Restoration Cases Flagship Collection

Case #3:

Bringing the Atlantic Forest back to life in the Rio Doce Watershed, Minas Gerais, Brazil

RESTOR

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FORESTORATION INTERNATIONAL

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In brief

Overview

Instituto Terra is a private, not for profit, ecological restoration institute created in 1998 by Lélia Deluiz Wanick Salgado and the famous Brazilian photographer, Sebastião Salgado. Instituto Terra implements forest restoration on Fazenda Bulcão, a former cattle ranch, and in surrounding areas of the Rio Doce Watershed in the municipality of Aimorés in Minas Gerais. After creating the "Private Reserve of Natural Heritage –RPPN", planting of native tree seedlings, assisted natural regeneration, and later enrichment planting led to the restoration of 608 ha. By 2019, after 20 years of planting and maintenance, 297 native tree species thrive there along with 172 bird, 33 mammal, 15 amphibian, and 15 reptile species. In 2009 the RPPN was designated as an outpost of the Atlantic Forest Biosphere Reserve. The long-term, multidimensional engagement and many successful outcomes inspire others to bring forests, watersheds, and rural communities back to life. Restoration, educational and outreach programs engage local communities and farmers. Instituto Terra become a regional hub for restoration for the entire Rio Doce Valley and developed the capacity to produce over 1 million native tree seedlings a year and trained over 82,000 people. An on-site school was founded in 2002. Since 1998, Instituto Terra's actions led to the recovery of 2,072 ha of degraded areas of Atlantic Forest, and to the protection and restoration of almost 2,000 springs within the Rio Doce Watershed with the internationally recognized Olhos D'Água extension program.

Exemplary practices

Local communities and farmers were engaged in restoration activities. Educational programs developed capacity for school teachers, students, technical professionals and sustainable development extension agents. The project formed a regional hub for restoration across the entire Rio Doce Valley, an area the size of Portugal. Restoration practices focused on the protection and restoration of springs and streams and improving water quality within the entire Rio Doce watershed. Genetically diverse seedlings of native tree species from local areas are produced in their nursery, which supplies seedlings for planting on farms throughout the region.

Key lessons learned

- *Think carefully about the restoration process and conduct a robust diagnosis of the problem.*
- *In relationships with partners and stakeholders, transparency and communication are essential.*
- *There is no "magic" solution. Every case is specific and requires its own analysis and approach for solving problems.*
- *Restoring forests and springs is a slow process. We need to be patient and let restoration take its time.*

Restoration narrative

Visit restor.eco

Brazil

Instituto Terra

Visit and learn more about the project's ecological analytics *here*

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How it all began

The history of the restoration of Fazenda Bulcão and surrounding areas began in 1998 with the decision, by the famous photographer, Sebastião Salgado, and his wife, Lélia Deluiz Wanick Salgado an architect and landscape designer, to bring back the forest on the land where Sebastião grew up. It was Lélia's idea, but Sebastião instantly agreed. "Let's reforest." The couple returned to the farm after more than 20 years of life in self-exile during the military dictatorship in Brazil. The cattle ranch that supported Sebastião's family had become highly degraded, having lost virtually all of its original forest cover (Figure 1). The hills were bare, soils were eroded, and the springs were dry.

The recovery of forest in Fazenda Bulcão represents a flagship case for restoration in Brazil's Atlantic Forest, where close to 80% of the original forest cover was converted into farms for production of coffee, sugar cane, cellulose and beef. The Atlantic Forest Biome is recognized as a Global Biodiversity Hotspot with over 50% percent of the biome's 20,000 tree species found nowhere else. Many of these species are vulnerable to extinction. The property lies within the watershed of the Rio Doce, which drains 228 municipalities in the states of Minas Gerais and Espírito Santo. Over 90% of the forest cover in the Rio Doce watershed has been removed, and forest remnants are highly degraded.

Figure 1. Instituto Terra and Fazenda Bulcão in 2002. Photo credit: Instituto Terra

Since the 1980s, the couple was alarmed by the speed of the forest degradation, not only on the farm, but across the entire Rio Doce Watershed. In 1990, upon inheriting the property, they decided to realize their dream of "making the Atlantic Forest born again, the way it was 50 years ago."

In 1998 they co-founded the NGO Instituto Terra to begin the reforestation of Fazenda Bulcão. Their original mission, which remains active today, was to create a regional hub of sustainable development that could serve as an example for the region, with the restoration of the farm and a nucleus of environmental education (Souza, 2010). The first step in restoring the farm was to transform 609 ha of the property into a "Private Reserve of Natural Heritage–RPPN", a designation given to private lands with high conservation value. Fazenda Bulcão became the first degraded private land holding to receive that designation with the promised objective of restoring a forest with high conservation value. But restoring forests on the farm was only the beginning.

Setting the scene

The Rio Doce Watershed is located between the states of Minas Gerais and Espírito Santo), spanning an area of 387.8 km² (Figure 2). The approximately 710 ha ranch (of which approximately 609 are RPPN and the remainder comprise the administrative area of Instituto Terra) lies within the Rio Doce Watershed, which extends over 82,646 km2, equivalent to the area of Portugal (Figure 2). The regional climate is humid subtropical with a very sharp dry season coinciding with winter, in which there is at least one month with precipitation less than 60 mm. Annual precipitation oscillates around 800 and 1300 mm with a mean precipitation of 1450 mm. The wet months are between December and March. Mean daily temperatures oscillate around 20° and 23°C, with a maximum of 35°C and a minimum of 18°C.

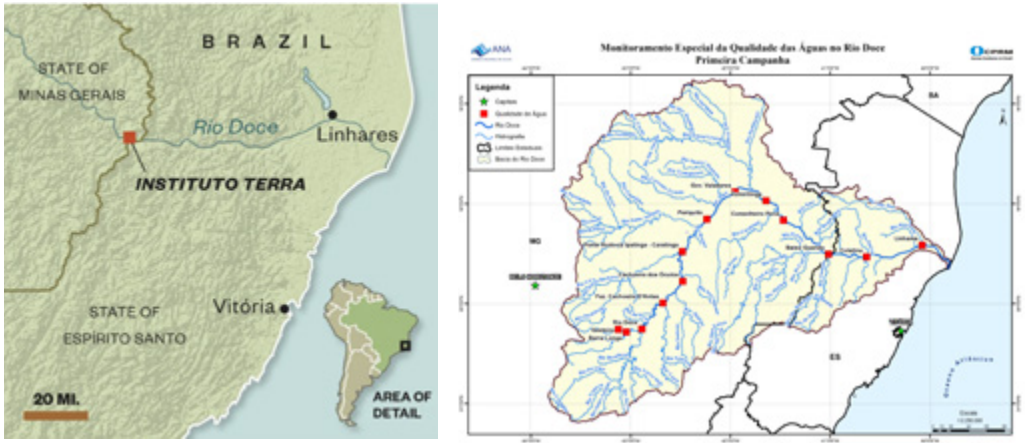

Figure 2. (left)Location of Instituto Terra in Minas Gerais State within the Rio Doce Watershed. Created by: Guilbert Gates; Source: Funk, 2015; (right) Rio Doce Basin. Source: http://www.cprm.gov.br/publique/media/hidrologia/eventos_criticos/20151120_monitoramento_qualidade_agua.jpg

The region has a hilly topography. In Fazenda Bulcão, 66% of the property has medium to high slopes, and 34% has slopes less than 20%. The Rio Doce Watershed is formed by alluvial deposits from the Neogene, with sand and sand-clay deposits in 20% of its area; sedimentary rocks from the Paleogene and Neogene in around 44% of its area; and in the higher parts composed of plutonic rocks covering around 14 of its area (Faustino & Silva, 2015). The soils are mainly red-yellow Latosols and eutrophic Podzolic soils. These types of soils are highly vulnerable to erosion (Souza, 2010). The vegetation within the Rio Doce watershed is classified as Seasonal Semideciduous Forest within the Atlantic Forest Biome.

According to data from the Brazilian Institute of Geography and Statistics, the estimated population for the Rio Doce basin area is around 3.1 million inhabitants, 68.7% urban and 31.3% rural. The basin's economy is based mainly on agriculture, industry and mining. The basin is home to the largest steel complex in Latin America. Active mines are operated by the Vale Mining Company and other companies, and monocultures of *Eucalyptus* trees produce cellulose. Production of sugar cane, coffee and fruit pulp are also important economic activities.

Deforestation history

Fazenda Bulção was typical of the degraded landscapes across vast areas of the Rio Doce Basin. Deforestation in the farm began in 1922 by the first owners of the land, immigrants from Austria, who first sold the high-value timber species in the farm to earn money, and later, established pasture lands. Valuable forest trees like Peroba rosa (*Aspidosperma* spp.) Peroba do Campo (*Paratecoma peroba*), Parajus (*Manilkara* spp), Jatobás (*Hymenaea courbaril*), Cedros (*Cedrela fissillis*), and Arapocas (*Senefeldera multiflora*) were harvested for timber, and other woody species cut for fuel wood.

Sebastião Salgado, the co-founder of the Instituto Terra, was born in Aimorés, and he talks about the degradation of the Atlantic Forest in his biography “Da minha terra a Terra” (Salgado, 2014). When he was a child, the Atlantic Forest covered half of the Rio Doce Basin. The farm was self-sustaining and prosperous, hosting around 30 families who worked for his father, but also had their own portion of the land assigned to them for subsistence. The farm produced corn, sweet potatoes, rice, tomatoes, fruits, pork, and cattle; most of the Fazenda was converted to pastures for cattle grazing. Like most farm properties dedicated to extensive cattle farming, the soils and the water sources were eroded and depleted. Especially during the last 50 years, the Rio Doce watershed experienced uncontrolled growth and establishment of urban centers along the river, depositing raw sewage into the river, which had only 5 treatment plants across its entire length. The consequences of this unplanned growth and development were desertification across the middle portion of the Rio Doce Watershed and the emigration of around 20% of its rural population. The land is so poor now that farmers can only raise 1 head of cattle per hectare compared to 4 in the past, and there are no riparian forests to prevent sediments from flowing into the river.

Implementation

Fazenda Bulção is the centerpiece of Instituto Terra's forest restoration project. The first tree planting activities in Fazenda Bulcão began in 1999 (Table 1), led by the Salgados with participation of school children from the municipality of Aimorés. Plantings were designed by the renowned forest engineer Renato de Jesus, who worked for the Vale Mining Company's reforestation projects. Renato de Jesus was a key contributor to the initial restoration work and future visions. The 710-ha farm now encompasses the restored forests, plus school facilities, a gift shop, and dormitories to house students engaged in their various training courses.

After assessing the land and soils, Renato de Jesus came up with a plan to plant 2.5 million trees. Initially, the Vale Mining Company provided the first 100,000 native tree seedlings and the technical assistance needed to start the restoration of the Fazenda Bulcão. This collaboration continued until 2002 when Instituto Terra built its own nursery (Souza, 2010). Seedlings were planted in concentric circles starting from the bottom of the farm and going up the hills around the property (Kepp, 2020).

The preparation of areas to be planted included the removal of invasive grasses, like *Brachiaria*, and dense patches of the Aroeira tree (*Myracrodruon urundeuva*). The species initially planted were primarily native species from early to late successional groups, with a small fraction of fast-growing exotics, like *Acacia*, that were pruned later. Invasive species were managed periodically (Souza, 2010). Due to the harsh conditions of dry soils and the characteristic high temperatures of the area, about 60% of the seedlings planted in the first year died. The following year this rate dropped to 40%. The reason for improved survival was that in the first year the staff selecting the species did not know which species were best adapted to survive in the degraded conditions of eroded soil and strong sun incidence, nor did they know the best conditions for their growth and survival. After that year, the staff learned which species were best adapted and also the conditions of eroded soils and direct sunlight improved thanks to the trees that survived and grew. Currently, seedling mortality rate is around 10 to 20%, with close to 90% of the restoration on the property completed. Until 2021, the project had planted over 2.3 million seedlings across the farm.

In 2001, the Instituto Terra received support from the NGO SOS Mata Atlântica and from Conservation International to build the infrastructure for a native seedling nursery (Figure 3). The nursery initially produced 80,000 seedlings in a year. After two expansions, the nursery now has the capacity to produce over 1 million seedlings a year. The staff collects seeds for the nursery from trees in a radius of 200 km around Fazenda Bulcão. In 2018, a seed bank program was initiated that focused on the most threatened tree species in the region. During seed collecting expeditions in 2018, 110 mother trees of native species were registered including 40 genetic sources of Peroba amarela (*Paratecoma peroba*), an endangered species from the region.

Figure 3. The nursery at Instituto Terra.
Photo credit: Instituto Terra

Year — Timeline of restoration and educational activities of the Instituto Terra

- **1998** Founding of the Instituto Terra and creation of Private Natural Heritage Reserve (RPPN) Fazenda Bulcão, consisting of 608 hectares, to serve as an experimental and demonstration area for Atlantic Forest restoration.
- **1999** Restoration begins with participation of school children from municipality of Aimorés, Minas Gerais and seedlings donated by Vale Company.
- **2002** Creation of Center for Education and Environmental Recuperation (CERA)
- **2005** Creation of Center for Studies in Ecosystem Restoration (NERE)
- **2005** Initiation of Terrinhas Program, school program for 8-14 yr-olds to develop environmental leaders and educators among public school children in the region
- **2009** The RPPN Fazenda Bulcão was designated as an outpost of the Atlantic Forest Biosphere Reserve
- **2010** Initiation of Olhos D'Água Program to restore forest and thousands of springs and streams in headwaters of the Rio Doce. With the Olhos D'Água Program, the Instituto Terra aims to protect thousands of the more than 300,000springs in the Rio Doce Hydrographic Basin.
- **2012** Launch of Semear Portal

Following initial tree planting, the Instituto Terra adopted assisted natural regeneration techniques to stimulate the regeneration of native tree species and to remove exotic and hyperabundant native species. These management techniques were used in 32 ha of the reforested area of the RPPN Fazenda Bulcão as well as cutting vines and bamboos, mowing grasses, and weeding and fertilizing around individual young trees. Fazenda Bulcão was managed as a conservation unit, to promote accumulation of diverse native species rescued from other locations in the Rio Doce valley, and to achieve the full representation of the flora of the region.

Instituto Terra conducts forest restoration, education, and research focused both inside and outside of Fazenda Bulcão, within the Rio Doce Watershed. In addition to the restoration actions in the farm, the Instituto Terra implements long-term projects in the broader Rio Doce Basin (Table 1). Interested local farmers protect water springs and plant seedlings supplied by the Instituto Terra under agreements to maintain them in the long term.

The Center for Education and Environmental Recuperation (CERA) was created by the Instituto Terra in 2002, and promotes the sustainable development of the Rio Doce Basin, through environmental and restoration education programs targeted as continuing education for teachers of rural schools, political local leaders, extension officers, agronomy, and environmental technicians and the rural landowners.

In 2005, the Center for Studies in Ecosystem Restoration (NERE) program was initiated within CERA. This program offers continuing education, theoretical and applied, to 20 agronomy and environmental technicians who reside in a yearly boarding school in the farm during the courses, and specialize on various topics concerning ecosystem restoration. NERE is a program for training young technicians to relate directly with small rural producers, helping to disseminate knowledge about agro-ecological practices, reforestation of Permanent Protection Areas and Legal Reserves, as well as on the revitalization of water springs (Figure 6). The Terrinhas Program was also initiated in 2005 to provide environmental education for children ages 8-14 and to develop environmental leaders and educators among public school children in the region.

The regional Olhos D'Água Program began in 2010, with the goal of protecting and restoring around 300,000 water springs along the Rio Doce Watershed, with active involvement and environmental education of rural landowners.

Within the protocol of the Olhos D'Água Program, participating farmers are provided with free technical assistance, materials for construction of fences and seedlings to revegetate areas around the springs, as well as kits for the installation of mini-sewage treatment plants. Project technicians conduct an environmental diagnosis of each property, identifying the necessary actions to promote the recovery of springs and the most appropriate land uses. Together with the farmers, the Instituto Terra staff locate the spring sites and define the areas to be restored and fenced off. The farmers are responsible for planting seedlings and maintaining the sites. The Olhos D'Água Program also donates small, rural, water treatment plants and septic tanks to reduce the flow of household wastes into the watershed, and builds a series of small, water capture ponds to reduce runoff and erosion (Figure 4).

The Semear Portal was created to support restoration practitioners with online information on native species production and maintenance. It shares knowledge on production of native tree seedlings gathered by the nursery staff. The Semear Portal also provides an open space dedicated to other institutions, universities, nurseries, laboratories and scholars who want to share other methodologies and processes.

Figure 4. Working with rural producers to restore springs © Foto: Arquivo Instituto Terra

Governance arrangements and partnerships

Instituto Terra functions as a not-for-profit organization formed by a council and a directive. The directive is made up of the Salgados as co-founders, alongside several other professionals in the areas of forestry, law, agronomy, among others. In addition, the organization is composed of an executive team and groups of consultants. Instituto Terra works strongly on the engagement of its staff. They consider it key to engage their staff, because if they "do not understand the importance of what we are creating here there is no sense. People here understand why they do what they do and they love it," stated Isabella Salton, the Executive Director.

Another main focus of Instituto Terra is to engage farmers in the region. At the beginning of the Olhos D'Água Program, the staff had to go door-to-door to enlist participation of farmers. They were known as the "water hunters" and people usually closed the door to them because they did not believe that an NGO could help them. Many farmers lacked trust due to many previous, failed government or NGO programs and the fear that their land would be taken away. After they could see results of the projects reforestation efforts, their trust was restored too, and more farmers enlisted in the program.

Instituto Terra has a results-oriented management model. Operational protocols (standardized) guide their politics and actions. A Balanced Scorecard is the tool used to monitor their strategic objectives and the Project Desk, conceived using best practices recommended by the "Project Management Institute" (https://www.pmi.org/) supports their actions (planning, execution, and control), and the technique of rolling forecasting aids in budget planning. A risk management strategy, established in 2013, assesses the risks involved in not meeting the objectives planned. In 2018 and 2019 the Instituto Terra developed strategic guidelines for their work, to focus on projects that address their fundamental mission and values. The first is to increase the technical and scientific profile of the Instituto Terra, to have better scientific solutions for needs inside and outside of Fazenda Bulcão. The second aim is to extend environmental education.

Instituto Terra partners with state, municipality, national, and international government agencies, NGOs, and private businesses. Partnerships are established through financial and technical cooperation agreements. They have partnered with and/or received funding from over 40 national and international institutions. In 2005, agreements were signed for the granting of internships and partnerships with Federal University of Espírito Santo, the Federal Faculty of Agrarian Sciences of Diamantina, the Presidente Antônio Carlos University, and the Universidade Vale in Minas Gerais. Fazenda Bulcão became an experimental facility for research on management, recovery, and conservation of the Atlantic Forest. In 2020, Instituto Terra created a science committee to better understand and manage local and regional challenges and to recommend research topics to address during the next 20 years.

Costs, funding, and other support

The Instituto Terra runs on an annual budget of R$10 million (close to US$ 2 million), which funded 75 staff members in 2021. The sources of those funds are varied, including a variety of international and national donor funds and gift shop revenues. Early on, FunBio (the Brazilian Biodiversity Fund) donated US$ 500,000 to the project. This amount was matched by the Salgados, several US Foundations, and Natura, a Brazilian cosmetic company. They received enormous help early on from companies and foundations in France and from other European countries. Later, Brazil's federal government and state governments in Minas Gerais and Espírito Santo offered funding.

The restoration activities and the sustainability of Instituto Terra are maintained by in-kind donations from particulars and also from organizations. As examples, in 2012, The Semear Portal was created with support from the National Economic and Social Development Bank (BNDES) through their Atlantic Forest Initiative. In 2005, the creation of NERE was facilitated by international cooperation agencies and the Phillips corporation. Since 2016 the Instituto Terra has received support from the Renova

Foundation, plus international donors like Energias de Portugal, WWF Germany, and Prince Albert II of Monaco Foundation, for different programs like educational and water sources restoration programs. In 2017 and 2018, the program received financial support from the Fondation Lemarchand and the Renova Foundation. In 2019 the amount received was around US$ 300,000 (Instituto Terra, 2021). Examples of specific actions funded by different groups in 2019 included: the donation by the Public Defender's Office of Colatina and Instituto Líderes do Amanhã that allowed the production and planting of 1500 native seedlings to restore 0.6 ha on Fazenda Buldão.

Carbon offsetting projects, such as the one financed by Biofilm, a Brazilian film producer, to offset the emissions related to the travels to the French "Varilux Film Festival" financed the planting of 286 seedlings in 2019. Green Corporate Responsibility actions have also funded the planting of tree seedlings. Recently a law firm granted each client the planting of a seedling on the farm (Instituto Terra, 2021).

Ecological and social outcomes

By 2018, more than 90% of the RPPN (548 ha) was in the process of being restored. Over 20 years of operation, native seedlings were planted in 2,072 ha of degraded areas of the Rio Doce Watershed, including the Instituto Terra headquarters and RPPN Fazenda Bulcão, as well as in locations distributed in municipalities in the region (Instituto Terra, 2020). Since 1998, close to 140,000 people have visited the RPPN Fazenda Bulcão as researchers, students, collaborators, and tourists.

Restoration monitoring of the farm was conducted first in 2000, and then again in 2002, 2005, and yearly until 2008. The first detailed survey of vegetation of the RPPN included monitoring of flora and fauna and assessments of the degree of disturbance and natural regeneration potential. The first map of land use was elaborated based on aerial photography at an approximate scale of 1:13,300. The floristic survey of trees with a circumference at breast height greater than or equal to 15 cm recorded 142 plant species in 55 families (Souza, 2010). The first faunal survey was conducted between registered 156 species and 39

families of birds. For mammals, 21 species, 12 families, and 6 orders were found in the RPPN, mostly in second growth forest areas (Capoeira and Capoeirão) that regenerated spontaneously prior to or immediately after cattle were removed in 1999. Of these, *Callicebus personatus* is classified as a vulnerable species (IUCN 1977). Nine species of Carnivora were recorded: *Cerdocyon thous*, *Nasua nasua, Procyon cancrivorus, Galictis vittata, Eira barbara, Herpailurus yaguarondi, Leopardus pardalis* (Figure 5), *Leopardus tigrinus*, and *Puma concolor*. By 2018, a great diversity of fauna has returned to Fazenda Bulcão, including 172 bird, 33 mammal, 15 amphibian, 15 reptiles and 297 plant species.

By 2020, the nursery at Instituto Terra had produced over 6 million seedlings of trees and shrubs native to Brazil's Atlantic Forest. Selected genotypes from Peroba amarela are being planted in a seed orchard to ensure adequate seed supplies for the future.

From 2010 to 2018, the Olhos D'Água Program protected 1,960 springs, initiated restoration of 1,313 ha, and involved 1,049 rural families. The Program was selected by the UN-Water Commission in 2011 as one of the best programs for the recovery and protection of water springs A partnership with Energest and the EDP Institution allowed

Figure 5. An ocelot or jaguatirica (Leopardis pardalis) on Fazenda Bulcão ©Leonardo Merçon. Photo courtesy of Instituto Terra.

Instituto Terra to protect 51 springs, serving 41 rural producers, and to install three mini-sewage treatment stations in the Guandu River Basin, an area with a population of over 88,000 (Instituto Terra, 2020).

As a result of the multiple educational and training programs carried out since the founding of Instituto Terra, 82,078 people from 177 municipalities in the states of Minas Gerais, Espírito Santo, and Rio de Janeiro have received some kind of training, including teachers and students, rural producers, agricultural, and environmental and forestry technicians. Since 2002, 1,257

courses and other educational events have been offered. The Terrinhas Program has to date reached around 3,200 school children in the public education system. Instituto Terra is a major supporter of the movement *Todos Pelo Rio Doce*, which organizes volunteers to protect hundreds of springs in the Rio Doce Hydrographic Basin (Instituto Terra, 2020).

Instituto Terra formed partnerships with 1,044 rural families to implement forest restoration activities on their properties, including recovery of water springs. "The producer doing part of the entire pre-planting, planting and maintenance process, values and starts to respect the relationship with the environment, migrating from a previously extractive vision and becoming an ally in conservation," said Gilson Gomes de Oliveira Júnior, an analyst of Instituto Terra's Project Management.

Key challenges

The Instituto Terra has faced many challenges since its beginning, but learns from mistakes and applies adaptive management by bringing together all who are involved to find solutions together. In 1998, little was known regarding how to restore the Atlantic Forest, or even what "restoration" meant. They learned by doing. Key experts, such as Renato de Jesus, played a pivotal role. It is not easy for a non-profit institution to survive, as institutional costs are very high. In the early years, Instituto Terra was looking for projects to maintain administration systems, but now they are taking a more strategic approach.

Instituto Terra experienced challenges common to many forest restoration projects, such as dominance of degraded areas by exotic weeds and colonizing species such as Aroeira (*Myracrodruon urundeuva*). Devastating floods in 2013 were followed by three drought years in 2016-2018. And there were small fires in 2003 and 2010. Instituto Terra maintains a trained volunteer team that is able to help and intervene when fires occur, which made it possible to take immediate action to fight fires and mitigate their impacts (Isabella Salton, personal communication). Now, the region faces multiple challenges of drought, economic crisis, and the Covid-19 pandemic. Continued monitoring and adaptive management of planted areas is a big challenge, particularly in

areas where natural regeneration is limited and grass cover is encroaching. Subsequent plantings and enrichment are needed in some areas to avoid a reversion to degraded conditions. Monitoring the recovery of forest is much easier than monitoring water flows following restoration around springs. It was difficult to know when and how water flows were restored because of different conditions within and across springs and also in the area around the spring. If a farmer makes a well above the spring, for example, it affects the spring's water flow. Monitoring needs to be conducted for many years after the project ends. Project funds do not cover costs of long-term follow-up, even though continued monitoring is essential to provide the evidence for restoration outcomes (Isabella Salton, personal communication).

Other challenges for restoration emerged from broader socio-economic issues at the regional scale. Young people in the Rio Doce Valley are emigrating to cities, and now only 20% of the population is rural. Fewer farmers are responsible for food production. Helping small farmers to achieve economic sustainability is a major challenge, but without economic sustainability they cannot even think of participating in restoration. "We need to create a complete system of restoration. We need to restore hope, the environment, and the people. Our work generates hope in the form of water, seedlings, and education," says Isabella Salton.

Enabling factors and innovations

A major factor leading to the success of restoration in Fazenda Bulcão and the surrounding Rio Doce watershed was the visionary leadership of the founders of the Instituto Terra, the Salgado family. Their vision was key to all that happened, including forming the RPPN in the same year and attracting supporters all over the world. Twenty years ago, climate change and environmental problems were not topics of conversation in rural Brazil, but these issues were paramount in the founding of the Instituto Terra.

From the beginning, the engagement of the local community was an essential element of the work of the Instituto Terra. Their mission was to bring capacity for sustainable development and restoration to the region. Later, the engagement of farmers in the Rio Doce Watershed became essential to achieving this mission. Water was the issue that brought the farmers around, as they recognized that protecting and restoring forests was key to restoring springs on their farms. No water, no production. This relationship clearly demonstrates that restoration is not a project, but a process of change and engagement. It is the communities and the

farmers who implement restoration. Planting seedlings is only a small part of the process. Crisis often generates the impetus for change. Such was the case after the tragic Mariana Dam accident in 2015. Funds were generated from private companies, government, and donors to restore the Rio Doce Watershed. The Instituto Terra was there, ready to provide the experience and capacity to work in the region. They were the first organization to sign a partnership contract with the Renova Foundation to restore 500 water springs in the region.

Students from NERE program learning about the nursery.
Photo: © Petit Philippe

Key lessons learned

- Think carefully about the restoration process and conduct a robust diagnosis of the problem. This means understanding soil conditions and what will be needed to overcome degradation in particular areas. Repeated interventions may be required.

- In relationships with partners and stakeholders, transparency and communication are essential. If people do not understand *why* restoration is needed, they will probably not want to become engaged. So, it is important to be clear and transparent in communicating the objectives and benefits of restoration activities.

- There is no “magic” solution. Every case is specific and requires its own analysis and approach for solving problems.

- One foundation or institution is not enough to solve the problems we are facing. But locally focused NGOs can play a critical role in mobilizing action and planning for implementing and monitoring restoration at large scales.

- Restoring forests and springs is a slow process. We need to be patient and let restoration take its time.

Figure 6. Students from the NERE program in 2017. They are the future makers of change. Photo credit: Instituto Terra

Learn more

Additional resources and information

Instituto Terra website: https://institutoterra.org/

Instituto Terra Institutional Video

Video, Instituto Terra | Renascimento que transforma: https://www.youtube.com/watch?v=0Dwix-of5ok

Video, Instituto Terra || Projeto Olhos D'Água: https://vimeo.com/254737300

Music video: Refloresta with Gilberto Gil, Gilsons e Bem Gil

Interview with Lélia Wanick and Sebastião Salgado by Míriam Leitão for Globo News -16/06/2012 (in Portuguese): https://www.youtube.com/watch?v=8C5q26lSOsU

Google Arts and Culture Exhibition "It is possible to recover the Atlantic Forest"

Video, Fundaçao Renova "Environmental Recovery: learn more the work done in partnership with Instituto Terra": https://www.youtube.com/watch?v=-0RJxTi2WAA

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