



**Implementation of the Health and Safety Policy at the  
Geology Department of Federal University of Rio de Janeiro (UFRJ), Brazil**  
Implementação da Política de Saúde e Segurança no  
Departamento de Geologia da Universidade Federal do Rio de Janeiro (UFRJ), Brasil

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Recebido em: 15/04/2019 Aprovado em: 20/05/2019

DOI: [http://dx.doi.org/10.11137/2019\\_3\\_321\\_332](http://dx.doi.org/10.11137/2019_3_321_332)

## Resumo

Os geocientistas em suas atividades laborais estão sujeitos à uma série de riscos que podem causar danos à sua saúde e segurança (S&S). O curso de geologia da UFRJ possui extensa carga horária de atividades de campo. Sendo assim, os alunos e professores do departamento estão submetidos à uma série de riscos, perigos e danos, que até então não haviam sido identificados. Tendo em vista esta problemática, este estudo teve como objetivo implementar procedimentos de saúde e segurança no Departamento de Geologia da UFRJ, visando promover a atuação direta dos envolvidos na identificação, gerenciamento, prevenção, mitigação dos riscos e eliminação dos riscos, além do desenvolvimento da cultura de saúde e segurança no departamento.

**Palavras-chave:** Saúde e segurança; Atividade de campo de geologia; Educação; Riscos

## Abstract

Geoscientists in their work activities are subject to a series of risks that can cause harm to their health and safety (H&S). The geology course at the Federal University of Rio de Janeiro (UFRJ) has an extensive workload of field activities. Therefore, the students and professors of the department are subjected to a series of risks, dangers and damages, which, until then, had not been identified. Taking into consideration this issue, the present work had as objective to implement health and safety procedures in the Geology Department of UFRJ, aiming to promote the direct action of those involved in the identification, management, prevention, mitigation of risks and elimination of risks, besides the development of the health and safety culture at the department.

**Keywords:** Health and safety; Geology field activities; Education; Risks

## 1 Introduction

Geoscientists, in their field activity, are susceptible to several risks, which can cause damage to their personal integrity. Currently, the geology course of the Federal University of Rio de Janeiro (UFRJ) has an extensive workload of field activities, which account for 978 hours annually, in addition to an extensive mileage. The rest of the information about the field activities are listed in Table 1. Therefore, the students and professors of the department are subjected to a series of risks and dangers, which until then had not been monitored (Braga *et al.*, 2018).

Taking into consideration this issue, the present work had as objective to implement H&S procedures in the Geology Department of UFRJ, aiming

to promote the direct action of those involved in the identification, management, prevention and mitigation of risks.

To achieve this, a coordinated action was proposed between the three administrative levels of the university: the undergraduate coordination, including professors, students and professionals with knowledge in occupational health and safety, the direction of the Geosciences Institute (IGEO) and the Rectory of the University, in order to develop the H&S culture at the UFRJ's Geology Department.

The whole procedure, besides minimizing the eventual adversities which the students are subject, aimed to prepare future professionals that will be integrated to the H&S culture in the labor market.

## 2 Materials and Methods

The first stage of the project consisted in the collection of data throughout the 60 years of existence of the geology course at UFRJ, being done the same in other universities in South America.

Based on the consolidation and critical analysis of data filed at the Department of Geology secretary and the twenty years of practical experience of the authors working for mine and oil industry, it was identified the accident history of students and identified the risks along the routes of the field activities.

Thereby, procedures were developed for the identification, control, mitigation and elimination of each risk to which the geoscientist is submitted.

Concomitantly with the data collection, it was initiated a project to implement the subject "Health and Safety". This subject would become mandatory in the new curriculum of the graduation course of geology, and would initiate for students who entered in the first semester of 2017.

In addition, due to the vast experience with health and safety by the coordinators of this project, it was encouraged the need to provide information about the physical and mental conditions of the students, in order to provide a more effective assistance in the field activities. For this purpose, a field outing form was designed to be filled in by the student.

Field Activities Data in Geology Course	
Amount of hours / year	978
Amount of days / year	122
Amount of field activities / year	22
Amount of students / year	298
Working Sites	
State	County/Location
Bahia	Canudos, Morro do Chapéu and Salvador
Ceará	Chapada do Araripe and Vale do Cariri
Espírito Santo	Guarapari
Minas Gerais	South region, Quadrilátero Ferrífero and Triângulo Mineiro
Paraíba	Sousa
Paraná	Castro and Ponta Grossa
Piauí	Picos and São Raimundo Nonato
Rio de Janeiro	Campos, Itaboraí, Petrópolis, Quatis, Lakes region and South Fluminense region
Rio Grande do Norte	Mossoró
Rio Grande do Sul	Lavras do Sul and Minas do Camaquã
São Paulo	Taubaté, Monte Alto and Araraquara
Sergipe	Aracaju
Total Kilometers / year	91.430

Table 1 Qualitative and quantitative data about the field activities in the Geology Course of the Federal University of Rio de Janeiro.

Regarding the transport of the students, it was pointed out the need to evaluate the integrity of the vehicles prior to the field trip. For this purpose, it was initiated the development of a daily inspection of vehicle form, to be filled in by the drivers.

### 3 Accidents Involving Geology Students

From the data collection of the accident history of geology students in field activities, several cases were identified, among which, due to the circumstances in a near past, stands out the most recent ones, such as:

- In August of 2018, occurred an accident involving a truck and a bus that transported students from the São Paulo University (USP) to a tournament (Figure 1). The accident was on the Fernão Dias highway in Minas Gerais, and left at least 15 students injured (G1 Sul de Minas, 2018).



Figure 1 Photo of the front of the truck, that was destroyed in the accident involving students of the São Paulo University (G1 Sul de Minas, 2018).

- In July of 2018, three geology students from the Federal University of Brasília (UNB), had to be rescued by a helicopter in a forest region in the state of Tocantins, Brazil (Figure 2). The reason was that the students could not get down from Estrondo Range, after climbing a cliff (G1 Tocantins, 2018).
- From the Federal University of Bahia, the vehicle carrying geology students flipped over, leaving them stuck to the hardware (Várzea do Poço Notícias, 2017). The students and the driver were injured (Figure 3).



Figure 2 Photo of the rescue of the geology students, after being trapped in the Estrondo Range (G1 Tocantins, 2018).



Figure 3 Photo of the vehicle that was taking the geology students by the time of the accident, with breakdowns due to the rollover (Várzea do Poço Notícias, 2017).

- From the Federal University of Mato Grosso, a geology student died buried in a collapse of a trench at a small-scale mining area in Nossa Senhora do Livramento, at 42 km from Cuiabá (G1 Mato Grosso, 2017). He and two other geology students were doing ore research at the trench when the landslide occurred (Figure 4). The student died immediately and one of the girls was injured.
- A geology professor, Rubén Somoza, from the Buenos Aires University, died after the car in which he was lost control and fell on a precipice (Figure 5) in the Province of Salta, Argentina (Cadena 365, 2017). Two geology students, who were with the professor at the time of the accident, left unharmed.





Figure 4 Photo of the trench slip, which victimized the geologist (24 horas news, 2017).



Figure 5 Photo of the fallen vehicle, where were the professor and the students of geology (Cadena 365, 2017).

- The geology student, Yego Cunha Leal, from the Federal University of Pará (UFPA), was found dead during a fieldwork in the Babaçulândia (Figure 6) region, north of Tocantins, in 2013. The student left with the professor to pick up the car in order to rescue two colleagues who had been ill by sunstroke, but on the way, Yego also felt unwell. The professor told Yego to wait at the place until he returned with the car, but when he returned the student was gone. The body was found three days after the student's disappearance, about 15 km from where he was last seen. The medical report did not define the cause of death, but indicated that it would not have been violent. According to the participants of the search, one hypothesis would have been

that the student died from dehydration, since it was very hot in the region (TV Anhangueira, 2013).



Figure 6 Region of Babaçulândia, extreme north of the state of Tocantins, where the student Yego Cunha Leal, disappeared and later, was found dead in 2013 (TV Anhangueira, 2013).

The geology student, Vinicius Santana da Silva, died after being hit by a rock on his head during a fieldwork at Cabugi Peak, in the state of Rio Grande do Norte, in 2006 (nominuto, 2010).

Based on the data filed by the secretary, collection of these accidents and other information obtained through statements of the department members, carried out at the beginning of the project, risks with different degrees of danger were diagnosed, being them responsible for causing minor occurrences until fatal accidents. Among the hazards identified, the following stands out:

- Traffic accidents during the journeys;
- Projection of objects inside the vehicle during the journeys;
- Run over by vehicles during the field activity;
- Getting lost in the field;
- Falls of the same level or in different levels;
- Bites of insects or venomous animals
- Attacks large or/and wild animals;
- Projection of particles (rock fragments or from the hammer) in the eyes during the activity;

- Exposure to tropical diseases;
- Human aggression due to lack of communication with the owner of the property;
- Pressing or cutting limbs;
- Be struck by lightning;
- Be struck by branches / or trunk of trees;
- Fall of materials (fragments of rock on slopes);
- Delay in the rescue of an eventual victim, due to lack of knowledge of the route or resources in the region where the activity is carried out.

In the face of the identified and mapped risks, fundamental procedures were elaborated in other than the didactic activities are developed with security, such as:

- Map of the field routes, use seat belts, respect the workload of drivers, defensive driving and transit on roads only during the daylight;
- Objects must be packed in the luggage compartments of vehicles;
- Sign the workspace, and follow the professor's safety guidelines;
- The student or group of students should be equipped with some instrument of communication and guidance, such as: cellphone, radio, GPS, satellite telephone;
- Use the appropriate personal protective equipment (safety helmets, eye protection, protective gloves, protective footwear, snake gaiters) and appropriate clothes, such as: long-sleeved shirt, high visibility clothing, pants, beekeeper mask;
- Be properly vaccinated;
- Ask the owner of the property to access the field work area;
- Do not realize field activities during storms;

- Carry out the mapping of the routes and resources in the region where the activity is developed;
- Work on students' risk perception, so that they are always alert during field activities.
- Apply sunscreen during the field activity.

In order to raise awareness and involve the students, the discipline "Health and Safety in Field Activities" was created. This discipline is a prerequisite for all the field activities carried out in the course, as shown in the flowchart of Figure 7. Through its theoretical and practical classes, the student is trained to evaluate the risks and define actions of control measures. Besides the immediate benefit, by becoming aware of the risks involved, the student acquired critical view and starts to demand the institution and their professors an adequate attitude about health and safety.

As a result, the students of the first group of Health and Safety, within the new culture in which they were being inserted, developed the "Geological Guide to Prevent Field Accidents", highlighting the main risks and their respective mitigation procedures (Figure 8).

As a response from the Department of Geology to this new culture implemented, there were discussions that resulted in a form to be completed by each student at the beginning of the course and updated annually, called "Personal record for field activities". This form contains basic information about the student's health, which can be useful in the event of an accident. In addition, the form requires that the students are aware of the basic rules of behavior and safety in the field and affirms the commitment to comply with them. Filling in and updating the data is a prerequisite for students to participate on the field activities. The form in question is shown below (Figures 9, 10 and 11).

At the same time, the "Daily Vehicle Inspection Form", previously mentioned, was drawn up. This requires the person in charge of the vehicle, the driver, to verify if the vehicle is in good condition

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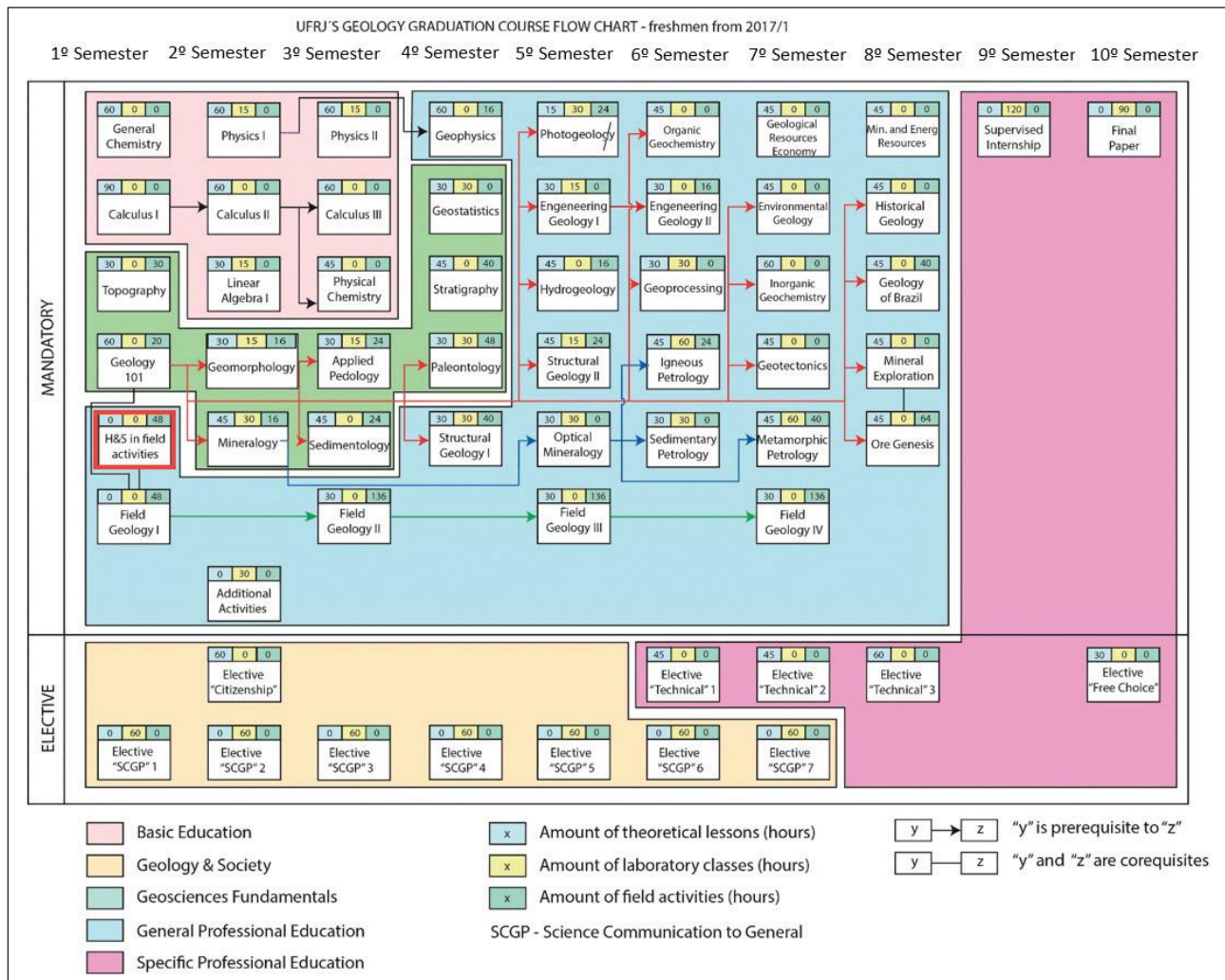


Figure 7 Flowchart elaborated in 2017 of UFRJ geology course, highlighting the new subject of "Health and Safety in Field Activities". The subject is prerequisite for all the field activities carried out in the course.

to operate. If the vehicle does not meet any of the requirements listed on the form (Figure 12), the department recommends that the vehicle do not leave to the field trip.

## 5 Conclusions

Considering the goal of the project was to establish a culture of health and safety at the Department of Geology, that encompasses students and employees, it is possible to affirm that the development of a code of conduct is in progress, considering that it is a gradual process.

Another important factor for the success of this initiative is the participation of the central administration of UFRJ. Therefore, as a consequence of

the H&S project, there was a proposal for a discussion on H&S standards in the field activity at the Institute of Geosciences. The meetings culminated in the drafting of a resolution that contained procedures focused on the risk perception on field activities at the institute.

As a result, it was presented to the rector a series of demands that are necessary for the success of the implementation of the security actions, among them:

- Provide Personal Protective Equipment (PPE) and Collective Protective Equipment (CPE) to students;
- Provide life insurance to the students on field activities;



- Provide safe transportation and with quality;
- Ensure that the members of UFRJ understand the benefits of updating the risk management;
- Provide the necessary resources for the execution of risk management;
- Assist in the Geology Program of H&S;
- Guarantee the effectiveness of the implemented controls;
- Monitor the evolution of the Risk Factor;
- Encourage the groups of UFRJ to propose solutions to reduce the Risk Factor;
- Make decisions about resource allocation, when necessary.

Federal University of Rio de Janeiro (UFRJ)

**GEOSCIENCE**  
Health & Safety

### Main PPE's

(Personal protective equipment)

- Safety helmet
- Safety goggles
- Respirator
- Safety / cut resistant gloves
- Safety boots and snake bite legging



### Main CPE's


(Collective protective equipment)

- Atmospheric discharge monitoring devices
- Lightening rod
- Hand free eyewash station
- Protective grilles
- Cone
- Marking signs
- Isolation barriers

### Danger Mitigation

**Traffic accidents during translation**

Vehicle safety conditions checklist; driver's physical and mental conditions; traffic legislation




**Slump**

Stay alert to soil slope; be in physical shape; keep fed and hydrated

**Insect stings and spiteful animals**

Beckeping hat; avoid noises while hiking in the woods; wear safety boots with snake bite legging; EpiPen(adrenaline)



### Tree fall

Avoid hiking during storms; search for shelter

**Eyes particle projection**

Always wear safety goggles

**Wild animals attacks**

Be aware of the species that may inhabit the location; if they spot you, clear the area; don't attack



**Human aggression**

Ask for authorization in private properties

**Run over in highways**

Avoid working in outcrops in the highways; wear traffic vests

### Atmospheric discharge

Monitor lightening detector devices; in case of menace search for shelter



**Tropical diseases**

Be immunized; use mosquito repellent; wear long sleeve blouses

**Being lost**

Compass; GPS; cellphone; satellite phone; radio communicator

**Rockfall and landslides**

Avoid being over the cliff edges; always wear safety helmets

**Injury limbs**

Wear safety gloves or cut resistant gloves

We mind about your life, and you?

This geological guide was made to aware the geoscience community about a series of risks that might come up during field and laboratory activities.

From bee stings to landslides, any situation potentially to harm your health and safety (H&S) and anyone else must be envisaged meanwhile achievement of any working activities.

Therefore, it's suggested reading this guide when about to begin both indoor and outdoor working tasks. Nothing is more important than individual and collective health and safety.

This was made by UFRJ 2017's Geology Class



**GEOSCIENCE GUIDE TO PREVENT ACCIDENTS**



Figure 8 Geological Guide to Prevent Field Accidents, prepared by the first group of Health and Safety subject.

As a consequence of these actions, the rectory decided to implement a health and safety policy in other sectors of UFRJ, in addition to ensuring the effectiveness of the implemented controls.

Even with a change in the institution's position regarding the health and safety project, there are

still occasional misconduct, which demonstrates the need to advance the H&S culture. Despite this, the mobilization of students and professors in relation to the perception of risks and their consequent mitigation is already remarkable.




**Personal record for field activities**

The aim of this record file is to help in emergency situations during field activities by the Geology Course of Federal University of Rio de Janeiro. This data are classified and won't be used afterwards.

Discipline: \_\_\_\_\_

Student's name: \_\_\_\_\_

Student register: \_\_\_\_\_ Birth: \_\_\_\_/\_\_\_\_/\_\_\_\_

ID: \_\_\_\_\_ CPF: \_\_\_\_\_

Blood type: \_\_\_\_\_ RH: \_\_\_\_\_

Emergency number: \_\_\_\_\_

Person to be reached: \_\_\_\_\_ Kinship: \_\_\_\_\_

Do you have any chronic diseases? Did you passed by surgery procedures recently? (If so, itemize):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Do you have allergies? (If so, itemize):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Do you use long term medicines? (If so, itemize):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name	Dosage

Figure 9 Personal record for field activities form to be filled in by geology students of UFRJ.



Do you have allergies?  Yes  No  
To what? \_\_\_\_\_

Do you have food restriction?  Yes  No  
What? \_\_\_\_\_

Do you have or had heart diseases?  Yes  No  
If so, what? \_\_\_\_\_  
Are you in treatment?  Yes  No  
Where? \_\_\_\_\_

Do you have spinal problems?  Yes  No  
If so, itemize: \_\_\_\_\_

Do you have hiking limitations?  Yes  No  
Do you have weight issues?  Yes  No

Have you ever been admitted in a hospital?  Yes  No  
If so, why? \_\_\_\_\_

Have you ever been under any specialized treatment?  Yes  No  
If so, which one? \_\_\_\_\_

It is prohibited to use or be under the influence of alcohol and / or narcotics (drugs) during the field activities or in the dependencies of the university.

Other comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I refuse to fill in this personal record file.

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Signature)

Figure 10 Personal record for field activities form to be filled in by geology students of UFRJ.

Do you have allergies?  Yes  No  
To what? \_\_\_\_\_

Do you have food restriction?  Yes  No  
What? \_\_\_\_\_

Do you have or had heart diseases?  Yes  No  
If so, what? \_\_\_\_\_  
Are you in treatment?  Yes  No  
Where? \_\_\_\_\_

Do you have spinal problems?  Yes  No  
If so, itemize: \_\_\_\_\_

Do you have hiking limitations?  Yes  No  
Do you have weight issues?  Yes  No

Have you ever been admitted in a hospital?  Yes  No  
If so, why? \_\_\_\_\_

Have you ever been under any specialized treatment?  Yes  No  
If so, which one? \_\_\_\_\_

It is prohibited to use or be under the influence of alcohol and / or narcotics (drugs) during the field activities or in the dependencies of the university.

Other comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I refuse to fill in this personal record file.

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Signature)

Figure 11 Personal record for field activities form to be filled in by geology students of UFRJ.





## 6 References

- Braga, M.A.; Silva, M.A.C.; Rodrigues, C.T.; Oliveira, L.A. 2018. Implementação da Política de Saúde e Segurança no Departamento de Geologia da Universidade Federal do Rio de Janeiro (UFRJ). *In*: CONGRESSO BRASILEIRO DE GEOLOGIA, 49°. Rio de Janeiro, 2018. *Anais*, Rio de Janeiro, UFRJ, p. 193.
- Cadena365. 2017. News website. Available on: <<http://www.cadena365.com/index.php/murio-un-profesor-universitario-al-caer-al-precipicio-una-camioneta-con-estudiantes-de-geologia/>>. Accessed on: 04 set. 2018.
- G1 Mato Grosso. 2017. News website. Available on: <<https://g1.globo.com/mato-grosso/noticia/estudante-de-geologia-que-morreu-soterrado-em-mt-iria-colar-grau-nesta-sexta-feira.ghtml>>. Accessed on: 04 set. 2018.
- G1 Tocantins. 2018. News website. Available on: <<https://g1.globo.com/to/tocantins/noticia/tres-pesquisadores-sao-resgatadas-apos-se-perderem-em-regiao-de-serra-no-to.ghtml>>. Accessed on: 04 set. 2018.
- Nominuto. 2010. News website. Available on: <<http://nominuto.com/noticias/policia/morte-no-cabugi-justica-suspende-processo-contr-professor-da-ufm/62832/>>. Accessed on: 06 oct. 2018.
- G1 TV Anhanguera. 2013. News website. Available on: <<http://g1.globo.com/to/tocantins/noticia/2013/09/laudo-que-revela-cao-da-morte-de-estudante-do-para-sai-nesta-quinta.html>>. Accessed on: 06 oct. 2018.
- Várzea do Poço Notícias. 2017. News website. Available on: <<http://varzeadoconoicias.blogspot.com/2017/04/pm-resgata-estudantes-da-ufba-na-zona.html>>. Accessed on: 04 set. 2018.
- 24 Horas News. 2017. News website. Available on: <<https://www.24horasnews.com.br/noticia/bacharel-em-geologia-morre-soterrado-em-garimbo-de-livramento-mais-duas-bachareis-feridas.html>>. Accessed on: 01 out. 2018.