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THE DAM FAILURE

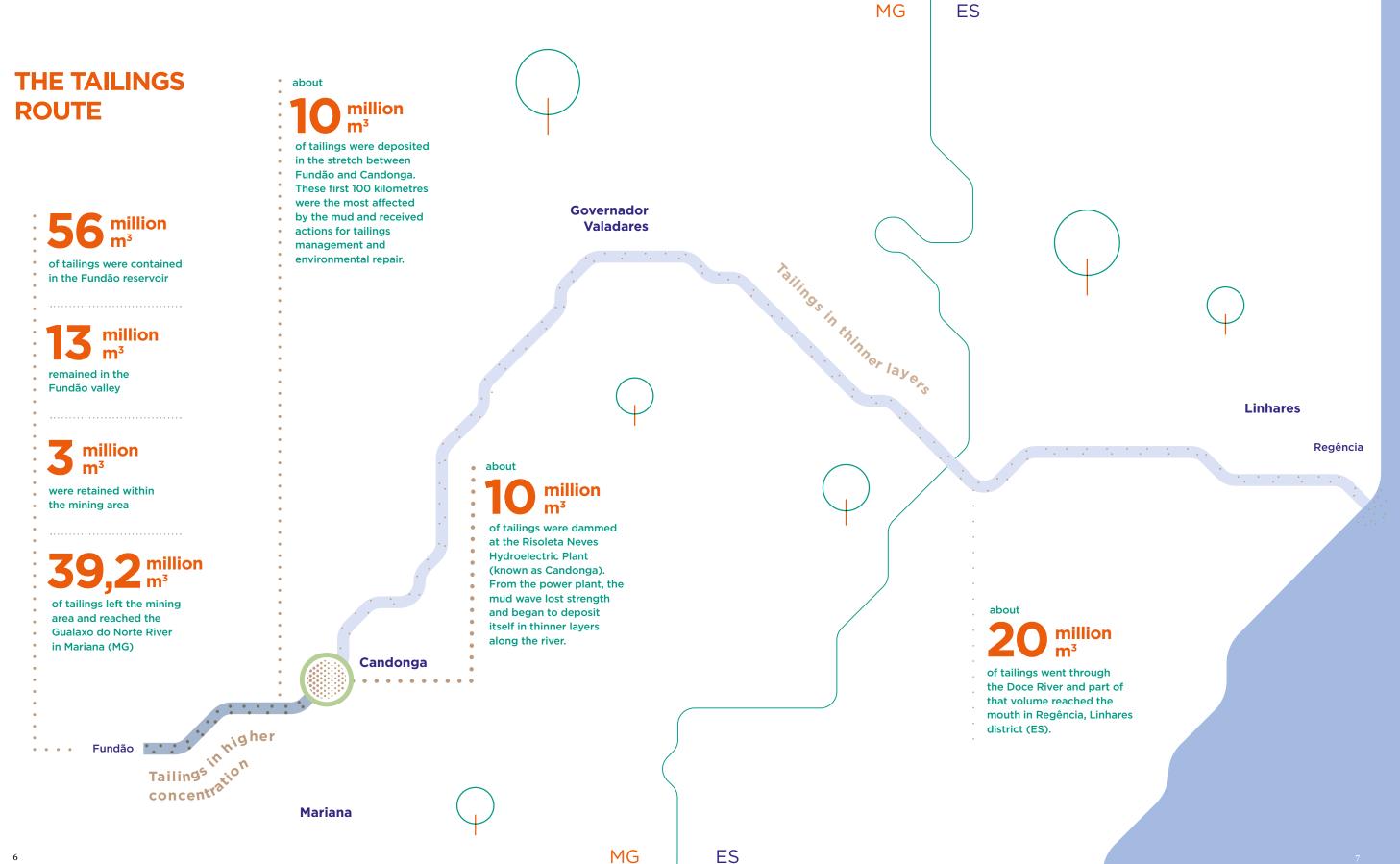
DAM DAMAGES



*TTAC originally considers 39 impacted municipalities, but the CIF Deliberation 58 of March 31st, 2017, delimited new areas of socioeconomic coverage in five other communities, totaling 44 municipalities. The Fundão dam failure, in Mariana (MG), occurred on November 5th, 2015, when approximately 39,2 million cubic meters of tailings reached the Gualaxo do Norte River, in Mariana, from where they flowed into the Doce River and on to the river mouth.

Along this route, 19 people died and a series of specific impacts occurred in each stretch as it passed through 39 municipalities (*) from Minas Gerais to Espírito Santo States, over 670 kilometres.

In addition to the serious environmental impacts, the tailings dam failure in Mariana resulted in social and economic damage, and the social component stands out as the driving force behind the challenges the repair process needs to overcome.



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THE SOLUTION MODEL

PARTNERSHIP REPAIR COMPENSATION



The model defined to repair the impacts is the result of a Transaction and Conduct Adjustment Term (TTAC) signed in March 2016. An agreement among dozens of entities, including Federation bodies, such as Ibama, ICMBio, ANA, state and municipal agencies, Samarco, Vale and BHP companies and representatives of the basin committee, established the guidelines on how the process would be developed.

The actions were divided into two main fronts. The first is the repair itself, aimed at reversing or decreasing the impacts caused by the dam failure - this includes tailings management, the reconstruction of villages, and indemnities. The second is compensation, to reimburse society for the general damage in people's lives - forest restoration, spring recovery and sanitation for the municipalities along the Doce River are some examples.

TTAC also established the Doce River recovery would be carried out by an autonomous organization, 100% dedicated to the activities of impacts repair and compensation. Thus, the Renova Foundation was created.

The Foundation is the entity responsible for mobilizing and carrying out the repair. It brings together technicians and specialists from different areas of knowledge, tens of socio-environmental and scientific knowledge entities from Brazil and the world, and today it adds up to about 7 thousand people (including its own collaborators and partners) working in the repair process, from Mariana to the Doce River mouth. More than 25 universities and 40 NGOs and partner institutions are also engaged.

It is a non-profit organization, structured in an unprecedented model of governance to repair damages caused by the Fundão dam failure.



TTAC is an innovative option to the conventional model of judicial solution of conflicts and defines the scope of work of the Renova Foundation, formed by 42 programs and projects which are under way from Mariana to the Doce River mouth.

These programs are divided into three main areas of integrated action.

People and communities

Land and water Tailings management, water provision, land use, forest restoration, biodiversity and assistance to animals

Reconstruction and infrastructure Resettlement, water and effluent treatment, urban infrastructure and accesses and tailings containment

Dialogue, registration, indemnities, fostering the economy, education and traditional and indigenous communities

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GOVERNANCE



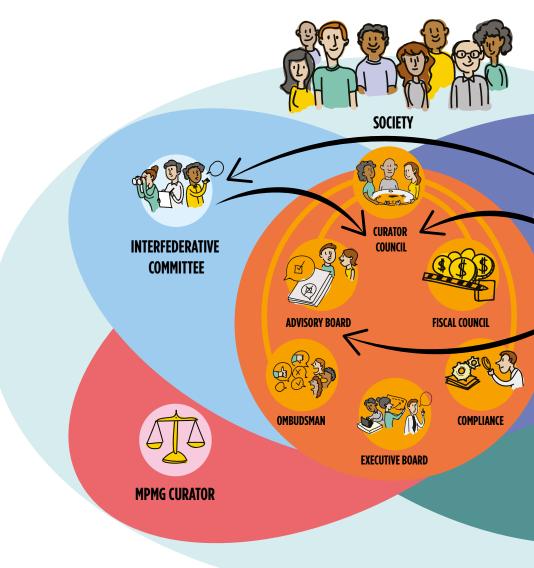
By establishing an organization exclusively dedicated to the repair process, a complex governance model was also created, with the presence of more than 70 entities. The answers to each challenge are obtained together, with no engaged party controlling the decision.

TTAC constituted the Interfederative Committee (CIF), a collegiate system that brings together representatives of public bodies and society and is led by Ibama. CIF operates as an external and independent instance of the Renova Foundation , with the function of guiding, following, monitoring and supervising the implementation of repair measures. It has 11 Technical Chambers - consultative bodies set up to assist its work.

In internal instances, the **Curator Board**, composed by representatives appointed by CIF and by Vale, BHP and Samarco companies, has the competence to approve plans, programs and projects which are proposed by the Executive Board of the Renova Foundation.

The **Advisory Board**, made up of affected communities' representatives, basin committees, Ibama and academic institutions, represents society within the Renova Foundation. Its role is to provide an opinion on plans, programs and projects, in addition to indicating proposals for solutions to the damage caused by the dam failure. On the other hand, the **Fiscal Board** is responsible for inspection activities, accountability and compliance of the finances.

Since the beginning, the Renova Foundation activities have been monitored by the Public Prosecutor's Office of Minas Gerais Foundations, which ensures the accomplishment of the goals and operation of this model of repair, hitherto unprecedented in Brazil.





IUCN INDEPENDENT PANEL



LOCAL COMMITTEES



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All repair actions carried out by the Renova Foundation are verified by an independent external audit, which ensures transparency in the monitoring and inspection of the investments made and the results achieved. It is a complex governance, with about 400 people participating in a collegiate process, with shared control between the various actors.

Externally, a panel was also created with the International Union for the Conservation of Nature and Natural Resources (IUCN) to monitor the evolution of the scientific components of the process as a whole.

TAC GOVERNANCE

In June 2018, a new commitment was signed, the TAC (Conduct Adjustment Term) Governance, which incorporated the participation of those affected in all instances of the repair decision-making processes, enhancing the collective solution building model. TAC Governance established the creation of regional chambers and local commissions, which are being organized with the support of independent technical advisors and will represent the affected communities. Representatives of these chambers and commissions will be part of the Interfederative Committee (CIF), the Curator Board and the Advisory Board of the Renova Foundation.

Within the system established by TAC Governance, the general ombudsman was hired by the end of 2019 with the mission of deepening the dialogue with those affected. Also, within the TAC Governance, an Observers Forum will be formed, an external body to the Renova Foundation which is composed by representatives of civil society, academy, peoples and traditional communities affected. The Forum will aim to monitor what is being done in the recovery of sites impacted by the dam failure, subsidizing the Public Prosecutor's Office of Foundations. Three questions about the TAC Governance

What has changed with the TAC Governance?

TAC Governance opened space for the direct participation of those affected in the decisions of the Foundation's repair actions. The affected people will now have a seat in all instances of Governance, including the CIF, Technical Chamber and the Curator Board.

In practice, what does that mean?

It means that communities will now have the right to vote and effective participation in decisions on the repair process. In other words, the participation of those affected goes to a higher level of power, which is deliberation. So far, those affected were entitled to the voice and its participation happened indirectly, either through the Advisory Board, in the structuring of some programs or organizations such as the Basin Committee. They will now also have the right to vote. The Renova Foundation welcomes the presence expansion of those affected in the governance system as a fundamental step towards greater community participation in the repair process, increasing the legitimacy of all their decisions and actions.

How will those affected indicate their representatives for the Renova Foundation governance?

Those affected will sovereignly choose the representatives of the 21 local commissions and six regional chambers that were also created by TAC Governance.

FIST STEPS

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The Integrated Register is the basis for recognizing the losses suffered by each individual. It is essential to create the database that defines the repair initiatives. Through this system, it becomes possible to characterize the extent of the impact for each person and to identify those affected and their material and economic losses. It is a comprehensive form that identifies material damage.

The completion is voluntary and the affected person may be accompanied by a lawyer or legal counsel.

EMERGENCY REGISTRATION

took over the process.

more than thousand registrations sent to the CIF, corresponding to

The Renova Foundation has listening, dialogue and social participation as guiding practices for its actions with the affected communities.

Engagement actions are fundamental for building the joint path. By December 2019, around 110 thousand people had attended collective dialogue meetings.

thousand meetings held

DIALOGUE

ASSISTANCE PEOPLE



attendees at the meetings

The Renova Foundation provides permanent channels of communication and interaction with society through fixed, virtual and toll-free call centers, which work to ensure that responses are provided within the established period, in accessible, appropriate and understandable language to interested parties.

information and service centers

about

Toll-free calls answered daily professionals involved in permanent interaction channels

more than

Ombudsman

To register complaints or reports of cases which have violated moral and ethical principles, the Renova Foundation has an Ombudsman. Transparency and respect for the protester's privacy are guaranteed. It also investigates allegations of misconduct, disrespect for human rights and non-compliance with laws and obligations.

7.779

registered manifestations

75% concluded manifestations

Soon after the 2015 dam failure, the emergency registration started and was carried out until May 2016, when the Renova Foundation



about

R\$

about



MARIANA

On July 24th, 2019, the first indemnity agreements were approved with 83 families affected in Mariana (MG). In November 2019, those affected were receiving final compensation. In the municipality, the payment of indemnities went through a process which was different from the rest of the impacted region, due to several factors, including the evaluation of Public Civil Action by the Public Ministry and the decisions of the affected people, who chose that the registration to be carried out by the Caritas Technical Advisor.

The Renova Foundation respected the decision of those affected that the registration should be carried out by Cáritas and, therefore, it did not initiate the process of indemnities payment in the region before an agreement under the Public Civil Action. The agreement was ratified by the Court of Justice of Minas Gerais (TJMG) and by the Judicial Center for the Resolution of Conflicts and Citizenship (Cejusc) in the Mariana district.

1.332 families registered in Mariana, 478 started negotiations with the Mediated Indemnity Program (PIM) until December 31st, 2019

319 negotiations have been completed

dossiers were delivered by the Technical Advisor to the **Renova Foundation until** December 31st, 2019



billion

financial aid

ousand

indemnities

people received

is the amount paid in indemnities and

INDEMNITY* *PAYMENTS CONCLUDED UNTIL DECEMBER 2019

Indemnity for directly affected people is a core task in the repair process. Until December 2019, R\$ 2,11 billion were allocated to the indemnity and emergency financial aid processes, which reached around 320 thousand people across the region impacted by the Fundão dam failure.

To create an alternative to a judicial process, the proposal for the Mediated Indemnity Program (PIM), a free voluntary membership program, was collectively developed.

PIM works on two indemnity fronts: Water Damage, for people who lived in cities and districts that had their water supply interrupted for more than 24 hours, and General Damage, aimed at people who lost their income or material goods.

It was necessary to develop guidelines and policies in order to repair those who are entitled to financial compensation considering the diversity of damages, the high informality and the individuality of each process. Fair indemnity presupposes knowing the extent of the damage and impact for each individual.

More than 500 professionals are distributed in 22 Mediated Indemnity Centers located throughout the impacted territory.

MEDIATED INDEMNITY PROGRAM - PIM

Water Damage

The Water Damage was aimed at all people who lived in cities and districts which had no water supply and distribution for more than 24 hours uninterrupted due to the Fundão dam failure, in November 2015.

- Scheduling: Contact for scheduling the presentation of indemnity proposals
- **Reimbursement:** People who lived in cities and districts that had their water supply interrupted for more than 24 hours, due to the dam failure
- **Proposals:** Simplified proof of impact proof of residence

R\$ million

is the amount paid in indemnities for water damage

of accepted proposals and payments made within 90 days after signing the conciliation term

General Damage

Integrated registration: Application of interviews and integrated form

Compensation: Moral damages, material damages and loss profits

Damage Matrix: Definition of a damage matrix set with more than a thousand items

Value criteria: The criteria of indemnity values for general damages were previously discussed with impacted communities, representatives of public authorities and technical entities. Indemnity is calculated individually for each affected party or group of affected parties and considers the particularities of each party.

46 paid in indemnities for general damage

R\$

indemnity processes paid R\$ paid in emergency financial aid

people served

EMERGENCY FINANCIAL AID

Renova Foundation pays a monthly emergency financial aid to more than 32 thousand people who have suffered a direct impact on their economic or productive activity due to the dam failure. The amount, previously discussed with representatives of the Public Ministry of Labor (MPT), public authorities and technical entities, corresponds to a current minimum wage, plus 20% for each of the dependents and increased by an amount equivalent to a basic basket (reference from Dieese).

FISHERMAN IN FACT

The highly informal environment that prevails in the territory affected by the Fundão dam tailings is one of the greatest challenges of the Renova Foundation for the payment of indemnities. To overcome the challenge, the Foundation listens to communities and experts in pursuit of developing solutions.

The Fisherman in Fact pilot project came in this context. The goal is to identify those who fished professionally, but did not have the professional document (General Fishing Registry - RGP) with the public authorities at the time of the dam failure. The Fisherman in Fact project candidate can take two professional fishermen, who are documented by the Federal Government, to be witnesses of his craft. In addition, the fisherman must answer a questionnaire and submit secondary documents or, in the absence of them, make a self-narrative of his/her "life story" as a fisherman.

The pilot project was implemented in Regência (ES), Povoação (ES) and Conselheiro Pena (MG). About 150 affected were considered eligible, who were directed to service by PIM. The next step is the Fisherman in Fact Project Expansion Plan in each one of the fishing communities along the Doce River channel and mouth.



HEALTH AND SOCIAL PROTECTION

ASSISTANCE HUMAN RIGHTS RESEARCH



Assistance to the affected people started immediately after the Fundão dam failure, with the premise of guaranteeing basic human rights - access to first aid, psychological support and assistance to the families of victims and of missing people, access to information, drinking water, housing and adequate food.

After the emergency period, efforts in the areas of Health and Social Protection were concentrated on supporting the public policies of the municipalities. Currently, about 70 professionals, including doctors, nurses, social workers and psychologists, work in Mariana and Barra Longa (MG) with the support of the Renova Foundation. Actions are also underway, such as structuring psychosocial care centers, building a Basic Health Unit (UBS) in the resettlements of Bento Rodrigues and Paracatu de Baixo and strengthening the medical care and health surveillance teams.

In 2019, the Renova Foundation released the Human Health Risk Assessment Consolidation Report (ARSH), which was conducted based on samples collected in rural areas of Mariana and Barra Longa. The report noted that:

the metals resulting from the rupture of the Fundão dam do not represent a toxicological risk to human health;

it is not necessary to limit agricultural activities or water consumption (with treatment);

there is no need to remove residents from the region.

Renova Foundation is entering into partnerships with the Minas Gerais State Research Support Foundation (Fapemig) and the Espírito Santo Research and Innovation Support Foundation (Fapes) to carry out new complementary studies, which will launch public notices and select the best proposals in the themes of Mental Health, Toxicology, Descriptive Epidemiology and Occupational Health. One of the goals of the Social Protection initiatives developed by the Renova Foundation is to support and strengthen the Public Policy on Social Assistance. In this sense, the Foundation offers financial education workshops for Social Assistance and Education professionals in Minas Gerais, in partnership with the Financial Education Association of Brazil (AEF-Brasil). In Espírito Santo, financial education workshops are offered in partnership with the Social Service of Industry (SESI-ES). In Mariana (MG), in addition to training for professionals, human resources, equipment, vehicles and playrooms were made available. In Barra Longa, training is offered to professionals and human resources are made available. Work plans and partnership terms are being finalized for other municipalities in the territory for actions to support public social assistance policy.

about



health professionals - including doctors, nurses, social workers, psychologists and others - work in Mariana and Barra Longa (MG) with support from the Renova Foundation



The effectiveness of the repair involves education and social protagonism initiatives. The actions start from the concept of Education for Revitalization, which connects different visions of the future, with the training of young leaders, educators, strengthening of networks and communities of practices.

The Education Program for the Revitalization of the Doce River Basin aims to engage communities in building solutions to improve the socioenvironmental quality of the affected territories, through articulation, mobilization, training and engagement of people. The projects start from territorial realities to engage communities to revitalize the affected areas, with the Environmental Education National Policy as a guideline, and will be implemented in the 39 affected municipalities.

The training of young leaders is at the forefront of the Renova Foundation strategies for education. The goal is to recognize young people as key players in the repair process of the Doce River Basin, through educational and socio-environmental development processes.

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YOUTH LEADERSHIP TRAINING

The Youth Leadership Training project is scheduled to start in February 2020. There will be three training cycles, which will include 1.200 young people between 15 and 29 years old, per cycle, totaling 3.600 young people. Each cycle is expected to last two years. The cycles will start first in Minas Gerais. For Espírito Santo, they are scheduled to start in the second semester.

In September, the first institutions selected by the Youth Leadership Training Notice - Cycle 1 were announced. Five partnerships have already been formalized and will operate from Mariana to the mouth:

- Popular Center for Culture and Development (CPCD).
- Geraldo Pelingeiro Abreu Foundation (FGPA).
- Integrated Center of Sustainable Development Studies and Programs (CIEDS).
- Minas Gerais Association of Agricultural Family Schools (Amefa).
- Lumiar Ambiental \cap

The young participants will go through the following training stages: project design and implementation, mobilization and selection, youth mapping and diagnosis, integration, design, implementation and finalization of the project.

Education for Revitalization

Front

Strengthening Networks and **Public Policies**

Training of Educators and **Experimental Schools**

WE ARE THE DOCE RIVER FUTURE

Training young leaders, capable of thinking about the future of the Doce River through initiatives in the areas of sustainable development, innovation and preservation and cultural rescue of the communities affected by the Fundão dam failure through education. This is the goal of the project "We are the Doce River Future", which was launched by the Renova Foundation in early 2018 in partnership with the Elos Institute.

The first cycle of the project, which began in 2018, had 90 young people from 22 municipalities selected to participate in educational and leadership training processes. There were 760 subscribers in total. After a year of work, the participants learned to develop environmental, cultural and educational projects and initiatives. Today, 23 projects are being implemented.

In Santa Cruz do Escalvado (MG), for example, a group of young people uses music to bring families closer to the countryside. In Mariana (MG), since March 2019, conversation roundtables stimulate the protagonism of black youth. In Aimorés (MG), spring recharge areas are being recovered with the action of local youth.

young people participated in training

projects carried out by young people at their communities

	Until 2028
d	135 mobilized institutions
	135 implemented projects
	135 educational collectives created
	7.380 trained educators
	1.388 experimental school
	projects supported

In Baixo Guandu (ES), Camila Miranda, 27, a graduate in Environmental Sanitation Technology and student of Agronomy, showcased a project that proposes to monitor the installation of the Sewage Treatment Station (ETE) planned to the municipality.

In 2020, the project enters its second cycle. About 150 young people from 24 municipalities will be selected. The selection process is under preparation, as well as the mapping of the profiles of young people aged 15 to 29 of these municipalities.

Three questions for Camila Miranda

What motivated you to engage in the project "We are the Doce **River Future**"?

I was already graduated in Environmental Sanitation when the project was launched. As I am from Baixo Guandu, I thought that, if I was chosen, I would make a project for the Sewage Treatment Station of Baixo Guandu, a construction that had stopped. I did the training with Elos Institute to learn how to deal with the community. And it was much more than I expected. I managed to embrace the feeling.

How is your project for Baixo Guandu?

I wanted a treatment plant in Baixo Guandu. When I realized that my feet were off the ground, because I wanted to make a project happen, I understood that what I could do was following-up as a population. I didn't want to represent any institution, I wanted to be part of the population, investigating what they would do. If the city had a project, how was the Renova Foundation's resources. In addition, I decided to do an awareness campaign with the population. And I also managed to do a sanitation forum. It was the first sanitation forum in Baixo Guandu. I managed to take public power, the population and the Renova Foundation. I was very interested in this meeting, so that

everyone could know what the city is doing and what Renova is going to do.

What did you expect with this initiative?

That the work would arouse the interest of the population. This interest, this desire to be engaged and to know that our city has this money and can have this work. I had a lot of support from everyone. More than a project, this is a purpose that I have for my life - working with sanitation, the environment and water resources. I think Baixo Guandu deserves to improve the quality of our water. This is the path. Read about sanitation programs on page 118.



Young people participate in the "We are the Doce River Future"





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FOSTERING THE LOCAL ECONOMY

EMPLOYMENT PARTNERSHIP RESEARCH DEVELOPMENT



*UNTIL DECEMBER 31ST, 2019

In addition to repair and compensation actions, the Foundation works to foster the local economy on three fronts: promoting the economic diversification of municipalities, especially those that rely on mining; encouraging mechanisms to stimulate the development of productive chains; and restoring productive capacity to micro and small companies.

The Renova Foundation encourages the hiring of local suppliers and labour and provides business credit through development funds.



7.84 billion*

is the amount mobilized in actions for repair and compensation



in ISSQN was the income from operations for city halls

6.272 total jobs generated by the **Renova Foundation**

> 53% of the professionals engaged are from the affected municipalities

The repair work carried out by the Renova Foundation maintains 6.272 direct and indirect jobs.

Of the total of generated jobs generated, 53% of the professionals engaged into the repair works are from the affected municipalities.

is R\$ 1,43 billion.



32

The amount of the contracts signed with local suppliers for the entire area where the Renova Foundation operates until December 2019

STATES

The Renova Foundation repair and compensation actions in Minas Gerais and Espírito Santo mobilized R\$ 7,84 billion up to December 2019.

MINAS GERAIS

35 impacted municipalities

R\$ 2,8 billion referring to 575 current contracts

R\$ 1,9 billion referring to 311 suppliers from Minas Gerais **ESPÍRITO SANTO**

4 impacted municipalities

about

R\$ 93,4 million referring to 68 current contracts

R\$ 46,3 million referring to 26 suppliers from Espirito Santo

MARIANA

Data until

December 2019

contracts signed by

with companies

from Mariana

billion

the Renova Foundation

is amount of these contracts

R\$

In August 2018, the Renova Foundation signed an agreement that prioritizes the hiring of labour and suppliers from companies in Mariana (MG) to carry out repair actions. With the term, Renova started to demand in the public notices and in the competition processes and bidding for the municipality the minimum hiring of 70% of local labor. The term was signed with the Mariana City Council, Metabase Union, Minas Gerais Integrated Development Institute (INDI), Mariana Service Providers and Equipment Rental Association (Ampla) and the Trade, Industrial and Agricultural Association (Acciam) of Mariana.

In July 2019, the Renova Foundation announced a package of approximately R\$ 100 million for Mariana, signed with the City Hall. The planned interventions focus on economic diversification (including tourism), infrastructure and sustainable development. Among the initiatives are the renovation of Gomes Freire square, one of the main references of the city for tourists and residents, and the reactivation of the dairy cooperative. Also included in the package are the renovation and expansion of the Child and Adolescent Psychosocial Care Center (CAPSij), the implementation of the Entrepreneur House and the acquisition of the necessary infrastructure and technical assistance to prepare the georeferencing and the Mariana Master Plan.

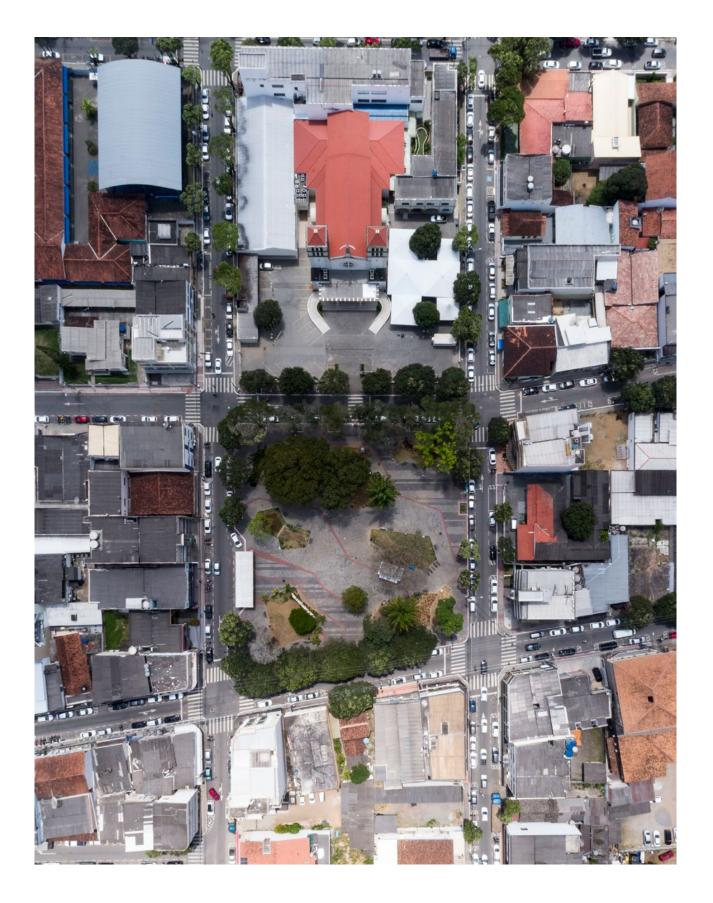
Hiring local companies also generates taxes. Until December 2019, the hiring generated R\$ 51,5 million in Services Tax (ISS) to the municipality.

R\$ 51,5 million was the ISS income for

of the workforce of these

contracts is from the city

the municipalities, being generated by the hiring of local companies



DESENVOLVE RIO DOCE FUND

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R\$ million approved for 1.299 companies

Launched in October 2017, in partnership with the Development Bank of Minas Gerais (BDMG) and the Development Bank of the State of Espírito Santo (Bandes), Desenvolve Rio Doce Fund is intended for micro and small companies in the impacted municipalities. The Fund approved credit lines for 1.299 companies, generating a disbursement of R\$ 37,9 million until December, 2019. Desenvolve Rio Doce offers more attractive conditions, for example, interest rates lower than the market average.

COMPETE RIO DOCE FUND

Launched in December, 2018, it is a credit line with attractive rates for micro and small companies that have some restrictions in control bodies and were left aside with no access to Desenvolve Rio Doce. Until August, 2019, the Compete Fund provided credit lines for 72 companies, which represented a sum of R\$ 3,056 million disbursed for these projects.



available for low cost working

capital for companies with no

access to formal credit

R\$

million

made available by the Diversifica Mariana Fund in order to attract companies from the most diverse segments to the city

DIVERSIFICA MARIANA FUND

Launched in May, 2018, with an amount of R\$ 55 million, it aims to attract companies from the most diverse segments to Mariana (MG) and reduce its dependence on mining activity. The subsidy model pays part of the interest rates charged on credit operations.

ENTREPRENEURSHIP IN RESETTLEMENTS

In order to stimulate entrepreneurship and the consequent financial independence of families which will be resettled in Bento Rodrigues, Paracatu de Baixo (Mariana-MG), Gesteira (Barra Longa-MG) and rural areas, Renova Foundation implemented the Innovating Futures Futuros project, executed in partnership with Criare Institute. In the second half of 2019, the first phase of the awareness project with the families of Bento Rodrigues (16 participants) and Paracatu de Baixo (eight participants) was performed based on topics of self-knowledge, life and career planning, entrepreneurship, among others.

The result of a market research carried out over the second half of 2019, which mapped the commercial potential of families and resettlements, will guide the works of the next phase of the two pioneer groups. From February, the participants of Bento Rodrigues and Paracatu de Baixo effectively begin to develop business and enterprise plans with individual monitoring by specialists.

PARTNERSHIP WITH BRAZILFOUNDATION

The partnership between the Renova Foundation and BrazilFoundation, which provides financial support and training for organizations linked to entrepreneurship, received 40 proposals in its second call. The candidates showcased projects aimed at developing their activities and fostering the social impact of their actions and the income of the families involved. BrazilFoundation is an international organization that has been operating independently for 18 years to mobilize resources, ideas and actions that contribute to promoting equality, social justice and opportunities.



Learn more about the partnership with BrazilFoundation

R\$

questions for

is the amount allocated to the projects selected for the second call of the partnership between Renova and BrazilFoundation

The first call, launched in December 2018, invested R\$ 739 thousand in the 13 selected projects. The Small Farmers Association of Km 14 of Mutum Preto (APROKM), district of Baixo Guandu (ES), was one of the 13 selected with the Health in the Basket project. The contract between them, BrazilFoundation and Renova was signed in April of that year. According to the president of APROKM, Arlene Ribeiro Milani da Silva, the partnership, which will last one year, will allow 58 participating producers to buy machinery and, thus, improve the quality of their products and obtain more market penetration.

Who are the participants in this partnership with BrazilFoundation? Three :

The 58 producers of the Small Producers Association at Km 14 Arlene da of Mutum Preto are participating in this partnership. They produce Silva everything: beans, eggs, flour, vegetables in general. Everything is organic.

How will the partnership between the Renova Foundation and BrazilFoundation contribute to improving the situation of these producers?

It is allowing the Association to purchase equipment that will improve our production. Right now, we're buying a car to help in delivery. It will also be important to facilitate the entry of these producers to the market. They are people who produced, for example, 50 kilos of cassava and had nowhere to sell everything. Now there will be. The producers are already prepared. They have already started to plant and prepare their products.

What is the most important in this partnership?

The appreciation of our product, which is organic, of very good quality. And the facilitation to sell.

PEPPER JELLY IN BENTO RODRIGUES

In Bento Rodrigues, Mariana district (Minas Gerais), a group of women rewrites their own history by resuming the tradition of producing the famous "Biquinho" pepper jelly. The failure of the Fundão dam in 2015 paralyzed the pepper jelly production activities of the Bento Rodrigues Fruits and Vegetables Association (Ahobero), which was in the process of expanding and generating income for Bento Rodrigues residents. With the help of the partnership with the NGO BrazilFoundation, the equipment was recovered, and the jelly producers have already returned to production in a rented space in Mariana. After the dam failure, the pepper jelly became a symbol of Bento Rodrigues. BrazilFoundaton's support allowed Ahobero to purchase jars, packaging and labels; adding more value to the production of spicy pepper jelly; achieving sufficient production to serve the existing public and reach new markets, increasing income for the nine associates and for 45 people indirectly.



BrazilFoundation's support allowed Ahobero to add more value to its production

TRAINING AND SUPPORTING ENTREPRENEURS

Residents and entrepreneurs of Linhares (headquarters), Regência and Povoação, at the mouth of the Doce River, in Espírito Santo, are qualifying to leverage and create new businesses in the districts impacted by the Fundão dam collapse. Qualification courses, technical assistance, consultancy, exchange of experiences and participation in events are among the main actions developed for the resumption of the local economy. Approximately R\$ 4 million were spent on initiatives at the mouth, through the Renova Foundation Economy and Innovation Program, which are diversifying the economy and strengthening local entrepreneurship. More than 700 people participated in the actions, including residents, entrepreneurs in the field of handcrafts, fishing and owners of restaurants, inns, camping and event spaces, which strengthens the tourist vocation of the region.

about **R\$**

million

disbursed in the initiatives at the mouth, through the Renova Foundation Economy and Innovation Program

more than **700**people participated
in the actions

40 thousand hectares is the forecast of the area to be recovered along the Doce River Basin

> about **3,5** tons of seeds will be incubated by the end of the year

> > approximately 50% demand will be met by the network

SEED PRODUCTIVE CHAIN

Renova Foundation is starting the Seed Network project to strengthen the environmental restoration production chain in the Doce River Basin, opening up social opportunities and gains in scale in this activity. The project, which is part of the Renova Foundation sustainable land use programs, has a partnership with the Northeast Research Center (Cepan). The Seed Network will be responsible for supplying at least 50% of the Renova Foundation demand for seeds and seedlings for reforestation actions and will supply inputs to other demanders. The project aims to identify, train and encourage strategic links in the production chain, such as seed collectors and seedling producers, opening an inclusive and participatory market for native species. This year, the Renova Foundation aims to incubate about 3,5 tons of seeds, with estimated expenses of R\$ 350 thousand. According to the director of Cepan, Severino Ribeiro, "the initiative can become a successful case of job and income generation and inclusion of people, acting directly on one of the main points for the scale gain of restoration projects, which is the social participation and longevity of these projects". In the future, the Network will function as a cooperative or autonomous association, stimulating other links in the productive chain of environmental restoration, such as, for example, the manufacture of bio-jewelry (seed necklaces). Read more about forest restoration programs in the Sustainable Land Use chapter.

BARRA LONGA AND REGÊNCIA EMBROIDERY

In Barra Longa (MG), embroiderers keep their art alive. The Minas Gerais Culture Association (ACG), with support from the Renova Foundation, has heated the local economy and generated income and opportunities for families. Participating in the project are women from the Mixed Rural Cooperative of Gesteira and the embroiderers group from Barra Longa known as "Meninas da Barra". The success of the embroiderers in Barra Longa led to a partnership with the stylist Ronaldo Fraga, who took the artisans' creations to the São Paulo Fashion Week 2018 parade. These pieces are now part of the São Paulo Museum of Art (MASP) collection. The Renova Foundation also supports embroiderers associations in the Regência community, in Linhares (ES). There are about 60 artisans, from the Craftsmen and Similars of Regência and Region Association (Arte). The agreement signed between Renova and the Association has the amount of R\$ 204 thousand and is expected to last for one year.

R\$ **4** thousand

is the value resulting from the agreement signed between Renova and the Craftsmen and Similars of Regência and **Region Association**

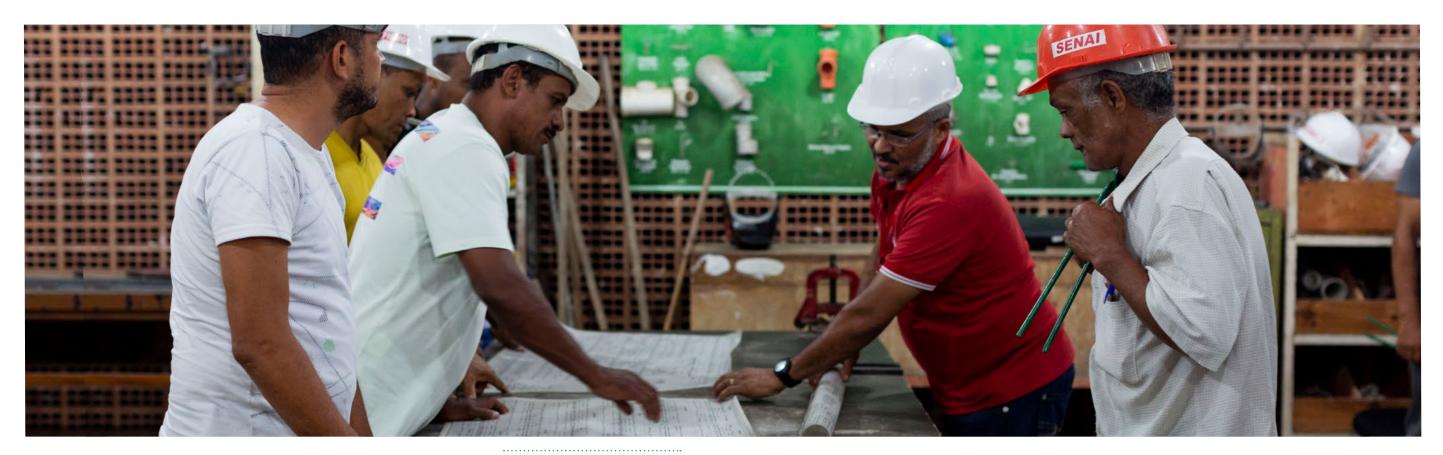
The funds are destined for the acquisition of inputs and the necessary equipment to produce the products, in addition to training courses.

ADOBE BRICK MADE WITH TAILINGS

There are two studies addressing the "sustainable use of iron ore from the dam tailings for the handmade manufacture of adobe bricks applied to housing construction", conducted by the Federal University of Ouro Preto (Ufop) and the Federal University of Lavras (Ufla). Adobe is a solid brick made basically of raw land and water, molded into a shape, in an artisanal or semi-industrial process. It is an ancient technique that was widely used at the Colonial Brazil history period, including in Mariana at the Gold Cycle peak.



Embroiderers from Regência receive 42 support for the purchase of inputs.



PARTNERSHIP WITH SENAI

The development and diversification of economic activities in the region affected by the failure of the Fundão dam are among the tasks of the Renova Foundation. The Foundation's partnership with the National Service of Industrial Learning (Senai), both in Minas Gerais and Espírito Santo, contributes to the training of labor and to attract projects and companies that can promote the development of communities.

Cities such as Mariana, Rio Doce and Governador Valadares, in Minas Gerais, and Regência and Povoação, in Espírito Santo, were contemplated with courses in bakery, confectionery, electrical installations and several other professional courses, including for artisans. In Mariana alone, there were more than 800 gualification vacancies.

Bricklayer course offered by SENAI and supported by the Renova Foundation

80 professional qualification vacancies in Mariana

A

Training in Regulatory Standard 10 (NR10), on safety at installations and services in electricity, and Regulatory Standard 18 (NR18), on working conditions and environment for the construction industry.

and Ceramic Tiles.

€₽

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2.300

people are enrolled in

the Renova Foundation

partnership courses between SENAI and

94 courses have been completed and another 30 are planned or in progress. The courses with the greatest demand are:

Qualification in Masonry bricklayer, Infrastructure

Qualification as a painter of real estate construction.

Qualification in Solid Waste Management.

Qualification as Electrician building installer.

Qualification as hydraulic plumber.

DOCE RIVER PUBLIC NOTICE

The Renova Foundation works to stimulate the tourist and cultural potential of the Doce River Basin, the mouth and the coast of Espírito Santo, with the aim of generating income for the local population. In addition to maintaining partnerships already signed, such as supporting the Regência stage of the Brazilian Surfing Circuit, the Renova Foundation wants to stimulate the growth of tourist activity throughout the region, in addition to sports, culture and leisure activities.

For that end, it launched two public notices: Doce Minas Gerais and Doce Espírito Santo, aiming to promote actions to improve the life quality of the municipality's populations through cultural, tourism, sports and leisure projects of individuals, micro-entrepreneurs, collectives and informal groups.

The Doce Minas Gerais public notice was launched on September 2019 and the registration was closed on November 8th. The judging

committee is evaluating the released by February.

Doce Minas Gerais public notice has a budget of R\$ 9 million to be distributed by the projects, which will serve 36 municipalities in Minas Gerais.

The Doce Espírito Santo public notice, published on January 8th, 2020, has the same goal as the Doce Minas Gerais public notice, but aimed exclusively at Espírito Santo. There will be ten municipalities contemplated, which will be able to register projects in the three axes (Tourism, Sports and Leisure, and Culture).

Doce Espírito Santo public notice has a maximum total budget of R\$ 4,5 million. Each of the three axes may receive up to R\$ 1,5 million.



.....

committee is evaluating the registered projects and the result shall be

TRADITION and DENHERY



TRADITIONAL AND INDIGENOUS COMMUNITIES

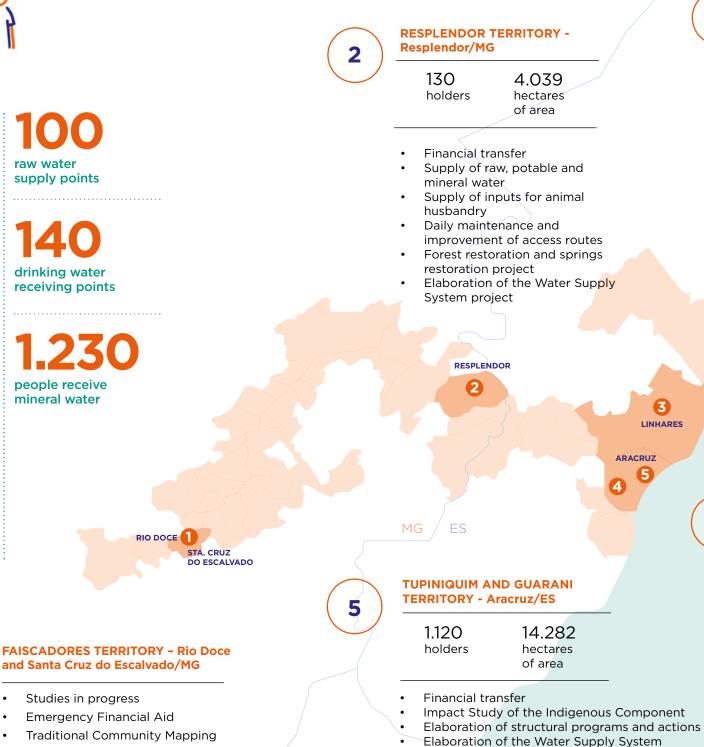
PEOPLE TRADITIONAL COMMUNITIES WATER

The actions to protect and restore the life quality of Indigenous Peoples and Traditional Communities aim to repair and compensate for the social, cultural, environmental and economic impacts in these communities in an integrated and participatory manner in accordance with the memories, traditions and realities of these families, which are an important part of the Doce River history.

The relationship with the territory, combined with the cultural differences of each group, offer specificities to their ways of life. Its territorial care and protection practices, as well as environmental management, guide the actions of the Renova Foundation, which respects the particularities of each of the five territories served and of more than 1.600 members.

Emergency actions are taken to reduce the vulnerability of the served groups, such as financial assistance, the supply of inputs for raising animals and the supply of raw, mineral and drinking water according to the specific needs of each territory.

This work is developed through partnerships with regulatory bodies and social agreements with involvement of the communities.



project

Study

3		BOLA DE DEGREDO RY - Linhares/ES	
	179 holde	ers hectares of area	
	SupplComrQuilo	gency Financial Aid ly of mineral water munication Plan mbola Impact Study pration of programs	,

- and structuring actions Water Supply System
- Project concluded



3

COMBOIOS TERRITORY -Aracruz/ES

192 holders

3.872 hectares of area

- Financial transfer
- Impact Study of the
- indigenous component
- Elaboration of structural programs and actions
- Elaboration of the Water Supply System project
- Flood Plan



TAILINGS MANAGEMENT



An important step on the repair path involves finding solutions to the tailings that have spread through the Doce River and its tributaries. To seek the best ways, Renova Foundation heard more than 80 specialists. And, based on everything which was exposed, it created the Tailings Management Plan in June 2017.

The plan divided the affected region, which covers 670 kilometres, in 17 stretches, from Mariana (MG) to Linhares (ES), at the mouth of the Doce River. Each one is evaluated according to specific indicators. Based on this detailed analysis, the solutions are defined and implemented with the principle of having the least impact on the environment and the surroundings, including communities.

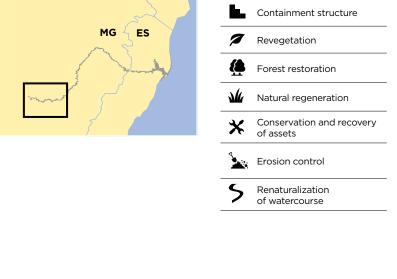
Stretch 1

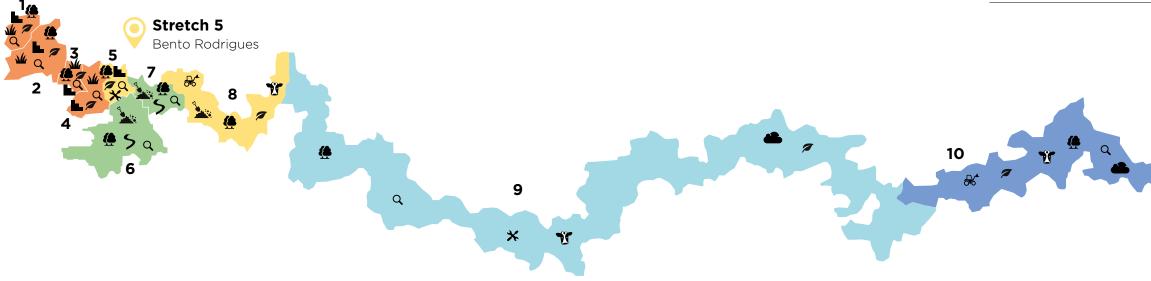
Mariana (MG)

Based on this principle, the Renova Foundation concluded that it would concentrate the actions to remove the tailings from Barra Longa (MG), the only municipality with an urban area directly affected by the mud, and from Risoleta Neves Hydroelectric Plant (Candonga). The other areas would receive environmental and social recovery actions.

11

M.





₽	Removal of tailings from the gutter
Q	Monitoring soil or sediment
Y	Resumption of productive/ agricultural activities in the tailings
	Emergency dikes
	Under definition
4	Atmospheric control and monitoring

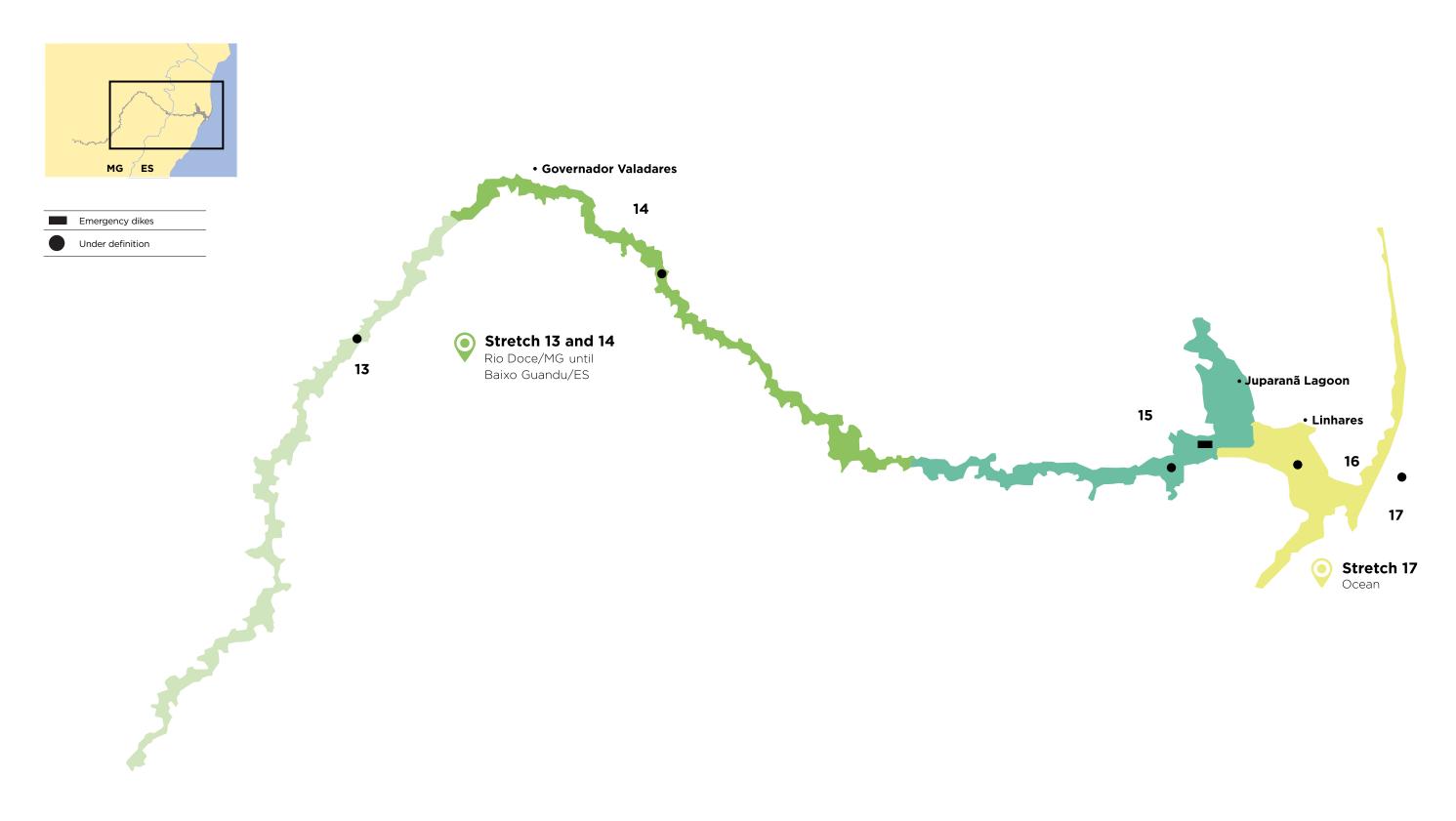
$\overset{55}{\sim}$

Stretch 12

Risoleta Neves

Hydroelectric Power Plant (Candonga)

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ACTIONS FOR REPAIR

WATER BIODIVERSITY RESEARCH SUSTAINABILITY

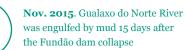


The repair actions were initiated shortly after the collapse, with the cleaning of the riverbeds and the stabilization of the riversides of the Gualaxo do Norte and Carmo Rivers, between Mariana and Santa Cruz do Escalvado, in Minas Gerais.

An emergency revegetation was carried out to avoid erosion and, in rainy periods, to avoid this material from going back to the river. The technique also allows the return of the organic matter that the soil needs to restore the vegetation of the riparian forest.

> The banksides were restructured using biodegradable blankets







Planting of fast-growing native species helped to combat erosion and prevent sludge from falling into the watercourse.







Aug. 2017. After the emergency stage, Gualaxo do Norte received other interventions such as the riparian forest process of restoration and the renaturalization technique

3

Aug. 2019. The Gualaxo do Norte River, which first suffered the environmental impact, responds to the actions carried out by the Renova Foundation



NATIVE SPECIES

On the banksides and plains of the Gualaxo do Norte River, vegetation is being recovered and enriched with native species

120 thousand seedlings of native species introduced in an area of 120 hectares

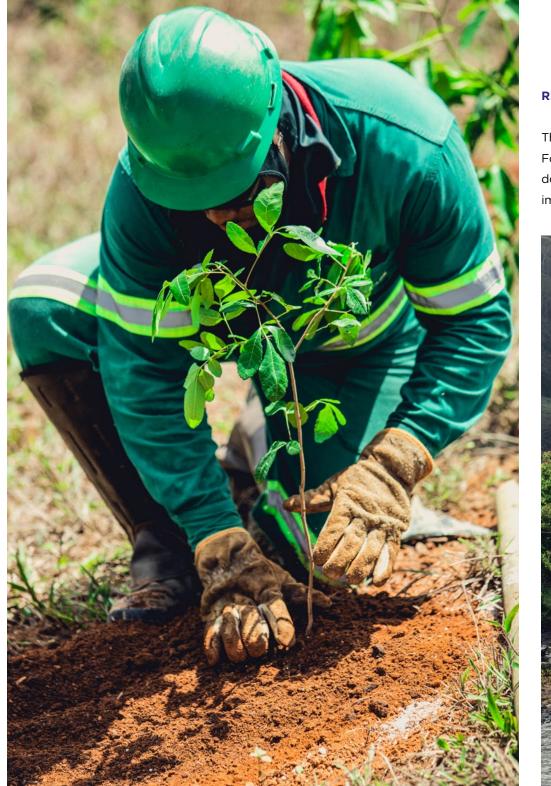
NATURAL TREATMENT

The Natural Treatment Station (ETN) uses technological solutions to achieve a better standard of water quality. Through the Renova Foundation Economy and Innovation Program, the unprecedented project is being developed by LiaMarinha, a startup from Mariana. ETN uses filtering barriers and islands of vegetation in the river gutter. These barriers are able to filter water and absorb metals.

With the sediment retained, the water that follows will reach the Doce River with more quality and with a lower turbidity index. The station will be deployed after environmental licensing and the first results related to water and biodiversity are expected for February 2021.

CAMARGOS WATERFALL

In response to the request of the Camargos community, district of Mariana (MG), the Renova Foundation will recover the local waterfall, which was used for leisure before the collapse. A series of meetings was held with residents so they could actively participate in each stage of the process until the conceptual project was approved. The forecast is that the recovery activities of the well and the waterfall surroundings to be completed by the end of the second half of 2020.



RESULTS

The results of the water quality monitoring carried out by the Renova Foundation on the Gualaxo do Norte River show that turbidity is decreasing every year when compared to the end of 2015, in the immediate post-collapse mapping, when turbidity was at its peak.



Reconformation

Actions were taken to prevent the mud accumulated on the outside of the rivers from falling into their riverbeds. Among them, the removal of tailings and the planting of fastgrowing native species to combat erosion

Blankets

In order to restructure the riverbanks, efforts were made to recover them as naturally as possible. For that end, it was placed blankets made with coconut fiber, biodegradable, which also hold seeds

Rockfill

Another solution adopted was the rockfill, which is to place stones along the riverbeds to avoid erosion in rain seasons. Bermalongas with natural fibers (wooden stakes) are used to stabilize the riverbeds



Re Afte vege

Emergency revegetation

Emergency revegetation was carried out with 41 thousand seedlings to avoid erosion and to bring back the organic matter that the soil needs to restore the vegetation of the riparian forest

THE RIVER ANSWERS

Monitoring

The data measured by the automatic stations are locally stored and sent to a database which is accessible by the public agencies that regulate and inspect the Brazilian waters. The results of the water quality monitoring carried out by the Renova Foundation on the Gualaxo do Norte River show that turbidity is decreasing every year, compared to the end of 2015, in the immediate post-collapse, when turbidity was at its peak.

6

Renaturalization

In order to promote the return of the aquatic ecosystem, the renaturalization technique was used, which creates backwater areas on the riverbank to make it difficult for the tailings to descend and minimizes turbidity

 $\overset{62}{\sim}$

Restoration of riparian forest

After the first stages of emergency planting of vegetation and riverbanks reconformation, in January 2018, the riparian forest process of restoration was started, with the planting of native tree species

RISOLETA NEVES HYDROELECTRIC PLANT



One of the areas most affected by the tailings is the region of the Risoleta Neves Hydroelectric Plant (known as "Candonga"), located on the edge of the municipalities of Doce River and Santa Cruz do Escalvado, in Minas Gerais. The plant played a key role in retaining more than 10 million cubic meters of tailings (a quarter of which leaked from Fundão), preventing them to follow the Doce River channel. Cleaning the reservoir is a complex operation that started in 2016. Providing the plant the conditions to resume its operation involves innovative and unprecedented engineering solutions.

To contain the tailings mud that could still arrive from Fundão, three metal bars were built inside the plant's reservoir, where they will be submerged after filling the reservoir.

> The cleaning of the plant's three turbines, called Energy Generating Units (UGE), is completed. This work involved the performance of divers who helped to identify and manually remove the debris that compromised the equipment operation.

The material is dredged and sent, with the support of two boosters sets (pumping station), to two cofferdams, where it is decanted. The liquid effluent is drained into sumps (small dikes) and then sent to basins, where it will be treated and filtered before being returned to the Doce River. With this method, the tailings are dry stacked. The material is accommodated at Floresta Farm, located three kilometres from the plant. Floresta Farm undergoes a series of interventions to receive this material in 2020.

¹ million m³

of material which was deposited on a 400 meter stretch in Candonga was removed The cleaning at this stage is inside the plant. Among employees and outsourced workforce, the operation has 35 people, in addition to vehicles, dredgers, pumps and other equipment. The works are expected to be completed in 2021.



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MONITORING WITH DRONES

One of the most effective technological practices for monitoring the areas affected by the Fundão dam collapse is the use of drones. Held since 2016, the central goal of applying this technology is to quantify changes in vegetation cover and map the improvement in the characteristics of the impacted areas, from Fundão to the region of the Risoleta Neves Hydroelectric Plant.

During different periods, drones capture images with high spatial resolution of the entire impacted region. These images serve as a visual monitoring to see the before, during and after the repair activities. Stretch of the Gualaxo do Norte River in Mariana (MG). Visual information helps to define the actions of the Renova Foundation in the region.

Its application goes beyond the visual: this material is sent to analysts in geographic information systems, which perform the interpretation of this content, resulting in mapping the use and vegetation cover of the soil.

The captured images generate quantitative data that make it possible to analyze the evolution of the impacted region. For each period, approximately 9.300 hectares are mapped, covering not only the area affected by the tailings, but also the surrounding rural properties, serving as a subsidy several Renova Foundation programs.



RECOVERY OF DEGRADED AREAS

WATER RESEARCH BIODIVERSITY

The recovery process of the areas impacted by the Fundão dam failure involved, at first, cleaning the gutters and stabilizing the riverbanks of the Gualaxo do Norte and Carmo Rivers, between Mariana and Santa Cruz do Escalvado (MG). In this stretch, the mud formed piles in narrower places, compromising the vegetation and the watercourses. To combat erosion and prevent the mud accumulated in the external part of the rivers from falling into the gutters, more than 800 hectares of fast-growing native species were planted in an emergency action.

In parallel, erosion control and riverbanks reconformation actions were carried out in an area of approximately 1.522 hectares equivalent to 1.500 soccer fields - through bioengineering works. Sediment retainers, bio-blankets, bamboo bundles, rows of stones are among the resources used according to the characteristics of each location. In the so-called flood plains (neighborhood of the riverbeds to the most distant point reached by the rivers in the floods), the drainage paths have been redone and the vegetation has been restored. This is a preparatory step for the restoration of the riparian forest - which protects the integrity of rivers - with the planting of native tree species. more than **800**hectares of
emergency planting

1.522

for erosion control

hectares received erosion control and riverbanks reconformation actions - equivalent to 1.500 soccer fields - through bioengineering works About 113 tributaries were recovered, which are small rivers that feed the Upper Doce River. These tributaries disappeared from the landscape after the Fundão dam failure and, therefore, had to be completely redesigned based on geoprocessing information. The water has good quality indexes and presence of fish

AGREEMENT WITH MST

In August 2019, an agreement was signed between the Renova Foundation and the Francisca Veras Training Center, an organization of Governador Valadares formed by settled families and mediated by the Landless Rural Workers Movement (MST). The agreement will enable the forest restoration of 180 hectares of Permanent Preservation and Water Recharge Areas (APP/ARH) in four settlements of Minas Gerais, located at Santa Maria do Suaçuí, Periquito, Campanário and Jampruca. The partnership will involve actions to mobilization, training and area fencing. The initial production forecast is about 285 thousand seedlings, among forest and agroforestry species, involving 200 families in the first moment. It is a pilot partnership for further future expansion in more than 340 hectares. The process is scheduled for conclusion on October 2020.



ACCELERATION OF BIODIVERSITY

A study led by Professor Maria Catarina Kasuya, a specialist in soil microbiology at the Federal University of Vicosa (UFV), proved that emergency revegetation, with the use of native species, accelerated the increase in the diversity of microorganisms in the soil. These microorganisms, properly isolated and in the form of substrate, allow the production of seedlings more quickly - which will support the work of the Renova Foundation in the reforestation process of the Doce River Basin. The initial results showed that this methodology can significantly reduce the time required for seedling production in the nursery.

> *Three questions* for Maria Catarina Kasuya

Right when the collapse happened, many people said that would not be possible to recover the environment. Is recovery possible?

Yes, recovery is possible. Our research shows that we can speed it up, too. I don't know if we will get the initial conditions. Most of the areas that were directly affected by the mud already showed degradation before the collapse. But there is a possibility that nature will return to what it was before.

In what stage is your work with the Renova Foundation?

We are in the stage of distributing the substrate inoculated with microorganisms for the production of seedlings to the nursery. We are going to train nursery workers and, at the same time, develop these seedlings in the nursery and in the field. It is an integrated work with the community.

Which stretch will be prioritized first?

We are developing, mainly, for the first stretch, the Upper Doce River, which was directly affected by the mud. But nothing prevents the use of these seedlings for any area.

Renova Foundation supports rural producers who were impacted by the tailings flow through the implementation of a sustainable and economic production model which is suitable to the local reality. Currently, 233 rural properties located in a stretch of 100 kilometres between the Fundão dam and the Risoleta Neves Hydroelectric Plant, are receiving actions to promote the resumption of their agricultural activities in a model which includes environmental recovery.

21 properties were selected as model farms and will house 25 Demonstrative Units (UDs), the result of a partnership between Renova Foundation, WRI Brasil, International Agroforestry Research Center (ICRAF) and Ecological Farm. They will be models of silviculture of native species, management of ecological pasture and agroforestry systems.

hectares of paddocks for sustainable livestock management little dams built to store rainwater



To implement the recovery actions, the Renova Foundation teams adopt a systemic view on rural property, considering the productive activity, but also the need to work on environmental adequacy according to the norms of the Brazilian legislation. Therefore, the work is broader than the damage direct repair from where the tailings went. Among the solutions are the rational management of pastures with the improvement of the food quality for cattle breeding, the use and conservation of the soil with the construction of little dams (reservoirs to collect rainwater) in the pasture areas, the adequacy and improvement of rural structures and the installation of systems for the domestic sewage treatment.



To foster the actions integration, joint solutions were built with entities such as the Technical Assistance and Rural Extension Company of the Minas Gerais State (Emater-MG), the Agricultural Research Corporation of Minas de Gerais (Epamig) and the Federal University of Viçosa (UFV). Rural producer receiving technical support from the Renova Foundation Approximately 594 hectares of impacted rural productive areas will be recovered. Another 2.559 hectares located in regions that have not been impacted (four times the extent of sites with tailings deposits) will be upgraded, expanding the region's economic and environmental sustainability chain.



Productive Environmental Zoning (ZAP) of the Gualaxo do Norte River Basin and Carmo

do Norte River Basin and Carm River micro basin - concluded Properties diagnosed using the Sustainability Indicator in Agrosystems (ISA): concluded - more than 4 thousand indexes evaluated

Rural Environmental Registry (CAR): mandatory national registration for all rural properties, in order to integrate the environmental information of rural properties



Socioeconomic and Environmental Adequacy Plans (PASEAs) for rural properties for productive purposes. In progress

Environmental Regularization Program (PRA), in compliance with the New Brazilian Forest Code. In progress

Sávio do

Carmo, rural

the community

municipality of

producer in

of Chopotó,

Ponte Nova

SOCIOECONOMIC AND ENVIRONMENTAL ADEQUACY PLAN (PASEA)



WATER SUSTAINABILITY REPAIR

In September 2019, technicians from the Renova Foundation began visiting 168 rural producers to deliver individual recovery plans for each property, within the Socioeconomic and Environmental Adequacy Plan (PASEA). The properties had detailed action plans the Executive PASEAs, which bring personalized actions to each one of the 168 producers.

The delivery process started in the cities of Ponte Nova, Rio Doce, Santa Cruz do Escalvado, Mariana and Barra Longa. At the feedback session, a booklet about the PASEA is handed to the producer and the actions that have already been taken to recover the property are showcased, in addition to those that are yet to come.

PASEA goal is to promote environmental adequacy, recovery of springs, degraded pastures and legal reserves, adequacy and improvement of rural structures such as barns and pigsties, installation of systems for the domestic sewage treatment, among other measures.

PASEA was developed through technical visits followed by the producers, to support them in the decision making regarding the planning, adaptation and regularization of their properties in line with the developed rural activities. About 200 producers agreed to participate in the initiative. The tool was created by the Secretary of Agriculture, Livestock and Supply of Minas Gerais (Seapa) and put into practice through a partnership between the Technical Assistance and Rural Extension Company of Minas Gerais (Emater-MG) and the Renova Foundation.

The actions have been taking place since 2017 and, until 2021, new activities will be carried out. In addition, producers will receive Technical Assistance and Rural Extension (ATER) until 2023. In all, 235 properties between Fundão and the Risoleta Neves Hydroelectric Plant (Candonga) are eligible for PASEA.

is the number of rural properties that have received detailed action plans within PASEA

INITIATORS

PASEA was preceded by the elaboration and/or rectification of the Rural Environmental Registry (CAR), the performance of diagnoses through the application of the Productive Environmental Zoning (ZAP) methodologies and Agro-ecosystem Sustainability Indicators (ISA), the latter applied between 2017 and 2018 through field visit, collection and analysis of soil and water, and application of a questionnaire that evaluated 21 indicators in each property, detailing the social, economic and environmental characteristics, such as the level of training of workers and productivity. The focus of the program will be to reach the ISA sustainability threshold (0.7) with a reassessment every two years to review action plans and monitoring families through Technical Assistance and Rural Extension (ATER) technicians.

Two questionsDo you believe that Pasea will improve your property and productionfor Ricardoprocesses?

Yes. It will get better because, after this plan, we will have to take better care of everything inside the property. We will have to keep doing, for example, the fencing of springs, keep renovating the fences. We have to understand that, after the improvements are concluded, we cannot let them go bad. We performed a lot of enhancements and it was a big help to us.

What has changed on your property?

Renova Foundation designed the little dams to hold rainwater, and this will help a lot. Prior to that, the water went downstream, opening a crater until it reached the river. Now, the water is trapped inside the little dam. The trees the Renova Foundation plants on the riverbanks will establish the soil, and that is also a good thing. The Renova Foundation conversations are very productive. They provide us the ideas, we think it is good and implement it, like planting more trees near the springs. I believe that if everyone works and plays its role, it can't go wrong.

TECHNICAL ASSISTANCE AND RURAL EXTENSION (ATER)

WATER SUSTAINABILITY ASSISTANCE

During the entire process of rural properties' integrated repair, Technical Assistance and Rural Extension (ATER) services will be provided to resume agricultural activities. The first 5.6 thousand hours of assistance were carried out by Renova Foundation teams on rural properties reached between January 2017 and August 2019.

The goal is to promote the conservation of natural resources, sustainable production practices and direct support to families in the management of property and products commercialization, complementing the integrated vision of the Socioeconomic and Environmental Adequacy Plans (PASEAs) built in a medium and long-term perspective.

In September 2019, the works between Mariana and Rio Doce were initiated. The forecast is to close in 2023 with 210 families served. Between Rio Doce and Linhares (ES) technical assistance services will also be provided from 2020, until at least 2023.

The entities are selected through public notices giving prioritizing to local institutions. In order to strengthen ATER, partnerships are also established with relevant actors on the topic, such as Emater (Company of Technical Assistance and Rural Extension of the State of Minas Gerais), Federal University of Vicosa and state secretariats of agriculture.



Renova Rebanho is one of the projects that combines artificial insemination technology with management techniques in the properties participating of the repair actions. Until December 2019, 194 visits were conducted to rural properties located in Mariana, Barra Longa, Ponte Nova, Santa Cruz do Escalvado, Acaiaca and Rio Doce, Minas Gerais. More than 1.000 animals have been inseminated.



hours of Technical Assistance and Rural Extension (ATER) were carried out until December 2019

about

in the initiative

rural producers participating



In September 2019, the first phase was initiated of the recovery planting for 40 thousand hectares of Permanent Preservation Areas (APPs) and water recharge in the Doce River Basin, located in Minas Gerais and Espírito Santo. The initial action foresees planting in 800 hectares or 800 soccer fields, which is equivalent to five times the area of Ibirapuera Park, in São Paulo, one of the largest urban parks in the country.

The forest restoration program is considered one of the largest ever carried out in a hydrographic basin in the world and will have investments of around R\$ 1.1 billion.

This phase is expected to be conducted until February 2020, during the rainy season. The municipalities of Governador Valadares, Coimbra, Periquito and Galileia, in Minas Gerais, will be contemplated; and Colatina, Marilândia and Pancas, in Espírito Santo. Around 800 thousand seedlings of Atlantic Forest species will be used. The seedlings were produced in partnership with 10 nurseries in the upper, middle and lower part of the Doce River Basin.

The measure is part of the scope of the compensatory actions taken by the entity, since the area to be restored was not directly affected by the tailings. The entire reforestation of the 40 thousand hectares will last for 10 years. The action cost is expected to reach R\$ 1.1 billion.

Renova Foundation mobilized rural producers and communities to work on these first hectares of planting. The initiative is part a partnership with the World Wildlife Fund Brasil (WWF-Brazil), which developed a large-scale forest recovery project specific to the Doce River Basin.

Seedling planting began in September in thousand regions where the streams supplying the hectares with Doce River Basin are born. direct planting of 20 million seedlings thousand Planting of seedlings of Atlantic Forest species near hectares to be the Gualaxo River recovered in 10 years **30**thousand hectares by conducting of natural regeneration Learn more about of the areas forest restoration

The UGR is a working group that aims to contribute to the expansion of the institutional performance of the Renova Foundation. The proposal is to strengthen the dialogue between the Foundation and rural producers located in the Doce River Basin, in order to increase the capillarity of the forest restoration program. The group is made up of representatives from various agencies in the areas of agriculture and the environment of the governments of Minas Gerais and Espírito Santo, in addition to the Doce River Basins Committee, Ibama, Forest Restoration Technical Chamber and federations of Espírito Santo and Minas Gerais workers and farmers. The main points handled by the UGR are Payment for Environmental Services (PSA) in the basin (see page 84), forest restoration and spring recovery programs, in addition to the dissemination, access and engagement strategies of the rural producer to the socio-environmental initiatives which are being developed. UGR will be divided into local units, or subgroups, working together with affluent committees - institutional working groups gathered along the Doce River Basin, in conjunction with local governments, associations and unions.



REGIONAL MANAGEMENT UNIT (UGR)

SPRING RECOVERY



Springs have a fundamental environmental role in the recovery of a river and even of a watershed. If they are preserved, there are good chances of restoring degraded areas, not only rescuing terrestrial and aquatic biota, but also guaranteeing the quality of the water collected for supply and consumption.

The Spring Recovery Program, which is in its third year, aims to recover 5 thousand springs in 10 years, through the planting of seedlings and natural regeneration. The infiltration of water in the soil and drainage improve the health of the water in the river, and planting, by providing the soil with enough conditions to retain rainwater, protect the sources and favor forest regeneration.

- In the first stage of work, the Renova Foundation teams make a diagnosis and provide fencing to protect the springs.
- Subsequently, they undergo planting and maintenance to ensure preservation, and begin to be monitored.

This work front mobilizes, engages and qualifies rural producers so they act with the springs' recovery. The goal is to support the technical recovery while adapting the properties for the environment aspects, incorporating the best socio-environmental practices for agriculture, forestry and livestock.

In 2019, of the 500 springs planned to be recovered, 350 are in Minas Gerais (100 in the Piranga basin and 250 in the Suaçuí basin) and 150 in Espírito Santo. In Minas, properties in the cities of Sabinópolis, Virginópolis, Guanhães, Governador Valadares (districts of São Vítor, Penha do Cassiano and Córrego dos Melquíades), Resplendor and Ponte Nova will receive project actions. In Espírito Santo, the selected locations are Marilândia, Colatina and Linhares. 1.554 springs in

recovery process

571 hectares under recovery

> 272 kilometres of fence

450 rural producers participating

1 million

of seedlings were produced to be used in the springs' recovery



PAYMENT FOR ENVIRONMENTAL SERVICES (PSA)



COMPENSATION DEVELOPMENT PAYMENT

Payment for Environmental Services (PSA) was the chosen tool by the Renova Foundation to support and encourage the recovery of 40 thousand hectares of Permanent Preservation Areas (APPs) and 5 thousand springs in the Doce River Basin, over a 10-year period.

The core idea of the PSA is to remunerate conservation and restoration actions. The lawsuit is defended by the National Water Agency (ANA), according to which the rural producer deserves to receive financial compensation when they adopt measures that protect springs and water sources on their properties.

The rural owner or holder will be responsible for maintaining the areas covered by the program for a period of five years. The public notice predicts the producer also plants native forest species and implement soil and water conservation projects in productive areas.

In July 2018, the first PSA public notice was launched. The 270 owners who signed up were eligible for the program (see on the next page).

Between August 5th, 2019 and January 1st, 2020, Renova issued a second notice for rural producers' adhesion to the Forest Restoration Program. In addition to the payment of PSA, this public notice included support in the CAR registration, construction of water fountains or provision of an exclusive livestock area. Its goal is to recover 500 springs in the Pontões, Suaçuí and Piranga basins between the years 2019 and 2020; and a thousand hectares of degraded areas located within Permanent Preservation Areas (APPs) or Water Recharge Areas identified as priorities in the Manhuaçu and Guandu river basins. In the coming years, other public notices will be launched to contemplate different basins important for the recovery of the Doce River.



Check how the Renova Foundation's Payment for Environmental Services (PSA) works



FIRST PAYMENTS

In late November 2019, the first payments were carried out to producers who joined the PSA. Payments are made according to the size of the area available for forest restoration. The amount of R\$ 252 hectare/year will be transferred to each rural producer. If the producer makes one hectare available for restoration, he will receive R\$ 252 per year for five years; if another producer makes four hectares available, he will receive R\$ 1.008 per year for five years. The total transfer of R\$ 1 million is estimated by the end of the contracts. The Forest Inventory, in progress, will map and assess biodiversity in the Doce River Basin region using cutting-edge technology









FOREST INVENTORY

Renova Foundation is carrying out a study called Forest Inventory which assesses the biodiversity of flora, soil conditions and the landscape in the areas of springs, riverbanks and water recharge in the Doce River Basin. Data such as tree height, diameter and species types are mapped, creating parameters which will allow the analysis of the structure, composition and vitality of forests. Botanical and soil collections, tree measurements, and interviews with residents and farmers are conducted. The trees evaluated are marked with plates and their information will be filed by QR Code. The goal is to create reference ecosystems to guide restoration actions. From these analyses, forest restoration indicators and subsidies for the formulation of public policies will be generated, which aim the sustainable use, recovery, and conservation of forest resources.

PACT FOR THE ATLANTIC FOREST

In 2019, a partnership was consolidated between the Renova Foundation and the Pact for the Restoration of the Atlantic Forest (pactomataatlantica.org.br). The pact is made up of organizations which work at the Atlantic Forest with the goal of making the restoration of 15 million hectares possible by 2050, improving forest restoration techniques and disseminating the actions developed throughout the region, through the coordination and integration of efforts and actions of its more than 260 members. In order to establish sustainable and economically viable landscapes, the partnership agreed between the Renova Foundation and the Pact for the Atlantic Forest foresees that all forest restoration actions carried out by the Foundation in the biome make part of the Pact's initiatives. The adhesion to the partnership will not involve financial resources and foresees the construction of reports on the areas restored by the Renova Foundation, contributing to the fulfillment of the joint goal.



WATER MANAGEMENT

WATER BIODIVERSITY



million

physical, chemical and

assessed for the water

biological parameters are

parameters are evaluated

in the sediments

of data generated

annually

The Doce River is now the most monitored in Brazil. And the more than 3 million data generated annually by the major monitoring program in the country - Systematic Qualitative and Quantitative Monitoring Program (PMQQS) - show that the conditions of the basin are today the same as before the dam failure. The comparison is possible because, previously, the water quality was analyzed by the Minas Gerais Water Management Institute (Igam), which started monitoring in 1997.

The same data that allow us to affirm the water from the Doce River is in similar conditions to those before the collapse ensure that it can be consumed after going through conventional treatment in the municipal supply systems. The water quality is analyzed before and after passing through the Water Treatment Plants (ETAs). The verification, which is the responsibility of the local concessionaires, takes place in more than 300 points spread over 30 municipalities before the water is distributed to the population.

PMQQS was implemented on July 31st, 2017 and is expected to last 10 years. The program makes an extensive and detailed monitoring, in real time, of the impacted water courses conditions.

> The collected data show that the basin conditions are today the same as before the collapse

The goal is to monitor the evolution of water quality parameters in 92 points, from Mariana (MG) to the mouth, in Linhares (ES), over time. Twenty-two automatic stations transmit daily data, including subsidizing the preventive planning of basin supply systems. 92 points being monitored in impacted watercourses:

56 points in the basin from the dam's dikes in Mariana to the mouth of the river, including lagoons in Espírito Santo

36

points on the coast from the Espírito Santo north coast to the south of Bahia

> 22 points with automatic stations



The information is stored in a database and shared with environmental agencies. Since March 2019, the data has also been made available on the Renova Foundation website. Five bodies participate in this work, through a Technical Monitoring Group (GTA): National Water Agency (ANA), Brazilian Institute for the Environment and Renewable Natural Resources (Ibama), Chico Mendes Institute for Biodiversity Conservation (ICMBio), Minas Gerais Water Management Institute (Igam) and Espírito Santo State Water Resources Agency (Agerh).

GATÃO DO MAR

One of the ways to monitor water quality on the coast is through a specialized vessel called "Gatão do Mar". Developed to act in the survey of geochemical, physical-chemical and biological data, the vessel has a structure that allows the use of fundamental equipment for data acquisition and water and sediment quality analysis.

Every month, the oceanographers and analysts of the Socio-Environmental Program of the Renova Foundation spend six days at sea and, during the trip of approximately 350 km, from the north coast of Espírito Santo to the south coast of Bahia, use probes and dredgers to measure and collect water samples, sediments, algae, plankton, fish, corals, beach sand and invertebrates, which are sent for analysis laboratory.

The action is also part of the Systematic Qualitative and Quantitative Monitoring Program (PMQQS).

MG ES

Ο

X-RAY OF RIO DOCE BASIN MONITORING

It all starts in the laboratory, preparing materials for the field trip



1ST

Water samples are collected every month at 56 points in the Doce River basin and at 36 points in the coastal zone



Fundão

92

Every 3 months, sediments deposited on the bottom of the river and lagoons are collected to check if there has been a change in the characteristics of the sediment, which may have an impact on the ecosystem



Ο

In the field, samples are recorded and detailed with source information: location of collection, weather of the day, electrical conductivity and other characteristics

After registration, samples

boxes and transported to

In the laboratory, chemical,

parameters are evaluated

physical and biological

are stored in Styrofoam

the laboratory

Governador Valadares

0

Ο

5[™]



For water samples, 80 parameters are evaluated; for sediment sample, 40 parameters

8тн

Ο

Among the analyses, is the one of bioindicators, which assesses the behavior of the organisms that make up aquatic communities (algae, earthworms, snails). The presence of these animals may indicate that a given ecosystem has good environmental quality

9тн

10TH

22 automatic monitoring stations

Ο

generate information in real time and act as an alert system for issues that may interfere in the public water supply

The monitoring set forms an extensive database and all this information is shared with public bodies such as the State Institute of Environment and Water Resources, Minas Gerais Water Management Institute, Ibama, ICMBio, Espírito Santo State Water **Resources Agency**

ndonga

Ο

 \bigcirc

670 km o^{f river} affected

ES





 (\mathbf{O})

(O)

Check how the Doce River Basin monitoring works

92 monitoring points in total, including rivers, lagoons and the coast of Espírito Santo



(O)

Ο



Ο

Reports on water status are available on the website of the National Water Agency, the Interfederative Committee and the Renova Foundation

93





Renova Foundation operates on two fronts for the biodiversity actions, both focused on providing subsidies for decision-making on actions for environmental preservation - these are studies of terrestrial flora and fauna and the Doce River aquatic biota and marine monitoring. More than 30 educational, research, business and NGO institutions are partners of the Renova Foundation in these projects and mobilize a team of approximately 800 professionals.

From the result of this joint work, guidelines will be established for the preservation of the ecosystem along the Doce River on the impacted stretch, including the mouth and coastal zone of Espírito Santo, subsidies for assessing the consumption of fish in the diet and analyses of the clearance of fishing of native species with no threats to the local fauna, among others. The joint analysis of the collected data will also serve as subsidies for forest restoration since it will provide inputs to define areas for restoring forests.

Wild Fauna Recovery

Another work front will act on the construction and equipping of two Wild Animal Screening and Rehabilitation Centers, one in Minas Gerais and another one in Espírito Santo. After the deliveries, the Renova Foundation will maintain the spaces for a period of three years.



Discover the work performed by the researchers at Doce River State Park.



Researchers monitor fauna and flora in the Doce River State Park (MG)



TERRESTRIAL FAUNA AND FLORA

The monitoring will detect the residual metals levels in vertebrates and invertebrates, in the terrestrial flora, in the river islands and in the soil along the Doce River. The study is mapping land use and occupation, helping to identify the distribution and situation of forest remnants in the area.

INVESTIGATED ORGANISMS

Vertebrates

Amphibians: frogs ar <u></u> tree frogs

å

Reptiles: lizards, sna turtles and broad-sno caiman

Birds: all groups, with attention to migrator

2:2

Small mammals: rats, bats (excellent indica of environmental qua especially from forest

Big mammals: foxes,

Rapeld Method

The method foresees the division of the land into plots, something like trails of 250 meters, and of transects, delimitations that vary from one kilometre to five kilometres, to collect data on species of plants and animals.

94

	Plants			
nd	₩	Several		
kes,	Invertebrates			
outed	8	Earthworms		
	Ř	Beetles		
h special ry birds	Ŷ	Butterflies		
s, skunks,	SE	Dragonflies		
ators ality,	\Diamond	Trichopteran insects		
sts)	濲	Ephemeris (very short life cycle)		
, tapirs,	'			

jaguars, ocelots and primates

AQUATIC AND MARINE BIOTA MONITORING



Partnership with the Espírito Santo Technology Foundation (FEST) and the Federal University of Espírito Santo (Ufes) for monitoring aquatic biodiversity in the Espírito Santo portion of the Doce River, mouth, estuary and coastal and marine regions

The results of the study will help to measure the impacts of the tailings on the environment and will be able to provide subsidies for the decision making on the quality of the fish and indicate eventual remedial measures

200 monitoring points

30

educational and research institutions, companies and NGOs

526

professionals

16 months was the duration of the 1st monitoring phase

43thousand

data collection on water, sediment, animals and plants

DOCE RIVER AND OCEAN NETWORK

In September 2018, Renova Foundation signed a Technical-Scientific and Financial Cooperation Agreement with the Espírito Santo Technology Foundation (Fest) and the Federal University of Espírito Santo (Ufes) to fund the research project of the Doce River and Ocean Network.

The Rio Doce Ocean Network, an academic collaborative network formed by researchers from 27 institutions across the country with the central coordination of Ufes, monitors physical and chemical aspects of the environments and biodiversity at around 200 points throughout the entire Espírito Santo portion of the Doce River and in the estuarine, coastal and marine regions, which comprise the mouth surroundings and the area that runs from Guarapari (ES) to Porto Seguro (BA). In total, the work mobilizes 526 people.

In the study, drones, aircraft and small, medium and large vessels are used. In addition, there are sensors of different types, satellite images and automated floats always equipped with specific instruments for this type of monitoring.

This is a large and complex study, with collections and analyzes from microorganisms to whales, and which is configured as a reference - in addition to being comprehensive, it integrates the knowledge of the river and marine environment, fundamental for the Doce River recovery. For this reason, the initiative can serve as a model for other basins in the country that are in a process of constant degradation and risk.

Sea turtles in a tank at ICMbio, in

partnership with the Tamar Project

CONSERVATION UNITS

Also, as part of biodiversity actions, studies are underway to identify impacts on 40 Conservation Units (UCs) - natural areas subject to protection legally instituted by the government - that may have been directly or indirectly affected by the dam collapse. Partners were hired to carry out this diagnosis and measure any physical, biological and socioeconomic impacts, in order to support the remedial measures which are indicated as necessary.

The 40 Conservation Units undergo assessment and impact studies. As compensatory measures, the Renova Foundation will fund actions to consolidate two Conservation Units - the Doce River State Park (MG) and the Santa Cruz Wildlife Refuge (ES). The construction of the headquarters and the preparation and execution of the Management Plan for the new Environmental Protection Area (APA) at the mouth of the Doce River (ES), which will be created by the Federal Government, are also planned.

Research support

The Renova Foundation signed a Cooperation Agreement with the Minas Gerais State Research Support Foundation (Fapemig) for the issue of a public notice for the selection of projects focused on research, development, and innovation, for monitoring the biodiversity of Minas Gerais aquatic environments in areas impacted by the Fundão dam collapse. The public notice, with wide competition, will select projects for six thematic lines of research: biogeochemical processes; sediment dynamics and hydrogeomorphology; aquatic biota (habitat structure); aquatic biota (communities, populations and bio invasion); ecotoxicity and riparian forests.

SEA TURTLE

An important parameter to assess biodiversity in the region of the Doce River mouth, the spawning of sea turtles, which takes place on the Espírito Santo coast, is monitored by the Pro-Tamar Foundation. The region is one of the main turtle spawning hotspots in the country.

In order to assess the impacts of the tailings which reached the sea, transported by the Doce River, the Renova Foundation and the Pró-Tamar Foundation are conducting a project to monitor the reproductive behavior of turtles in an area of 159 kilometres of shore in Espírito Santo, from Aracruz to Conceição da Barra. Spawning events are strictly registered to identify any change in the animal's reproductive pattern, which has become a symbol of preservation in the region.

Within the monitored region, the highest concentration of nests occurs on both banks adjacent to the mouth of the Doce River, on the shores of Comboios and Povoação. The study is carried out throughout the year and reinforced during the turtle spawning phase, from September to March.

Among the monitored places are areas such as Comboios Biological Reserve, Comboios Indigenous Land, Povoação, Monsarás, Cacimbas, Ipiranga, Ipiranguinha, Pontal do Ipiranga, Barra Seca/Urussuquara, Campo Grande, Barra Nova and Guriri. The activities use the Pro-Tamar Foundation protocols to mobilize local labor - fishermen and traditional residents of the coast - for the detection and monitoring of females, nests and baby turtles, considering the knowledge of the population.

Due to the sea turtle's long life-cycle, the evaluation of the effects on these populations will only be possible in the long term.

DOCE RIVER NATIONAL PARK

The Renova Foundation directed R\$ 63 million to invest in improvement and conservation actions in the Doce River National Park over

10 years. The contribution will be used to expand the park's limits, develop actions to combat forest fires, acquire equipment, vehicles and boats, implement surveillance systems, promote repairs, projects and various works. These and other actions will be guided by a work plan introduced by the Minas Gerais State Forests Institute (IEF-MG) and approved by the Interfederative Committee (CIF).



FISHING BIODIVERSITY



Renova Foundation works to restore the socioeconomic and environmental conditions for the resumption of aquaculture and fishing activities.

The results of studies and surveillance of biodiversity carried out in partnership between the Renova Foundation and specialized institutions should answer, among other questions, whether the fish is fit for human consumption. The construction of a database for monitoring and controlling of the fish stocks of the Doce River is also planned. After overcoming fishing restrictions in the basin, one of the main challenges will be to restore the market and consumer confidence. Renova Foundation works to certify the quality of the fish.

In the current context, exotic species fishing is allowed in Minas Gerais. The capture of native species is prohibited on the stretch of the Doce River in Minas Gerais and at some natural lagoons in the state as a way to ensure the repopulation of native species. The measure was applied by the State Forestry Institute (IEF). In Espírito Santo, an action by the Federal Public Ministry prohibits fishing in the coastal area of the Doce River mouth, up to 20 meters deep, between Barra do Riacho (Aracruz) and Degredo/Ipiranguinha (Linhares).

The release of the activity depends on the assessment of bodies linked to the Ministry of the Environment, the Health Surveillance National Agency (Anvisa) and regulators at the state level.

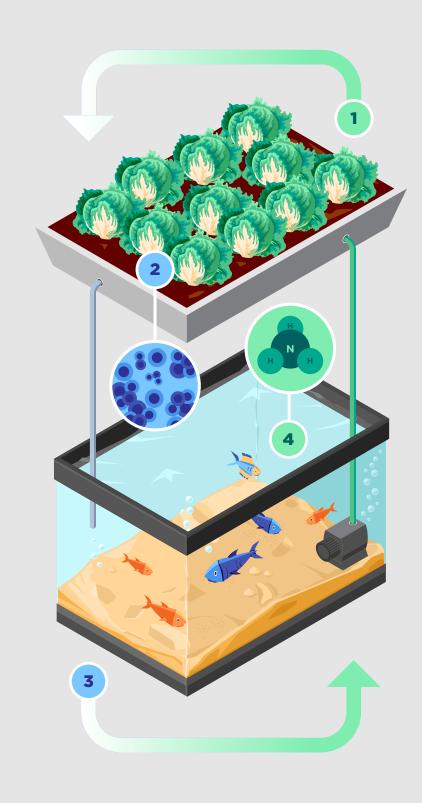
INTEGRATED ACTION FRONTS



Axis 1: Overcoming limitations and restrictions on fishing and aquaculture



Axis 2: Productive structuring and production alternatives and income generation



Aquaponics Cycle

1 NUTRIENTS ENRICHED WATER. Fish feeding and breathing produce waste in the form of effluents and ammonia, which are toxic to fishes. These are, however, very nutritious and are pumped into the plants. 2 BACTERIA. Nitrosomonas and nitrobacter transform ammonia into nitrite and nitrates, which are then more efficiently absorbed by plants. **3** CLEAN WATER. The ammonia, nitrite and nitrate present in the water are absorbed by the plants, which, in turn, develop themselves with these compounds. After that, the water will be clean again and returns to the fish tank. **4** WASTE. Ammonia: produced by the fishes breathing. Faeces: by-product waste of the fish food cycle.

AQUAPONIA PROJECT

One of the initiatives of the Aquaculture and Fishing Resumption Activities Program in Doce River mouth is the pilot aquaponics project, called "Farming for Fishing" in partnership with the Federal Institute of Espírito Santo (IFES). The project foresees the training of fishermen from the communities of Areal, Entre Rios, Povoação and Regência, in Linhares (ES), for the production of fish in suspended tanks combined with vegetables through aquaponics technology (a farming system that unites pisciculture - fish farming - and hydroponics - growing plants with their roots submerged in water). At first, six systems (each with a 5.5-meter diameter) will be installed in each community and, after one year, the fishermen themselves will evaluate the progress towards the implementation of three more systems in each community. The pilot's official launch took place in June 2019 at the contemplated communities. In the second semester of 2019, training courses (Super intensive Pisciculture, Hydroponics and Fish Processing) were performed to the fishermen participating in the project. Training continues in the first half of 2020, at the same moment that cooperative and associative workshops are offered to those affected, as a way of stimulating the sustainability of economic activities.



RESETTLEMENT



The resettlement program's mission is to reestablish the ways of life and the organization of communities which lost their homes due to the tailings passage after the Fundão dam collapse: the Bento Rodrigues district (the first to be hit by the tailings) and Paracatu de Baixo, in Mariana (MG); Gesteira, in Barra Longa (MG); and the rural areas of these municipalities. It is a unique model with the involvement of the families in the design of their communities.

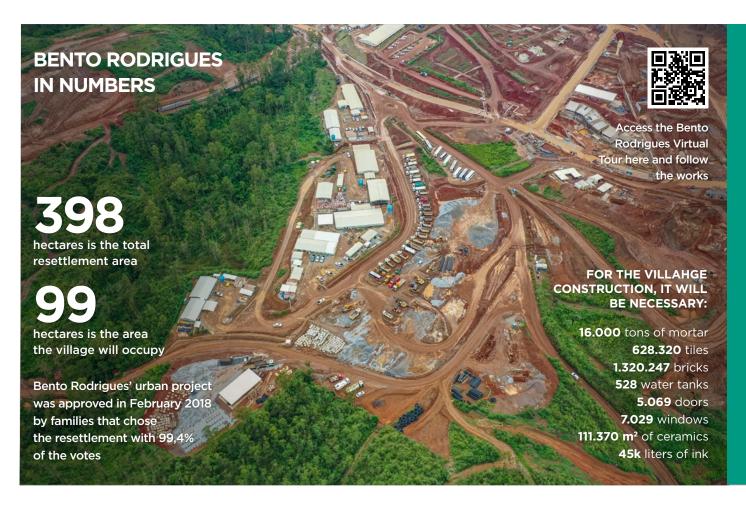
The reconstruction of the sub-districts affected by the mud is the result of a long process which involves planning, urban concepts, project approval, adaptation to land challenges, design of each house according to the family's wishes, installation of collective services and approval of each project at the City Hall, among other stages. On the public side, there is also a need to develop and approve legislations related to the construction of new urban centers.

About 470 families actively participate in the resettlement process. Until the villages and properties are rebuilt, everyone has the right to housing guaranteed by the Renova Foundation, which currently rents houses to around 300 families at the Mariana and Barra Longa regions (MG).

> The main goal of resettlement is to ensure that housing and areas where public facilities will be located meet the needs raised by future residents, preserving their habits, neighborhood relations and cultural and religious traditions.

BENTO RODRIGUES

In Bento Rodrigues, the construction of houses follows several stages: lot containment, foundation and masonry. The works of the municipal school and the health center and services are in the masonry stage. The landfill adequacy work started in August 2019 and follows the schedule. The paving of the road leading to the resettlement land was completed in October 2019, along with signage and lighting. São Bento street, the main street of the new community, was also completed is the estimated number of in October. Other infrastructure works, such as drainage, water and families to be resettled in Bento Rodrigues sewage networks, paving and electricity, are still underway.



TWO INFRASTRUCTURE SETS WILL BE BUILT:

- 1 Elevated reservoir/water treatment station (ETA)
- 1 Sewage Treatment Station (ETEs)

TEN PUBLIC CONSTRUCTIONS WILL BE BUILT:

- Soccer field
- Bento Rodrigues School
- Health Center
- Service station
- Mercês Church
- São Bento Church
- God Assembly Temple
- Community association
- Multisport court
- Fruit and vegetable association

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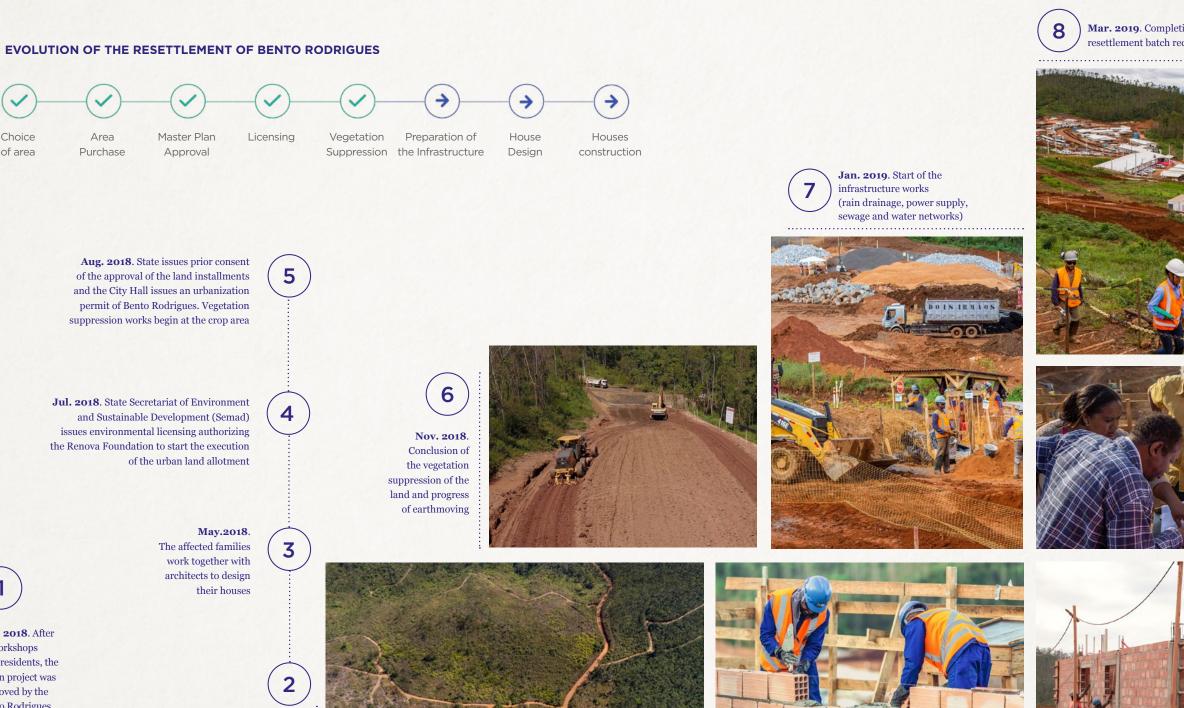
school construction

11

Jul. 2019. Start of houses and

12

Dec. 2019. Houses construction follows the expected pace



Apr. 2018. Definition of the municipal guidelines for land parceling of the Lavoura land

1

Feb. 2018. After 14 workshops with residents, the urban project was

approved by the **Bento Rodrigues** community

.

Choice

of area

Mar. 2019. Completion of resettlement batch records



Apr. 2019. Signing of an agreement between Renova and the City Hall of Mariana to transfer R\$ 7.9 million for hiring labor and equipment for issuing permits. The school's containment works also begin.



Jul. 2019. Residents follow construction project







of area

Purchase

Approval

Vegetation Preparation of Suppression the Infrastructure

4

Houses construction

PARACATU DE BAIXO

Infrastructure works, including the trench, land containment, earthmoving, installation of drainage, water and sewage networks, started in July 2019. In November, the construction of the first houses foundations began. In parallel, the development of about 70 conceptual house projects by the Renova Foundation architects continues with the participation of families. The architectural designs of the school and health center were approved by the community in September 2019.

109 is the estimated number of families to be resettled in Paracatu de Baixo

Design

5 Apr. 2019. Families start designing their homes projects with the support of architects 6 May. 2019. works on the

Apr. 2019. Municipal Council for Environmental Development (Codema) approves environmental license for the resettlement of Paracatu de Baixo

7

May. 2019. Conclusion of works on the construction site



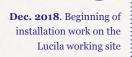




Sep. 2018. Conceptual urban project developed with the participation of resettlement families is approved by the community in assembly (97% of favorable votes). The City Council approves the first law project to create a special guideline area (ADIES) for resettlement projects.









3

Nov. 2018. Mariana City Hall grants the Exemption of Environmental Licensing for installation of the construction site on the Lucila land, which has 406 hectares



(8)

Jul. 2019. The Municipal Department of Works and Urban Management of Mariana issues urban licensing that enables the start of earthmoving. Start of infrastructure works



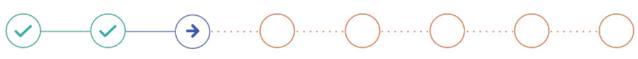


INFRASTRUCTURE

WATER BIODIVERSITY LAND

GESTEIRA

In December 2018, the Renova Foundation formally signed the purchase of the land for resettlement. Drilling, polygonal fencing and soil analysis services were also completed. In August 2019, discussions on resettlement guidelines began, which will underpin the housing restoration process.



Vegetation

Choice of area Area

Purchase

Master Plan Approval

Licensing

Preparation of Suppression the Infrastructure

Houses construction

House

Design

is the estimated number of families to be resettled in Gesteira



Landfill of Mariana

Another important infrastructure project is

landfill (MG), which has already started. The interventions will allow the residues to be

inserted in waterproofed places and prevent

land, to later be covered with compacted soil.

This method ensures that the landfill works

operate the landfill for five years.

1.50

works completed and delivered

142,2

1.200

kilometres underwent

maintenance

been renovated

kilometres of accesses have

more than

under adequate conditions. About 120 workers will be mobilized for the construction and the municipality will have a fund of R\$ 15 million to

the contact of the garbage with the natural

the readjustment of the Mariana sanitary

The repair also involves the reconstruction and recovery of damaged infrastructure in the Mariana and Barra Longa region. Among the activities, cleaning and removal of residues, rubble and debris resulting from the collapse, demolition and reconstruction of remaining compromised structures are undertaken or contemplated.

More than 1.500 works have been completed and delivered so far, such as restoration of houses, rural properties and schools, reconstruction of bridges, fences, corrals, artesian wells and bridges made of wood, slopes containment and hillsides. Altogether, 142,2 kilometres of accesses were renovated, 1.200 kilometres underwent maintenance and 212 kilometres of fencing of rural properties were rebuilt.





Reconstruction of the Águas Claras bridge in Mariana





The Barra Longa municipality in Minas Gerais was the only one with an urban area directly impacted by the tailings. The city had most of its infrastructure cleaned and renovated in actions that started immediately after the Fundão dam failure. In addition to the renovation and reconstruction of buildings and backyards, the new Manoel Lino Mol square, Beira Rio Avenue, Gustavo Capanema Municipal School, the sports court and the Gesteira district square were also delivered. Part of the 170 thousand cubic meters of tailings removed from the municipality was moved to the Exhibition Park to expand the area. Another part was used to raise the soccer field, which previously suffered from floods in the rainy seasons.

More than 320 properties were renovated or rebuilt. Among the interventions already delivered, there are:

rebuilt houses

shops were

renovated

properties

underwent

104

renovated residences and properties maintenance

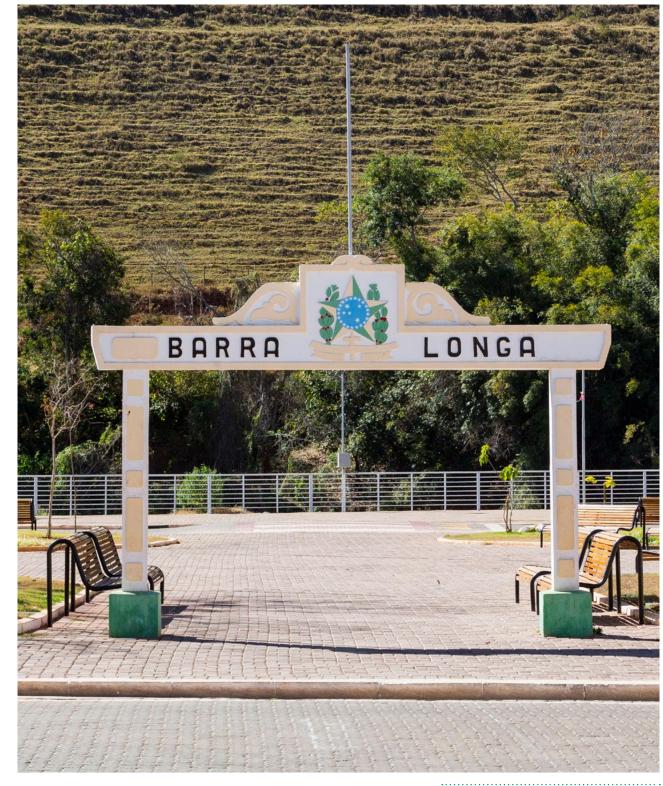
189 backyards and lands were renovated

Historical Heritage

Historical Heritages of Barra Longa (MG) which were damaged by the Fundão dam collapse will also be restored. There are 12 heritage buildings listed and inventoried by the municipality which will undergo works of architectural recovery.



Hotel Xavier is one of the properties under recovery. The bicentennial building had its lower part and external paint affected and has been closed since 2016. On site, the construction work is being assembled and workers are being mobilized, as well as cleaning, demolition and evaluation of the roof, walls and props of the property.



Recovery of Manuel Lino Mol square transformed the place into a multipurpose environment

WATER SUPPLY WATER HUMAN RIGHTS



Water security in the impacted municipalities is one of the main concerns of the Renova Foundation. The interruption of water collection and shortages caused by the Fundão dam collapse drew attention to the structures, some of which are precarious, in the Water Treatment Stations (ETAs) of municipalities in the impacted region.

Water security studies pointed out the water sources which could be used for alternative capture in the affected cities and added to the diagnosis of ETAs. With these reports, it was possible to identify the needs of each region.

Improvements were performed to ETAs along the impacted stretch and professionals were trained to work with the new equipment. In some places, in addition to improvement actions, such as renovations, it was necessary to build treatment plants.

Another work front operates to reduce the risk of shortages in 24 municipalities that drew water from the Doce River. The identification of new water sources for alternative water collection reduced the risk of shortages, as it sought other sources of water resources, complementing the Doce River offer.

The goal is that in municipalities with up to 100 thousand inhabitants, 30% of the water sent for treatment has an independent source from the Doce River; for larger cities, the target is 50% and, in Governador Valadares, 67% of the total supply. The Governador Valadares water pipeline is under construction.

water treatment systems were concluded between conventional ETAs and simplified treatments (*)

(*) Among the 13 concluded systems, four ETAs will undergo new improvement works



pipelines concluded (between built and renovated ones)

alternative capture systems concluded (between surface and underground sources)

Currently, just as all raw water collected, the water from the Doce River can be safely drunk as long as it is treated. This means that it is suitable for human consumption after undergoing conventional treatment at the ETAs, before reaching the consumer's taps.

WATER PIPELINE IN GOVERNADOR VALADARES

In Governador Valadares (MG), the construction works of a pipeline, budgeted at R\$ 155 million, are in full operation to guarantee the community water security. The initiative will allow the capture of water from the Corrente Grande River, an alternative to the Doce River, especially during the dry season. The pipeline, which will be 35 kilometres long, runs from the rural area of the municipality to the urban area, supplying three Water Treatment Plants (ETAs): Central, Vila Isa and Santa Rita. In addition, to ensure the sustainability of the process, springs on the Corrente Grande River are being protected. The work is expected to be delivered in 2021.



SANITATION WATER COMPENSATION DEVELOPMENT



A fundamental action for the revitalization of the Doce River is due the compensatory measure that provides the destination by the Renova Foundation of R\$ 500 million to the municipalities impacted by the tailings for improvement projects in the collection and treatment of sewage and proper disposal of solid waste.

The financial resource will be used for sewage depletion system projects, implementation of sewage collection and treatment works, dump eradication and implantation, expansion and improvement of regional sanitary landfills, selective collection program, recyclable sorting unit, waste transshipment station, organic treatment units, review of municipal sanitation plans, among others.

This is a point that, in a transversal way, will favor the recovery of the river. The preservation of tributaries and investments in sewage treatment can take the Doce River to a level that has not been seen for many years. The decrease in illegal sewage disposal contributes to better water oxygenation and less contamination, to bring back the health of the river and, as a consequence, the entire ecosystem around it.

The Minas Gerais Development Bank (BDMG) and the Espírito Santo State Development Bank (Bandes) are the financial agents responsible for the transfer of resources to the municipalities, according to the project schedule for each location. Of the total of R\$ 500 million, about R\$ 390 million is under the responsibility of the Minas Gerais bank, and R\$ 110 million, with the Espírito Santo institution. The definition of the amount allocated to each municipality considers the number of inhabitants, the amount of funds transferred from the Municipality Participation Fund, the level of impact suffered on the water supply systems in the localities and the percentage of treated sewage.

80%

of all the sewage generated by the municipalities affected by the Fundão collapse is discharged into the Doce River, according to the Doce River Hydrographic Basin Committee (CBHDoce) Renova Foundation also provides training and technical support to ensure the consistency of sanitation projects and their proper implementation. Until December 2019, there were 727 hours of training with public officials, with offers of workshops on different topics, such as project design, bidding process and works monitoring, and structuring of consortium solutions for the destination of solid waste and services management.

By the end of December 2019, R\$ 4,1 million were transferred to sanitary sewage and solid waste actions to the municipalities of Alpercata (MG), Dionísio (MG), Iapu (MG), Marliéria (MG), Rio Casca (MG), São José do Goiabal (MG), São Domingos do Prata (MG), Baixo Guandu (ES) and Colatina (ES).





AXIS 1

In the area where the Fundão dam is located, a 40-meter-high dam, called Axis 1, was built to contain part of the rest of the tailings that remains in the reservoir. The construction applied a methodology that aims to offer more resilience to the structure. The conclusion of the construction closes the priority actions carried out since the Fundão dam failure, in November 2015, aimed at ensuring the stability of the tailings containment structures.

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TRANSPARENCY

Check the amounts disbursed in the main repair and compensation actions of the Renova Foundation (in R\$):

1,20	1,19	942,5	720,3	491,75	380,57	51
billion	billion	million	million	million	million	mi
FINANCIAL ASSISTANCE page 21	PIM page 20	TAILINGS CONTAINMENT page 119	CANDONGA page 64	ENVIRONMENTAL RECOVERY + TAILLINGS MANAGEMENT page 52	IMPACTED INFRASTRUCTURE page 111	RESET pa
190,81	159,82	145,17	104,82	60,82	1,50	/
million	million	million	million	million	billion	
WATER MONITORING page 90	SOCIAL ENGAGEMENT AND PARTICIPATION page 16	ECONOMY AND INNOVATION page 32	EDUCATION AND CULTURE page 25	HEALTH AND SOCIAL PROTECTION page 24	OTHER PROGRAMS Biodiversity, sanitation, agricultural activities, APPs and springs, fishing, tourism, register, historical memory and others	



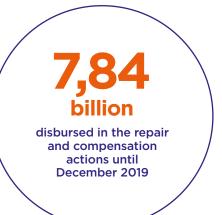
240,21 million

ETTLEMENT

page 104

WATER SUPPLY SYSTEM

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Access for more repair financial data

TAGS SUMMARY

WATER
ASSISTENCE
DAM
BIODIVERSITY
COMPENSATION
TRADICIONAL COMUNITIES
DAMAGES
DEVELOPMENT
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EMPLOYMENT
LEADERSHIP
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PAYMENT
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