



IUCN Rio Doce Panel Stories of influence

Frederico Campos Viana



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FIGURE 1 SATELLITE IMAGE OF THE FUNDÃO DAM BEFORE AND AFTER THE DAM FAILURE

November 2022, IUCN,
Fundão dam area
Photo: IUCN/Rio Doce Panel



EXECUTIVE SUMMARY

The Fundão disaster in 2015 was one of the biggest environmental disasters in Brazil's history. The collapse of the dam near the city of Mariana released around 39 million m³ of tailings, which travelled 670 km to reach the Atlantic Ocean. Along the way, the tailings resulted in 19 deaths, devastated ecosystems and disrupted the livelihoods of thousands of people.

In support of restoration activities, IUCN established the Rio Doce Panel, an Independent Scientific and Technical Advisory Panel (ISTAP) with the mission to provide expert advice in a range of areas. Composed of renowned national and international scientists, the Panel served from 2017 to 2022.

This report - *The Rio Doce Panel: Stories of Influence* – describes the work of the Panel and its long-term influences and impacts. To produce it, the author reviewed a number of documents and data from the Monitoring, Evaluation and Learning (MEL) strategy and interviewed Panel members, policymakers and government representatives, among others. He also conducted 27 semi-structured interviews, joined Panel members on a site visit, and attended an alignment meeting to discuss the Panel's activities and outputs.

In a uniquely complex and politicised environment, the value added by the Rio Doce Panel is evident in its strategic perspectives and recommendations. Much of this influence is directly tied to its five thematic reports, which address impact assessment of disasters, climate change, source-to-sea approaches, governance, and assessment of coastal and marine zones. The Panel has also produced five Issue Papers, each with recommendations on specific restoration-related topics.

The Panel's expertise also proved invaluable when a second dam ruptured in 2019, with some of its recommendations applied to the recovery responses. The experts also contributed to a global initiative to review tailings management practices, led by the International Council of Mining and Metals (ICMM).

In addition to its influence, the Panel serves as a useful example for other complex conservation challenges and highlights the great importance of collaboration for implementing long-term sustainable solutions.

ACKNOWLEDGEMENTS

Just like the Rio Doce recovery process, this report is a testimony to the power of collaboration and resilience, and many people have contributed to it.

We thank IUCN and its entire staff for their extraordinary and invaluable work and their desire to protect and restore the region's communities and environments. Their guidance has been fundamental to this report. While the report aims to reflect the complexity and importance of IUCN's work, any errors or omissions are the sole responsibility of the author.

We extend our thanks to the Renova Foundation and the many other individuals and organisations who shared their knowledge and experience, providing important insights into the challenges and opportunities of restoring the Rio Doce.

We must also recognise the people of the entire Rio Doce community. Even with the difficulties of making a living and in such difficult circumstances, they took the time to explain the issues and contribute to this report. The long-term success of the Rio Doce restoration will require the long-term engagement and support of these people; any plans must consider their fears and desires.

We thank the group of researchers and editors who helped bring this report to life.

The process of writing this report has been a real lesson in humility. Being involved in the restoration of the Rio Doce has been a deeply personal experience for me, coming from Minas Gerais, the state where the Fundão dam broke. To be associated with such important work is something I am very proud.

LIST OF ACRONYMS

CBH-Doce	<i>Comitê da Bacia Hidrográfica do Rio Doce</i> (Rio Doce Watershed Committee)
CIF	<i>Comitê Interfederativo</i> (Inter-Federative Committee)
CT-Bio	<i>Câmaras Técnicas</i> [etc.] (Technical Chamber on Biodiversity)
ES	<i>Espírito Santo</i>
FBDS	<i>Fundação Brasileira para o Desenvolvimento Sustentável</i> (Foundation for Sustainable Development)
HPP	Hydroelectric Power Plant
IBAMA	<i>Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis</i> (Brazilian Institute of Environment and Renewable Natural Resources)
ICCM	International Council on Mining and Metals
IP	Issue Paper
ISTAP	Independent Scientific and Technical Advisory Panel
IUCN	International Union for Conservation of Nature
MEL	Monitoring, Evaluation and Learning
MG	Minas Gerais
PMQQS	Programa de Monitoramento Quali-quantitativo Sistemático de Água e Sedimento (Systematic Qualitative and Quantitative Monitoring Programme for Water and Sediment)
RDP	Rio Doce Panel
SGIR	<i>Sistema de Gestão de Impactos e Restauração</i> (Impact and Restoration Management System)
SIWI	Stockholm International Water Institute
TC	Technical Chambers
TTAC	<i>Termo de Transação e Ajustamento de Conduta</i> (Terms of Transaction and Conduct Adjustment)
TAC-GOV	TAC-Governance
TR	Thematic Report
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

8 September 2020
Renova Foundation
In the image, stretches of the
mouth of the Doce River.
Photo: © All rights reserved to
NITRO Histórias Visuais

THE DISASTER AND THE CONTEXT OF REPARATION

The Fundão tailings dam failed on November 5th, 2015 near the city of Mariana (in the state of Minas Gerais, MG), releasing around 39.2 million m³ of tailings into the valley and the Gualaxo do Norte River. The tailings reached the neighbouring districts of Bento Rodrigues and Paracatu de Baixo, resulting in 19 deaths, swallowing houses and extrapolating the riverbanks until they reached the Carmo and Doce rivers.

As it flowed downstream, about a third of the tailings became trapped in the Risoleta Neves Hydroelectric Power Plant (HPP), known as Candonga, located between the cities of Rio Doce and Santa Cruz do Escalvado, also interrupting its operation and affecting several municipalities. The tailings followed the Rio Doce, leaving a trail of mud and destruction. They contaminated soil and water, left hundreds homeless, and impacted entire ecosystems. In all, some 90.000 people were affected. After 17 days and 670 kilometres, the mudflow reached the mouth of the Rio Doce, reaching the Atlantic Ocean and the surrounding coastal areas.

The Federal Government of Brazil, the mining companies and other entities immediately started discussing a restoration plan. Eventually, twelve entities signed a Term of Transaction and Adjustment of Conduct (TTAC), an out-of-court agreement that defined different roles and responsibilities for 42 social, environmental and economic restoration programmes and established some rules of action, including instruments for social participation.

The TTAC also determined the creation of the Renova Foundation in 2016, a non-profit organisation to lead the process, and the Inter-Federative Committee (CIF), responsible for guiding and validating the Foundation's activities.

As an extrajudicial solution for conflict resolution and expansion of social participation, in 2018, the signatories of the TTAC signed the TAC-Governance (TAC-Gov). This complementary agreement was established to bring immediacy and celerity to legal claims and improve the mechanisms of participation of those affected.

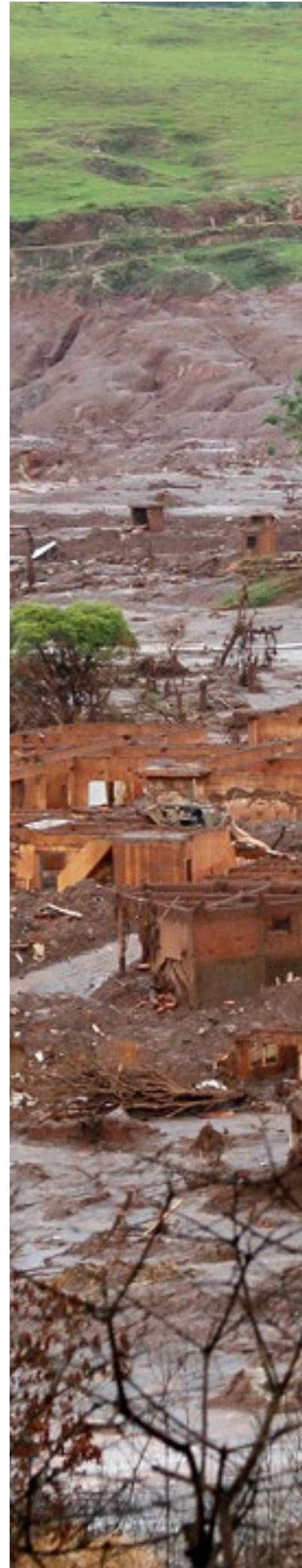
When in January 2019 another dam owned by the mining company Vale collapsed in Brumadinho, Minas Gerais, questions about the reparation model adopted and the promptness of responses for the Rio Doce Basin emerged and heated up the public debate. Not only the effectiveness of ongoing actions were on the agenda, but also issues related to the safety of tailings dams and the model adopted in Brazil, the risks of mining activity and the accountability of mining companies for disasters such as those in Mariana and Brumadinho.

Furthermore, a Public Civil Action filed by the Federal Attorney General's Office (AGU), the Attorney General of the State of Minas Gerais, with the support of other public bodies of the Judiciary and the CIF, aimed to expedite some emergency actions, initiating a process of judicialisation of the reparation programmes and the definition of 13 priority areas. This process influenced the internal structure of the Renova Foundation, the implementation of programmes and prioritisation of actions, as well as the reparation schedule.

Right: The collapse of the tailings dam of mining company Samarco, whose owners are Vale and Anglo-Australian BHP, caused a torrent of mud that flooded several houses in the district of Bento Rodrigues, in Mariana, in the Central Region of Minas Gerais. Initially, the mining company had claimed that two dams had broken, Fundão and Santarém. On 16 November, Samarco confirmed that only the Fundão dam had broken.

Location: District of Bento Rodrigues, Municipality of Mariana, Minas Gerais.

Photo: Rogério Alves/TV Senado





WHO IS WHO

The scale and complexity of the Fundão Dam disaster required the participation of a wide range of actors and stakeholders, including:

- **The Rio Doce Watershed Committee (CBH-Doce)** a group of representatives from government, civil society, and the academic and private sectors, formed to oversee the management and conservation of the Rio Doce river basin. The basin committees are part of Brazil's National Water Resources Management System, and constitute the so-called "Parliament of the Waters".
- **The Renova Foundation** a non-profit organisation established by TTAC to implement the 42 reparation programmes. With 6,000 employees and partners, Renova is the main body responsible for implementing the restoration actions, from Mariana to the mouth of the Rio Doce.

GOVERNMENT BODIES

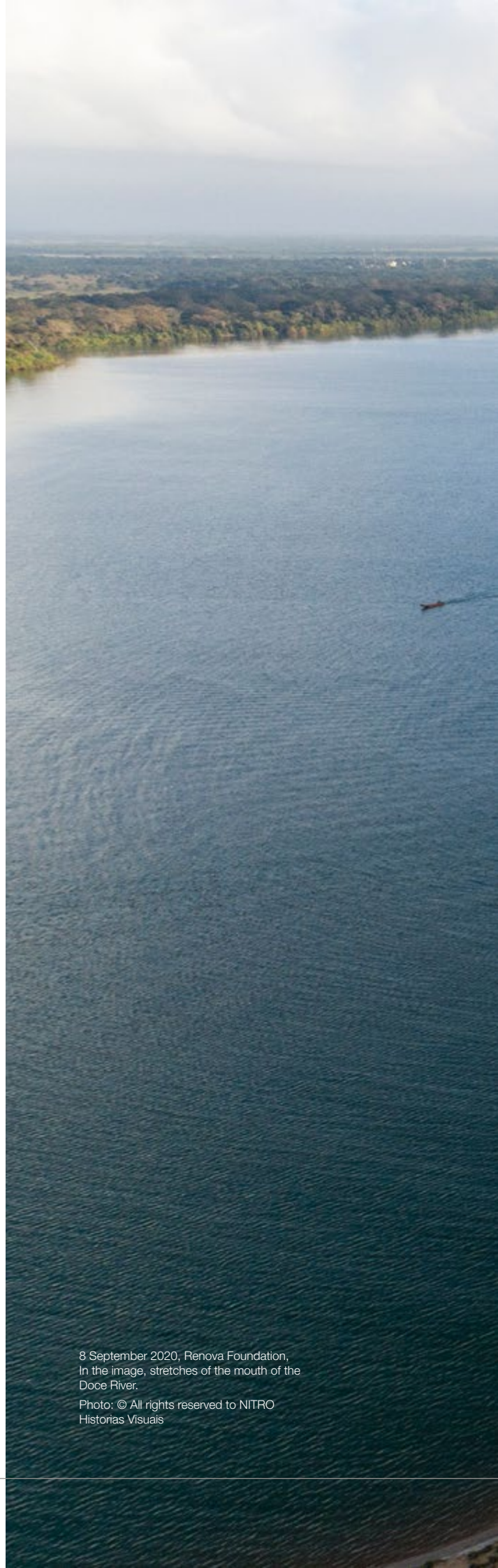
- **The Interfederative Committee (CIF)** is composed of representatives of various public bodies from the two affected states and the Federal Government. Organised into 11 technical themes, the CIF has the function of guiding, monitoring and validating Renova's activities and promoting permanent dialogue between the entities that are part of the governance system.

MINING COMPANIES

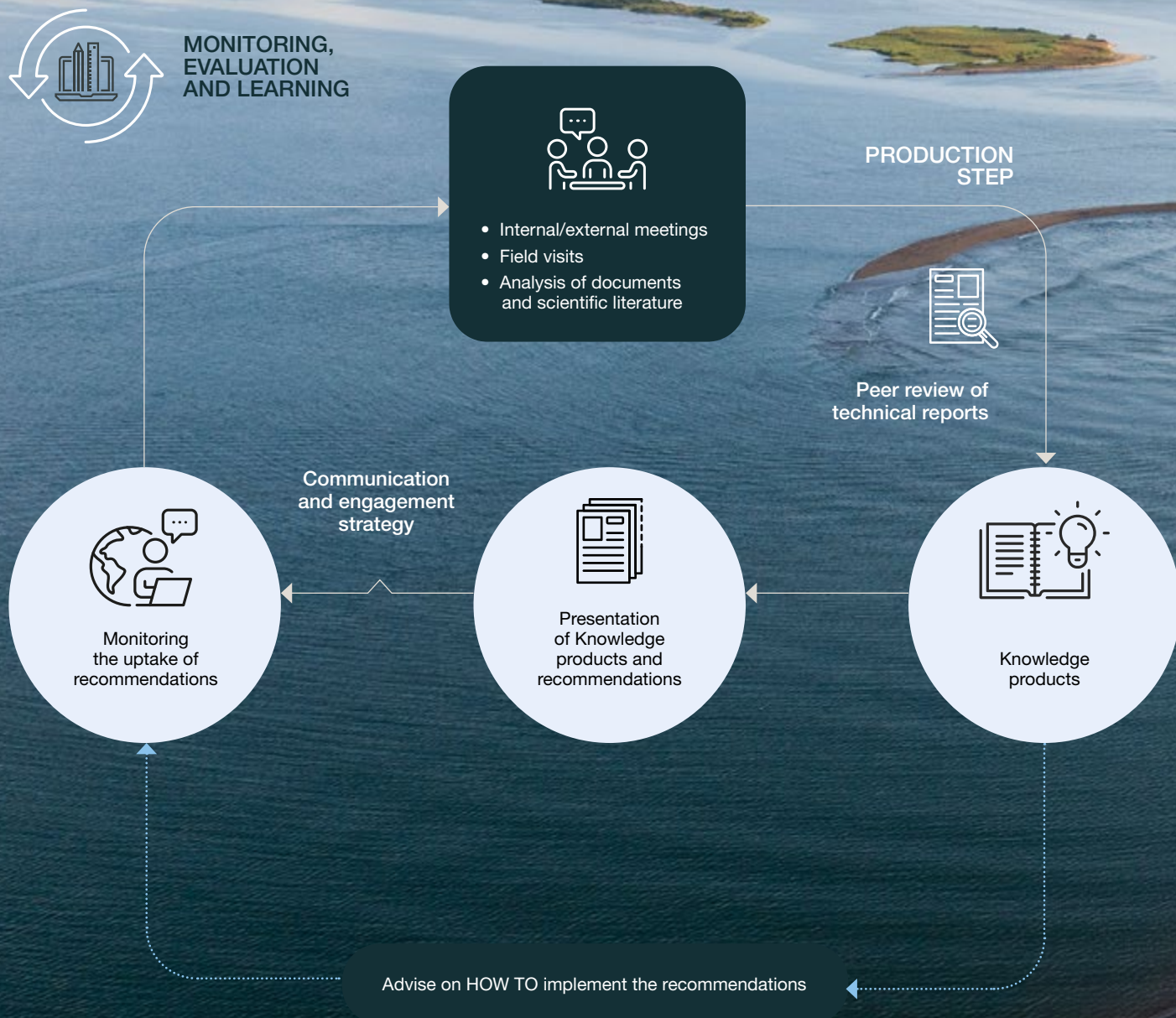
- The Fundão Dam is owned by **Samarco Mineração**, a joint venture owned and managed by two multinational mining companies: Vale and BHP. Each owns 50 per cent of Samarco's shares.
- **Vale** is a Brazilian multinational mining company and one of the largest iron ore producers in the world, with operations in more than 30 countries. It is also active in other mining sectors - for example, nickel, copper and precious metals.
- Formerly known as BHP Billiton, **BHP** is one of the world's largest mining companies. Headquartered in Australia, it operates in more than 90 locations on six continents. It produces iron ore, copper, nickel, coal and potash.

8 September 2020, Renova Foundation,
In the image, stretches of the mouth of the
Doce River.

Photo: © All rights reserved to NITRO
Historias Visuais



THE PANEL



INFOGRAPHIC 1: HOW THE PANEL WORKED (Source: Illustration developed by the report author)

Created under the Independent Scientific and Technical Advisory Panel (ISTAP) instrument, the Rio Doce Panel was created to contribute with technical and scientific knowledge and propose recommendations to the Renova Foundation, mainly, and to other institutions involved in the restoration process. Formed by experts in different areas of knowledge, the Panel's proposal was to bring a more comprehensive and long-term view to the restoration challenge.

The Panel was comprised of seven members: a Chair and six technical experts of recognised standing in their respective scientific and technical fields, selected for their expertise,

and for their commitment to the restoration process itself. The experts were expected to act without political or emotional bias, independently of any government or private organisation and following a code of ethics.

In their work - both virtual and face-to-face - members always sought consensus. The multidisciplinary nature of the Panel required listening and attention, as well as respect for each other and for formal protocols. Its recommendations might not be binding, but to be influential they needed to be relevant and plausible.



The purpose of the Rio Doce Panel was to help the Renova Foundation, other decision-makers and the communities themselves build an integrated landscape with nature-based and economically sustainable solutions that could serve as a model for other river basins. In other words, it was about bringing back better.

Rio Doce Panel during a visit to the UHE Risoleta Neves facilities. 2019.
Photo: IUCN/Rio Doce Panel





Brumadinho, Minas Gerais
Socio-environmental catastrophe
caused by the collapse of the
Vale mining company dam in
Brumadinho (MG)
Photo: Felipe Werneck/Ibama

RESTORATION

THE CHALLENGE



2015

Collapse of the Fundão tailings dam at Samarco's iron mining complex



670 km

Distance travelled by the tailings from the dam to the Atlantic Ocean



39

Municipalities directly affected



19

Number of fatalities



39 million m³

Volume of mining tailings

INFOGRAPHIC 2: THE FUNDÃO DAM FAILS, UNLEASHING A DISASTER (Source: Illustration developed by the report author)

From the beginning, the restoration faced several considerable challenges.

The Fundão Dam failure was considered the biggest environmental disaster of all time in Brazil. Travelling 670 km from the Fundão dam to the Atlantic Ocean, tailings impacted ecosystems, displaced communities and destroyed livelihoods along its path.

The more than 90.000 people affected lived in densely populated urban settlements, traditional fishing villages and quilombola communities carrying out agricultural activities in remote locations, and its territories belonging to indigenous peoples.

Additionally, the economic and historical dependence on agricultural and extractive activities has directly affected the region's livelihoods, disrupting fundamental activities and leaving populations even more vulnerable.

The governance system created to monitor and supervise the activities of the Renova Foundation established by the TTAC was also seen as a challenge to address, both because of its complex and innovative character and because of the length of the decision-making system, criticised throughout the process.



Brumadinho, Minas Gerais

Socio-environmental catastrophe caused by the collapse of the Vale mining company dam in Brumadinho (MG)

Photo: Felipe Werneck/Ibama

Hence, despite the urgent need to restore ecosystems and communities, the proposed model still had gaps in key aspects of governance. Among them, the effectiveness of participatory spaces, the difficulty of reaching consensus among the actors involved, as well as flaws in transparency and access to information. In spite of strong public pressure for effective responses, trust in public and private institutions was severely undermined.

MINING ACTIVITY IN THE REGION AND THE FUNDÃO DAM

The exploitation of the Rio Doce Basin took place mainly from the 18th century onwards. Attracted by the extraction of timber and the promise of precious metals such as gold and emerald, the first settlers to establish in the region also began to occupy the land and work in agriculture, cultivating both crops and livestock. Later, with the discovery of other precious metals, the Rio Doce also became a rich source of minerals and an important logistical resource.

The increased demand for iron and other metals during the Second World War accelerated the region's exploitation, which developed economically, becoming a major centre for producing and exporting inputs for the industry.

Founded in 1971, the Alegria mine extracted ore with low iron content and then used new technologies to enrich the tailings. Part of this mining complex, the Fundão Dam began operating in 2008. It was projected to contain a total of 79.6 million m³ of fine tailings and 32 million m³ of sandy tailings, with a lifespan of 25 years.

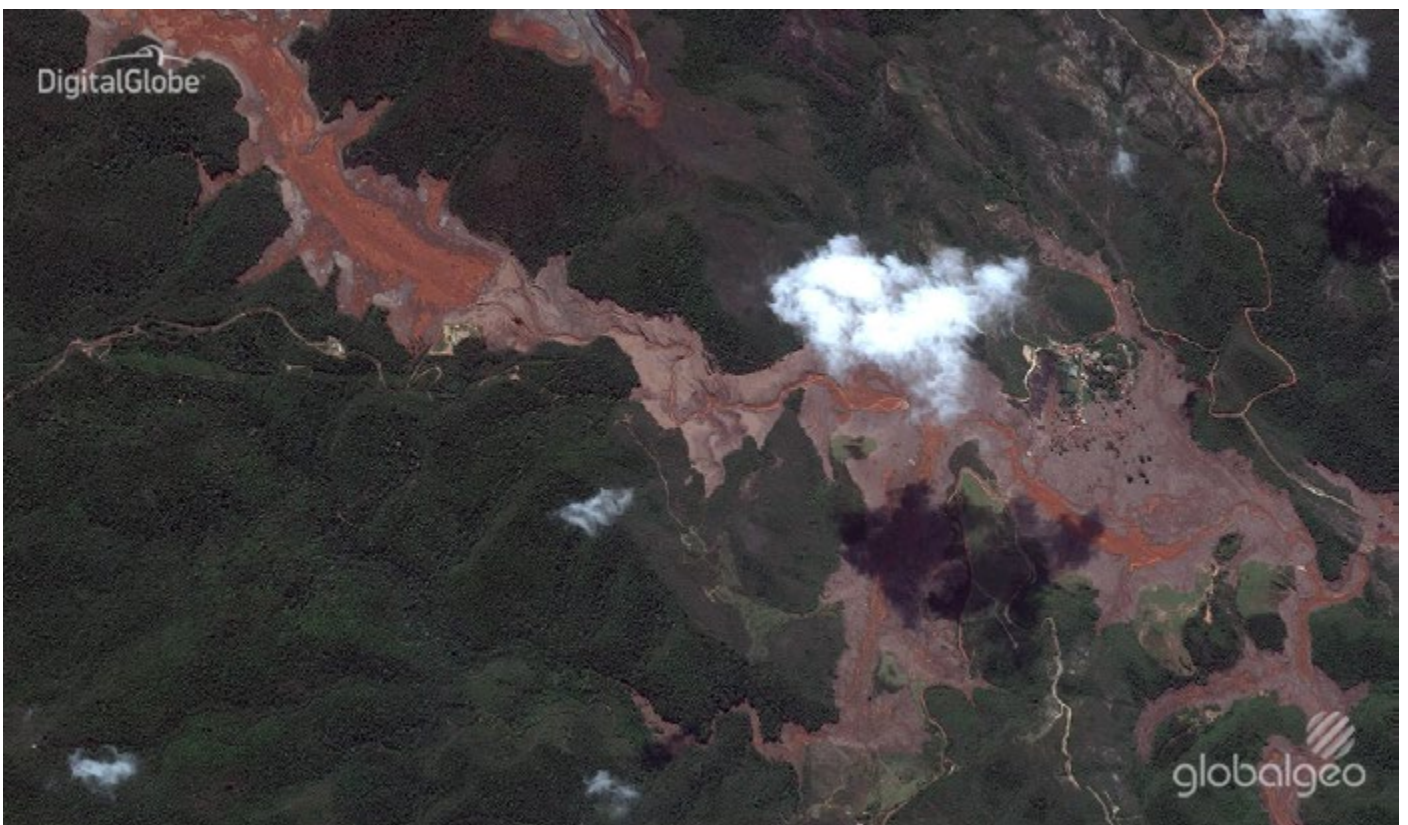


FIGURE 1: SATELLITE IMAGE OF THE FUNDÃO DAM BEFORE AND AFTER THE DAM FAILURE (Source: Digital Globe, Globalgeo)

COLLABORATION WITH THE RENOVA FOUNDATION AND OTHER ACTORS

Dialogue, participation and engagement with different interest groups in a democratic way were vital to the Panel's work. IUCN and Members managed meetings with local communities and national and sub-national authorities and listened to their views and opinions.



Rio Doce Panel in a meeting with representatives of the Tupiniquim Indigenous Association of Comboios, in Aracruz/ES. 2019.

Photo: IUCN/Painel Rio Doce

In operational terms, the Panel's recommendations were initially directed exclusively to the Renova Foundation, which, in the working dynamic established with IUCN, was committed to providing technical responses to each of them. The Foundation's responses had to indicate whether they would be implemented partially or in full, as well as the reasons in case of non-acceptance. Some required the participation and engagement of other actors involved, evidenced in several official responses and interactions with other reparation agents.



Rio Doce Panel during a presentation to the Renova Foundation technical team. 2019.

Photo: IUCN/Painel Rio Doce

Renova was only one of many stakeholders and the Panel understood the importance of broadening the focus and began to incorporate and balance recommendations and relations between the Renova Foundation and other actors. For example, before the Covid-19 pandemic in 2020, meetings and presentations external to Renova were only possible during the Panel's annual meetings, and required time and logistical effort to organise. The popularisation of online communications has contributed to a greater rapprochement with other actors, allowing more room for presentation and deepening the recommendations. This approach gave more visibility to the Panel and its recommendations and the ability to directly or indirectly influence the Basin restoration process.

Another issue that hindered the adherence and relevance of some recommendations was the extended production time of the Panel's technical reports, especially given the dynamic context of the restoration.

LEGAL ENVIRONMENT AND TURNING POINTS

The litigation of the 13 thematic axes resulted in internal changes at the Renova Foundation, as well as interruptions of ongoing operations to meet the requirements of the lawsuit. As a result, the priority focus of Renova's technical staff was on activities related to the commitments established by the TTAC and those related to the priority axes, extinguishing all work fronts that were not explicitly related to these objectives.

Moreover, many recommendations needed to be targeted and worked on with other stakeholders, mainly as they were centred on systemic and long-term restoration. Some issues raised by the Panel were recognised by Renova for their due socio-environmental relevance. However, they were not prioritised in their implementation because they went beyond the scope of action defined by the legal instruments and legal means highlighted above, or even its decision-making space within the Governance system. The distance of the recommendations from this new reality and the need to expand its influence to other spheres led the Panel to redefine action strategies and, together with Renova, seek new forms of collaboration.



THE PANEL'S INFLUENCE

Over its five years of operation, the Panel has produced five Thematic Reports (TRs) - more in-depth research on critical issues affecting the Rio Doce landscape; and five papers Issues Papers (IP) series - specific recommendations on more targeted topics in the Basin. The papers in the Issue Papers series covered topics such as the economic recovery of the region, the fishing ban, the case of the Lagoa Juparanã in Espírito Santo, and the interconnections between environmental and human health.

The five thematic reports addressed the impact assessment of the disaster and mitigation measures, climate change, source-to-sea and landscape approaches for biodiversity conservation, the long-term governance system and the evaluation of impacts on coastal and marine areas. Of the 35 recommendations made by the Panel in its knowledge products, the Renova Foundation indicated the implementation of 16 of them fully and 10 partially.

35

RECOMMENDATIONS

11

RECOMMENDATIONS ON GOVERNANCE

9

RECOMMENDATIONS ON ENVIRONMENTAL
AND HUMAN HEALTH

5

RECOMMENDATIONS ON ENVIRONMENTAL
AND SOCIAL IMPACT ASSESSMENT



5

RECOMMENDATIONS ON KNOWLEDGE
MANAGEMENT AND COMMUNICATION

OF THE **35** RECOMMENDATIONS

3

RECOMMENDATIONS FOR ALTERNATIVE
LIVELIHOODS AND SOCIAL DEVELOPMENT

26

RECOMMENDATIONS CONVERGE WITH
RENOVA'S WORK AND WILL BE FULLY
OR PARTIALLY IMPLEMENTED

2

RECOMMENDATIONS FOR RISK
ASSESSMENT AND ADAPTIVE
MANAGEMENT

9

RECOMMENDATIONS WILL NOT BE
IMPLEMENTED BECAUSE THEY GO BEYOND
THE SCOPE OF ACTION OR BECAUSE OF
TECHNICAL DISAGREEMENT

INFLUENCING INTERNAL PRACTICES AND PROMOTING A NEW PERSPECTIVE

REORIENTATION TOWARDS THE LONG TERM

From the outset of its activities, the Panel brought to the table a long-term vision and measures that could deliver sustainable positive results beyond the mission of the Renova Foundation. These include identifying threats to the sustainability of the programmes and the need for adaptation measures to address climate change impacts.

In contrast, there was an expectation from Renova's teams that the Panel's recommendations would contribute to topics under discussion in the governance system, enabling it to indicate timely paths to influence the decisions and responses of the Foundation.

Despite this divergence, some actions carried out by the Renova Foundation incorporated the integrated and long-term vision, especially those aimed at improving the environmental quality of the basin, economic and social development, and long-term governance.

These include forest restoration of +40 thousand ha and water recharge areas; the recovery of springs, in partnership with permanent institutions; and investments in sanitation, water security and improved water supply throughout the region as a compensatory measure.

25 August 2020. RENOVA Foundation. Mid Rio Doce. Socio-environmental programme. 27 - Springs recovery programme. Socio-environmental specialist analysing the state of water and vegetation in Periquito. Image: NITRO Historias Visuais
Photo: © All rights reserved to NITRO Historias Visuais



UNDERSTANDING THE IMPACTS OF THE DISASTER

Knowing and agreeing on the magnitude and extent of the damage caused was critical to defining remedial actions and a comprehensive restoration plan.

In the first Thematic Report (TR1), *The Impacts of the Fundão Dam failure*, the Panel recommended, among other measures, a comprehensive assessment of the impacts and establishing a baseline to represent the situation of communities and environments before the Dam failure.

In some cases, such as on water quality, access to health and education had baseline data from before the dam collapse. However, the teams found it difficult to establish baseline data on livelihoods, communities or even the state of the marine environment before the disaster, given past information gaps.

On the other hand, experts from Renova, specialised consultancies at the service of the CIF and other legal and government entities, generated vast information and knowledge on the state of the Rio Doce basin. Nevertheless, this information often included divergent interpretations of the available data and covered a wide range of disciplines, with voluminous and complex information available.

Building a broader picture of the disaster required integrating the information into a single set. To support this task, the Panel developed the fourth paper in the [Issues Papers series](#) (IP4), which proposes a framework for organising, classifying and describing impacts in a consolidated way in a single tool.

The recommendations and tools proposed in TR1 and IP4 assisted the Renova Foundation in integrating impact assessments and connecting different databases. Based on this work, Renova developed the Impact and Restoration Management System (SGIR) to centralise information and data on impacts, incorporating a new team into the Foundation - the Impact Curatorship, established to consolidate and systematise this information.

By the time the Impacts Curatorship started its activities, there were already more than 600 studies assessing the impacts of the disaster. To facilitate dialogue with (and between) the programmes, the new area was responsible for reorganising the available scientific information into a consolidated base, helping to steer restoration towards a broad and unique understanding of the disaster and its impacts and to inform decision-making more efficiently. In doing so, it also helped to draw attention to the importance of the process beyond the outcomes.

BUILDING NEW LIVELIHOODS


Partnerships with development and training institutions for reskilling and vocational training and capacity building, including programmes for youth and adolescents, and with government agencies and universities to support small-scale producers in their socio-economic and environmental readjustment, also acting in line with the recommendations made by the Panel. While many actions started before the publication of the Panel's work, the recommendations reinforced the need for action, integration and continuity over the long term.

Other partnerships work on sectoral diagnostics and mapping opportunities to diversify the economy and foster entrepreneurship. Actions included stimulating new value chains, reskilling and empowering communities, and creating financial and policy instruments, all in line with the Panel's recommendations.

Still in relation to the forward-thinking for the Rio Doce basin, actions for the development of environmental education and projects for youth leadership development and educators' training were developed in partnership with universities.

NATURE-BASED SOLUTIONS

Nature-based solutions are of utmost importance for the resilience of socio-ecological systems. The Panel identified these approaches as essential for the integral recovery of the basin, capable of effectively and adaptively protecting, sustainably managing and restoring natural or modified ecosystems. The renaturalisation project of the Gualaxo do Norte River and rural areas of the Upper Rio Doce, along with reforestation and tailings management techniques, are examples of nature-based solutions implemented by Renova in the restoration process.



11 October 2018,
Fundacao RENOVA | Expedicao
Caminho da Reparacao (RENOVA
Foundation)
In the image, the waters of the
Gualaxo River
Photo: © All rights reserved to
NITRO Historias Visuais



ASSESSING IMPACTS ON MARINE AND COASTAL ENVIRONMENTS

Efforts are currently underway to comprehend the full extent of the dam failure's impacts on various ecosystems. However, a major challenge in restoration was to consolidate technical knowledge about the magnitude of damage to coastal and marine areas.

Against this background and in light of the previous work developed with TR1 and IP4, it was necessary to establish a working model that would meet the practical needs of the remediation, the Panel and Renova agreed on a collaborative working model. Based on eight workshops led by the Panel, Renova's Impact Assessment and Biodiversity Teams and the Brazilian Foundation for Sustainable Development (FBDS) worked together to build a framework for assessing impacts on coastal and marine environments. By adopting this new approach to work, the technical teams were able to receive early access to the ideas and recommendations put forth by the Panel. This allowed them to make necessary adaptations to the practical challenge of its execution, and implement the recommendations even before the final document was published. The methodology developed was also previously presented to the technical staff of the CIF Technical Chamber on Biodiversity (CT-Bio) to obtain feedback.

The result was the development of a customised method to assess impacts on coastal and marine ecosystems. By the time this report was developed, the results from implementing the methodology developed by the Panel subsidised the creation of the Integrated Action Plans for the recovery and conservation of biodiversity, built in a participatory manner with the permanent institutions that carry out the environmental management of the Basin.

PARTICIPATORY MONITORING AND KNOWLEDGE MANAGEMENT

Communication and information management were at the heart of the recommendations as necessary tools to promote social participation and resolve conflicts on issues essential to life in the region. These included water quality, resumption of fishing activities and potential risks and harmful effects of tailings spilt into the river on the population's health.

6 October 6, 2018,
RENOVA Foundation | Path of
Reparation Expedition,
In the image, experts evaluating
specimens during marine monitoring
actions

Photo: © All rights reserved to NITRO
Historias Visuais



In response and in line with the recommendations, a publicly available water monitoring platform, the Monitoring Rio Doce - Systematic Qualitative and Quantitative Monitoring Programme for Water and Sediment (PMQQS), was developed in partnership with several federal and state government agencies.

The data available contributed to the Basin's Integrated Water Resources Plan (PIRH), which serves as an instrument for effectively planning and managing water resources within the region. Such data plays a crucial role in identifying and addressing potential issues while providing sustainable solutions for responsible resource usage. Additionally, the data is accessible to the public, thereby enabling informed decision-making and ensuring transparency, encouraging social involvement, facilitating resource monitoring, and promoting research and knowledge production.

Renova has made additional investment in other tools and partnerships to improve communication and access to information. This includes an online geospatial platform that provides visual and interactive information on the health of the basin and progress of remediation programs. Further, periodic bulletins on water quality are available. Renova has also established partnerships with state and federal agencies and society to promote integrated data sharing. Furthermore, an information and knowledge centre on remediation has been created.

Also in line with the recommendations, initiatives to monitor water and biodiversity are being developed with citizen participation in cooperation with UNESCO. Additionally, fishing and aquaculture activities are being monitored with the involvement of fishers to conduct a socioeconomic assessment of fishing in the Rio Doce and the coastal region of Espírito Santo. This assessment is essential for resuming activities that were interrupted due to the dam failure.

MAINSTREAMING CLIMATE CHANGE

At the core of global discussions, climate change was identified by the Panel from the outset as a threat to the sustainability and resilience of mitigation outcomes, especially in the medium and long term. However, including this perspective in environmental management plans was not yet a practice incorporated by planning bodies, and there is no mention of the topic in TTAC.

The Panel's Second Thematic Report (TR2) published in 2021 proposed four recommendations, three of which urged the need to create a climate action plan on restoration with the involvement of the CIF, municipal governments and sectoral entities. The Panel suggested that actions should address climate vulnerabilities and risks, increase resilience and account for carbon emissions from repair programmes.

In their official response, Renova stated that the recommendations required broader and more orchestrated action with other entities and were beyond the Foundation's implementation capacity. Yet, it stated it would act upon to promote nature-based solutions.

Though it did not have the expected internal relevance, TR2 covered a crucial issue for the region that had already been suffering from adverse effects of climate change, such as periodic floods and droughts of atypical behaviour, which made the document achieve great repercussions. The state government of Minas Gerais considered collaborating with IUCN to create a climate action plan. Later on, the governments of Minas Gerais and Espírito Santo built their own climate change adaptation plans.

The TR2 also contributed to monitoring GHG emissions from the Brumadinho restoration. Other actors have also incorporated climate change into their respective long-term plans. The Manhuaçu River sub-basin has included climate issues in its multi-year plan. CBH-Doce incorporated climate change in preparing the new PIRH, prioritising adaptation measures and actions to monitor climate impacts.

Rio Pequeno, conector do Rio Doce com a Lagoa Juparanã. 2019.
Pequeno River, connector of the Rio Doce with the Juparanã Lake. 2019.
Photo: IUCN/Rio Doce Panel



PROMOTING NATURAL FLOWS AND THE CASE OF THE JUPARANÃ LAKE



One of the largest freshwater lakes in Brazil, Lake Juparanã, connects to the Rio Doce through the Rio Pequeno, flowing in both directions - depending on the season. When the Fundão dam collapsed, there was a risk that the plume of tailings and entrained sediments would reach the lake, potentially affecting local biodiversity, water quality, and the water supply of three towns in the region.

A court decision determined the construction of an emergency dam, which temporarily contained the flow of mud into Juparanã but prevented natural water flows. In the period of heavy rains the following summer, the measure prevented the lake from overflowing with excess water, raising the level of the water and flooding some areas upstream. Some social groups benefited from the increased water level of the lagoon while others were harmed, which contributed to the creation of local political tensions around this issue.

Families occupying the houses built on the banks of the Pequeno River (downstream of the dam) were under other types of risk, such as the structural risk of the dam itself, and began to receive social assistance from the Renova Foundation, such as temporary relocation, housing and health care.

The Panel studied different proposals on the optimal way to manage the lake and its surroundings, using the concept of the source-to-sea approach. Due to the importance of the natural links between the lake and the river systems, and the risks of contamination by tailings and other chemicals, the Panel recommended permanent monitoring of the lake to identify and describe any impacts on the ecosystem; and the construction of a dam with gates that would adjust automatically to control the flow of water in both directions.

Regardless of these recommendations, a court decision before the publication of the Panel's study established the construction of an adjustable cofferdam and a specific team to monitor and change its level as the volume of water varies. Even if not in line with the Panel's proposal, the solution made it possible to re-establish natural connections and not interrupt natural flows, the main point raised by the Panel in IP3.

During the course of this process, the Renova Foundation conducted several technical studies of different natures (environmental, social, structural) to evaluate possible scenarios and define the best definitive solution within the scope of the judicial process related to the case. In addition, it continued to assist the Civil Defences of Linhares and Sooretama in monitoring the level of the Rio Doce through the PMQQS, especially in Governador Valadares (MG), Baixo Guandu, Itapina (district of Colatina), Colatina and Linhares.

INFLUENCING BEYOND RIO DOCE

RESPONDING TO SIMILAR DISASTERS

The collapse of Vale's B1 dam on January, 25th 2019, located in the Córrego do Feijão complex, caused a humanitarian disaster of enormous proportions, with the loss of more than 270 lives, and directly affected the municipality of Brumadinho (MG) and the Paraopeba River basin and its biodiversity.

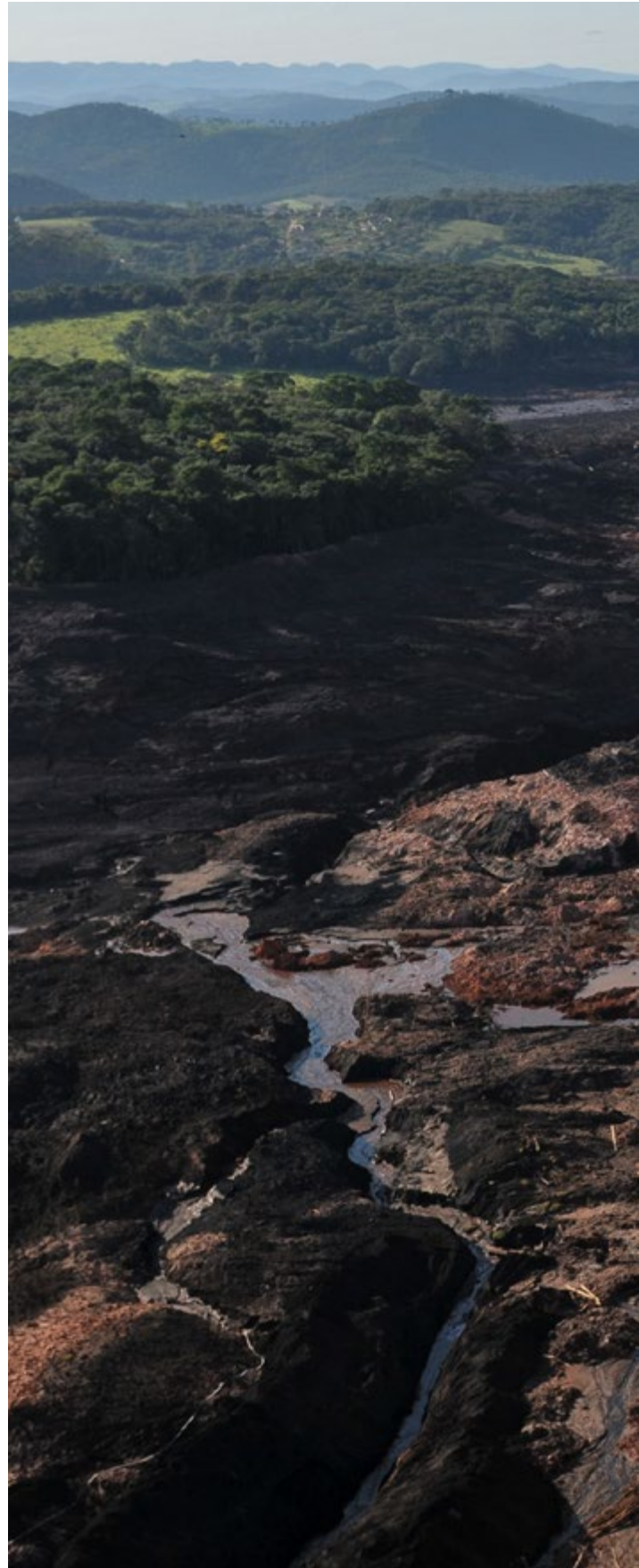
While different measures were taken in the two events, evidence shows that some of the Panel's reports and recommendations were used in the design of responses to the Brumadinho disaster. Both TR1 and IP4 were used to elaborate the impact assessment strategy and develop a socio-environmental remediation plan for the Paraopeba River region. As previously mentioned, TR2, on mainstreaming climate change in restoration, also served as the basis for monitoring GHG emissions in remediation activities.

INFLUENCING OPERATIONAL STANDARDS

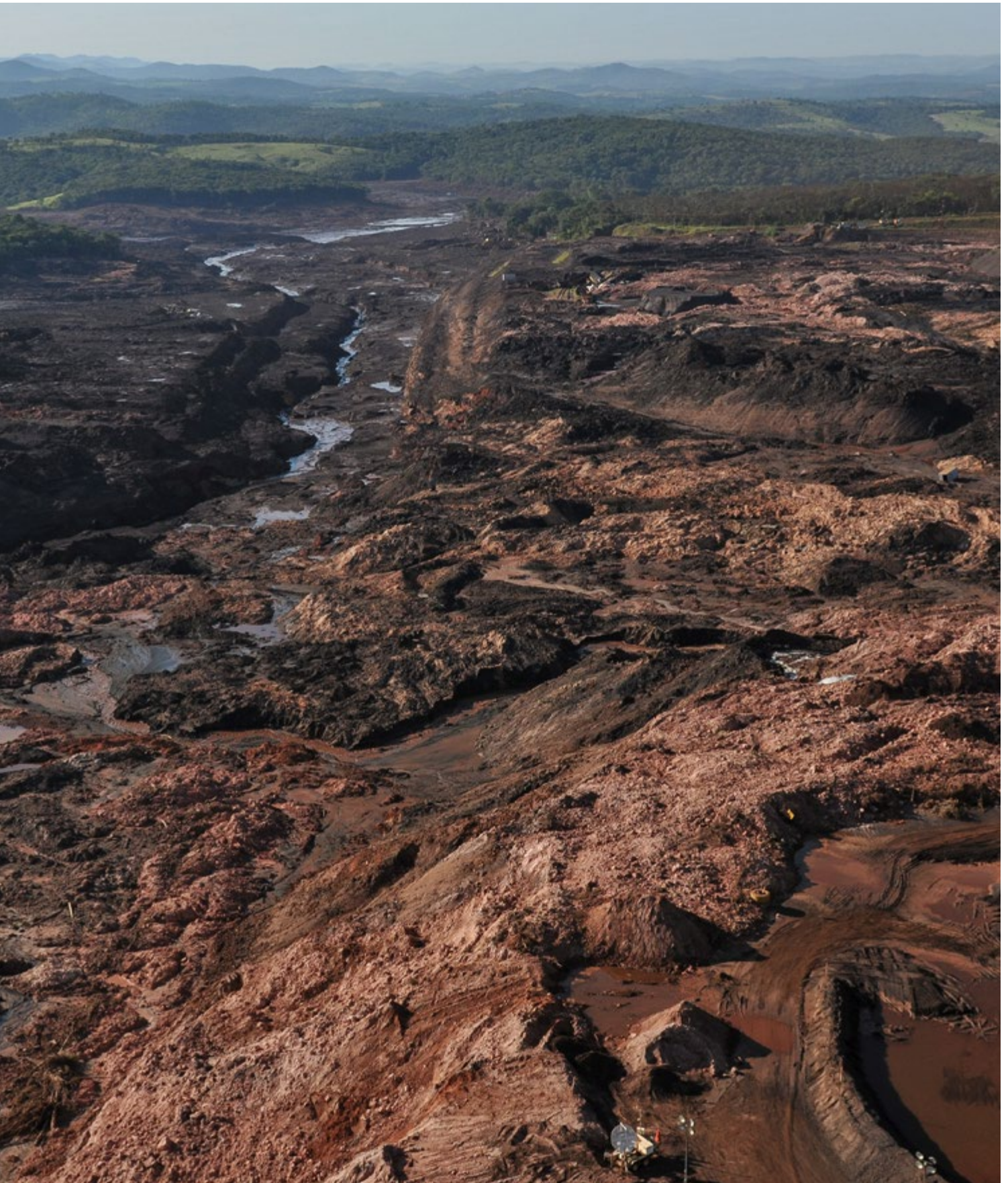
A second dam failure (B1) less than five years after Fundão prompted the International Council on Mining and Metals (ICMM), the United Nations Environment Programme (UNEP) and the Principles for Responsible Investment (PRI) to create the Global Tailings Review. It convened experts and advisors to review global standards for the establishment and decommissioning of tailings dams and prevent similar disasters from recurring.

Panel members and IUCN advised the process on subjects such as the assessment of post-disaster impacts and restoration strategies for affected ecosystems. The work led to the proposal of a new global standard for tailings management to be implemented internationally by infrastructure managers and related policymakers.

The Panel's and Renova Foundation's work also reverberated at international conferences, with presentations at the annual conference of the International Association for Impact Assessment (IAIA), the world's most important on the subject, the IUCN World Conservation Congress, and meetings of the Stockholm International Water Institute (SIWI). IUCN also received the IAIA Global Award in 2022 for its work in the field of impact assessment, with a focus on the knowledge products developed within the Panel.



Brumadinho, Minas Gerais,
Socio-environmental catastrophe caused
by the collapse of the Vale mining company
dam in Brumadinho (MG)
Photo: Felipe Werneck/lbama





1 October, 2018
Renova Foundation / Restoration Path Expedition
Aerial view of the Doce river, in the city of
Colatina.

Photo: © Todos os direitos reservados a NITRO
Historias Visuais

CONCLUSIONS AND REFLECTIONS

The Fundão dam disaster and subsequent efforts to remediate the region highlighted that a watershed is a complex system of intricate links and connections that could not be viewed or studied separately.

Likewise, restoration was not an engineering problem to be solved simply with work, equipment, and machinery. The dam's failure was not only a result of its structure but also of the company's management model.

The Panel contributed to the recovery process by moving towards a comprehensive view of the disaster and its impacts. It succeeded in reminding the different actors of the importance of taking a long-term vision, analysing the impact with a source-to-sea approach and strengthening the resilience of the river basin. The Reports offered significant insights into complex issues such as climate change, ex-post impact assessments and long-term governance.

The restoration work has provided many surprising lessons, and one of them is the importance of processes. Throughout this trajectory, the Panel's work was enlightening, helping to point pathways for the future of the Rio Doce Basin, many of which converged and influenced the strategies adopted in the Rio Doce remediation or other remediation processes adopted in Brazil and around the world. Despite some points of divergence or non-implementation, the vast majority of the Panel's recommendations and ideas converge with the remediation efforts and will continue to reverberate in this important work of recovery of the Basin.

LIST OF INTERVIEWS

André de Freitas, former President of the Renova Foundation

Bruno Pimenta, former Biodiversity Coordinator at the Renova Foundation

Carlos Durigan, IUCN Council Member

Caroline Coguetto, former MEL Officer at IUCN

Christianne Maroun, member of the Rio Doce Panel

Daniela Arpini, Renova's Impacts Curator Specialist

Fernanda Maschietto, former IUCN Project Officer

Francisco Barbosa, Vice-chair and member of the Rio Doce Panel

João Leal, MEL Officer at IUCN

Jonathan Renshaw, member of the Rio Doce Panel

José Carlos Carvalho, former Minister of Environment and external consultant to the Renova Foundation

Laila Medeiros, Biodiversity Coordinator at Renova

Luis E. Sánchez, member of the Rio Doce Panel

Maria Cecília Wey de Brito, member of the Rio Doce Panel

Mirna Castro Folco, Renova Foundation Specialist

Peter May, member of the Rio Doce Panel

Renata Bennet, former IUCN Communications Officer

Roberto Waack, former President of the Renova Foundation

Sergio Kuroda, Renova's policy and restoration monitoring manager

Silvério da Luz, former mayor of the municipality of Rio Doce

Suely Araújo, former President of Ibama

Thais Herdy, Renova's former head of partnerships with Unesco and IUCN

Vitor Silva, Renova's focal point with the Rio Doce Panel

Yolanda Kakabadse, Chair of the Rio Doce Panel

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**INTERNATIONAL UNION
FOR CONSERVATION OF NATURE**

WORLD HEADQUARTERS
Rue Mauverney 28
1196 Gland, Switzerland
mail@iucn.org

www.iucn.org/
www.iucn.org/riodocepanel
www.iucn.org/resources/publications

