



# **Using secondary data to assess knowledge uptake and influence of the Rio Doce Panel: Findings and key lessons learned from using the N-Vivo software**

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## Content

Executive Summary .....	3
1. Introduction .....	4
2. Context .....	4
3. Methods .....	5
3.1. Building a database .....	5
3.2. Organising and coding information .....	6
3.2.1 Sources .....	6
3.2.2 Nodes .....	7
3.2.3 Cases .....	8
3.2.4 Sets .....	8
3.2.5 Queries .....	8
3.2.6 Memos .....	9
4 Exploring the database .....	9
5 Results .....	11
Environmental and Human Health .....	12
Governance .....	12
Alternative Livelihoods and Socioeconomic Development .....	13
Risk Assessment and Adaptive Management .....	13
Environmental and Social Impact Assessment .....	13
6 Conclusion, Best Practices, and Recommendations .....	14
Key Lessons Learned .....	15
Annexe 1: Key themes used for coding information .....	16
References .....	20



## Executive Summary

The International Union for Conservation of Nature (IUCN) used the N-Vivo software as a Monitoring, Evaluation and Learning (MEL) tool in the context of the Rio Doce Panel (RDP), an Independent Scientific and Technical Advisory Panel (ISTAP) dedicated to mining compensation of the environmental and social impacts of the Fundão's dam disaster.

In a highly complex scenario with multiple stakeholders, N-Vivo was first used as an alternative for the difficulty of relying on primary data collection. IUCN Secretariat developed a strategy to explore online secondary data, compiling more than 1,100 documents in N-Vivo and using a coding system for its organisation and analysis.

Throughout the RDP lifespan, N-Vivo became an important tool for assessing the RDP's effectiveness, acting as an institutional memory and repository of information, keeping the RDP members updated, providing feedback and fostering insights for adaptive management and tracking the implementation of the RDP's recommendations. N-Vivo also allowed us to pinpoint information and evidence gaps for primary data collection and to tailor follow-up interviews accordingly.

This report presents an overview of how N-Vivo was used by IUCN and the RDP, the lessons learned from the RDP experience, and the role it played in the Monitoring, Evaluation, and Learning (MEL) strategy. It also reflects on how such a tool could be used and benefit future ISTAPs and other large projects managed by IUCN.



## 1. Introduction

This report is an analysis of the use of N-Vivo software by the IUCN secretariat in the context of the Rio Doce Panel (RDP), an Independent Scientific and Technical Advisory Panel (ISTAP) missioned to provide recommendations for the resilient and sustainable repair of the damages caused by the Fundão tailings dam collapse in 2015 in the municipality of Mariana, in the state of Minas Gerais, Brazil. It also presents the lessons learned from this experience to benefit future ISTAPs and IUCN endeavours.

Amidst a complex reparation process that dealt with the disaster's environmental and social impacts, IUCN Secretariat used N-Vivo to systematise relevant information for RDP's work, keeping RDP members updated and tracking the implementation and the impact of the recommendations issued by RDP. Throughout RDP's lifespan, the IUCN MEL team catalogued 1,193 documents, such as media articles, meeting minutes, communication pieces, scientific papers, etc.

## 2. Context

To understand the N-Vivo structure created by IUCN, it is necessary to understand the complexity of the Fundão tailings dam collapse. The disaster caused 19 deaths and released about 39.2 million m<sup>3</sup> of tailings into the Fundão creek. The released tailings travelled along the Rio Doce, disrupting ecosystems and livelihoods, and eventually reached the Atlantic Ocean in the State of Espírito Santo, about 670 km downstream from the dam (Sánchez et al., 2018).

In addition to the emergency responses to the disaster, Samarco (which operated the dam) and its shareholders (Vale and BHP) came to an out-of-court Agreement, known as "TTAC", with several public authorities to repair and compensate the extensive environmental and socioeconomic damage in the Rio Doce Basin. The TTAC mandated the creation of the Renova Foundation (RF) as the organisation executing the 42 reparation and compensation programmes under the Agreement.

The TTAC also created a complex deliberative governance system, with the central coordination and deliberation roles falling to the Inter-federative Committee (the CIF, in the Portuguese acronym). The CIF is composed of representatives from the two States affected by the disaster, the Federal Government, several national and subnational technical and regulatory bodies, and the judiciary branch. Representatives of affected peoples and public prosecutors were included as parties in a later version of the Agreement, entitled "TAC-Gov" (Maroun et al., 2021; Sánchez et al., 2018).



The RDP was created in 2017 by request of the Renova Foundation (RF) and works to prepare studies with recommendations that seek to provide a long-term view to reparation programmes by drawing on scientific knowledge and integrative, landscape-based approaches. Although most of the recommendations are meant for the RF, others involve different stakeholders in the reparation process that play crucial roles in achieving the RDP's vision. To reach those audiences, the RDP had communication and engagement strategies to promote stakeholder awareness, understanding and Agreement with the recommendations.

The Monitoring, Evaluation, and Learning strategy was designed to understand if the RDP performed as expected and to demonstrate the intended and unintended outcomes of the RDP and its influence on the target audience. The information collected thanks to implementing the MEL strategy should then improve RDP's work and identify lessons that could benefit other ISTAPs in the future. In IUCN's preliminary research design, the Secretariat aimed to collect primary data through direct interactions with stakeholders (interviews and focal groups) to assess their awareness, understanding and use of the RDP's recommendations.

Nevertheless, the high number of stakeholders and their limited availability restricted primary data collection. Additionally, given the significant number of groups involved in the complex reparation efforts – more than 30 stakeholders - IUCN would have had to invest considerable efforts and resources in collecting and analysing data and ultimately making sense of it.

To work around these limitations, IUCN Secretariat explored secondary data publicly available online or easily accessible using a data analysis software called N-Vivo. N-Vivo is a tool that allows storing, organising and analysing large amounts of qualitative data coming from various sources of information and in different languages. Criteria used by IUCN to select this tool included data sources, data interoperability, data management, qualitative data analyses and exploration and data visualisation.

## 3. Methods

### 3.1. Building a database

IUCN Secretariat compiled a list of documents issued by key stakeholders identified during the inception phase that potentially had relevant information about the recommendation issued by the RDP. The documents were records of stakeholder actions (e.g., periodic activity reports), records of their decision-making processes (meeting minutes and deliberations), records of the way they plan their activities (e.g., annual work plans), performance studies on specific issues (e.g., biodiversity inventories, diagnosis of the disaster's impacts) and other informed stakeholders share with the public (websites, news, interviews). The documents also included minutes and



transcripts of meetings between key stakeholders and the RDP, particularly relevant when tracking the RDP's influence pathways.

Given the nature of some documents (e.g., monthly meeting minutes), the database was updated every month or every two months. Documents were imported in N-Vivo and organised according to the document type and author. All files were also registered with their issue year, adding month and day when possible. By December 2022, 1,193 documents were added to the database. Most of these documents were CIF minutes (593), institutional documents, and communication pieces from Renova Foundation (291). Still, IUCN Secretariat also included documents from the federal and state governments, the judiciary branch, public prosecutors and representatives of affected peoples, and media articles.

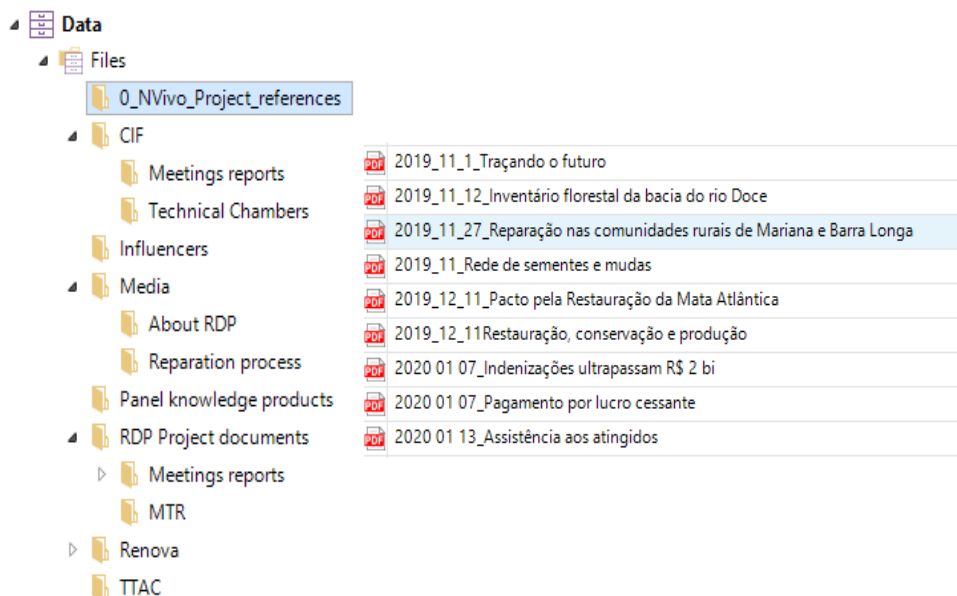
## 3.2 Organising and coding information

### 3.2.1 Sources

Most of the research material was imported directly from PDF or Word files. Communication material was frequently imported as PDF articles without pictures using the N-Capture tool for Google Chrome to reduce the file size. The naming of the files included the year of elaboration and, if possible, with month and day.

The files were organised in folders according to the organisations or groups of stakeholders and then according to the document type, as shown in Figure 1.

**Figure 1 – Illustration of a structure of folders and examples of file names**





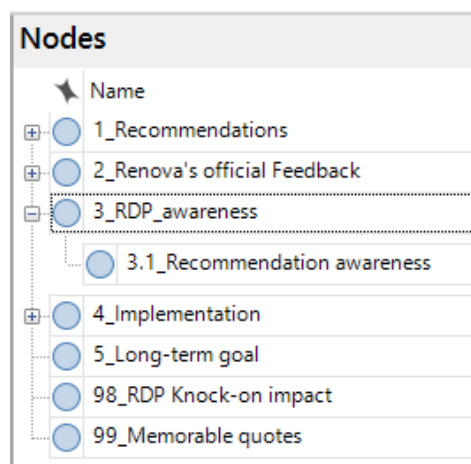
### 3.2.2 Nodes

Nodes are central to understanding and working with N-Vivo. They are a collection of references about a specific theme, place or area of interest. They allow for gathering related material and information in one place to look for emerging patterns later. The Node function was used to code information into “topic” using a set of 50 themes (see Annex 1) commonly addressed by the Rio Doce RDP in its knowledge products and recommendations. Some of these topics were disaggregated into sub-nodes for more granular analysis.

In our case, we also used Nodes to group information around the type of influence the RDP had on its target audience. As represented in Figure 3, items were coded according to the following “nodes:

- RDP products were coded as "Node 1\_Recommendations" according to each of the six recommendations' types (Capacity building, Governance, Research, etc.);
- Renova's official feedback documents were coded as "Node 1\_Recommendations" for recommendation's types", and "Node 2\_Renova's official Feedback" according to i) the categories of action of their responses (sub-node “Answers”) and ii) the official Category of their response (sub-node “Category”).
- When the analysis or searches indicated findings related to the “key research questions”, the relevant results were coded into "nodes 3\_RDP awareness", "Node 4\_Implementation", and/or "Node 5\_Long term goal".
- Potential or observed knock-on effects of RDP products were regrouped under “Node 98\_RDP Knock-on impact”.
- Finally, quotes representing important ideas that could be cited in reports or communication pieces were assembled under “Node 99\_Memorable”.

**Figure 3 – Illustration of Nodes Representation**





### 3.2.3 Cases

All files were coded into Cases, also called "units of observation", representing RDP or the other stakeholder groups identified during the stakeholder mapping, as shown in Figure 2.

**Figure 2 – Illustration of Cases Classification**

The image shows a screenshot of a software interface titled 'Cases'. It features a table with a header row 'Name' and a list of stakeholder groups. Each row has a small circular icon to its left. The groups listed are Civil Society, Government, Local community, Media, Multistakeholder, Private sector, RDP, Renova Foundation, and Universities and research institutes. The 'Government' and 'Multistakeholder' rows have a small square icon with a plus sign to their left, indicating they are expandable.

	Name
	Civil Society
+	Government
	Local community
	Media
+	Multistakeholder
	Private sector
	RDP
	Renova Foundation
	Universities and research institutes

### 3.2.4 Sets

All files were coded into Sets according to the year of elaboration or publication (from 2016). This coding facilitates temporal analysis.

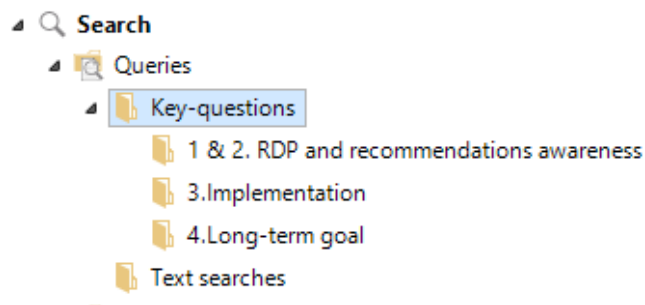
### 3.2.5 Queries

Queries were used to find the occurrence of specific words and analyse phrases in our sources. The results of the queries were then read and, when relevant, coded into nodes and organised into two main folders, as shown in Figure 4.





Figure 4- Illustration of Queries Structure



### 3.2.6 Memos

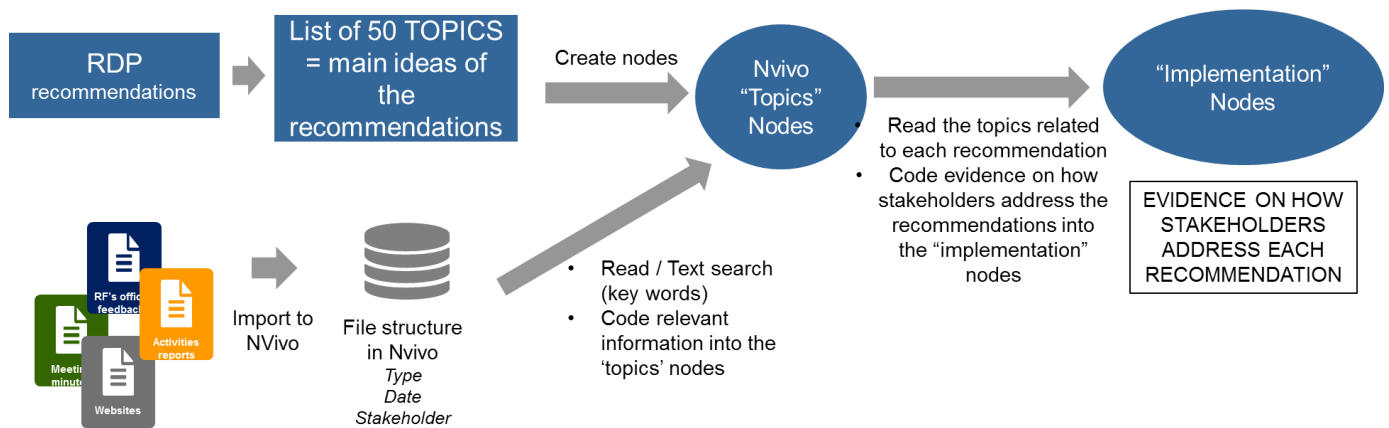
Relevant information on the progress of the analysis was stored in Memos. Memos were used to register some queries' details and when results were analysed and coded for the last time.

## 4 Exploring the database

We used a tree steps approach to explore our data set.

- 1) We read all the documents with a high potential of containing information relevant to our analysis (e.g., a transcript of a meeting between the RDP and RF staff about an RDP study) and directly coded the identified excerpts into corresponding “topic” nodes;  
For long documents (e.g., RF’s activity reports, which span several hundred pages) or if the number of documents was overly high (e.g., hundreds of monthly meeting minutes of all of CIF’s technical chambers), we ran queries and performed text analytic searches. We defined a list of keywords or expressions related to the “topics” nodes and used them to search these documents. All relevant information was then coded into the corresponding “topic” nodes.
- 2) Once the dataset's content had been coded into topics, we coded all the excerpts into a corresponding "implementation" node, i.e “Node 3\_RDP awareness”, "Node 4\_Implementation", and/or "Node 5\_Long term goal" (Figure 5).

**Figure 5. Illustration of the methods used to code relevant information on stakeholders' actions to implement each recommendation.**



Source: Cogueto et al., 2021

- 3) Finally, we divided the RDP's recommendations into six categories to structure our qualitative analyses: i) Comprehensive impact assessment; ii) High-level inter-institutional articulation and governance; iii) Knowledge management, communication and information sharing; iv) Alternative livelihoods and Socioeconomic Impacts; v) Ecosystems and Human Health; vi) Risk and adaptive management. Table 1 provides a more detailed description of these categories and shows how the different recommendations from the RDP were matched to it.



**Table 1 – Recommendation Groups and Descriptions**

<b>Groups &amp; Number of Recommendations</b>	<b>Description</b>	<b>Recommendations</b>
<b>Environmental and Human Health (9 Recommendations)</b>	Recommendations related to qualifying and improving local ecosystems fall into three different lines of action: i) Continuous effort to monitor the environmental health and the quality of ecosystems; ii) Lake Juparanã-related recommendations; iii) Recommendations focusing on Nature-based solutions;	TR02R03 TR03R02, TR03R05 IP02R02 IP03R01, IP03R02, IP03R03 IP05R01, IP05R03
<b>Governance (11)</b>	An overarching category containing recommendations that promote governance models between different stakeholders involved in the planning and implementation chains. This involves creating common capacities (e.g., sanitary systems), promoting citizen engagement, creating common frameworks between different stakeholders (e.g., Rio Doce Climate Action Plan), establishing public policies, and planning future actions.	TR01R05 TR02R01, TR02R02, TR02R04 TR03R01, TR03R03, TR03R04 TR04R01, TR04R02, TR04R04 IP02R01
<b>Environmental and Social Impact Assessment (3)</b>	Recommendations that produce a socioenvironmental assessment that promote a diagnosis of a degraded area.	TR01R01, TR01R02 IP04R01
<b>Knowledge Management and Communication (5)</b>	Recommendations related to creating, sharing, and communicating data packages in a systematised manner to relevant stakeholders.	TR01R06, TR01R07 TR0403 IP02R03 IP05R02
<b>Alternative Livelihoods and Socioeconomic Development (3)</b>	Recommendations related to economic development in rural areas, debt availability, and mobilising stakeholders to increase entrepreneurship activity.	IP01R01, IP01R02, IP01R03
<b>Risk Assessment and Adaptative Management (2)</b>	Identify and map potential threats to local resilience.	TR01R03, TR01R04

These analyses allowed us to assess how various stakeholders, notably the Renova Foundation, perceived, discussed, and acted upon the RDP’s recommendations. It also allowed us to constantly track the many changes occurring amidst the Rio Doce reparation process and inform the RDP member of these contextual changes. Finally, we used these different analyses to understand better the remaining knowledge gaps among the RDP target audience.

## 5 Results

Through our analysis, we found portions of text or information related to all the topics we had identified and used as nodes, with varying numbers of references. We yielded many coding hits, especially in more transparent and publicised programmes. For example, the water monitoring node used to track how water quality was being monitored, the participation of local communities, and the results from the water monitoring analyses had more than 274 references in 42 documents. Other topics, such as alternative livelihoods and political governance, had more than 100 references, and



updating them was especially helpful in understanding the implementation of the RDP's recommendations. As significant cornerstones of the reparation context, keeping track of these topics also helped keep the RDP updated on unexpected events.

On the one hand, we identified several cases where stakeholders aligned their actions with the RDP's recommendations. In particular, we found evidence that stakeholders' actions aligned with RDP's recommendations in Environmental and Human Health, Governance, Alternative Livelihoods and Socioeconomic Development, Risk Assessment and Adaptive Management and Environmental and Social Impact Assessment. These recorded influences were later catalogued in the Influence Log, which had 58 entries as of March 2023. Some of the most relevant examples of the RDP's influence on their target audience are presented below:

### Environmental and Human Health

- The World Resource Institute (WRI) used IUCN's Restoration Opportunities Assessment Methodology and TR02 to promote a diagnostic of the basin and argue that the Rio Doce reparation context needs to adopt more policies and increase investments capable of generation institutional and social resilience for adaptation to climate change.
- The RDP and other factors influenced the Rio Doce-centred committee's adoption of climate change plans. The sub-basin of the Rio Manhaçu basin incorporated climate-change considerations into its multi-annual plan. Although it is impossible to assess the extent to which TR02 influenced Manhaçu, we found evidence that CBH-Doce used TR02 as one of its sources for incorporating climate change into its new Hydrological Resource Plans. In this document, the most important priorities for the following years are adapting infrastructure and considering climate change's impact on the watershed.
- The One Health approach proposed by the RDP in IP05 led to Renova embracing a methodology called Integrated Management for Health and Environment (GAISMA). The victims criticised this approach, which preferred an analysis focused on human health, and the judicialisation made Renova drop the methodology.

### Governance

- Representatives of the Minas Gerais' Planning Secretariat said that SISEMA (Minas Gerais' Environment System) is pushing for a renegotiation plan that considers the source-to-sea approach and that they are using the RDP's documents to make their case. However, since the renegotiation process is still ongoing, clear evidence of how the Source-to-Sea approach and TR03 will be incorporated into such a plan still needs to be made clear.



## Alternative Livelihoods and Socioeconomic Development

- Evidence that the public prosecutor used IP02 to justify the fishing ban in July 2019 was found. In early 2020, RF organised a workshop to provide feedback and communicate the overall assessment results on freshwater biodiversity and fish toxicity to affected communities and government authorities. A Renova member also mentioned that IP02 reinforced RF practices under Program 14.

## Risk Assessment and Adaptive Management

- TR01 showed that Renova needed to produce a more systematic assessment of all the information produced by the academia and technical organisations in the reparation context. This led to the creation of the Impact Curatorship, a department within the RF that focused on transversal subjects and tries to promote integration within the reparation of many programs.
- Vale officials used TR02 as a source to develop Brumadinho's disaster reparation efforts. They included chapters addressing Impact Assessment and Climate Change in Paraopeba's watershed Reparation Plan, compiled in response to the disaster caused by the failure of a tailings dam owned by Vale in Brumadinho.

## Environmental and Social Impact Assessment

- IP04 and TR05's played an important role in constructing an assessment framework on marine and coastal biodiversity by RF. The RDP's links with Renova staff members and Fundação Brasileira de Desenvolvimento Sustentável (FBDS) contributed to making the framework more collaborative and applicable within the reparation context.

Vale's use of TR02 in the Paraopeba basin, the creation of the Impact Curatorship, and the marine impact assessment methodology are significant evidence of the RDP's high impact on scientific production and knowledge creation in the reparation context. Such evidence was also used in other evaluation assessments, such as the External Evaluation and the Legacy Paper, to illustrate RDP's importance further and attest to its influence.

On the other hand, our analyses also show that some specific topics related to RDP's recommendations, such as payment for environmental services and the source-to-sea and landscape approaches, had less uptake than expected. When such trends were observed, extensive reading of the documents where these topics were found was done and helped to understand better why these issues were not moving forward as planned.



We also used the information gaps we identified during our N-Vivo analyses to follow up and engage with some target audiences. The primary findings helped to filter the list of stakeholders to interview, prioritise cases where we identified behaviours aligned with the RDP's recommendations, and strategically plan the scripts for the interviews to focus on topics the stakeholders had acted upon. This process allows for fewer and shorter interviews that provide more relevant information. Interlocutors who were not inclined to participate in exploratory interviews or provide specific information on their work when first contacted by us felt encouraged to do so after seeing the analysis results, thus providing valuable information to our research.

Through this process, we were also able to capture instances of missed opportunities for more catalytic effects and transformative changes. For example, a public official mentioned briefly after the TR02 publication that they would like to collaborate with IUCN to build a state-wide capacity plan to increase resilience in municipalities. Two years later, this plan was launched. Still, in a follow-up meeting, Minas Gerais' Environment Secretariat members denied having used TR02 for their climate action plan, saying they did not promote the plan as a response to Mariana or Brumadinho but rather as a "natural evolution" of the previous environmental plans. A more active collaboration with the Minas Gerais government could have increased the RDP's influence in this climate change plan and engendered additional collaboration in other areas.

Finally, N-Vivo ensured that RDP members were informed about new development within the reparation context identified through the document review. In retrospect, this could have been done more periodically and through a better institutional alignment with the communication team.

## 6 Conclusion, Best Practices, and Recommendations

Throughout RDP, N-Vivo proved to be an important software for collecting, analysing and making sense of secondary data, pinpointing knowledge gaps to guide primary data collection, and acting as a repository of information and an institutional memory tool. Using N-Vivo, enabled RDP to track the implementation of its recommendations, assess its effectiveness, understand its impacts, and become better informed about Renova's programs and the implementation of RDP's recommendations amidst a highly complex reparation process with multiple stakeholders.

It is, however, essential to reassess its use after changes in the context. At first, RF was keen to publicise its implementation of the TTAC's programs; secondary data relevant to the project was more readily available online. By the end of the RDP's lifetime, the Rio Doce reparation process context had changed to become increasingly judicialised and implementation of the programs lost its importance in comparison with judicial settlements and the renegotiation process. These processes, which tended to happen in internal meetings, were less transparent and hindered secondary data collection through N-Vivo. By constantly assessing information gaps, the software allowed for more precise and targeted interviews with more relevant information.



N-Vivo is also a great support to the communication work. As software that acts as a repository of information and as a future memory for the project, it can serve to code and keep track of meaningful quotes and dialogues that attest to the impact of the work done, summarise a relevant discussion, tell a story or is relevant in other forms. This information can feed periodical communications efforts to reach a bigger audience or be a practical storytelling device in RDP documents, such as thematic reports, external evaluations, or IUCN's Stories of Influence.

The main conclusion arriving from this report is that N-Vivo can be a valuable addition to IUCN's suite of monitoring, evaluation and learning tool as it can help both projects and the institution at large to better track and understand some aspects of their work and particularly for when operating in complex and rapid evolving context. Other international organisations, such as the World Bank and IMF, use N-Vivo to define project portfolios and assess cross-cutting issues, such as identifying lessons from a specific subset of projects. A similar use of N-Vivo is something that IUCN could explore as it can foster inter-project reflection on best practices and feed future project design with lessons learned.

It is essential to understand that using N-Vivo requires significant work to collect and organise information, create user guidelines, and architecture its informational system, which is time- and resource-consuming. Future users should thus carefully consider these aspects before engaging with the tool.

### Key Lessons Learned

1. N-Vivo is a valuable tool for tracking knowledge uptake in complex projects with many stakeholders that prevent direct and/or periodic follow-up but is best when combined with other data collection approaches. It can help provide significant insight and pinpoint knowledge gaps, which can then be used to define primary data collection needs and strategies.
2. Creating a well-designed cataloguing architecture and promoting guidelines for N-Vivo use requires investing significant time and resources that must be adequately considered at the project design stage.
3. N-Vivo played a vital role in RDP's adaptive management strategy as it helped to attest impact and outreach of the RDP's work. Therefore, other ISTAPs should consider it a tool when planning their monitoring, evaluation and learning strategy.
4. N-Vivo's data collection and filing strategy should be reviewed periodically to address changes in the project context.



## Annexe 1: Key themes used for coding information

Name	Description
Alternative livelihoods	
Capacity building	
Diversification	
Rural value chains	
Sustainable land use	Sustainable and alternative land use
Technical assistance	
Tourism	
Base decision-making	
Biodiversity	
Climate change	
Adaptation	
Climate mitigation	
Community participation	
Participative monitoring	
Comprehensive impact assessment	Integrated impact assessment
Acknowledge uncertainties	
Cumulative impact	Clear mention of the cumulative impact
Systematic approach	
Ecosystems services	





Name	Description
Fishing	
Funding	
Human and ecosystem health	
GAISMA	
Human health	
Info & comm	
Access to information	
Communication	
Info & knowledge management	
Information sharing plan	
Institutional capacity building	
Landscape approach	
Long-lasting legacy	
Mitigation objectives	Objectives of mitigation as cited in TR01
Compensate for damage	that cannot be remediated
Remediate damage	
Restore biophysical environment	Restore the biophysical environment to a desired previous state
Restore or enhance livelihoods	of affected people
More than TTAC	



Name	Description
Multistakeholder	
Stakeholder engagement	
Nature-based solutions	
Partnerships	Partnerships with other organisations
Previous conditions	A baseline of conditions of the basin before the dam break
Previous trends	Trends of the indicators prior to the dam collapse
Programs' impact	The assessment of Renova's programs outcomes
Adaptive management	
Integrated evaluation	Integrated evaluation of programs outcomes
Negative impact	
TTAC review	
Programs' management	of Renova's programs
Rely on specialists	
Research	
Resilience	The broad concept of resilience
Restoration of native vegetation	
Resumption of activities	
Risk assessment	
Sanitation	
Source to see	
Natural flows	



Name	Description
Sustainability	
Socioeconomic	
Socioenvironmental	
Sustainable fishing	
Vulnerability	
Water	
Monitoring	



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