The Brazilian National System of Civil Protection and Disaster Response: From Planning to Implementation of a National Strategy

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02 – Petrópolis and the Extreme Event
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Key Issues

- Present how the National Civil Protection System works based on a recent disaster of great local impact.

- The Petrópolis disaster, which happened in February 2022, represents the most representative and frequent damages and losses in Brazil.

- Present how the Integrated Disaster Information System (S2ID) tool operates a disaster response at Federal and Municipality level.

- Demonstrate the evolution of disaster preparedness and response in Brazil in the last decade, presented as lessons learned from the January 2011 disaster in the State of Rio de Janeiro.
According to the last statistics, Brazil has a population of approximately 215 million inhabitants (2022). It is a Federative State composed of the Federal District, 26 States and 5,570 municipalities.

Like all sectorial policies, Civil Protection has the main guidelines defined at the Federal level, but with specific jurisdiction at the state and municipal levels, regarding a political-administrative autonomy.

This case study will present in detail the competences of each level of the Administration: Federal Government, State of Rio de Janeiro, Petrópolis municipality to illustrate the specific responsibilities of each involved actor in the process of disaster response and recovery in Brazil.
The Civil Defense in Brazil is organized as system namely, National System of Civil Protection (Sinpdec). It is managed by the National Secretariat of Civil Defense (Sedec).

It is up to Sinpdec to implement the established doctrine in the National Policy for Civil Protection (PNPDEC). The Sinpdec encompasses Federal Systems, States and Municipalities. These actors work together, aligned in an integrated Public Policy of Civil Protection which focuses on disaster prevention, mitigation, preparedness, response and recovery.
Sinpédec's Structure

Context

National Secretariat -SEDEC
Sinpédec Coordinator
Responsible for the articulation and coordination at the Federal level

Civil Protection State Authority
Responsible for the articulation and coordination at the State level

Civil Protection City Authority
Responsible for the articulation and coordination at the City level

DRM, Urban and Rural Resilience and Disaster Response

Public Sector
- Health
- Public Safety
- Infrastructure
- Water and Sanitation
- Others

Civil Society
- Private sector
- Industries
- Academy
- NGOs
- Others

Federal
State
City
Civil Protection State Authority
Responsible for the articulation and coordination at the State level

National Secretariat - SEDEC
SINPDEC COORDINATOR
Responsible for the articulation and coordination at the Federal level

DRM, Urban and Rural Resilience and Disaster Response

Civil Protection City Authority
Responsible for the articulation and coordination at the City level

Public Sector
- Federal
  - Health
  - Public Safety
  - Infrastructure
  - Water and Sanitation
  - others
- State
- City

Civil Society
- Federal
- State
- City
  - Private sector
  - Industries
  - Academy
  - NGO's
  - others
Responsible for coordinating Civil Protection actions throughout the national territory

Represented by Sedec / Ministry of Regional Development

Central Government Agency

Federal System
- Responsible for articulation, coordination and implementation of Sinpdec at the federal level.

State System
- Responsible for articulation, coordination and implementation of Sinpdec at the state level.

Municipal System
- Responsible for articulation, coordination and implementation of Sinpdec at the municipal level.
The operation and attributions of Civil Protection organizations are established by Law 12.608/2012, which defines the stages of acting: prevention, mitigation, preparedness, response and recovery.

These actions must have a systemic approach, integrating a cycle of action, involving different sectors of the Public Administration, such as Health, Infrastructure, Social Security, among others.

The case study will describe response and recovery actions triggered by the disaster event in Petropolis in February 2022. It will present the whole processing from weather monitoring, to disaster response management until defining a proposed Reconstruction Work Plan for affected communities.
Petrópolis and the Extreme Event
Petrópolis - RJ
Petrópolis

A municipality located in the mountainous region of the Rio de Janeiro State with about 310 thousand citizens. It has a high-risk profile for hydrological events and was one of the most affected municipalities in the January 2011's disaster, considered the biggest disaster in Brazilian history, when over 1,200 people died.

The charts below presents the historical disaster profile.
On 02/15/2022 Petrópolis was affected by high precipitation (approximately 548.6mm in 24 hours) that severely affected local communities and infrastructure.

Main damages and losses:

- 120,000 people was directly affected
- 13,500 displaced
- 241 deaths
- 6,014 events reported (5,088 landslides)
- Approximately USD 40 millions in losses
- 100,000 tons of debris
S2ID functionality for Civil Protection activities
The Integrated Disaster Information System (S2ID) houses several Sedec products, with the objective to qualify and give transparency of risks and disasters management in Brazil. By transforming all processes into online software and collection of all disaster data in a structured database, the National and Subnational Governments are capable to better managed the complex process of disaster risk mitigation.

It currently has over 12,000 users, 88% of municipalities have at least one active user and as per 2022 statistics. Currently, 6,272 disasters were recorded.
The Decree 10.593/2020 assigns Sedec as the main authority to manage the S2ID implementation and coordination. It is the only instrument for states and municipalities to inform losses and damages, to declare emergency situations, to request Federal recognition of an emergency situation and to request Federal support for response and reconstruction.
The system was designed according to actions, phases, modules and the user profiles who have access.

Modules
The modules represent each acting phases, according to the Civil Protection actions cycle.

Profile of Users
Civil Protection and agents:
- municipal
- state
- federal
Preparedness, Response and Reconstruction

- Contingency Plan ("Plancon")
- Registration and communication of warnings and alerts
- Damages and losses reports (FIDE)
- Emergency situation declaration
- Post-disaster needs report
- Federal Recognition of an emergency situation
- Response and Rehabilitation request form
- Work Plan for infrastructure Reconstruction
Federal Agencies

Monitor disaster risk hazards and send NOTICES, ALERTS and BULLETINS.

Obs: there are more agencies, here are just a few examples

Cenad/Sedec

Process and consolidate information and forwards it to the Protection and Civil Defense agencies

states and cities

Process and consolidate the informations and forward to the population

Articulation

Industry technology solutions of integrated telecommunications into a single functional architecture.

Idap

Messages are sent to the registered users in respective locality. Participating Brazilian industries that are telephony service providers: "Claro", "Vivo", "Tim", "Oi", "Sercomtel", "Algar" and "Nextel".
Founded in 2011, the National Center for Monitoring and Natural Disaster Alerts (Cemaden), is responsible to issue alerts, using modern technologies for monitoring and hydrometeorological and geodynamic forecasts. It currently monitors more than 1,600 municipalities with a high-risk profile for floods and landslides.
The National Center for Risk and Disaster Management (CENAD) is the responsible, at the Federal level, for managing information on risks, alerts and response actions in articulation with the Civil Protection System Federal. On a daily basis, CENAD receives data for different Federal Government Institutions which, after analysis, goes into useful risk information shared with States' and Municipalities' Civil Defense.
Petropolis Disaster Response Actions
Monitoring, Alert and Impact Assessment

02/13/2022 – Cemaden issue the first alert and inform Cenad.

02/13 – Cenad insert alert data in S2ID that forwards information to municipalities and Rio de Janeiro State.

02/13 to 02/15 – The alert level increases into a red level.

02/15 – Alert broadcasting by SMS, TV and Google Public Alerts (Cenad).

02/15 – Activation of 5 sirens in less than 1 minute in risk areas. 18 in one hour.

02/15 - Mayor declares Public Calamity.

02/16 - Start of rescue actions by security authorities and release of roads.
Disaster Information Form (FIDE)

Damages and losses reports (FIDE)
Emergency situation declaration

Data were collected until 17:00 on 02/16/2022 which were complemented and/or updated as the scenario evolved.

50 areas have been affected from more than 5,000 landslides and flashfloods

- Identification
- Disaster Classification
- Date
- Area with affected population
- Causes and effects of the disaster
- Human, material and environmental damages
- Public and private economic losses
- Reporting Institution
Petropolis

Disaster-first data recorded in S2ID

Human Impacts (deaths, injured, hospitalized, displaced and missing persons) – **more than 120,000 people directly affected** by the disaster.
Economic Losses – Private Sector (agriculture, commerce, industry and services) – USD 20 million
Early Response Actions

- 02/16 – Disaster occurrence, Public Calamity declaration by Petropolis and Federal recognition request received

- 02/17 – Sedec recognized the Municipal Declaration

- 02/17 - Submission of the 1st response actions resources request (Humanitarian Assistance) in the amount of USD 320,000.00 to Sedec

- 02/17 – Civil Defense Payment Card (CPDC) account activated – CPDC (Sedec)

- 02/18 – Credit available to municipality for the early response actions (3 days after disaster strikes)
Response and Rehabilitation request form

- Humanitarian Assistance
- Shelter
- Rehabilitation of Essential Public Services (Electricity, water, transport)
- Cleaning of roads and roads
- Rehabilitation of schools and hospitals
- Temporary works that do not need complex design
- Etc.

### Atualização de dados humanos (pessoas)

<table>
<thead>
<tr>
<th>Desabrigados nº</th>
<th>Desalojados nº</th>
<th>Afetados nº</th>
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<tr>
<td>950</td>
<td>1500</td>
<td>120000</td>
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</tbody>
</table>

### Descrição das metas e itens

**Meta 1**

**Aquisição de óleo diesel**

Desde o início da situação, e com dois decretos renovados, o município está continuamente transportando água para famílias necessitadas e que passaram por grande escassez em relação ao consumo humano e, principalmente, à desinfeção e arável. Com a chegada de terrenos e tratamento do tanque, foi transportado em torno de 300,000 litros de água em um período de 175 dias e sete e cinco dias consecutivos. Reunindo um gasto de quase quatro mil litros de óleo diesel, o município pode atender ao 10% do consumo de óleo diesel.

**Tabela 1**

<table>
<thead>
<tr>
<th>Pessoas diretamente beneficiadas</th>
<th>Período de execução (em dias)</th>
<th>Valor total da meta 1</th>
</tr>
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<tbody>
<tr>
<td>90</td>
<td>175</td>
<td>R$ 18.116,73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Óleo</th>
<th>Unid</th>
<th>Período de execução (em dias)</th>
<th>Valor unitário (R$)</th>
<th>Valor total do item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3947</td>
<td>LITRO</td>
<td>175</td>
<td>4,59</td>
<td>R$ 18.116,73</td>
</tr>
</tbody>
</table>
Petropolis

Response and Rehabilitation request form

- BRL 2,759,470.25 for Humanitarian Assistance:
  Food, mattress, hygiene items and vehicles for debris removal and cleaning.
• BRL 26.886.629,26 for rehabilitation (69 items):
  Urban cleaning: clearing streets, cleaning channels and drainage
  Temporary bridges
  Services for Urban Cleaning and Clearing of Channels
  Houses demolition (133)
  Electricity and water supply
  Cleaning of small rivers and streams
Reconstruction Plan

Work Plan for Infrastructure Reconstruction

- Infrastructure reparation and reconstruction
- Public buildings recovery
- Roads and bridges recovery
- Construction of new structures to protect affected areas, such as walls to protect slopes, recovery of riverbanks, etc.
- New housing settlements, in specific cases according to Housing Law.
Reconstruction

- **BRL 5.442.643,77** for Reconstruction (16 items):
  Roads recovery with concretes walls to stabilize slopes

- **Total release BRL 34.649.479,98**
- **3 items requested are still under analysis in a total of BRL 21.576.872,52**
The events of January 11th, 2011, in Rio de Janeiro State are recognized as the worst disasters in the history of the country. Heavy rains affected 16 municipalities in the mountainous region, resulting in 1,192 deaths.

In addition, two more significant disasters that occurred in Santa Catarina State (2008) and Pernambuco State (2011), this disaster triggered a series of structural changes in the last decade on the DRM agenda in Brazil.
Majors actions from lessons learned

- Legal Framework
- Comprehensive disaster risk mapping and risk assessments performed by the Federal Government and State and Municipal institutions
- Development and deployment of S2ID (2011 – 2016)
- Publishing the Natural Disasters Digital Atlas as compendium of data to be used for analytics and decision making
- Establishment of Cenad and Cemaden
- Civil Defense Payment Card
LEGAL FRAMEWORKS

- **2012**: Lei nº 12.608
  - Create PNPDEC and SINPDEC

- **2012**: Decreto nº 10.593
  - Organization and functioning
    - PNPDEC and SINPDEC

- **2013**: Portaria nº 743
  - Federal Recognition

- **2013**: Portaria nº 3.234
  - SSID

- **2014**: Portaria nº 3.040
  - CPDC

- **2015**: Portaria nº 3.033
  - Resource Transfer

- **2016**: Portaria nº 3.027
  - Sending alerts

- **2017**: Portaria nº 260
  - Federal Recognition

- **PRESENT**:
1. Hazard Maps: cartographic documents that represent the event probability related to the landslides and floods;

2. Hydrological-prone risk areas maps: cartographic reports that quantify the elements at risk located in known risk areas. 1,600 municipalities and over 10 thousand mapping areas.
<table>
<thead>
<tr>
<th></th>
<th>BEFORE (S2ID)</th>
<th>AFTER (S2iD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Recognition</td>
<td>90 days average</td>
<td>5 days average</td>
</tr>
<tr>
<td>Documents</td>
<td>Paper reports without standards</td>
<td>Digital online reports with standard information</td>
</tr>
<tr>
<td>Resources release to subnational</td>
<td>Up to 4 years</td>
<td>180 days average</td>
</tr>
<tr>
<td>Historical Data</td>
<td>Paper reports</td>
<td>Database</td>
</tr>
<tr>
<td>Accountability</td>
<td>High disapproval rating</td>
<td>Simplified process with constant monitoring</td>
</tr>
</tbody>
</table>
The Atlas' main objective is to provide systematized disasters and related damages and losses. The data source is the S2ID and historical data prior to the system, gathered from various sources. A total of 90,122 disasters records from 1991 to 2021 were collected and analyzed. Atlas shows data through graphic and spatial.
Municipalities have a previously registered bank account.
When a disaster happens, the account is activated by the Federal Government at the Public Bank and the Mayor only has to sign a document.
It can only be used for relief, assistance and rehabilitation actions.
Withdrawals are not allowed.
Spending can be monitored in real time by the control authorities.

Why?
Expenses with purchases of smaller items are difficult to trace and with little transparency, making accountability problematic.
Time for effective transfers between the Federal Government and Subnational has significantly reduced.
Still challenges

- Lack of local capacity:
  - to implement disaster risk mitigation works
  - to implement reconstruction projects with build back better principles
  - to promote improved and comprehensive disaster prevention programs
- Resettlement of population in high-risk areas
- Land title issues and occupation of non-regulated areas
- Lack of Disaster Risk Finance and Insurance programs (refer to the WB study on Brazil's DRF)
Thank You!

Feel free to contact us if you have any questions.

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