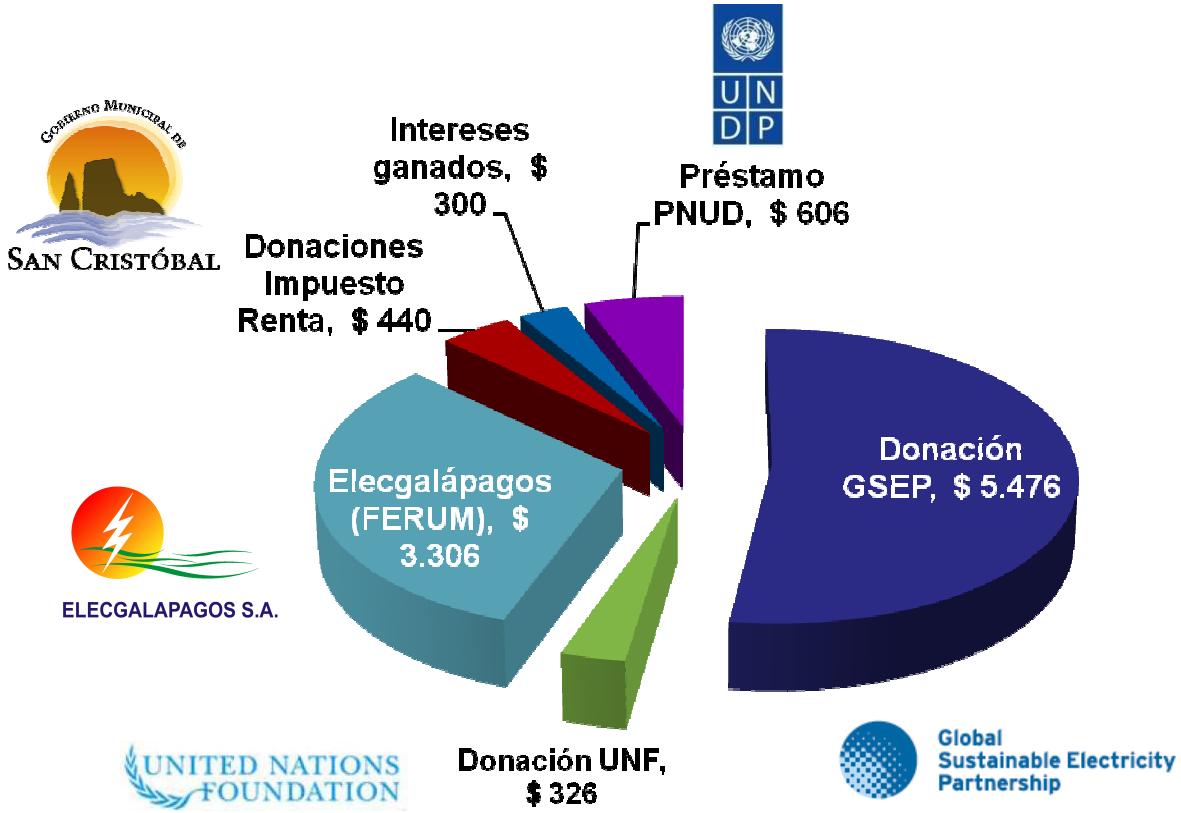
Project Characteristics

- Wind Park: Tropezón Hill
- Installed Capacity: 2.4 MW (3 x 800 kW)
- Covered Need: approx. 35% of the Annual Island Demand
- CO2 Emissions Reduction: approx. 3.000 tons/year (UNFCCC Registered CERs)
- Transmission Line: 12 km – 13.8 kV (including 3 km underground cables to avoid disturbing petrels flight pattern
- The park connects to the existing diesel power plant with a hybrid control system to optimize the use of wind resource
- Commercial Operation Date: October 2007

MAIN GOAL:

Reduce Fuel Consumption on the Island

Project Funding (kUS$)



FINANCIAMIENTO (kUS$)	
GSEP Donation	$ 5.476
UNF Donation	$ 326
Elecgalápagos (FERUM)	$ 3.306
Income Tax Contributions	$ 440
Interest on Committed Capital	$ 300
UNDP Loan	$ 606
TOTAL	$ 10.453

Environmental Considerations

- Original site was discarded due to “Galapagos Petrels” (endangered bird species) flight pattern and the presence of indegeneous plants “Miconia2.
- Alternative site defined by GSEP with the collaboration of the Galapagos National Park authorities and the Charles Darwin Foundation
- Creation of a Special High Level Advisory Committee to see at the EMP implementation
- Comprehensive Environmental Impact Studies and Environental Management Plan. Received its Environmental License from the Ecuador Ministry of Environment
- Mitigation measures include a program to increase Petrels birth rate by erradication of rats that were introduced in the Galapagos by overseas transportation. The program is implemented with the assistance of the Galapagos National Park which reports to the Ministry of environment.

The project is registered under the UNFCCC Carbon Credit System (CDM)

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Wind Park Inauguration, October 2007 2007

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Operating Results: Electricity Generation (1)

WIND (EÓLICO) - DIESEL GENERATION SUMMARY: 2007 - 2013							
YEAR / AÑO	DIESEL (kWh)	WIND (EOLICO) (kWh)	TOTAL (kWh)	DIESEL (%)	WIND (%)	TON CO2 AVOIDED (EVITADAS)	DIESEL SAVED (EVITADO) (GALLONS)
2007	975.858	790.398	1.766.256	55,3%	44,7%	632	68.730
2008	5.834.693	2.682.461	8.517.153	68,5%	31,5%	2.146	233.257
2009	5.882.731	3.204.436	9.087.167	64,7%	35,3%	2.564	278.647
2010	5.919.000	3.434.854	9.353.853	63,3%	36,7%	2.748	298.683
2011	6.745.046	3.344.625	10.089.672	66,9%	33,1%	2.676	290.837
2012	8.752.958	2.398.372	11.151.330	78,5%	21,5%	1.919	208.554
2013	7.984.046	3.451.451	11.435.497	69,8%	30,2%	2.761	300.126
TOTAL	42.094.331	19.306.597	61.400.929	68,6%	31,4%	15.445	1.678.835

NOTE: 2007 includes October - December period only / 2007 incluye solamente el período oct - dic.

Estimated Government savings due to lower cost of electricity vs price of diesel fuel:
$2.5 Millions USD as of 2013 and $14 Millions USD over the operating life of the Wind Park

Since October 2007, 15.445 tons of CO2 and 1,700,000 gallons (6,5 million liters) of Diesel Fuel avoided in the GALÁPAGOS!!

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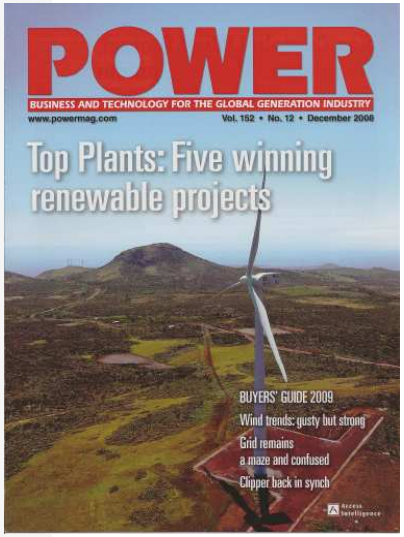
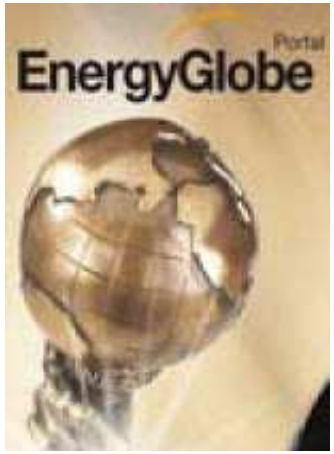
Facts and Recognitions

- 100% Ecuadorian Operation and Maintenance staff
- Strict Observance of the EMP including rats erradication program
- No negative impact on Petrels
- Revista POWER: Named one of the five most important RE projects in 2008
- Report by: IEEE Spectrum
- National Energy Globe Award 2009
- O&M operations under GSEP supervision until 2016, time at which the ownership will be transferred to the local utility





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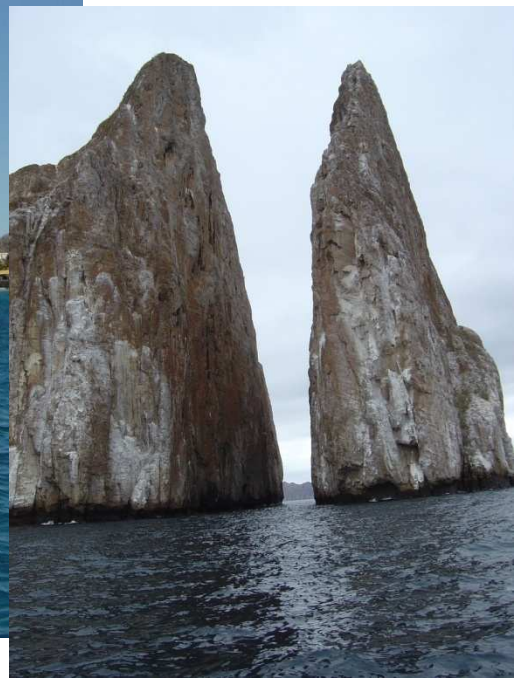
Puerto Baquerizo Moreno
San Cristóbal



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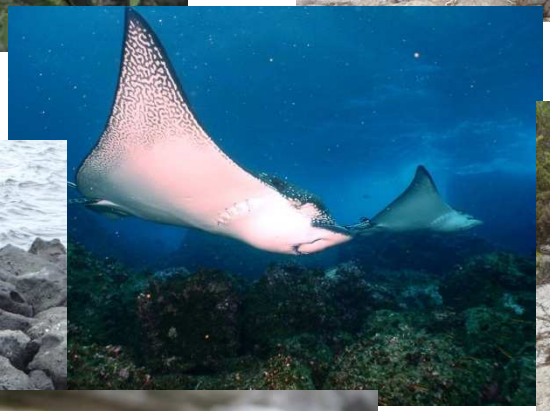
Galápagos: Typical Fauna



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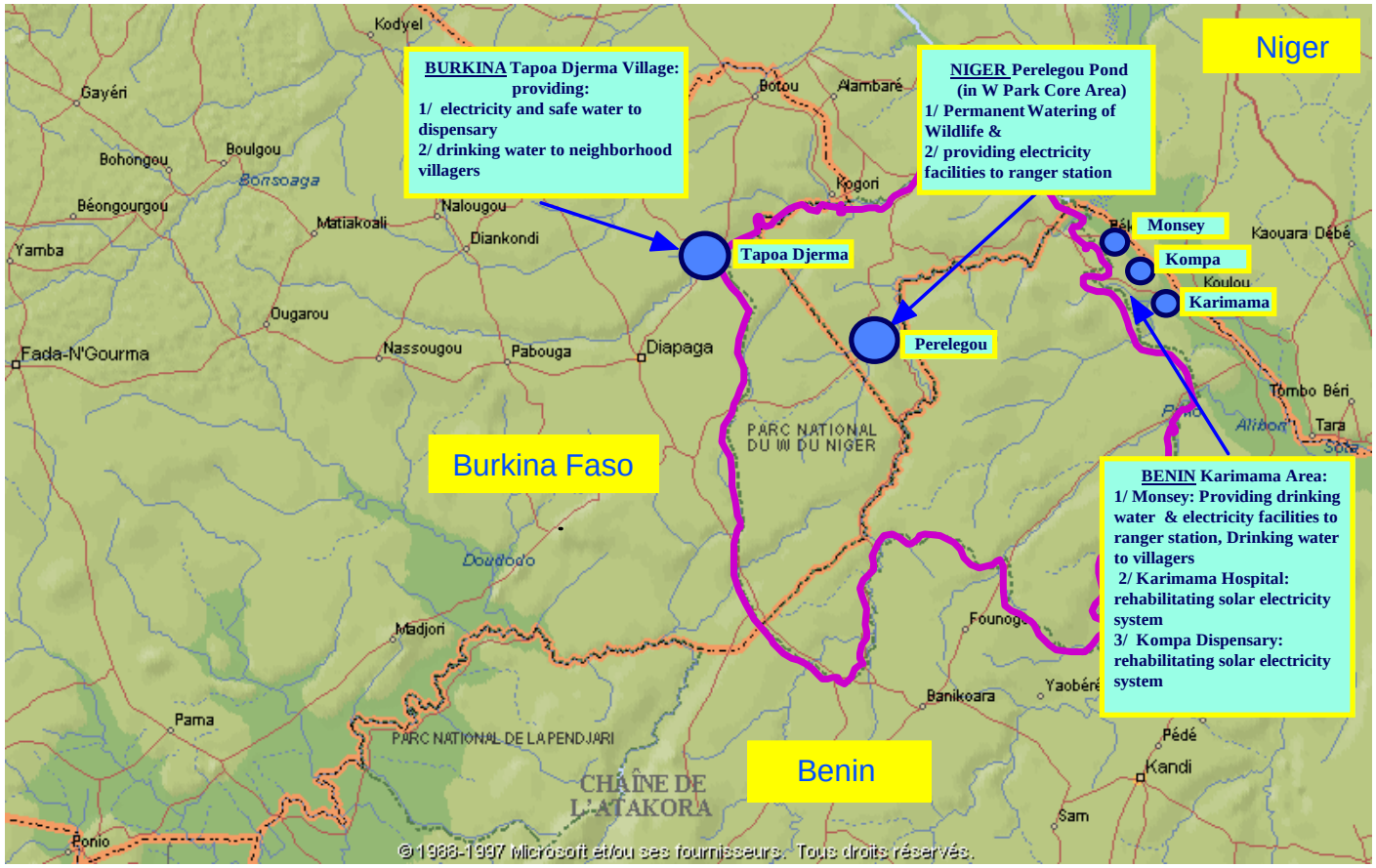
West Africa - Burkina Faso, Niger, Benin - W Park Project



W PARK - THE FIRST TRANSBOUNDARY BIOSPHERE SITE IN AFRICA - THE LETTER W MAKES REFERENCE TO THE SHAPE OF THE NIGER RIVER WHEN CROSSING THE PARK)

Location and description of projects

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W PARK PROJECT GOALS

- Demonstrate that the environment and development work hand in hand
- Have a Win-Win-Win situation whereby the local biodiversity win, the anti desertification struggle and global environment win, the surrounding populations win as well.
- Encourage the participation of the local populations in the overall project of W Park while facilitating their social and economic development.
- Stimulate regional cooperation through an interstate project.
- Enable involved countries to meet their obligations under international conventions such those on Biological Diversity and Desertification and Agenda 21.

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Perelegou Pond Before Project

Perelegou Pond After Project

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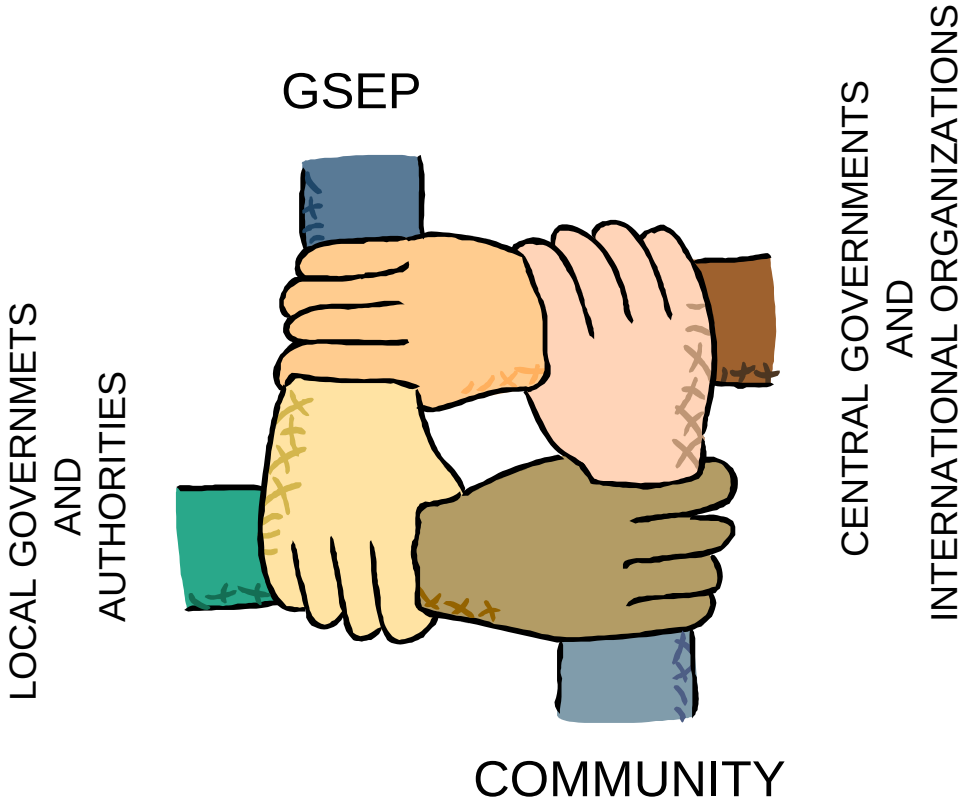
INVOLVING ALL STAKEHOLDERS FROM THE BEGINING IS KEY



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