BOTTLED MINERAL WATERS CLASSIFICATION AND LABELING ADJUSTMENT AMONG BRAZILIAN AND EUROPEAN COMMUNITY POLICIES

Lucio Carramillo CAETANO
Departamento de Geociências, UFRRJ
carramillo@gmail.com
Sueli Yoshinaga PEREIRA
Instituto de Geociências, UNICAMP
sueliyoshinaga@gmail.com
Heitor MOTHÉ FILHO
Departamento de Geociências, UFRRJ
heitorfmothe@gmail.com
Thiago Andrade de SOUSA
Doutorando Geoquímica Ambiental, UFF
thiagoandrade.geologia@gmail.com
Ricardo Correia Carramillo CAETANO
Mestre em Ciências Sociais, UFRRJ
ricardoccc3@gmail.com
Thiago Machado do PINHO
Mestrando Departamento de Geotecnia, USP
thiagompinho@usp.br
Igor Cristiano SILVA
Graduando Geologia, UFRRJ
igorcristiano@hotmail.com

Resumo

Ainda que a legislação voltada à área de alimentos no Brasil venha sendo atualizada em concordância com o CODEX ALIMENTARIUS, o mesmo não ocorre em relação à legislação da água mineral no contexto da gestão da mineração brasileira. O Código de Águas Minerais foi promulgado em 1945 e chega ao século XXI sem sofrer alteração significativa. Essa situação dificulta o setor a identificar-se com as águas minerais envasadas no Mundo, especificamente na Comunidade Europeia.

O presente trabalho propõe uma nova política da água mineral brasileira envasada, aproximando-a da legislação em vigor na Comunidade Europeia.

Pequenos ajustes, principalmente em relação as informações contidas na rotulagem da água mineral brasileira, realizados em consonância com as diretrizes já praticadas pela Comunidade Europeia propiciarão a ampliação da participação da água mineral brasileira envasada no mercado externo fazendo, com que a indústria de água mineral envasada no Brasil obtenha a visibilidade necessária para penetrar no mercado internacional das águas envasadas a partir do continente Europeu.

Dessa forma, o Brasil ampliaria sua presença nesse mercado participando com uma qualidade de água mineral envasada diferenciada, propiciando geração de empregos, tanto no Brasil através da ampliação de sua produção com criação de novas plantas industriais, bem como na Comunidade Européia com a criação de postos de distribuição desse novo produto com características diferentes das águas envasadas na Europa.

Palavras chave: Água mineral engarrafada, Política Nacional de Água Mineral, Rotulagem, Classificação de Água Mineral, Comunidade Europeia

Abstract

Although the food legislation in Brazil has been updated in accordance with CODEX ALIMENTARIUS, the same is not true of mineral water legislation in the context of Brazilian mining management. The Mineral Water Code was promulgated in 1945 and reaches the twenty-first century without significant change. This situation makes it difficult for the industry to identify itself with the bottled mineral waters in the world, specifically in the European Community.

The present work proposes a new policy of Brazilian bottled mineral water, bringing it closer to the legislation in force in the European Community.

Small adjustments, mainly in relation to the information contained in the labeling of Brazilian mineral water, carried out in accordance with the guidelines already practiced by the European Community, will increase the share of Brazilian bottled mineral water in the foreign market, making the bottled mineral water industry in Brazil obtain the necessary visibility to penetrate the international market of bottled waters from the European continent.

In this way, Brazil would expand its presence in this market by participating with a differentiated bottled mineral water quality, providing employment generation, both in Brazil through the expansion of its production with the creation of new industrial plants, as well as in the European Community with the creation of distribution points of this new product with different characteristics of the bottled waters in Europe.

Key Words: Bottled mineral water, Brazilian Mineral Water Policy, Labeling, Mineral Water Classification, European Community

1. Introduction

In the last decades, the growth of the bottled water industry in Brazil has demanded a constant change in Brazilian legislation, aiming to regulate the use of this mineral that is also considered a food.

As a mineral resource, the mineral water exploitation is governed by the National Mining Agency (Agência Nacional de Mineração - ANM), the former National Department of Mineral Production (Departamento Nacional de Produção Mineral - DNPM), attached to the Ministry of Mines and Energy (Ministério de Minas e Energia - MME).

On the other hand, as a food, its industrialization and commerce are governed by municipal, state and federal agencies, which are guided by the National Health Surveillance Agency (Agência Nacional de Vigilância Sanitária - ANVISA) of the Ministry of Health (Ministério da Saúde - MS).

Therefore, being considered a mineral resource and food at the same time generates a confusing and high administrative burden in order to legalize the extraction, classification, bottling and commercialization of mineral waters in Brazil.

The Brazilian Code of Mineral Waters, in force until the present day (January 2018), was promulgated in 1945 and,despite many suggestions for amendments, it was not possible to change it since any modification must pass through the National Congress and be approved by the Presidency of the Republic.

Thus, the classification of Brazilian mineral water is still defined by standards existing in the 1940s. This situation, as well as many others imposed by legislation with more than 70 years of existence, has been making it difficult for the Brazilian industry to identify itself with the bottled mineral water industry in the world, especially those situated in Europe.

Bottled water has become a worldwide business and the consumption has increased fast, and enters to the international trade circuit beverages as branded commodity (Wilk, 2006). The Plastic bottled water (BW) has a rapid growth, as a healthy drinking choice and as a safer alternative to existing drinking water (Hawskins 2017). According to the author, the markets of Bottled Waters emerged for the following factors: consumer drinking practices; opportunistic strategies on the part of beverage companies; the development of PET bottles; the sophisticated branding techniques, and various drinking water problems, as state failure to dubious water quality. Erkomaishvili (2015) presented competitive advantages of Georgia in mineral water production and the need to adjust

regulations and institutions, and propose a strategy to development the Georgia bottled mineral water.

Thereby, this work proposes a new Brazilian mineral policy focused on mineral water, through the suggestion that the new National Mining Agency (ANM) allow the introduction of new terms to the labels of the Brazilian bottled mineral water with the intention of bringing them closer to the concepts used in bottled mineral waters in the Member States of the European Community, and with that, making it possible to expand Brazilian exports to the European continent. A review and restructuration of Brazilian regulations and economic policies need to be adjusted to international standards. The article presents a singular strategy for improving the effectiveness for a global commercialization of this good.

2. Comparative aspects between bottled mineral waters in Brazil, the United States of America (USA) and the European Community (CE)

The mineral water has been one of the mineral resources most used by society in recent years (Caetano, 2009). This chapter describes the classifications and denominations of mineral waters that occur and are marketed in Brazil, the United States of America and the European Community. As the interest of this work is to discuss the possibility of expanding the market of Brazilian mineral water in the European continent, by adapting the rules of the European Community, only the differences in classification and labeling regulated in Brazil and in the European Community will be discussed.

2.1 . The Bottled mineral water in Brazil

Brazilian mineral waters are classified according to the Brazilian Code of Mineral Waters (Decree-Law n°. 7.841, 08/08/1945), which defines t hem in Article 1 as "those from natural or artificial sources which have chemical, physical or physicochemical properties distinct from ordinary waters, with characteristics that give them a medicinal action". In its third chapter, this code also defines table water as "normal composition waters from natural sources or artificially collected sources, which only fulfill the drinking conditions for the region" (PINTO, U. R.,2008).

In addition to classifying them, this Decree-Law regulates its use, whether through a spa, or as a commodity. Furthermore, this Code distinguishes mineral waters both in terms of their chemical composition and the nature of their sources, as can be seen in Tables I and II.

The growing demand for bottled water, both in national and international trade, has allowed the bottling of several types of water, which, together with mineral water, play a role in global bottled water statistics. Those waters are not differentiated in relation to their classification, but to the introduction or not of carbon dioxide.

The Brazilian mineral water Code, although based on the French legislation of the time,1945, does not consider the total dissolved solids concentration for the classification of a mineral water nor does it allow the treatment of mineral water by ozone to reduce the concentration of iron, manganese, sulfur and arsenic in order to make bottled mineral water attractive for trade.

Queiroz (2015) identifies that 35% of the Brazilian mineral waters are classified as Fluoridates, 20% are classified as Bicarbonated Alkaline, 10% as Earth-alkalines and another 10% rich in lithium. The rest of the Brazilian mineral waters are classified as carbo-gaseous, sulphated, Thermals', Radioactive among others (Table I and II). It is important to note that Queiroz (2015), in this work, studies all Brazilian mineral waters, not just those used for bottling.

2.2. The Bottled mineral water in the United States of America (USA)

Artesian water, ground water, mineral water, purified water, demineralized water, sparking bottled water, sterile water, well water are some types of bottled water found in the United States of America. In that country, mineral waters may be defined as waters having an equal or greater concentration of total dissolved solids (TDS) of 250 mg/L. Water that TDS content is bellow 500 ppm (mg/L) is called Low Mineral Content and water that TDS content is greater than 1.500 ppm (mg/L) is called Hight Mineral Content (Code of Federal Regulations, Title 21, Volume 2, Sec. 165, revised as of April, 1, 2017. [Accessed on Feb. 09th 2018]).

Table III shows the different names that are given to the bottled waters in the United States of America and the characteristics of each one. It is important to note that water treatment is permitted in USA except for waters that are termed mineral waters.

2.3. The Bottled mineral water in the European Community (EC)

Unlike in Brazil, the consumption of bottled mineral water in Europe provide a true complement to the diet of the European population due to certain characteristics that differentiate it from other waters. it is important to highlight certain characteristics of bottled mineral waters in the European Community such as:

1) Very low mineral content, when Mineral salt content, calculated as a fixed residue, not greater than 50 mg/L;

2) Low mineral content, when mineral salt content, calculated as a fixed residue, not greater than 500 mg/L;

3) Medium mineral content, when mineral salt content, calculated as a fixed residue, not greater than 1,500 mg/L;

4) Rich in mineral salts, when mineral salt content, calculated as a fixed residue, greater than 1,500 mg/L and

5) Suitable for low-sodium diet, when sodium content is less than 20 mg/L.

Unlike in Brazil (where the waters can also be classified as table water) and in the USA (where there is a plethora of bottled water types), EC bottled waters are always classified as minerals. In addition to this difference, it is also worth noting that in the EC the treatment of mineral waters with ozone is permitted only for the purpose of reducing the high concentrations of iron, manganese, sulfur and arsenic, which is not allowed in Brazil, neither in the USA.

Table IV shows the current classifications of bottled waters in the countries that are part of the European Community (Annex III of Directive 2009/54/CE of European Parliament and Council. Jun. 18, 2009).

2.3. Comparative Analysis of the mineral water bottled in Brazil and in the European Community.

The main focus of this work is the possible insertion of Brazilian bottled mineral water in the European market through the attempt to change some of the labels on the labels or even change the Brazilian policy for the classification and labeling of mineral waters, only the differences and similarities found between the classification and labeling of bottled mineral waters in Brazil and in the European Community will be discussed.

Caetano (2009) makes a comparative analysis between the information contained in tables I, II and IV and concludes that:

1) The mineral waters bottled in the European Community are mainly distinguished by the concentration of dry residue (or total dissolved solids - TDS), unlike what occurs in Brazil that does not take the TDS into account;
2) The mineral waters bottled in the European Community are classified as fluoridated when the concentration of fluoride is greater than 1 mg/L. In Brazil a concentration equal to or greater than 0.02 mg/L of fluoride already allows the classification of this water as fluoridated;
3) Radioactivity, despite being used as a standard for water classification in Brazil, is not used as a classification standard for bottled waters in the European Community;
4) In Brazil, bottled mineral waters can be classified as minerals waters by their temporary temperature and radioactivity and
5) In the European Community, bottled mineral waters may have a therapeutic assignment stamped on their labels, such as "It is suitable for low sodium diet", when the sodium concentration in the water is less than 20 mg/L. In Brazil, the use of such information on labelsis still not allowed.

Among the different standards for the classification of a mineral water in Brazil and in the European Community, it is possible to highlight the concentration of total dissolved solids (TDS) and the concentration of sodium, which, if adopted in Brazil, would categorize Brazilian mineral water in the same standards adopted by the European Community.

Brazilian mineral waters, unlike the European ones, have few solids dissolved. Therefore, if they were classified according to the European Community Directives they would receive the denomination of "very low mineralization", TDS < 50 mg/L and "low mineralization" or “oligomineral water” TDS<500 mg/L. Table V briefly describes the bases and differences in mineral water classification in Brazil and in the European Community.

To exemplify, we selected 10 best-known brands of bottled water in Brazil. Based on their concentration of dissolved solids, 6 of those brands would be classified in any European Community country as "low mineralization or oligomineral waters". They are: Indaiá (Bahia), TDS = 100 mg/L; Minalba (São Paulo), TDS = 85 mg/L; Ouro Fino (Paraná), TDS = 133 mg/L; Crystal Coca-Cola (São Paulo), TDS = 130 mg/L; Bioleve (São Paulo), TDS = 83 mg/L and Schin (São Paulo) TDS = 242 mg/L. The other 4 brands would be classified as “mineral waters of very low mineralization”, they are: Dias D'Avila (Bahia), TDS = 43 mg/L; Petrópolis Nestlé (Rio de Janeiro) and Levíssima Nestlé (Rio de Janeiro), both with TDS = 19 mg/L and Bonafont Danone (Minas Gerais), TDS = 18.5 mg/L.

According to Queiroz (2004), 48.2% of the Brazilian bottled mineral waters are classified as fluoridated, 16.2% as hypothermal to hyperthermal sources, 14.68% as cold radioactive to hyperthermal sources and 10.20% as table water. Also according to Queiroz (2004), 72% of the Brazilian bottled mineral waters have less than 100 mg/L of total solids dissolved.

This aspect of Brazilian mineral waters has become the object of desire of major international groups, such as the French group Danone, which made a huge investment in the search for sources of waters with low values of dry residue in the Brazilian territory. This group, at the end of 2008, fulfilled its dream and from August 2009 launched the Bonafont water (from Jacutinga - MG) with the lowest concentration of sodium (0.34 mg/L) and TDS (18.5 mg/L) in the Brazilian market.

Regarding the characteristics of bottled mineral waters in the European Community, it is found that the most well-known brands in the European market have a much higher dissolved salt concentration (TDS) when compared to Brazilian waters. The traditional brands Evian (TDS = 357 mg/L), Perrier (TDS = 475 mg/L), Salvelar (TDS = 850 mg/L), San Pellegrini (TDS = 1,109 mg/L) and Contrex (TDS = 2,078 mg/L) can reach salt concentrations 112 times higher than the amount of dissolved salts found in Brazilian mineral waters. However, some bottled mineral waters in the European Community show concentrations of salts similar to the concentrations typical of most Brazilian mineral waters. They are: Spa Reine (33 mg/L), Spa Finesse (88 mg/L) and Valvert (201 mg/L). Table V and figure 1 show some characteristics that greatly differ from the bottled mineral waters in Brazil and in the European Community. Table VI and Figure 1 show the different concentrations of dissolved solids (TDS) in some important bottled mineral waters in Brazil and the European Community.

Queiroz (2015), classify all the bottled mineral waters in Brazil as follows:

1) 41% of Brazilian Mineral Waters have less than 50 mg/L of total dissolved solid (TDS);
2) 30% of Brazilian Mineral Waters have more than 50 mg/L and less than 100 mg/L of TDS;
3) 23% of Brazilian Mineral Waters have more than 100 mg/L and less than 200 of TDS and
4) 6% of Brazilian Mineral Waters have more than 200 mg/L.

So more than 53% of Brazilian Mineral Waters could be call as "Oligomineral or low Mineralization" and 41% could be call as "Slightly Mineralized" if they were classification by EC Directives.

In true, Brazil has 94% of Bottle Mineral Water poor in salts. Only 6% of the Mineral Water Bottled in Brazil exceeds 250 mg/L of TDS.

Carpinelli & Bertolo (2006) calculated the medians of the values found in Brazilian mineral waters bottled by regions and found the following values:

1) In the North and Midwest regions of Brazil the median TDS is 30 mg/L;
2) In the Northeast region, the median TDS is 50 mg/L;
3) In the Southeast region, the median TDS is 90 mg/L and
4) In the South region, the median TDS is 160 mg/L.

The mean value of TDS for Brazil is 82 mg/L, which allows us to conclude that the bottled mineral waters in Brazil could be classified as "low mineralization" in the EC and that probably the bottled mineral waters in the North, Central West and Northeast Brazil would be within the European classification of "very low mineralization".

According to Carpinelli and Bertolo (2006), the median TDS calculated in bottled mineral waters in some European countries were as follows:

1) Portugal - 94 mg/L;
2) Italy - 250 mg/L;
3) England - 260 mg/L;
4) Spain - 270 mg/L and
5) France - 270 mg/L.

With these values it is possible to indicate a value of 269 mg/L for the median TDS of mineral waters bottled in European territory. Figure 2 shows the distribution of the median TDS in some European countries and Figure 4 shows the comparison of these values with the median values of bottled mineral waters in the different Brazilian regions.

3. Conclusions and Suggestions

It can be concluded that the main differences between the bottled mineral waters present in the Brazilian market and the bottled mineral waters in the European Community are related to the concentration of salts (TDS) in each of these waters.

Brazilian mineral waters, in general, are poor in dissolved minerals, which results in different characteristics when compared to those bottled in the European Community, where the concentration of salts is much higher.

Thus, in order to achieve the objectives of this work, which is focused on the expansion of the Brazilian mineral water market beyond Brazilian borders, numerous suggestions can be given to the Regency Agency (ANM) dedicated to the management of bottled mineral water in Brazil, such as:

- Changing the Brazilian mineral water classification for exporting applying the same European Community Policy;
- Checking sodium concentration in Brazilian Mineral Water Law to classify it as "*It is suitable for low sodium diet*" and
- Appropriate labelling in accordance to the EC requirements.

These procedures would bring beneficial results, such as:

1) Job creation mainly in Brazil (there are currently more than 13.5 million of unemployed people – April, 2017);

2) Tax revenues growth (federal, state and municipal);

3) Brazil and European Community partnership development.

4) Dissemination of product quality and market expansion to all the world.

4. Figures and Tables

Table I – Brazilian Mineral Water Classification (Brazil/1945) - Chemistry Composition (mg/L)

Classification	Decription
Oligomineral	Only one drug action
Radiferous	Contain dissolved radioactive substances that sustain a permanent radioactivity
Bicarbonate-alkaline	Sodium bicarbonate = or> 200 mg/L
Earth-alkaline	Sodium carbonate = or> 120 mg/L
Earth-alkaline Ca dominated	calcium = or> 48 mg/L as calcium bicarbonate
Earth-alkaline Mg dominated	magnesium = or> 30 mg/L as magnésium bicarbonate
Suphated	$SO_4^=$ = or> 100 mg/L
Sulphured	Sulfate = or> 1 mg/L
Nitrated	$NO_3^=$ (mineral origin) = or> 100 mg/L
Chlorinated	Sodium chloride = or> 500 mg/L
Ferruginous	Iron = or> 5 mg/L
Radioactive	Contain dissolved radon
Weakly Radioactive	Radon content between 5 to 10 Mache Unit per liter at 20℃ and 760mmHg pressure.
Radioactive	Radon content between 10 to 50 Mache Unit per liter at 20℃ and 760mmHg pressure.
Strongly radioactive	Radon content higher than 50 Mache Unit per liter at 20℃ and 760mmHg pressure.
Thoriferous	Minimum of 2 Mache unit per liter of dissolved thoron.
Carbogasous	Dissolved carbon dioxide gas = or> 200 mg/L at 20℃ and 760mmHg pressure.
Predominanting element	(> 0,02 mg/L): Iodized, fluoridated, lithium, etc.

Source: Caetano, 2004 updated Caetano, 2009

Table II – Brazilian Mineral Water Classification (Brazil/1945) - Classification at the source

Classification	Description
According to Gases:	
Radioactive	
Weakly radioactive	Those having a gas flow of at least 1 liter per minute with a radon content of 5 to 10 units Mache Unit per liter at 20℃ and 760mmHg pressure.
Radioactive	Those having a gas flow of at least 1 liter per minute with a radon content of 10 to 50 units Mache Unit per liter at 20℃ and 760mmHg pressure.
Strongly radioactive	Those having a gas flow of at least 1 liter per minute with a radon content higher than 50 Mache Unit per liter at 20℃ and 760mmHg pressure.
Thoriferous	Those having a gas flow of at least 1 liter per minute with a minimum of 2 Mache Unit per liter of dissolved thoron.
Sulfurous sources	Those that have definite releases of hydrogen sulphide gas.
According to the Temperature:	
Coldwaters	Temperature lower than25^{0}C
Hypothermal waters	Temperatures ranging from 25 to33^{0}C.
Mesothermal waters	Temperatures ranging from 33 to36^{0}C.
Isothermal waters	Temperatures ranging from 26 to 38^{0}C
Hyperthermal waters	Temperature higher than25^{0}C.

Source: Caetano, 2004

Table III – United States of America Bottled Water Classification/Denomination

Classification/Denomination	Description
Artesian Water ou Artesian Well Water	Water from a well tapping a confined aquifer in which the water level stands at some height above the top of the aquifer
Ground Water	Water from a subsurface saturated zone that is under a pressur equal to or greater than atmospheric pressure.
Mineral Water	Water containing notless than 250 parts per million (ppm) total dissolved solids (TDS), coming from a source tapped at one or more bore holes or springs, originating from a geologically and physically protected undeground water source.
Low Mineral Content	Water that TDS content is below 500 ppm..
Hight Mineral Content	Water that TDS content is greater than 1,500 ppm.
Purified Water, Demineralized Water, Deionized Water, Distilled Water, Reverse Osmosis Water[1]	Água que sofreu algum tipo de tratamento. Os pontinhos da última denominação deve ser substituído pelo tipo de método utilizado (purified ou demineralized ou deionized, etc.)
Sparkling Bottled Water	Water that, after treatment and possiblo replacement of carbon dioxide, contains the ame amount of carbon dioxide from the source tha it had at emergence from the source.
Spring Water	Water derived from underground formation from which water flows naturally to the surface of the earth.
Sterile Water ou Sterilized Water	Water that meets the requirements under "Sterility Tests".
Well Water	Water from a hole bored, drilled, or otherwise constructed in the ground which taps the water of an aquifer.
From a Community Water ou From a Municipal Source	Water that comes from a mommunity water system.
Not Sterile. Use as directed by Physician or by Labeling directions for use of infant formula	When the label or labeling of a bottled water product states or implies that the bottled water is for use in feeding infants, and the product is not commercially sterile.

Source: Caetano, 2004 updated https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=165.110, [Accessed on Feb. 12 2018].

[1] It can also be termed as Purified Drinking Water, Demineralized Drinking Water, Deionized Drinking Water, Distilled Drinking Water, Reverse Osmosis Drnking Water.

Table IV – European Mineral Water Classification

Classification	Description
Very low mineral content	Mineral salt content, calculated as a fixed residue, not greater than 50 mg/l
Low mineral content	Mineral salt content, calculated as a fixed residue, not greater than 500 mg/L
Medium mineral content	Mineral salt content, calculated as a fixed residue, not greater than 1.500 mg/L
Rich in mineral salts	Mineral salt content, calculated as a fixed residue, greater than 1 500 mg/L
Contains bicarbonate	Bicarbonate content greater than 600 mg/L
Contains sulphate	Sulphate content greater than 200 mg/L
Contains chloride	Chloride content greater than 200 mg/L
Contains calcium	Calcium content greater than 150 mg/L
Contains magnesium	Magnesium content greater than 50 mg/L
Contains fluoride	Fluoride content greater than 1 mg/L
Contains iron	Bivalent iron content greater than 1 mg/L
Acidic	Free carbon dioxide content greater than 250 mg/L
Containssodium	Sodium content greater than 200 mg/L
Suitable for alow-sodium diet	Sodium content less than 20 mg/L

Source: *Directiva del Consejo* 80/777/CEE, of jul, 14th,1980, amended by *Directiva del Consejo* 96/70/CE, of oct, 28, 1996

Table V -Classification: Brazilian Mineral Water x European Community Bottled mineral water

Limits for Bottled mineral water Classification	**Brazilian Mineral Water**	**European Community Mineral Water**
FLUORINE(mg/L)	0.02	1
SODIUM (mg/L)	No limits	<20 - It is suitable for low sodium diet
TDS (mg/L)	No limits	<50 - Slighty Mineralized; <500 - Oligomineral or Low Mineralization and >1500 - Rich in Mineral Salts
RADIOACTIVITY	> 10 Macheunits	Noclassification
TEMPERATURE	25º C	No classification
DRINKING WATER	Potability Standard	Potable

Table VI - TDS Comparison: Brazilian Mineral Water x Europian Ccommunity Mineral Botlled Water

Brazilian	Bonafont (Danone)	Levíssima (Nestlé)	Petrópolis (Nestlé)	Dias D´Ávila	Lindóia Bioleve
TDS mg/L	18,5	19	19	43	83
Brazilian	**Minalba**	**Indaiá (BA)**	**Crystal (Coca-Cola)**	**Ouro Fino**	**Schin**
TDS mg/L	85	100	130	133	242
EC	**Spa Reine**	**Spa Finesse**	**Valvert**		**Evian**
TDS mg/L	33	88	201		357
EC	**Perrier**	**Salvelat**	**San Pellgrini**	**Contrex**	**Hepar**
TDS mg/L	475	850	1109	2078	2513

Source: Caetano, 2009

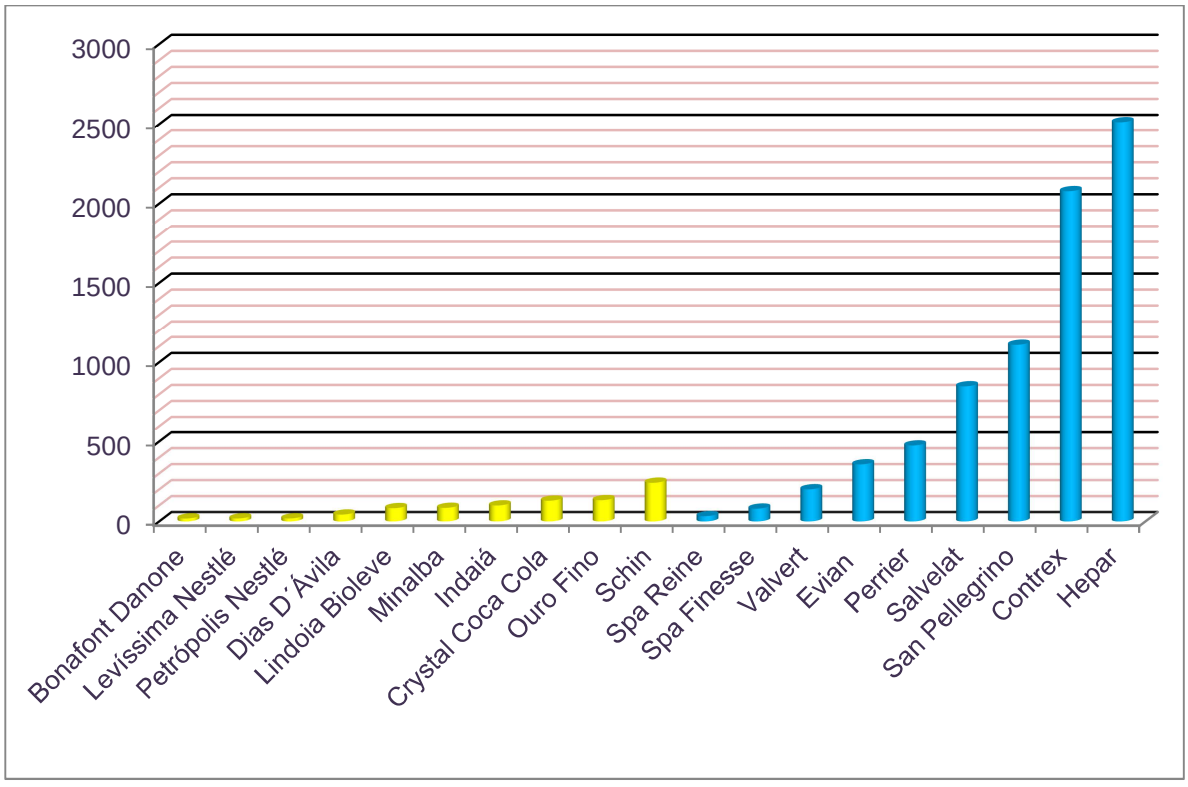

Figure 1 - TDS Comparing: Brazilian Bottled mineral water (yellow columns) x EC Bottled mineral water (blue columns)

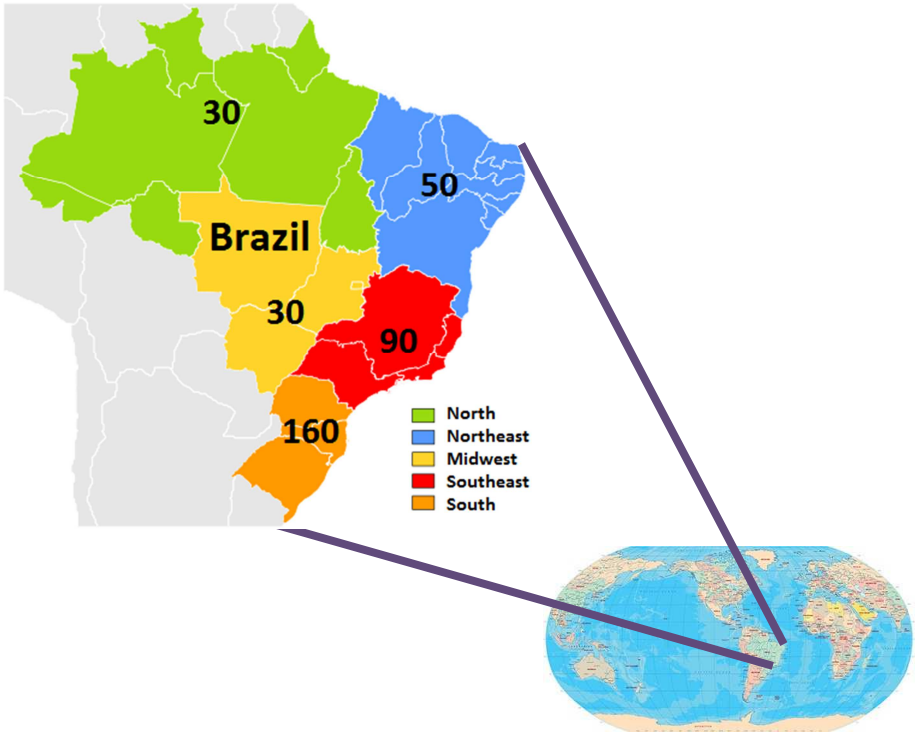

Figure 2 - The median TDS concentration (mg/L) in relation to the Brazilian regions (mg/L)
Source: Carpinelli & Bertolo (2006)
https://pt.wikipedia.org/wiki/Regi%C3%B5es_do_Brasil. [Accessed on Feb. 10 2018]

Figure 3 - The median TDS concentration (mg/L) in relation to some countries in the Europe (mg/L):
Source: Carpinelli & Bertolo (2006)
http://casalemgalway.blogspot.com.br/2016/11/vantagens-da-cidadania-europeia-na.html [Accessed on Feb. 10, 2018]

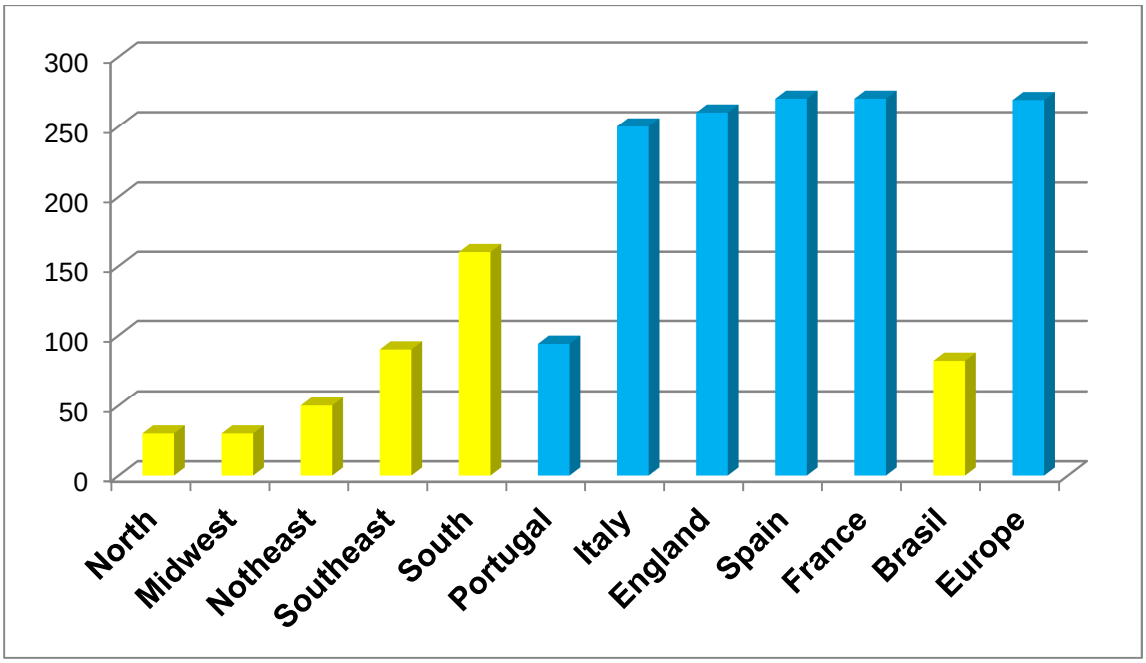

Figure 4 - TDS (mg/L) Comparing: Brazilian Regions Mineral Water X Some Countries in Europe Mineral Water
Source: Carpinelli & Bertolo (2006)

5. Bibliography

CAETANO, L. C. (2004). A Política da Água Mineral. Tese de Doutorado. Campinas: UNICAMP.

CAETANO, L. C. (2009). Relatório Técnico nº 57, Perfil da Água Mineral, http://www.mme.gov.br/documents/1138775/1256650/P31_RT57_Perfil_da_xgua_Mineral.pdf/a92381ad-d385-4f64-bfa6-2348795f3d7a. [Acessed on jan. 17, 2018.].

CARPINELLI, M. & BERTOLO, R. (2006). Águas Minerais Brasileiras e Europeias: Características Químicas e Classificação. Available in: https://uspdigital.usp.br/siicusp/cdOnlineTrabalhoVisualizarResumo?numeroInscricaoTrabalho=4052&numeroEdicao=16. [Accessed on Feb 13 2018].

Code of Federal Regulations, Title 21, Volume 2, Sec. 165, revised as of April, 1, 2017. [Accesed on feb. 09, 2018].

Code of Mineral Waters, 1945 http://www2.camara.leg.br/legin/fed/declei/1940-1949/decreto-lei-7841-8-agosto-1945-416551-norma-pe.html [Accessed on Feb. 10, 2018].

Directiva del Consejo 80/777/CEE, of jul. 14, 1980, amended by Directiva del Consejo 96/70/CE, of out. 28, 1996.

Erkomaishvili, G. Consumer Market for Mineral Water and Development Policy in Georgia. World Academy of Science, Engineering and TechnologyInternational Journal of Economics and Management Engineering. Vol: 9, No:5, 2015

Hawskins, G. The impacts of bottled water: an analysis of bottled water markets and their interactions with tap water position. WIREs Water 2017, 4:e1203. doi: 10.1002/wat2.1203

PINTO, U. R. (2008). Consolidação da Legislação Mineral e Ambiental, Brasília: LGE Editora.

QUEIROZ, E. (2004). Águas Minerais do Brasil: Distribuição, Classificação e Importância Economica. Modified in jun, 14 2017. Available in: http://www.anm.gov.br/dnpm/publicacoes/serie-

sustentabilidade/aguas-minerais-do-brasil-distribuicao-classificacao-e-importancia-economica/view. [accessed on feb, 13 2018].

QUEIROZ, E. T & PONTES, C.H.C. (2015). Estudo Diagnóstico da Águas Minerais e Potáveis de Mesa. Available in: https://aguassubterraneas.abas.org/asubterraneas/article/viewFile/23434/15520. [Accessed on jan. 31, 2017].

http://casalemgalway.blogspot.com.br/2016/11/vantagens-da-cidadania-europeia-na.html [Accessed on Feb. 10, 2018].

https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=165.110,

[Accessed on Feb. 12 2018].

https://pt.wikipedia.org/wiki/Regi%C3%B5es_do_Brasil. [Accessed on Feb. 10 2018].

WILK, R. 2006. Bottled Water. The pure commodity in the age of branding. Journal of Consume Culture. SAGE Publications, p. 303-325.