

Furnas Landscape Laboratory

*Project for the Ecological and Landscape Restoration
of Furnas Lake Watershed*



The Azores

- 9 islands
- 1.500 Km from Europe & 2.700 Km from North America
- 500 Km from Flores to Santa Maria
- 250.000 inhabitants (400 on the smallest – 17,12 Km²; 130.000 on the largest – 747 Km²)
- Economy based: public services; dairy farms; fishing; agriculture; some forestry; tourism



Furnas

Active volcano

Cultural and landscape richness

Dairy farms

Criptomeria japonica, monospecific forest stands

Invasive species

Eutrophicated lake



São Miguel island

Furnas Protected Landscape



The Problem – Eutrophication

RECUPERAÇÃO DA LAGOA DAS FURNAS FURNAS LAKE RESTORATION



A eutrofização da Lagoa das Furnas resultou da entrada excessiva de nutrientes (azoto e fósforo) provenientes dos estrumes e fertilizantes usados nas explorações agrícolas da Bacia Hidrográfica.

The eutrophication of Furnas Lake was a consequence of the excessive intake of nutrients (nitrogen and phosphorus) coming from manure and fertilizers used at the farms within the lake's drainage basin.



Imagens da anterior migração de nutrientes, das pastagens para a Lagoa.
Images from the former nutrient migration, from the pastures to the lake.



Para inverter este processo de degradação foi elaborado o Plano de Ordenamento da Bacia Hidrográfica da Lagoa das Furnas (POBHLF), cujos projectos e acções multisectoriais visam garantir a recuperação desta lagoa.

To reverse this degradation process, the Furnas Lake Watershed Restoration Plan was elaborated, with its diverse projects and actions which seek to contribute and assure Furnas Lake restoration.



Face à degradação da qualidade da água, o Governo dos Açores decidiu adquirir parte dos terrenos agrícolas que constituíam maior risco de escorrência de nutrientes para a lagoa, procedendo-se, posteriormente, à alteração do uso do solo.

Due to increased water degradation, the Government of the Azores decided to acquire some of the most polluting estates in order to effectively stop the nutrient flow, and subsequently proceed to the conversion of land use.

Terranos adquiridos >
Acquired land



The solutions

European Landscape Convention

Development of laws to manage the landscape and territory:

Furnas Lake Watershed Restoration Plan (2000 – 2005)

Classification – Furnas Protected Landscape (2005 – 2008)

Furnas Landscape Laboratory (2007 – onwards)

Terras do Priolo – European
Charter for Sustainable Tourism

Management Plans

The Solutions: Furnas Lake Watershed Restoration Plan



This plan main objective is to restore the water quality.

- Reduce nutrient runoff to the lake;
- Increase biodiversity;
- Safeguard income sustainability;
- Diversify and consolidate the basis of the local economy;
- Promote local values;
- Minimize geotechnical risks.

The Solutions: Furnas Protected Landscape



Furnas lake watershed corresponds to a significant part of *Furnas Protected Landscape*, inserted on São Miguel's Natural Park.

Therefore 3 levels of nature protection policies.

- Preserve an harmonious, natural and cultural interaction through the landscape protection, traditional uses, construction techniques and socio - cultural manifestations;
- Support the development of ways of life and economical activities harmonious with nature, and with the preservation of the local communities tradition;
- Maintain and preserve the landscape diversity, as well as of flora and fauna species, habitats and ecosystems;
- Regulate uses and activities, minimizing menaces to landscape stability;
- Promote touristic and recreational activities according to typologies and appropriate scaling, regarding the local biophysics characteristics;
- Promote scientific and educational activities which contribute to the population well-being, and develop a environmental support by the public;
- Contribute to the local community development through the benefits generated by service providence and natural products sales;

Solutions: Furnas Landscape Laboratory (*Furnas Landlab*)



- Furnas Landscape Laboratory is the homologous of the technological parks, but with a Natural Science vocation, installing full scale plots in the landscape;

How was it born?

- Through the acquisition of public land in 2007;
- *Furnas Landlab* obeys to the watershed measures and protected landscape policies;
- It's a large scale multifunctional landscape;

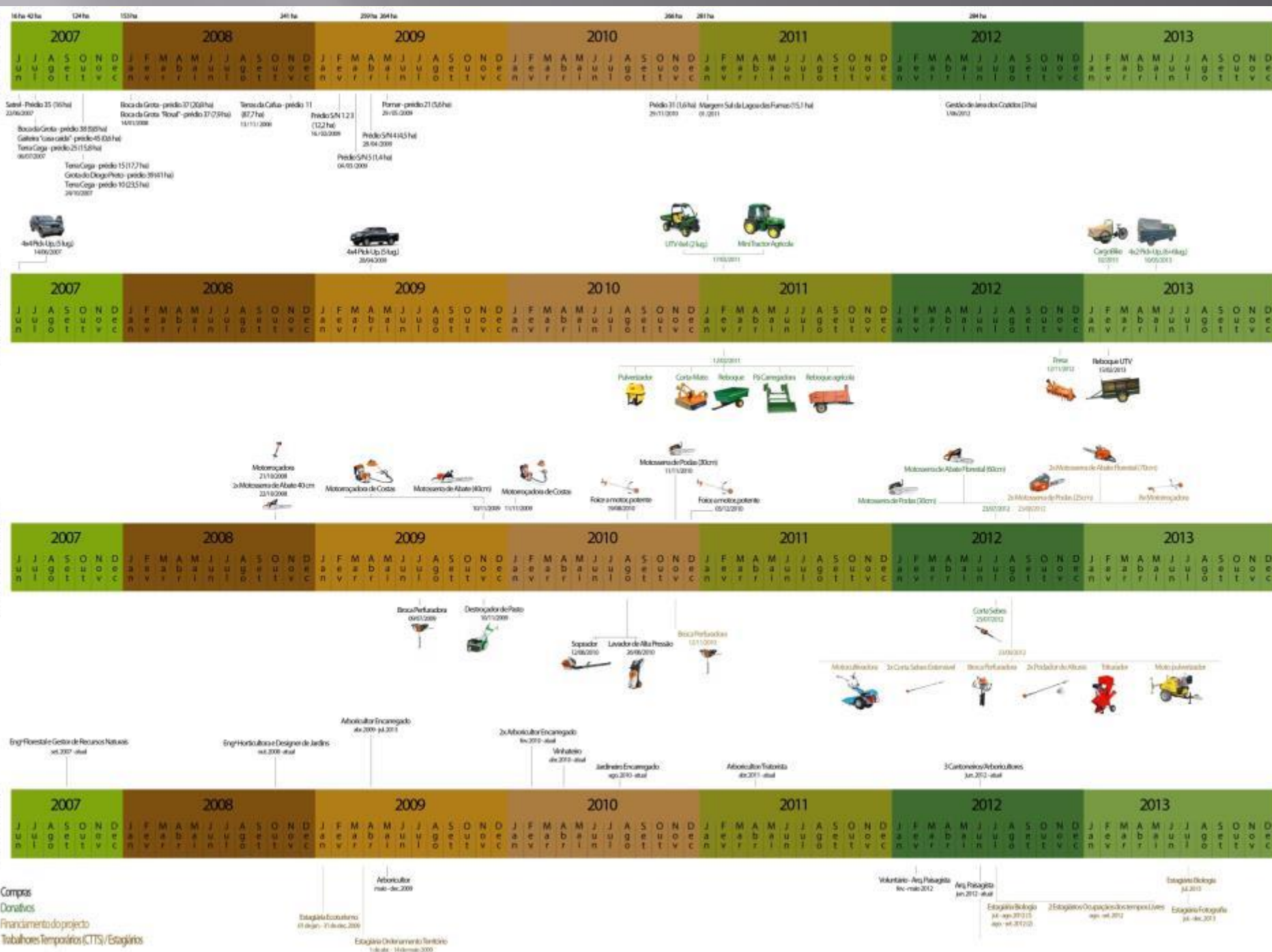
Objectives:

- Search for ecological, economical and social sustainability;
- Generate practical and scientific knowledge through the watershed plan implementation;
- Research on sustainable alternatives to the existing monocultures;
- Install real scale examples;
- Create a Multifunctional Forest Landscape

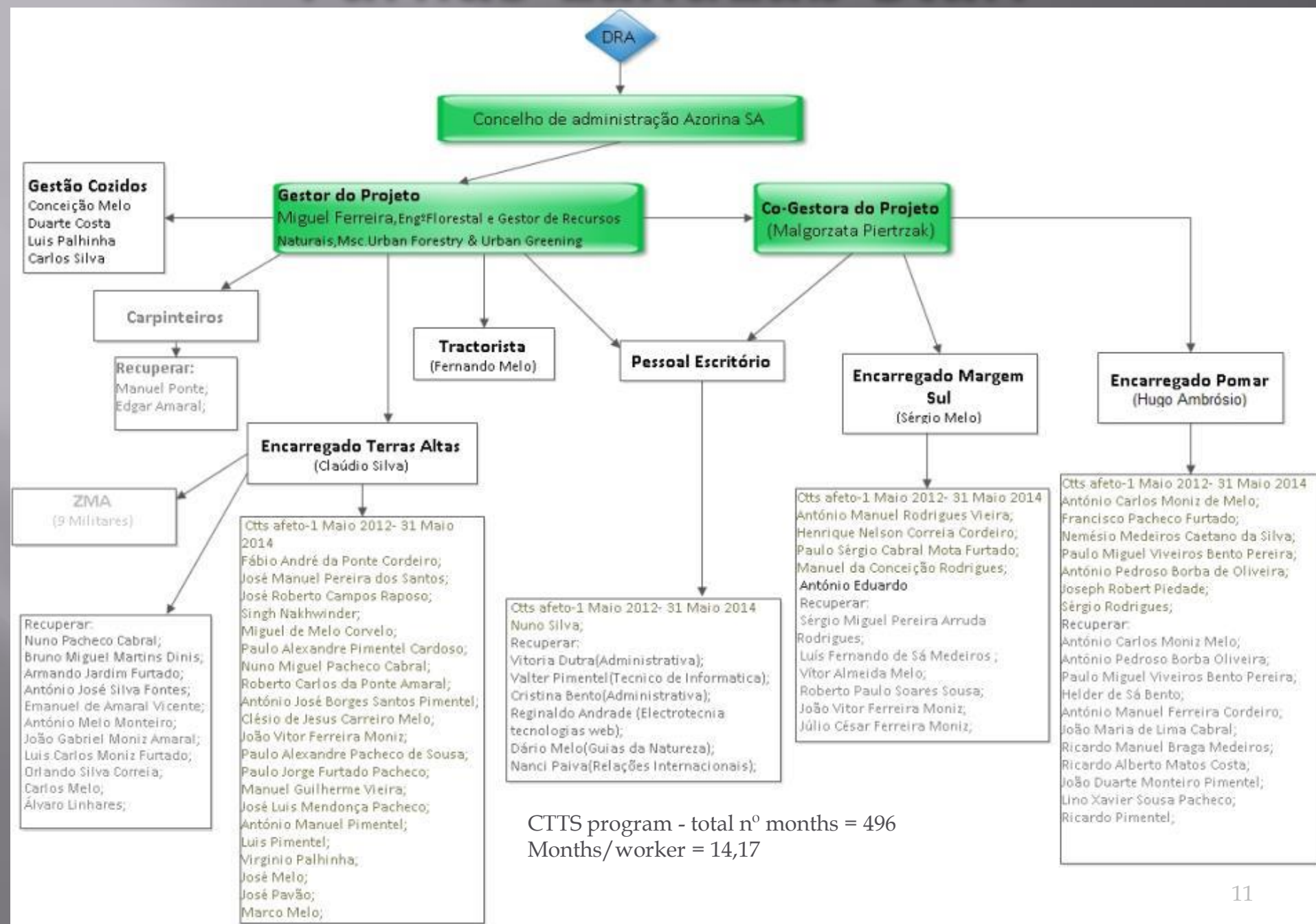
Furnas LandLab

From Paper to Action

EQUIPA



Furnas LandLab Staff



Furnas Landlab – paper to action

▣ Cleaning the landscape



Removal and cleaning of tons of polluting residues across the Landscape
(e.g. plastics; tires; abandoned vehicles; junk; packages)



Furnas Landlab – paper to action

▣ Invasive Flora Control



- Eradication of invasive flora across 160 ha of pastureland



Furnas Landlab – paper to action

▣ Siltation prevention

Restoration and plantation of 8 erosion gullies, with an area larger then 2 ha, and suppression of active erosion fronts.



Furnas Landlab – paper to action

- ▣ Siltation prevention – Native flora reintroduction



Replacement of invasive species by native ones

Furnas Landlab – paper to action

▣ Siltation prevention – Natural Engineering



Installation of
water energy
dissipaters with
local wood and
reeds

▣ Siltation prevention – Reduction of the hydrological torrential regime

Building of ponds,
by blocking old
draining systems



Furnas Landlab – paper to action

- ▣ Siltation prevention – retention basins



Construction of 6 retention basins along stream beds, from where 20.000m³ of sediments/year are removed, preventing it from reaching the lake;

Furnas Landlab – paper to action

- ▣ Sustainable management of public owned pastures and meadows

Over 8260 silage bales, equivalent to 6000 TON of grass and respective nutrients, exported away from the watershed



Rustic Golf



100 bales/cut



Approx. 400 bales /cut
+ honey + scenic views

Furnas Landlab – paper to action

▣ Diversification of forestry economy

Experimental trials of:
Silviculture techniques;
Native species;
Provenances;
Concepts;
Planning.



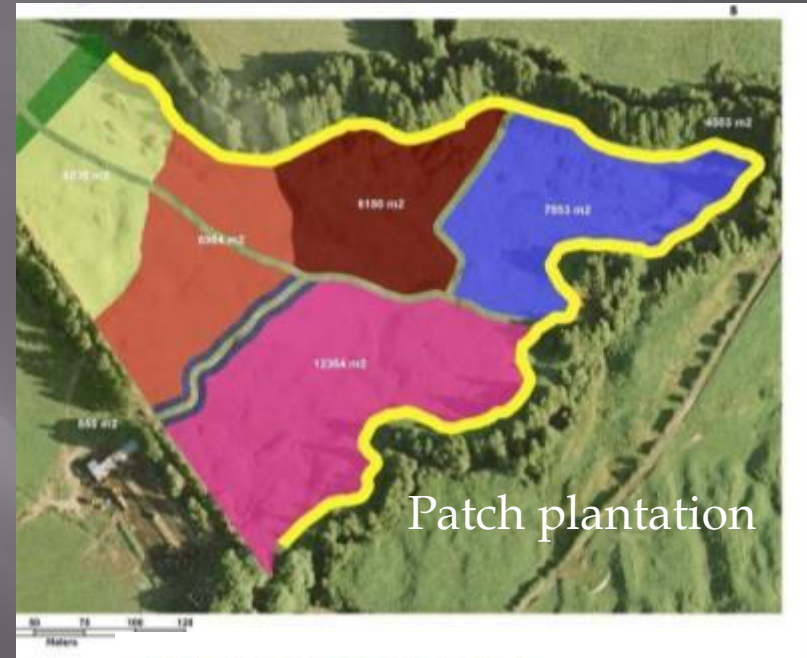
- Plantation of over 150.000 trees and shrubs, over 60 ha of public owned land;
- 34 ha of pastureland planted by estate owners
- Plantation of over 2 Km of vegetation buffers along streams;

Furnas Landlab – paper to action

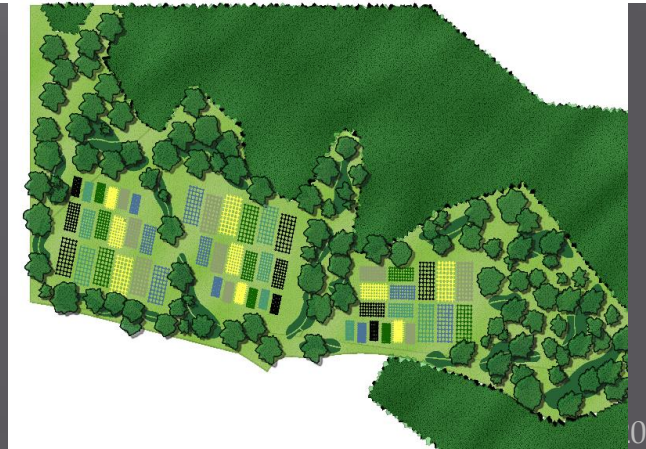
▣ Multifunctional Forest Landscape



Reinforce –European project



Patch plantation



MIT GreenIslands

Furnas Landlab – paper to action

- Restoration of Furnas traditional Fruit Orchard



Furnas Landlab – paper to action

- Restoration of Furnas traditional Fruit Orchard



Furnas Landlab – paper to action

▣ New fruit orchards

Apple orchard with 21 traditional varieties



Native blue berry (*Vaccinium cylindraceum*) orchards with 800 identified genetic units



Furnas Landlab – paper to action

- Production of thousands of herbaceous endemic (30.000)



Malfurada- *Hypericum foliosum*

Patalugo-menor – *Leontodon rigens*

Labaça-das-ilhas – *Rumex azoricus*

Trovisco-macho- *Euphorbia stygiana*

Malvavisco- *Pericallis malvifolia*

Angelica lignescens

Lysimachia azorica

Queiró- *Calluna vulgaris*

Feto-do-botão- *Woodwardia radicans*

Azorina vidalii



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- Pretty natives replace pretty invaders

Plantation of *Viburnum treleasei*
after the removal of *Hydrangeas*
at Furnas Protected Landscape



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▣ Biodiversity promotion - Fauna

Endemic bat
shelters
(at our sites and all
partner head offices)



Migratory birds



Native and
endemic birds



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- ▣ Willow collection restores stream bank

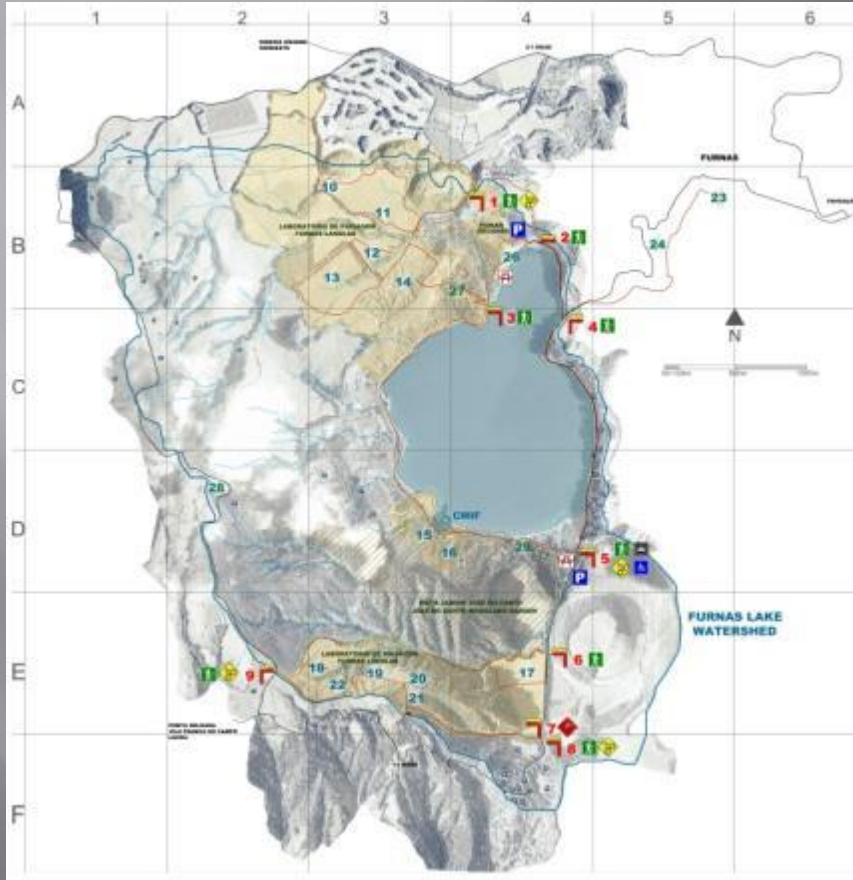


Workshop supported by members from the *English Basket Makers' Association*, for local basket makers, schools and curious apprentices

Cost of the Event "0 €" – through our partnerships

Furnas Landlab – paper to action

Planning of a multiuse trail network



Furnas Landlab – paper to action

Restoration of Furnas lake degraded margins through European cohesion funds: Proconvergência, POVT



Ruin demolition and removal of invasive flora



CMIF's Construction and planting of thousands of endemic plants



6.000 visitors in 2012
17.000 visitors in 2013

New accommodation for visiting partners, researchers, interns, artists and volunteers



Furnas Landlab – paper to action

Restoration of Furnas lake degraded margins through imagination



Furnas Landlab - PARTNERSHIPS

A Social project:

Involving the community in the betterment of the landscape

Local community

Research institutions

Partnerships

Companies & enterprises

Associations & NGO's

Public entities

Furnas Landlab - PARTNERSHIPS

Local community



Local Furnas school – plantation of endemics



Furnas Scouts – Maintenance of a granted area



Local Tuna fishing – Bamboo poles, provided



Furnas Landlab - PARTNERSHIPS

Companies & Enterprises



Regional Airline SATA - SATAForest



Fundação PT - LogoPT



Grupo
Bensaúde -
GreenPrint



EEG Lda , Grupo EDA -
Study of Pollens



STIHL, A.S. Maia - Furnas
Woodcarving Events



ValorPneu -
CO₂ offset



Furnas Golf
Course -
Driving Range

Furnas Landlab - PARTNERSHIPS

PT Logo – Google Earth



Furnas Landlab - PARTNERSHIPS

Research Institutions



Azores Biotechnology Center –
Micropropagation of
woody endemics



Azores University– field classes and projects



Insect Monitoring-
UAç, Biodiversity
Group



ZEro-imPact
innovative
tecHnology in
foRest plant
production



European Forest Institute – Climate change
study

Furnas Landlab - PARTNERSHIPS

Associations



Portuguese Society for Birds (SPEA)



Outdoor Activities enthusiast club (CALAG)



Geoparque Azores



Azores Amateur Photographers Association (AFAA)



International Congress and Convention Association (ICCA)



Azores Biking Association



Azores Archery Association (ARATA)

Furnas Landlab - PARTNERSHIPS

Public entities



Azores Military Zone (ZMA)
2009 National Defense and Environment Award



Employment Office
(24 unemployed workers on social welfare)



Azores Handicraft Centre (CRAA)



Azores water management body (AHA)



São Miguel's Agricultural Services



Azores Forest Services (DRRF)

The project in numbers during 6 years

- 2 National Awards;
- 30 plus partner institutions;
- Over a 1000 occasional volunteers;
- 31 trainees, national and international;
- 70 field workers through unemployment programs;
- 300 young militaries collaborated on the project;
- 5 International and National Presentations in congresses, in 2013 alone;

2013 Budget, e.g.

Cost (except wages & Visitor Centre): 72.000€

Income (except Visitor Centre & donations): 74.000€

Balance: + 2000€

Donations: 8.000€ machinery & tools + 2nd hand Pick Up truck

New protocol for 19.000€/Year for the next 25 years

Thank you to all our partners!

Promoter:



Partners and Sponsors:



Arqt. Of



Ass. de
Proprietários e
moradores da
Lagoa das Furnas



Escola básica
das Furnas



The Basketmakers' Association
for basketmakers and chairseaters



Zona Militar
dos Açores

Thank you!



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Portugal's National Landscape Award 2012

http://www.coe.int/t/dg4/cultureheritage/heritage/landscape/prix/session2013_EN.asp