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**Teaching case: the water I wear**

**Caso de enseñanza: el agua que visto**

**Caso para ensino: a água que eu visto**

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### Abstract

**Purpose:** This case aims to enable students to learn about environmental impacts and their effects and allow them to use methods of economic valuation of the environment to internalize externalities related to environmental and social impacts. The product in question is widely used what can make students identify themselves with the case. Then, they will be more

interested in the problem identified in this case which is the non-internalization of externalities (social and environmental impacts).

**Methodology:** The methodology of this teaching case is qualitative. Students read, discuss and apply the subject. Upon reading the case, students learn the steps of the laundry washing process. Students can identify the direct and indirect environmental and social impacts and their consequences by reading and discussing the case. Finally, they can apply the methods of economic valuation of the environment.

**Results:** It is possible to identify the social and environmental impacts and analyze and discuss these impacts on management and accounting.

**Study Contributions:** We hope that people can use this teaching case in undergraduate and graduate courses in environment and sustainability topics and topics related to costs and management.

**Keywords:** environmental impacts; social impacts; sustainability; environmental accounting; environmental costs.

### Resumen

**Objetivo:** El propósito de este caso es que los estudiantes aprendan sobre los impactos ambientales y sus efectos, además de permitirles utilizar métodos de valoración económica del ambiente para internalizar las externalidades relacionadas con los impactos ambientales y sociales. Dado que el producto jeans es ampliamente utilizado, existe una identificación entre el problema identificado en este caso, la no internalización de externalidades (impactos sociales y ambientales), y los consumidores, en este caso los propios estudiantes.

**Metodología:** La metodología de este caso de enseñanza es cualitativa. Los estudiantes leen, discuten y aplican el caso. Al leer el caso, los estudiantes aprenden los pasos del proceso de lavado de ropa. Al leer y discutir, los estudiantes pueden identificar los impactos ambientales y sociales directos e indirectos y sus consecuencias. Finalmente, se aplican y discuten métodos de valoración económica del medio ambiente, cuando es aplicable a la situación.

**Resultados:** Es posible identificar los impactos sociales y ambientales y analizar y discutir los efectos de estos impactos en la gestión y en la contabilidad.

**Contribuciones del Estudio:** Se espera que este Caso Docente sea utilizado en cursos de pregrado y posgrado en materias sobre medio ambiente y además de materias relacionadas con costos y gestión.

**Palabras clave:** impactos ambientales; impactos sociales; sustentabilidad; contabilidad ambiental; costos ambientales.

### Resumo

**Objetivo:** O objetivo deste caso é possibilitar a aprendizagem dos alunos sobre os impactos ambientais e seus efeitos, além de permitir que os mesmos utilizam métodos de avaliação econômica do meio ambiente para internalizar as externalidades referentes aos impactos ambientais e sociais. Como o produto em questão é usado amplamente, há uma identificação

entre o problema identificado neste caso, o da não internalização das externalidades (impactos sociais e ambientais), e os consumidores, neste caso, os próprios alunos.

**Metodologia:** A metodologia deste caso de ensino é qualitativa. Os alunos lêem, discutem e aplicam o caso. Ao ler o caso, os estudantes aprendem as etapas do processo de lavagem de uma lavanderia. Na leitura e na discussão, os alunos podem identificar quais são os impactos ambientais e sociais diretos e indiretos e suas consequências. Por fim, são aplicados e discutidos os métodos de valoração econômica do meio ambiente, quando aplicáveis à situação.

**Resultados:** É possível identificar os impactos sociais e ambientais e analisar e discutir os efeitos desses impactos na gestão e na contabilidade.

**Contribuições do Estudo:** Espera-se que este Caso para Ensino possa ser utilizado em cursos de graduação e pós-graduação em disciplinas sobre meio ambiente e sustentabilidade, além de disciplinas relacionadas a custos e gestão.

**Palavras-chave:** impactos ambientais; impactos sociais; sustentabilidade; contabilidade ambiental; custos ambientais.

## Part I - The case

### 1. Introduction

To operate a business whose essential direct material is water in a drought region poses enormous challenges. A company specialized in washing jeans had to have enough water available to perform the tasks. In addition, the company had to deal with the high cost of this resource that could make the business unfeasible. This case presents the conditions found by that company to identify the environmental impacts and their effects and allow the use of economic valuation methods that, despite internalizing externalities, reduce costs while minimizing the consumption of the environment.

We obtained the information through a visit to the company's facilities, guided by the owner, and interviews with the other employees. It is possible to learn about the production process, the challenges, and the solutions regarding the use of the water. The dialogues do not represent the strict transcription of the interview. We have modified the dialogs to give the story context. The information was offered by the company and faithfully reproduced.

## 2. The Case



**Figure 1** Waste disposed of outdoors.

**Source:** Elaborated by the author.

- What a sadness, what is it, teacher? What's in those bags? And those loose things... look like fabric! Natalia spoke.

- They don't look like fabric they are fabric! These bags contain the remnants of the jeans laundries responsible for the economic development of the region. Replied Professor Cristina.

- As scraps, if they are laundries, how can they produce scraps? But is this development? Replied Natalia.

- Hmm, I think the explanation will be long, thought the student Wesley.

The dialogue, which took place between an accounting professor and a student in the Accounting course, resulted from a visit that students were making to companies in a specific city. The visit was an end-of-course job, and this company specialized in washing jeans. The purpose of the visit was for students to learn about a company's operations on the spot and not just through books.

### 2.1 The Visited City

Located in the countryside of Pernambuco, the city visited is part of one of the nationally known confection centers, whose primary biome is the caatinga. The town, located in a drought region, with low rainfall density - one of the weakest in the area of the harsh Pernambuco.

In addition, according to the Municipality's Transparency Portal, economic data for 2019 pointed a GDP per capita at current prices of R \$ 13,557.60, with the median nominal monthly income of 1/2 minimum wage. The city hall also pointed out that the approximate population is 44 thousand inhabitants, with about only nine thousand employed persons, representing approximately 16.2%. According to the owner of the jeans laundry, they represented a significant portion of the city's GDP and labor force.

### 2.2 The company

The choice of the visit fell on one of the companies in the manufacturing hub. The company owner, Mr. André B., kindly accepted the proposal to "open" the jeans laundry to show how they worked. The company specializes in washing jeans, and its customers are manufacturers of jeans (pants, skirts, and jackets) from different parts of Brazil. The company owner, Mr. André B., kindly came to welcome the group. At first, he was startled because he imagined that they would be just the professor of the discipline and a student visiting the company. After the initial embarrassment passed, he asked that everyone take to a meeting room.

After the usual presentations and the apology of Professor Cristina for the misunderstanding regarding the size of the group, Mr. André started talking about the company. André told a little about the city's history, which was previously dominated by entrepreneurs in shoe manufacturing. With the drop in demand for sandals manufactured in the region, one of the residents had the idea of starting a new business: production of clothes from the fabric leftover from the manufacture of jeans (factories in the South). He bought bales of patchwork and tried to make the most of it. With it, the sale of bales and the engagement of producers began, based on the scraps.

André and his brother started the business, buying a burden. The first seamstress was the mother and, soon after, the aunt. Then, the brothers went to the rural area to find houses with sewing machines to outsource this stage of the production process (in a short time, it already had 25 seamstresses, and that number was growing). After some time in this family business, André decided to change his business and set up his own business. That's when he decided to wash clothes.

Wesley, one of Professor Cristina's most impertinent students, immediately exclaimed: - Did you stop producing clothes to become a "washerman"? Silence in the room, another embarrassment to be overcome by Professor Cristina. She looked at him with fiery eyes and immediately apologized. Mr. André, amused by the observation, relaxed the atmosphere and continued...

- Washerman, no, Wesley, owner of the laundry, and the big ones. It is specialized, and it is not like the one your mother can have the family wash. We only wash jeans here. André continued: - At the time, guys, I realized that there were specialized laundries only in the capital, which could be a great business opportunity here for the region. And, you know - addressing the group - as you say: I did well! The laundry came to meet market demand. Initially, the jeans were rough and very thick. The market started to demand a more flexible fabric with different colors. In addition, with washing, they add value to the manufactured parts, as they can add effects with washing (differentiated wear).

Natalia politely raised her hand and asked: - Mr. André, but this is not a dry region, with little water, how would it be a good deal to set up a laundry?

- Gosh, Natalia, the question is good, and that was an important question that I considered when I planned the business. We buy water from water trucks, and they come from another region. But you know, water is cheap, so, we import. Telling the truth, at the time, I didn't care much about it; having a cost that I could pass on in the price, it wouldn't be a problem. Today I think a little differently, but let's get to know the washing process; after all, you came here to meet a company in operation, not to listen to me tell the story.

### 2.3 Visiting the Production

The washing process is organized similarly to a production process. When we talk about washing jeans, that's just part of the process. In our case, the pants are ready, the pieces arrive, and are separated by washing type. In this case, the washing defines the effect of the pants, which can be light, dark, torn (wear effect), or with some color. There was a time when fashion was jeans with red effects. These effects are applied here in the laundry. After separation, the pants are prepared to use the mark and sent to the corresponding sector: whitening, coloring, or wear. Sometimes they go through more than one sector.

In bleaching and coloring, it uses chemical processes. After applying the effect, the pants are sent for washing, centrifugation (drying), and ironing. Then, they go to stock to be returned to customers, in our case, the jeans manufacturers. The photos shown in Figure 2 show the process in loco, which Professor Cristina took.



1. Reception of parts



2. Preparation



3. Wear Effect



4. Coloring effect



5. Chemical lightening effect



6. Preparation for washing



7. Washing Area



8. Centrifugation



9. Drying



10. Passing



11. Disposal



12. Residue



13. Residue



14. Residue



15. Waste for disposal

**Figura 2** Description of the washing process using photos.

Fonte: Elaborated by the authors.

## 2.4 Washing process data

On average, the washing process has the following water consumption:

- 120 liters of water per piece.
- On average, it consumes 6 million liters of water per month.
- Water price: in the rainy season, with a higher offer, the price of the water truck (15,000 liters or 15m<sup>3</sup>) costs about R \$ 5.00, plus R \$ 10.00 for the driver (hired as a free driver) -lance), more fuel, maintenance and depreciation of the truck (which is it is own) and which costs an additional R \$ 5.00.

In the region, we have about 300 laundries with these characteristics.

## 2.5 Problems in the process

André reported two problems: the lack of water and the pollution of the river, which received all the waste from the washes. André started to buy water to solve the first problem. At this point, Wesley questions whether the laundries do not compete with families for water during the dry season. Natalia amendment: This can be a severe social problem, jeans draining the population's water? How is that? Do the people have no priority? Is this can happen?

With some difficulty, André managed to answer the questions saying that, although there was a problem with water use, the city benefited from the creation of jobs. At that moment, student Renata said: - yes, lack of employment is a social problem, but does this water pollution not bring about a health problem that can also be a social problem? Who pays that bill?

At that moment, seeing the "enthusiasm" of the students, Professor Cristina intervened, asking that Mr. André continue. He reported that he observed that the water that his laundry poured into the river at the bottom of the factory, in the dry season, accumulated in the bed and started to become partially clean, as the waste decanted in three days. Then, he concluded that it was possible to do some treatment to replicate this natural process. He contacted several technicians and specialists in the region, but they said it was either impossible or costly (some even estimated costs at R \$ 300,000). But he didn't give up...

As FIEPE (Federation of Industries of Pernambuco) had a cooperation agreement with a German institution, he asked for help to solve the pollution problem, as the laundries were being pressured. With the arrival of two German technicians, they started a survey to find out and solve the problem. The technicians began by questioning whether the amount of water used, 120 liters per piece, was the minimum necessary. André said that was the standard, based on other laundries. According to his calculations, the price of 15m<sup>3</sup> is R \$ 20.00. At the time, it costs less but has already paid R \$ 85.00 for water, resulting in R \$ 105.00 per truck. With the consumption of approximately six million liters of water per month, this input cost was astronomical.

So, the technicians suggested trying to reduce and see the effect. After several attempts, they managed to reduce it to 72 liters/piece without losing the quality of the wash. Additionally, these technicians recalled that, in Germany, due to environmental rigor, there are no industrial laundries to serve garments. Investing R\$ 38,000.00 at the time, he started to recycle water (eliminating 70% of impurities and residues) at the cost of R\$ 1.00 per m<sup>3</sup>, which gives R\$ 15.00 for 15m<sup>3</sup> (the equivalent of a water truck). Therefore, even when water is at its minimum price, it is an advantage to recycle water.

But then, according to André, the following question arose: can this water replace clean water? Then the technicians left with another question. Is it necessary to use clean water throughout the process? André then verified that two could use recycled water with 70% cleaning (or 30% impurities) of the three washing processes. These two processes he called "dirty" processes. Summarizing the contribution of the Germans: reduced consumption; accept that it is better to partially clean up than not to do so and to analyze the process to see if it could use partially polluted water, and finally design a solution.

The solution proposed by the Germans is quite simple. As André said, we would be disappointed, as there was nothing sophisticated in the process. They installed an effluent recycling station, with tanks capturing dirty water (two cisterns, which André made much larger than suggested by the Germans); a cistern with a screen for filtering fibers, remains of fabrics, and stones discarded, sand decanting basin (product from leftover stones), tanks with tannin (he uses black wattle other chemicals added to the wash, such as potassium permanganate, which bleaches indigo).

From these tanks come out: the water with 70% cleaning and the sludge of the fabric with the paint. The sludge goes to six decanting and drying tanks. In the end, the dried sludge is packed in raffia bags and thrown in the city dump since there is no suitable destination for this type of waste. At that moment, the students started talking to each other out loud. Wesley immediately said: - do all this and play in the dump? But what is this? Natalia exclaimed: - how absurd! Even Patricia, who was quiet until then, was excited. Poor teacher Cristina, at that moment, began to question whether it was a good idea to take them to the company... "Wouldn't it have been better to get this data and deal with this subject in the classroom? I agree with the students, but we cannot be rude".

Mr. André, noticing the malaise, explained that he was analyzing alternatives for using this material: building bricks, placing them on the ground as a base for the roads, or another purpose. He searched for options in research centers, but without success, until that moment. He already recycles or reuses: (a) the drums (plastic packaging, which holds the chemicals) and (b) the cardboard boxes (which he sells). For the distribution of recycled water, the company had to install an additional pipeline system. So, now, each machine receives two pipes with water: one for clean water and another for recycled water.

Regarding the excess recycled water, these are dumped into the river. To accumulate this water for possible future use, André built a dike of approximately 1 meter to dam (with authorization from the authorities) part of the river water, taking advantage of a natural slope. When necessary, André pumps this water back, saving on water purchases. So, instead of polluting 100%, it degrades 30%.

Near the end of the visit, the students noticed a chimney at the end of the washing process. It was explained that the chimney was related to the operation of boilers whose fuel was firewood. The company has already tested other fuels (gas, sugarcane bagasse, fabric retraction, and others), but firewood is the cheapest option. The problem is that it causes deforestation. The region already has its reserves of firewood depleted. Firewood comes more and more from afar. He is currently using Algaroba wood. It uses a smoke collector, not emitting



sooty smoke into the atmosphere. This time, the students just looked at each other, without any comment!

In the end, Mr. André ended his presentation by saying the following: - I was motivated to do this for financial reasons, as it was costly to buy water and there was pressure from the authorities, who threatened to close the laundries; so far, everything I have invested in the environment has made me profit. But today, I invested thinking first about the environment and then about cost reduction. Finally, the teacher and the students thanked all the information and the reception.

When they were leaving, Mr. André wanted to ask everyone a question: - excuse my curiosity, but... how many pairs of jeans do each of you have?

## Part II - Teaching Notes

### 3.1 Questions for Discussion and Answers

#### What are the environmental impacts of the process?

First, students can be asked about what they think is an environmental impact. Then, concepts of environmental impact can be presented according to the literature and with the various bodies that approach the environment and work with this issue. It is also important to highlight how these concepts vary between authors and agencies. One can discuss these concepts and how the students' ideas may have converged or resembled the pre-existing ones.

The definition and scope of an environmental impact vary according to the circumstance in which it occurs, so it is crucial to discuss concepts to analyze most ideas here. In this way, some of the concepts of environmental impact presented by the literature are presented, and then by some agencies that work to preserve the environment.

Wathern (1988, p.7) defines environmental impact as the change in an environmental parameter, during a specific period and in a limited area compared to the situation that should have occurred if a particular activity had not started. In a broader analysis, Duinker and Beanlands (1986) define that to identify an environmental impact and exercise any judgment of its importance, one must carefully consider (a) the importance of the environmental attribute in question for project decision-makers, (b) the distribution of changes in time and space, (c) the magnitude of the change and (d) the reliability with which the changes were anticipated or measured.

In practice, the United Nations Environment Program defines that environmental impacts involve likely significant effects on the environment, including on issues such as "biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, heritage cultural, including architectural and archaeological heritage, landscape and interrelationship between factors" (Abaza, Bisset, & Sadler, 2004, p.91).

Brazilian National Environment Council (CONAMA), through Resolution 001/1986, defines environmental impact as "any change in the physical, chemical and biological properties of the environment, caused by any form of matter or energy resulting from activities human rights that, directly or indirectly" can affect the health, safety, well-being of the population, social and economic activities, biota, the aesthetic and sanitary conditions of the environment and the quality of environmental resources.

Additionally, it is essential to highlight the difference between direct and indirect environmental impact. Before working with direct and indirect impact concepts, one should focus on a concept of environmental impact. According to Ferreira (2003, p.9), it is the change in a particular area caused by a specific activity. Furthermore, the author identifies that this

change must be compared with the state of the environment if the activity had not started. Finally, the author identifies the two types of impacts: direct and indirect. Direct impacts are changes in the environment specified directly with the activity performed by the company. On the other hand, indirect impacts are changes caused in the environment that cannot be identified with the action performed.

Based on the discussion of the concepts, one can begin to identify the impacts presented in the case. At the beginning of the technical visit, Professor Cristina and the students are confronted with the fabric scraps inside the outdoor bag, as shown in Figure 1 and discussed in the first paragraph of the case description. However, the patchwork is only understood after the company owner, André explains the whole process of washing the jeans. The washing performed in the company generates two types of environmental impact:

- River pollution resulting from the washing of jeans. The water used for washing is thrown into the river, without any treatment, it can contain 100% impurities, with treatment it contains 30% impurities, also from the chemicals used in the process.
- Generation of waste, known as solid waste resulting from washing jeans. The waste corresponds to the dry sludge produced in the washing, housed in a plastic bag and thrown in the open dump.

Later, at the end of the visit, the students are faced with a chimney that keeps the boilers running. This chimney uses firewood as fuel. Considering that the firewood comes from the forest deforestation process, it is possible to indicate one more environmental impact:

- Deforestation of the forest is a process resulting from two factors: first, the use of firewood as fuel to keep the boilers working, since according to André, it is the cheapest fuel option; Second, the depletion of firewood in the reserves.

It is possible to identify that all the highlighted environmental impacts are direct ecological impacts, as they come directly from the jeans washing process. However, although not highlighted now in the developed case, there may be other indirect environmental impacts. It is possible to identify, for example, that river pollution can indirectly generate environmental impacts, such as effects on animals that survive in the river and those that use "dirty" water to stay. Such impacts can be caused to the environment due to this waste.

Students may be asked to identify which environmental impacts result from the jeans washing activity and the correlated externalities. Finally, the importance of discussing the responsibility of the various agents is emphasized. It is possible to discuss how far the company's commitment goes with its waste and when the public sector's responsibility for managing the waste generated by the company starts.

### **What are the social impacts?**

First, as well as for environmental impacts, it is possible to present and discuss the concepts of social impact between the literature and the bodies working in the area. As for environmental impact, for social impact, there is also no perfect/universal definition (Burdge & Vanclay, 1995). Therefore, some concepts of social impact are presented.

Vanclay (2002) indicates several authors who share social impacts in different classifications. These classifications involve, for example: (a) the impact on people's way of life, the way they work, play, and interact with each other daily, (b) the culture that involves beliefs, customs, and shared values, (c) the community and its cohesion, stability, character, services, and facilities (Rickson, Burdge & Armor, 1990; Vanclay, 1990), (d) psychosocial, which involve community cohesion and disruption of social networks (Jusle n, 1995).

On the other hand, according to Burdge and Vanclay (1995), there are several arguments against the use of these classifications. It should be considered that in the process of specifying social impacts, the use of a checklist based on categories may not adequately reflect the complex causal mechanisms that produce social consequences, especially those of a higher order (Slootweg et al., 2001). Therefore, significant social impacts vary from place to place, from project to project. The weight given to each social impact varies from community to community and between different groups within a given society (Vanclay, 2002).

In this study, the categories of valuation of social impacts were created by Baxter et al. (2004), in which the social impacts are divided into three. First, the positive social value resulting from the direct and indirect jobs generated is estimated, the negative impacts related to health and safety at work are subtracted from this value. The second category establishes a link between the taxes generated by the project and the social benefits arising from the use of these taxes. The last social category requires an estimate of the external benefits from using the products (Baxter et al., 2004).

Finally, it must be considered that there are also positive social impacts. Therefore, it is possible to identify concepts of positive social impact, such as, "the benefit received by individuals or groups of individuals, by an organization [...], by a sector of activities [...], by a field scientific [...], or even by society in general, [...] generation or dissemination of knowledge" (Wood, Costa, Lima, & Guimarães, 2016).

In this study, the positive and negative social impacts presented by the laundry case are identified. Based on the above, it is possible to identify some of the positive social impacts generated by laundries, such as job creation and the increase in GDP. As reported in the case, the city's laundries represent a significant portion of it.

Concerning negative social impacts, it is possible to highlight the following:

- Competition for water between families and laundry. The problem is caused by the installation of an economic activity that has water as an essential factor for maintaining the enterprise in a drought region.

It is also possible to identify some of the indirect social impacts that could be caused by the productive activity of the laundry, such as the generation of health problems caused by river pollution resulting from the washing of jeans, in addition to health problems related to dry sludge, which is bagged and thrown in the open pit. Other social issues can be found when there is an analysis from the point of view of society/population. In this case, the information comes from visiting the company. Therefore, the study of social impacts is limited to the information presented in the case. Finally, it is also interesting to highlight the role of the government in planning the economic development of this region.

### **Which methods of economic valuation of the environment are adequate to assess the identified impacts?**

First, one can ask what the students' view is about a possible economic valuation of the environment: is there an economic valuation of the environment? Does any company/institution economically value the environment?

Bebbington, Gray, Hibbitt, and Kirk (2001) argue that prices only arise through the transfer of private property rights. The consequences of this are: important economic and business decisions are made with little or no explicit concern for externalities, which arise from these decisions. Inevitably, the decisions made and the activities carried out tend to maximize the private economic and financial benefits and, equally, to maximize the social and environmental costs outsourced to society.

Ferreira (2003, p.16) highlights that "The valuation of the environment is one of the most critical aspects of the entire accounting process". Still, the author indicates that it is necessary to understand that the economic value of an environmental resource is the result of observing all its attributes, which may or may not be associated with use. This use can be related to current generations or future generations (based on sustainable development).

Based on the idea that the economic valuation of the environment can consider the use-value, be it now or in the future, some valuation methods can be highlighted, which are divided into two large groups (Dixon, Scura, Carpenter, & Sherman, 2013). The first group applies to non-exhaustible resources, and the second group applies to exhaustible resources.

Considering that the environmental impacts, in this case, are related to non-exhaustible resources, the main valuation methods that can be used are the Direct Method and Indirect Method. The Direct Method is: "one that values impacts, using a market value for the effects that change the quality or quantity of products that are eventually exchanged on the market" (Ferreira, 2003). The author cites the example of mangrove landfills, which can influence fishing and, therefore, it would be possible to measure how much fishing has failed to profit and establish a loss of revenue. If there is a decrease in fishing, the value lost due to the non-sale of the fish can be considered. It can also be considered the cost that families will have if they need to buy water.

On the other hand, the Indirect Method applies when "the valuation is made without using the market value for the impact or its direct effect, as there is no direct relationship between the effect of the impact and its way of valuing the effect." In this case, the author cites the creation of a landfill, which can decrease the value of a property. However, there is no market value already established or estimated for this loss. Thus, some indirect methods can be used, such as the Hedonic Price Method (property/environment ratio), the Travel Cost Method, and the Contingent Appraisal Method.

### **What qualitative characteristics do you consider necessary for accounting to recognize these impacts?**

According to CPC 00 (R1) 2019, there are fundamental characteristics of relevance and reliable representation. In addition, there are also the characteristics of improvement: comparability, verifiability, timeliness, and comprehensibility.

To account for any information, it is necessary that it is relevant and has a reliable representation. In other words, in any case, the fundamental qualitative characteristics, relevance, and faithful representation must be verified in the environmental information to be accounted for. Information is relevant when it can make a difference in the decisions made by users. The analysis of the relevance of ecological accounting information is presented in several studies (Hassel, Nilsson, & Nyquist, 2005; Iatridis, 2013; Moneva & Cuellar, 2009; Nilsson, 2003).

Regarding reliable representation, it deals with three characteristics. The information must be complete, neutral, and error-free. Therefore, to account for the information, it must have three aspects. Environmental information must be accounted for so that the representation is complete (that is, to include all the required information for the user to understand all the phenomena involved in the company's activity, not only the financial information, but also the process), neutral (that is, do not be biased showing only the "good side" of the process, but also the environmental degradation that the process may have caused) and free from errors (not necessarily accurate, but without errors in the accounting process, taking into account the existing environmental assessment methods).

To improve accounting information and improve its usefulness, CPC 00 (R2) highlights the characteristics of comparability, verification capacity, timeliness, and comprehensibility.

First, it must be understood that comparability is the characteristic that allows different companies to be compared. When environmental accounting information is available, reports from different companies can be compared. Thus, a company that, for example, has expenses with reforestation of trees used in production, or expenses with the reconstruction of fauna and flora, possibly does not bear environmental fines resulting from the process. In contrast, a company that does not do this type of work reverse for the environment may have to pay environmental fines in the future. It is also possible to compare sustainability discourse and practice between companies. If the two companies disclose such information, they will likely be compared.

Second, the ability to verify concerns the choice of one among the possible values related to a given fact. Therefore, the deal does not necessarily have to be accurate, and it is enough that it is an approximate verifiable estimate. The verification can be direct or indirect. The direct one would be through direct observation, for example, counting the cash. Indirect verification can be done using a model, formula, or other technique. In this case, to account for environmental information, the indirect method could be applied considering the environmental valuation methods addressed in question 4.

Third, timeliness is about making information available in time so that it can influence the decisions of users of accounting information. The information must be released as soon as possible so that it does not become unusable. Thus, the timing determines the relevance of accounting information, and if it is not timely, the data may lose relevance. In this case, the environmental information must be timely since the environmental data can also be useless if it is not informed promptly on time. For example, in the case of information about the river that is being polluted by the laundry. If this information is not released in time, it is possible that the government will not be able to act to end the river's pollution. The government could fine the company or, better, it could provide financing for the construction of the natural process for cleaning the water poured into the river, which, according to the laundry, would cost around R \$ 300,000.00. If the river pollution information is not timely, the laundry would continue to pollute the river. When the river is already contaminated, the data would not be as valuable as it would have been if it had been presented in advance. Another use is the possibility that customers and even suppliers can evaluate the company's commitment to sustainability and see if it follows its governance policy.

Finally, the information may have the characteristic of understandability. This last improvement feature concerns the classification, characterization, and clear and concise presentation of accounting information. In this case, the environmental information must be accounted for based on the valuation methods, and these must be presented and explained. In addition, the idea of why certain ways of valuing the environment should be used in each case.

Based on the discussion raised, it is possible to present the qualitative characteristics of the accounting information and ask students about its potential applicability concerning environmental accounting information: How could this environmental information increase the usefulness of accounting information? Which users could be interested? How could the environment and the population itself benefit from this information?

### **How can we account these social and environmental impacts?**

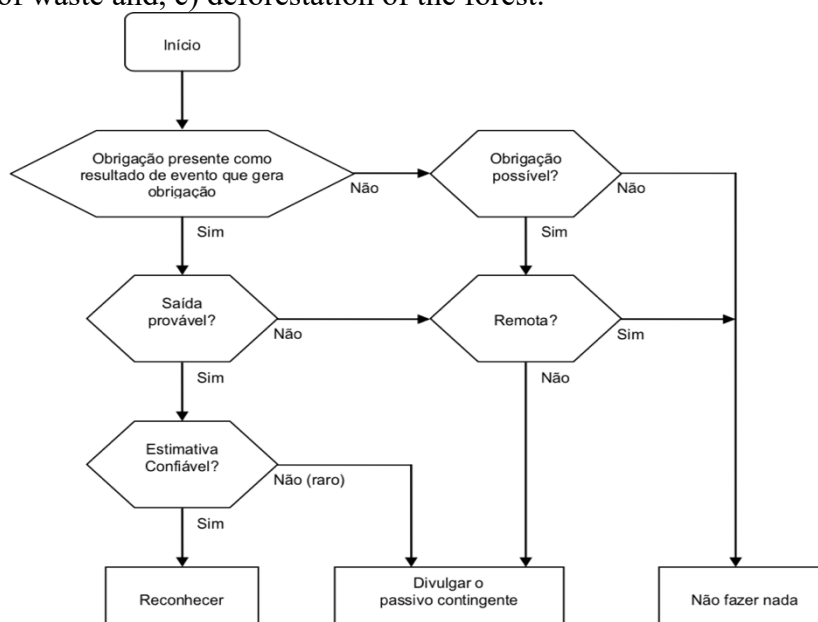
Accounting for environmental and social impacts can be done based on laws and regulations already established by the country. In Brazil, we can count with the Comitê de Pronunciamentos Técnicos (CPC) – the Accounting Pronouncements Committee. Two ways of

accounting for impacts can be discussed in this case. First, it can be asked how both the pollution of the river and the generation of waste, and the deforestation of the forest could be evidenced in the balance sheet and the other financial statements. In addition to the direct impacts, would it be possible to account for indirect effects, such as health problems that could be generated for the population in the vicinity of the river and the dump?

The accounting information must follow the accounting standards issued by the CPC. CPC 00 (R2) - Conceptual Framework for Financial Report CPC 25 - Provisions, Contingent Liabilities, and Contingent Assets, presents guidelines on how to account for the actions taken by the managers of the companies to mitigate the possible effects on the business resulting from future expenses not yet foreseen by accounting.

CPC 25 deals with the recognition, measurement, and disclosure of provisions, contingent assets, and liabilities. To apply CPC 25, it is necessary to understand the concepts of provision, contingent assets, and contingent liabilities that are on page 4 of the statement in question. Based on the concepts, is it possible to recognize environmental liabilities? Would the reported impacts have characteristics of liabilities? Would there be a need to provision or quote in an explanatory note?

Given these questions, it is possible to analyze CPC 25, which indicates that the logic of the Decision Tree (CPC 25, 2009) can be followed, taking into account the events to be counted. In this case, the direct impacts already identified would be: a) pollution of the river, b) generation of waste and, c) deforestation of the forest.



**Figure 3** Decision tree

Source: CPC 25 - Provisions, Contingent Liabilities and Contingent Assets (2009, p. 19).

First, it is necessary to identify which obligation can be or is generated from the events of a) river pollution, b) waste generation and, c) forest deforestation. One way to analyze this case is based on the Law on Crimes against the Environment (Law No. 9,605, 1998) foresees situations where there is the possibility of paying a fine due to the generation of environmental impacts such as cases of environmental pollution or deforestation.

By comparing aspects of the law with the facts that occurred in the case, those in which the law applies according to each environmental impact can be identified.

According to article 54 of the same law, "pollution of any nature should be considered at levels that result or may result in damage to human health, or that cause the death of animals

or the significant destruction of flora." In addition, the text adds in paragraph 2, item V, which should be considered as a crime the "release of solid, liquid or gaseous waste, or debris, oils or oily substances [...]". Thus, it is possible to identify that the Law on Crimes against the Environment applies both to pollution of the river and to pollution from the generation of waste, the Law on Crimes against the Environment (1998).

The same law also provides for a fine in relation to the third environmental impact, deforestation of the forest. According to Article 50-A, it must be considered a crime when the company "Deforest, economically exploit or degrade forest, planted or native, in public or unoccupied lands, [...]". Although the laundry in question is not directly responsible for deforestation, it can be held accountable, by the same law, for buying unsustainable wood.

Identified the fines that can be generated from the company's activity and. Consequently, the environmental impacts already placed, the analyzes must be made according to CPC 25 so that the obligations can be registered or not. As a way of simplifying the analyzes, table 1 was constructed, in which the answers of the decision tree are presented for each case of environmental impact.

**Table 1**  
**Decision tree**

a) River pollution	b) Waste generation	c) Deforestation of the forest
Present obligation as a result of an obligation-generating event?		
No.	No.	No.
Possible obligation?	Possible obligation?	Possible obligation?
Yes.	Yes.	Yes.
Remote?	Remote?	Remote?
No.	No.	No.
Disclose contingent liabilities.	Disclose contingent liabilities.	Disclose contingent liabilities.

**Source:** *Research data.*

Having identified the fines that can be generated by environmental impacts, it is possible to highlight that, according to CPC 25 (2009), all impacts must be disclosed in contingent liabilities. Therefore, a provision must be recognized by the best estimate according to what is determined in the laws regarding what was generated from solid waste (m3) and deforestation.

One can also work with the investment idea based on Decree No. 9,760 (2019), which deals with changes in the collection of federal government fines on environmental crimes and introduces the possibility of reversing possible penalties on ecological services, such as reforestation. In this case, can the company be considered to be making an investment if it performs environmental services? Based on Ferreira (2003) and Ribeiro (2005), it can be identified that in the case of fines applied and transformed into environmental services, classifications can be made in two stages. At first, the application of the fine is recognized; in a second step, this expense is transferred to Environmental Compensations to maintain transparency and the appropriate accounting record; when the compensation is settled, the payment is recorded. If environmental compensation has not been possible, only the fine is recorded, a compensation to replace the payment of the fine.

### 3.2 Teaching Objectives

We developed the case to enable learning about environmental impacts and their effects, in addition to allowing the use of methods of economic valuation of the environment. As the

product jeans are widely used, there is an identification between the problem of not internalizing externalities, referring to social and environmental impacts, and consumers, in this case, the students themselves. Still, it is possible to discuss the social impacts related to the conservation of the environment, inserting the issue of the triple bottom line.

In the economics course, emphasis can be given to methods of valuing the environment. In administration courses, focus can be placed on the company's management of environmental problems and also on its relationship with society. In accounting courses, in addition to the points above, it is possible to discuss the extent to which environmental events can be accounted for, what characteristics they would need to meet the qualitative characteristics of accounting, and also the requirements for recognition of the provision, assets, and liabilities contingent, according to CPC 25.

In all the courses mentioned, this teaching case can be used in cost, management accounting, or other disciplines that deal with issues related to a provision to analyze and insert the environmental issue in the company's cost and also in disciplines specific to the environment.

### 3.3 Suggestion for a Teaching Plan

It is recommended that the case be made available to students one week in advance. Therefore, at first, it is desired that (i) students individually read the case, indicate the problems, a brief analysis and try to answer the proposed questions. On the day of the case discussion, (ii) students can discuss it in groups of 3 to 4 people. Thus, the members of each group can confront the analyzes with those of the others and reach a consensus among the group regarding the answers and discussions. Finally, it is recommended (iii) to have a discussion with the whole class, confronting the position of each group.

### 3.4 Discussion (Case Analysis)

It is recommended that the case not be discussed only on the basis of the questions already answered here, but other discussions based on general knowledge that may allow for a broader analysis are also recommended.

In the description of the production process, a discussion can be raised about the generated waste, which is the lint of fabric, in large quantities. The fact that the water used can be reused leads to questions about the type of use. Even treated, it is not suitable for human consumption. Reuse decreases the amount of clean water to be used in the washing process in the future but does not eliminate the loss. So, could this process also be recorded in the financial reports?

Still, in relation to water pollution in the river, it is also allowed to discuss the cost of water pollution, including externalities. Would it be possible to include water costs in the washing process? First, you can analyze the cost of water as a product, and, later, you can analyze the cost that water pollution could generate for the population that will not be able to use it or will have health problems, among others.

The cost of water as a product can be based on André's statement, "water is cheap." Such speech raises the discussion about access to water, its value, the price that is charged and how it impacts the achievement of the Sustainable Development Goals (SDGs), formulated by the United Nations (UN, United Nations) . In this case, water pollution directly meets some objectives of the UN concerning sustainability, such as objective 6, which deals with "ensuring the availability and sustainable management of water and sanitation for all" and objective 14



on "Conservation and sustainable use of the oceans, seas and marine resources for sustainable development". Indirectly, it can be considered that the company is on the path of objective 8, "to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all", as it has already implemented a water reuse system; however, there is still dumping of polluted water into the river.

In addition to the issues raised about water pollution and deforestation, it is possible to raise the issue of the Triple Bottom Line (TBL), which enshrines the sustainability tripod: social, environmental and financial. The TBL differs from traditional reporting structures in that it includes ecological (or environmental) measures (Slaper & Hall, 2011). One can argue: to what extent have companies disregarded the TBL and considered only the financial aspect of the business? According to the same author, it can be difficult to assign appropriate measurement means for the TBL. Therefore, can the role of organizations be questioned in order to record the three aspects in the entities' reports? For example, in 2009, the CPC starts to address environmental issues in CPC 29 - Biological Assets and Agricultural Product and, in 2019, the CPC works with the inclusion of accounts related to possible environmental impacts (CPC 25, 2019). For the time being, it has not yet been possible to identify the possibility of accounting for social impacts by the CPC.

Finally, it is possible to discuss: (a) the responsibility of students, as jeans users and the social issues arising from the activity, (b) the dilemma between producing polluting and guaranteeing direct and indirect jobs, (c) the collection of taxes versus non-production and, consequently, not boosting economic activity. This is the dilemma of sustainable development. Finally, it should be considered that, although the case describes a medium-sized, privately held company, the situation can be extrapolated to larger companies, including publicly traded companies, which provide data that is easier to access.

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