Land Use DIALOGUE

BRAZIL

Brazilian Partners

International Partners

Background Paper: The Atlantic Rainforest Land Use Dialogue (LUD) Sustainable Landscape Planning in the Upper Itajai Valley

The Land Use Dialogue (LUD), that will take place in the Upper Itajai Valley, in the Brazilian state of Santa Catarina, is an initiative of the partnership between The Forests Dialogue (TFD), the Brazilian Forest Dialogue, the Association for the Preservation of the Environment and Life (Apremavi), and the International Union for Conservation of Nature (IUCN).

The LUD field dialogue will initiate a longer multi-year international TFD- LUD process and the Brazilian Forest Dialogue process – Sustainable Landscape Planning in the Upper Itajai Valley, which will take place in the next 12 months having this region as a case study. The goal of this field dialogue Brazil is to gather the existing knowledge on the Upper Itajai Valley, the different stakeholders engaged in various land uses in landscape, and to optimize social engagement processes in order to define scenarios and actions that allow for improved governance in the pursuit of sustainable development.

The proposal to unite different actors in a dialogue came from TFD's and the Brazilian Forest Dialogue's previous experience. For more than 10 years they have been uniting representatives from forestry companies, environmental organizations, and social movements with the goal of building common agendas between these sectors, aiming to promote effective actions associated with forest production, scaling up environmental conservation and restoration efforts, and generating benefits for Dialogue participants and society at large.

The Upper Itajai Valley was selected as the pilot region for this field dialogue since land use in the region is already largely recognized as contributing to a sustainable landscape (as we can see in the following video: https://www.youtube.com/watch?v=n7Y5f97k50A). In this way, this Dialogue is a great opportunity to exchange ideas and experiences that can contribute to enhance land use in the region, as well as to disseminate the experiences from the region as an example for other regions in Brazil and internationally. Similar TFD LUD are being planned in Mozambique, Tanzania, Chile, Laos and India.

The following are expected local-level results from this particular scoping dialogue:

1- Definition of the 2030 and 2050 scenarios for the Upper Itajai Valley.
2- Direct actions and planning of sustainable landscapes in the Upper Itajai Valley.
3- Evaluation of restoration opportunities (ROAM) in the Upper Itajai Valley.
4- Discussion of a mechanism to implement the defined scenarios.
5- Exchange processes, through the Brazilian Forest Dialogue, aiming to apply the learnings in other landscapes at risk in Brazil.
6- Exchange with other TFD LUD initiatives in different countries.

The following are the goals for this Brazilian Field Dialogue:

- Convene representatives from different sectors to mobilize resources and exchange ideas and experiences that involve business and organizations that are related to nature and climate resilient value chains.
- Promote dialogue and relationships with government and non-government entities seeking the implementation of the Brazilian Forest Code.
- Promote the development of landscape mosaics that integrate public and private Conservation Units.
- Engage the agribusiness sector in dialogues focused on understanding the relation between business operations and ecosystem functions.
- Facilitate the dialogue between NGOs, production organizations and private forestry companies seeking restoration and risk mitigation opportunities for communities and businesses, and the expansion of natural capital.

The Atlantic Rainforest and the Global Environmental Crisis

Biodiversity loss

Biodiversity loss if one of the main global environmental issues. According to a report published in March 2005 by the UN's Convention of Biological Diversity secretary, the Earth is suffering the largest species extinction since the end of the dinosaur period, 65 million years ago. The difference between the dinosaur period and present day is that human activities are the main cause for the mass extinction of plants and animals.

In Brazil, the 5th largest country in world and 1st mega diverse country, with approximately 20 percent of the world's species, is losing biodiversity at an alarming rate. There are 193 threatened bird species, 112 of these from the Atlantic Rainforest and 54 endemic to this region. Regarding mammals, 66 species are threatened – 12.4 percent from 530 known in Brazil. Among the mammals threatened of extinction, 40 percent are primates and the majority endemic to the Atlantic Rainforest. Additionally, there are 20 threatened reptile species in Brazil, 17 being amphibians, 130 terrestrial invertebrates, and 471 plant species, the majority of these (276 species) from the Atlantic Rainforest.

This immense genetic heritage, already scarce in developed countries, has inestimable economic and strategic value for many activities, such as for the development of medicinal products. Another

example are pollinators, that find favorable environments for its survival and reproduction in areas with conserved native vegetation, without which many agricultural crops would have its productivity hindered.

The loss of habitat is the main cause of biodiversity loss in the world and the Atlantic Rainforest is an extreme example where even a small and isolated fragment can be the only suitable place for certain species.

A typical example is the bromeliad *Dyckia distachya,* that was only found in Brazil in the rapids of Pelota River, between the Brazilian states of Rio Grande do Sul and Santa Catarina, and today is submerged by the lakes of three hydroelectric plants: “Itá”, “Machadinho” and “Barra Grande”. With such a restricted ecological niche, this species is now considered extinct in Brazil, even though there are current repopulation efforts in place.

Shortage and reduction of water quality

The reduction in the quality and quantity of water necessary for agricultural, industrial, energetic and public supply processes is another key environmental problem. According to GEO 4, a report from the United Nations Environment Program (UNEP), the growing weight of water demand will become intolerable for countries with scarce water supplies (and in dry regions, such as the Brazilian semiarid region). GEO 4 identified the need to maintain or improve the quantity and quality of water available in rivers, springs and lakes, as priorities since they provide guaranteed environmental services free of charge by the preserved ecosystems.

The reduction in quantity and quality of water supply is already identified as a problem in 53 percent of the Brazilian municipalities, which have issues with water bodies silting, resulting from vegetation removal along rivers (also known in Brazil as Permanent Preservation Areas – APPs), 38 percent of which face water pollution. Protecting water supplies, maintaining or recuperating its quantity and quality, is strategic for Brazil, not only to supply human populations, but also the majority of economic sectors, including agricultural activities. An example of the importance of water supplies is the energy sector, where the energy coming from hydropower plants is responsible for 84 percent of all electricity generated in Brazil.

The consequences of climate change

Another major global environmental problem that is already affecting environmental services is climate change. Reports from the Intergovernmental Panel on Climate Change (IPCC), a United Nations agency, present forecasts about the future implications of climate change on our ecosystems, stating that it is possible that *“the resilience of many ecosystems will be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g. floods, droughts, forest fires, insect proliferation, ocean acidification) and other climate change factors (for example, land-use change, pollution, excessive resource exploitation)”* and that *“the risk of extinction of approximately 20 percent to 30 percent of plant and animal species assessed so far increases if the global average*

temperature exceeds 1.5 to 2.5 °C." Or rather, climate change affects biodiversity and a majority of environmental services, wherever they may be.

Thus, all of the reasons that support the need to restore the Atlantic Forest are also bolstered by the prospect of global climate change. Considering potential increases in temperature, intense droughts, and torrential rains, the protection of the Atlantic rainforest ecosystem, which provides free and constant environmental services, seems obvious.

The Atlantic Rainforest Today

The Atlantic Rainforest is recognized as one of the most biologically diverse regions on the planet. This ecosystem spans 17 Brazilian states and consists of a variety of forest formations and associated ecosystems, which provide conditions appropriate for the survival of a large number of living species, in addition to maintaining various natural resources and environmental services.

Originally, the Atlantic Forest comprised of an area of 1,296,446km^2, which represented 15 percent of the Brazilian territory. Currently, approximately 8 percent of the original Atlantic Forest remains in well-conserved forest fragments spanning 100 hectares. When including natural forest fragments larger than 3 hectares in various stages of conservation, this estimate totals 13.32 percent (SOS Mata Atlântica/INPE, 2011).

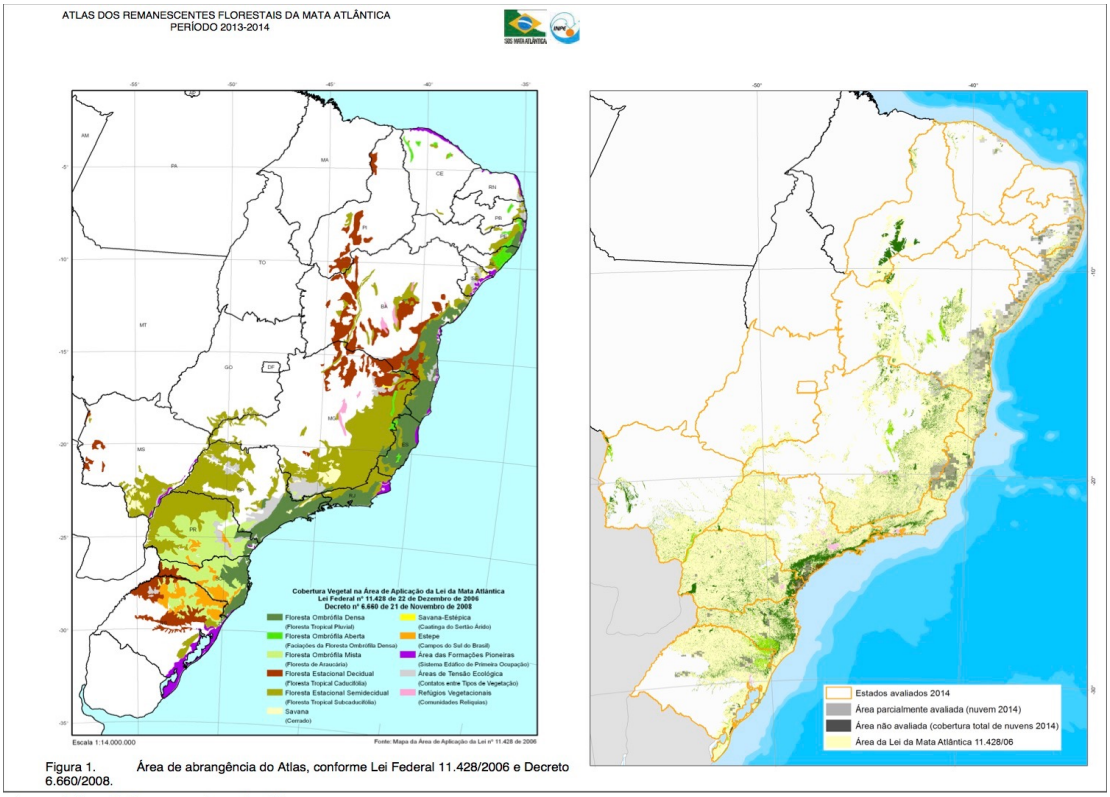


Figura 1. Área de abrangência do Atlas, conforme Lei Federal 11.428/2006 e Decreto 6.660/2008.

terça-feira, 3 de novembro de 15

To the left, an image of the remaining coverage of the Atlantic Rainforest, with its diverse types of vegetation. To the right, a map of vegetation forest coverage in 2014.

Estimates suggest that approximately eight million endemic plant species are found in the Atlantic Rainforest; many of these species are threatened by extinction. Other estimates indicate that in the Atlantic Rainforest, more than 20,000 plant species have been identified, many of which are used as food sources, and for medicinal and ornamental purposes. These plants also maintain balances among animal species, the forest itself, and other associated ecological processes.

In the Atlantic Rainforest, more than 1.6 million animal species have been identified, including insects and other invertebrates. Of the 270 mammalian species found in the Atlantic Forest, many are endemic and threatened by extinction. Additionally, more than 340 amphibian species, 350 fish species, 197 reptile species, and 1,020 bird species have been recorded in the Atlantic Rainforest. The highest level of bird endemism in the world can be found in the Atlantic Rainforest.

Approximately 70 percent of Brazilians live in the Atlantic Rainforest region and depend on the conservation of remaining forest fragments, which contribute to the maintenance of diverse ecosystem services, such as the regulation of climate, temperature, rain, and soil fertility. These forested areas also help protect slopes and hills, as well as springs and other water sources that supply water for cities and are essential for development and agricultural activities.

Santa Catarina

The state of Santa Catarina lies completely within the area constituting the Atlantic Rainforest.

According to the Map of Forest Fragments of the Atlantic Forest, during the period between 2008 and 2010, Santa Catarina was the Brazilian state containing the largest area of Atlantic Rainforest fragments in relation to the biome's original area. These fragments corresponded to an area of 2,210,061 hectares, or 23.03 percent of the state. However, the history of forest degradation is extensive. Between 2000 and 2011 around 78,946 hectares were deforested (SOS Mata Atlântica/INPE, 2012).

The intense history of deforestation resulted in significant fragmentation and marked qualitative loss of forests in Santa Catarina. Many species that were once found in abundance are no longer found in areas of forest regeneration. Also worth noting is an increase in the process of genetic erosion of species such as the Blackleg *(Ocotea catharinensis)*, cinnamon sassafras *(Ocotea odorifera),* walnut *(Ocotea porosa),* Araucaria *(Araucaria angustifolia)* and palm *(Euterpe edulis),* which are all found on the list of species threatened by extinction (Campanili and Schaffer, 2010).

Despite intense fragmentation, some forest regions demonstrate the richness and beauty of the Atlantic Rainforest that can still be seen and admired in the state of Santa Catarina, such as the towering pines located on the Plateau and in the West, the valuable Blackleg, the Itajai Valley, and the high fields of Santa Catarina, especially the region of the Field of Fathers.

Important mangrove areas are found in Babitonga Bay, in the São Francisco do Sul and Joinville regions, which are essential for the conservation of marine species like porpoises *(Pontoporia blainvillei)*. Dense broadleaf forest fragments, especially those found in the interior of the Serra do Itajai National Park—a hotspot of biodiversity in the itajai Valley area of Santa Catarina—are also worth mentioning. These forest fragments serve as important refuges for various species of flora and fauna.

A small portion of the Atlantic Rainforest is protected by Conservation Units. These areas present great potential for the creation of ecological corridors, with special emphasis on the patches of mixed rainforest, deciduous forest, and high fields located in the state's western region of Santa Catarina, bordering the Brazilian state of Paraná.

ATLAS DOS REMANESCENTES FLORESTAIS DA MATA ATLÂNTICA
PERÍODO 2013-2014

ESTADO DE SANTA CATARINA

Remanescentes Florestais da Mata Atlântica no Estado de Santa Catarina
Dinâmica entre o período 2013-2014.

Resultados quantitativos para o Estado de Santa Catarina – em hectares:

UF	SC	
Área do Estado	9.571.782	
Área na Lei nº 11.428/2006	9.571.782	100%
Mata em 2014	2.212.747	23,1%
Decremento de Mata		taxa anual
2013 a 2014	692	692
2012 a 2013	672	672
2011 a 2012	499	499
2010 a 2011	568	568
2008 a 2010	3.626	1.813
2005 a 2008	25.953	5.191
2000 a 2005	45.530	9.106
1995 a 2000	42.699	8.540
1990 a 1995	62.919	12.584
1985 a 1990	99.412	19.882
Mangue em 2014	11.935	
dec. Mangue 2014		
Restinga em 2014	76.016	
dec. Restinga 2014		
dec. TOTAL 2013-2014	692	
Natural não Florestal	539.106	
Total Natural	2.837.010	29,6%
Área Avaliada 2013	92%	
Área Avaliada 2014	97%	

ATLAS DOS REMANESCENTES FLORESTAIS DA MATA ATLÂNTICA
PERÍODO 2013-2014

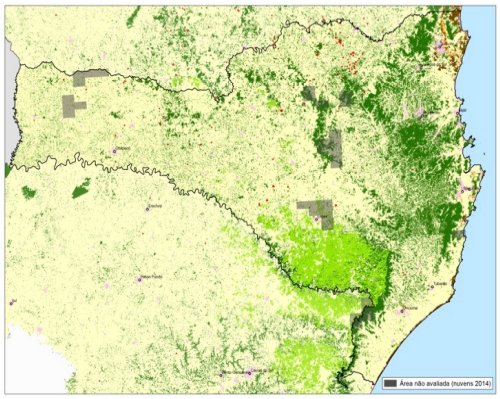


Figura 34 - Mapa do Estado de Santa Catarina com decrementos 2013-2014 ressaltados.

terça-feira, 3 de novembro de 15

The Valley and Upper Itajai Valley Region

The basin of the Itajai-Açu River, also known as Itajai Valley, covers 15,000 km^2 of the Brazilian state of Santa Catarina, where 52 cities are located, with approximately 800,000 inhabitants (20 percent of the population in the state).

The Southern and Western Itajai Rivers form the Itajaí-Açu River in the Rio do Sul municipality. The Northern Itajai River in Ibirama and the Itajaí Mirim river in Itajaí are important tributaries of the Itajai-

Açu River. The waters of this significant river basin, formed from thousands of other small tributaries, flow into the Atlantic Ocean, in the border of the cities of Itajai and Navegantes.

The Itajai Valley, starting from Blumenau, was mainly colonized by German and Italian farmers and, to a lesser extent, by Polish and Portuguese farmers. The European farmers used to different weather, soils and vegetation, settled on the banks of the Itajai-Açu River in the 1850s. At that time, thousands of indigenous peoples from the Xokleng, Kaingang and Guarani ethnicities were living in the dense and beautiful local forest. Both the forest and the indigenous peoples were considered obstacles to the objectives and "development" model pursued by the European immigrants.

The slash and burn agricultural practice adopted in the region since the colonization period, with no respect for Permanent Protected Areas, control of soil erosion coupled with the introduction of chemical fertilizers and pesticides, in the second half of the twentieth century, , has drastically reduced forest cover, soil fertility and water quantity and quality.

In addition to erosion, the release of “in natura” domestic sewage, untreated industrial effluents, and animal waste into the Itajai River Basin also affects the water quality.

The Upper Itajai Valley area was colonized in the twentieth century, and in less than 100 years of "economic growth" approximately 80 percent of the forest in the region was destroyed. Deforestation and forest degradation has reduced the number of animal species and extinguished others such as the jaguar and tapir.

Floods, a rare phenomenon in the region, are occurring more often. This can be explained, on one hand, due to the reduction of water infiltration into soils and the sedimentation of rivers, caused by the clearing of riparian forests, lack of erosion control, and the construction of roads and cities. On the other hand, a main factor related to flooding is the construction of cities next to riverbanks. There are only two solutions to flooding in the region: a) do not allow the occupation of riverbanks and; b) vacate as soon as possible the wrongfully occupied areas by companies or housing constructions.

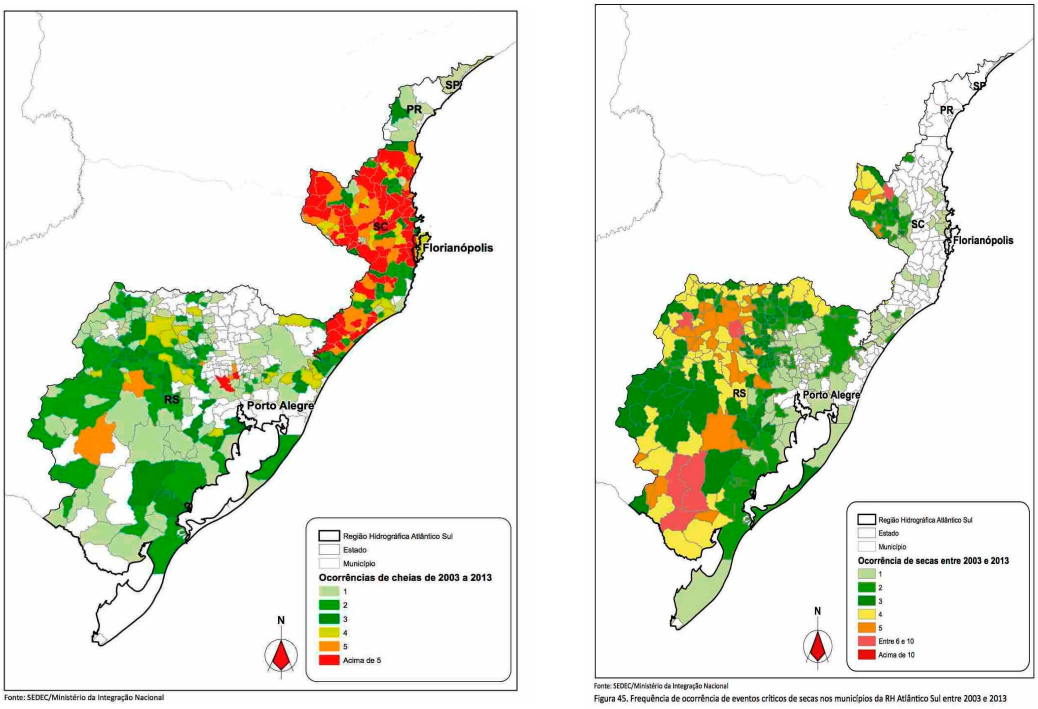
Until the 1980s, the native timber extraction industry exercised a prominent role in the local economy, being in great part responsible for the devastation of noble species in the forest. A practice called "coivara", which includes deforestation and burning, was historically used for the implementation of agriculture and ranching. From the 1970s to the 2000s, tobacco farming strongly contributed to the destruction of previously reduced forest fragments in the region due to the use of firewood to dry tobacco leaves.

With increasing scarcity of timber from native forests to exploit, especially from the 1970s onwards, timber companies and smallholders started to plant exotic trees, such as pine and eucalyptus. Currently, timber plantations generate revenue for many rural landowners, allowing the existence of the logging industry and other activities that need timber or wood, such as the tobacco industry.

After the promulgation of the Brazilian Constitution of 1988, there were more laws protecting the Atlantic Rainforest, such as the Decree 99547/1990, Decree 750/1993, Law 9605/1998 (Environmental Crimes Act), Law 11428/2006 (Atlantic Rainforest Law) and Decree 6660/2008, which regulated the Atlantic Rainforest Law, in addition to numerous resolutions by the National Environmental Council (CONAMA). This set of laws, in conjunction with the work of environmental NGOs, public prosecutors and environmental agencies, allow for a gradual decline in deforestation rates and the initial recovery of the Atlantic Rainforest.

The Itajaí Valley has been increasingly affected by extreme weather events. In November 2008, for example, there were severe floods and landslides, that resulted in 135 deaths and more than 70,000 homeless people. Santa Catarina's Natural Disaster Risk Map shows that 12 municipalities that are at "very high" risk of being affected by natural disasters are in the Itajai Valley. Another example is the city of Mirim Doce, in the Upper Valley, which was also strongly affected by a sequence of floods in February 2011, leaving half of the population homeless.

Studies from the National Water Agency (ANA) show that although there are relatively good indicators of water quality in the region, the greatest problem is the quantitative: 61 percent of water demand/supply is at a critical or very critical level. The study also indicates that many places in the South Atlantic Basin Region, where the Itajai River Basin is located, are susceptible to flooding. Such region presented the highest number of Brazilian municipalities, with frequency of above 5 floods events between 2003 and 2013. Santa Catarina is one of the states with higher recurrence of flood events during this period.



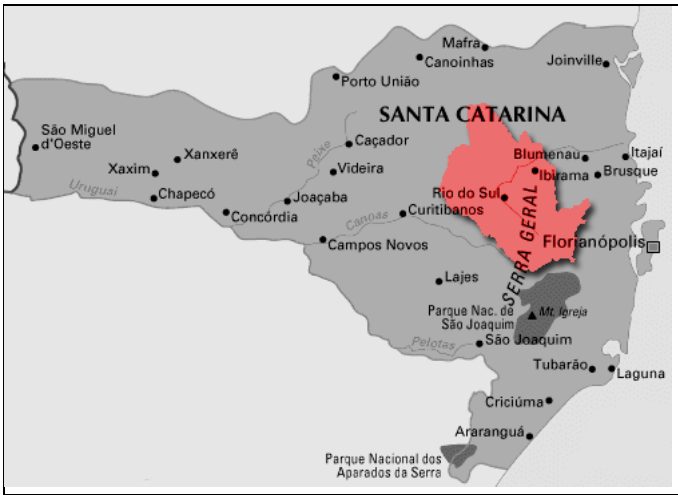
Frequency of the incidence of floods and dry season in the region between 2003 and 2013.

From a biodiversity point of view, the Upper Itajai Valley region is located at the transition between mixed and dense rainforests, which are together responsible for the maintenance of several endemic and endangered species of fauna and flora threatened of extinction.

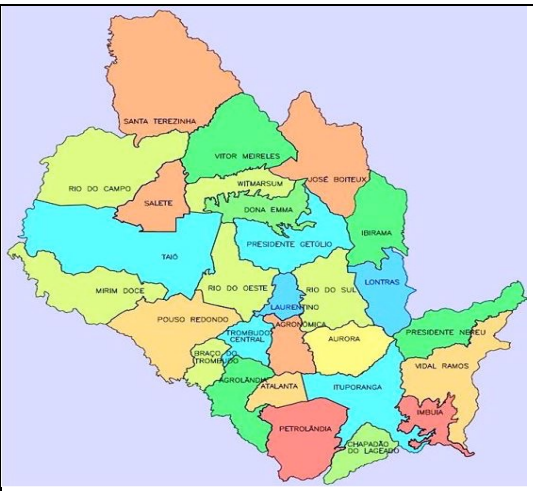
According to the Map of Priority Areas for Conservation, Sustainable Use and Brazilian Biodiversity Benefit Sharing (MMA-2007), the Upper Itajai Valley is characterized as a “highly important” and “very highly important” biological region. This region also houses federal and municipal protected areas, including the “Flona Ibirama” (TII), the Municipal Natural Park “Trilha dos Bugres (Imbuia), the “ARIE Sierra da Abelha (Victor Meirelles)” and the Municipal Natural Park of the Atlantic Rainforest (Atalanta).

Yet, biodiversity conservation in this region depends on the expansion of protected areas through the creation of new Conservation Units and initiatives to prevent deforestation. Moreover, it is essential to restore Legal Reserves and Permanent Protected Areas (APPs), which are fundamental mechanisms to recover and conserve fragments of the Atlantic Rainforest and to allow for the formation of mosaics and ecological corridors. These mechanisms can become effective if combined with payment for ecosystem services, as is the case of carbon neutralization and sequestration.

The Association of the Upper Itajai Valley Municipalities (AMAVI), with support from the Ministry of the Environment, has implemented an important contribution for the conservation of natural resources in the Upper Itajai Valley. They implemented their own Rural Environmental Registry system (integrated with the national SICAR system by the Ministry of the Environment – MMA), to identify and mark the Legal Reserves and APPs in rural properties within the 28 municipalities located in this region, seeking these properties’ environmental compliance.



Upper Itajai Valley in the Brazilian state of Santa Catarina.



Upper Itajai Valley Municipalities.

The development and implementation of the AMAVI Registry System for Rural Properties emerged after the Decree 6514/2008, which regulated the Environmental Crimes Act (Law 9605/1998). After

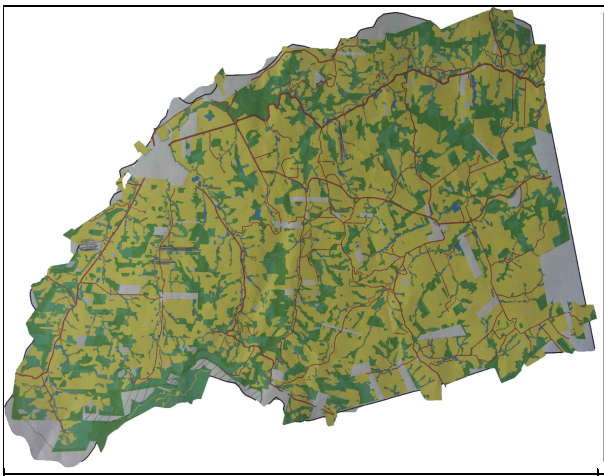
initial calculations, AMAVI concluded that about 40,000 smallholders in the region could be supported by this initiative. According to a preliminary survey conducted by AMAVI and the Ministry of the Environment, around 70 percent of smallholders in the region still conserve areas with native vegetation to form Legal Reserves. One of the most important and innovative aspects of AMAVI's initiative is the formation of corridors and mosaics between the fragments of native vegetation of the Atlantic Rainforest. In order to establish these corridors, municipalities and AMAVI's technicians, prioritize the connection between Legal Reserves and APPs across different properties when assisting local landowners in mapping forest patches for completing the Rural Environmental Registry.

The region has 751,400 hectares, so if we consider that 20 percent must be registered as Legal Reserves, it accounts for approximately 150,000 hectares, not to mention the APPs, which can easily partially overlap with Legal Reserves.

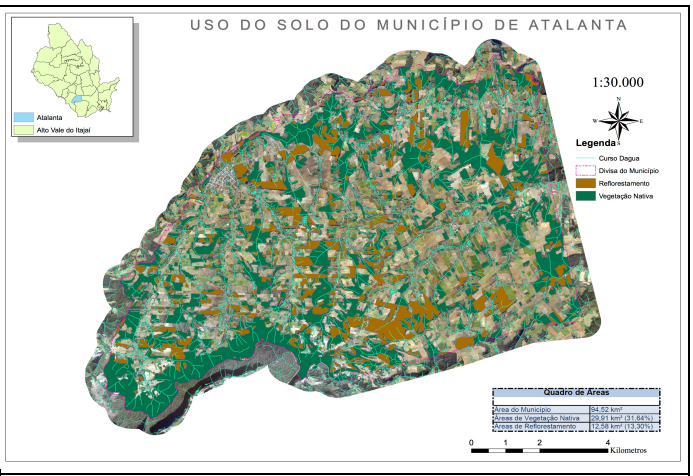
The city of Atalanta is an example of the implementation of the registry, with around 790 small rural properties. Approximately 38 percent of all rural properties have less than 10 hectares, 60 percent have between 10 and 50 hectares, and only 2 percent have between 50 and 100 hectares. Of all 790 rural properties in the city, 98 percent are already registered on CAR. (Atlanta City Hall, March 2016).

The CAR database shows some good news for the city:
- Natural forests cover 32 percent of the territory in Atalanta.
- Only 80 hectares of the APPs and Legal Reserves need to be recovered, which represents less than 1 percent of the municipality's total area;
- 13 percent of the territory is reforested with pine and eucalyptus, representing an important source of raw material and income for local properties.

The city of Atalanta also serves as an example since it already has an updated Land Use Map, which is a fundamental resource to initiate the integrated landscape planning process.



Properties registered in CAR, March 2016



Land Use Map created by the City Government

Land Use DIALOGUE

BRAZIL

Some aspects of the Upper Itajai Valley region