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DRINKING WATER: LEGISLATION, POLICY, ECONOMIC ASPECTS CASE STUDIES FROM CLUJ-NAPOCA (ROMANIA)

Ruxandra Mălina Petrescu-Mag
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"The human right to safe drinking water and sanitation is derived from the right to an adequate standard of living and inextricably related to the right to the highest attainable standard of physical and mental health, as well as the right to life and human dignity." *UN Human Rights Council (2010)*

FOREWORD

Water is a natural resource with environmental, social and economic value in all its forms of use or exploitation. Therefore, water conservation, reuse and saving are and should be desiderata of any society. The UN General Assembly declared the period from 2005 to 2015 as the International Decade for Action "Water for Life", which illustrates the unprecedented importance that is given to this sector, especially because of the water crisis humanity has been facing for decades. Nowadays, the challenge is to combine environmental protection with continuous economic growth in a way sustainable in the long term. The European Union environment policy is based on the belief that high environmental standards stimulate innovation and business opportunities. In-depth knowledge of consumer behaviour towards water may offer valuable predictions in shaping future policy and legislative directions for viable and realistic water protection, for everything that means sustainable water consumption. Based on this assumption, the book "Drinking water: legislation, policy and economic aspects. Case studies from Cluj-Napoca (Romania)" is structured in two parts. The first one presents and analyzes the legal and policy issues related to drinking water quality at EU and national level (with reference to Romania). The second one is a practical approach to the economic side of water as natural resource and commodity. It includes two case studies based on surveys and focused on consumers from Cluj-Napoca (Romania). The tap water provided by the municipal supply system is the drinking water source for the majority of Romanian consumers, including those from Cluj-Napoca. For this reason, consumers' perceptions of water services, water quality, drinking water issues and their related behaviour are essential and can be a starting point in fostering a sustainable behavior regarding water consumption in urban areas. Therefore, understanding perception, behavior and awareness of environmental aspects is important for policymakers, scientists, the business environment and consumers, especially because in Romania, between 2007 and 2013, water/wastewater infrastructure experienced the highest growth compared to other sectors.

Without claiming to be an exhaustive study, the paper aims to bring new information to the Romanian publishing context and to provide a useful tool for those interested in shaping a more sustainable framework for water.

January 2014

The authors

LIST OF ACRONYMS AND ABREVIATIONS

CASSA – SC Compania de Apa Somes -"Somes" SA ("Somes" Water Company)
DWD- Drinking Water Directive
ECHR - European Court of Human Rights
EU-European Union
EUFJE - European Union Forum of Judges for the Environment
EUWI - European Union Water Initiative
FWD – Framework Water Directive
IAWL- International Association for Water Law
ILC- International Law Commission
ISPA - Instrument for Structural Policies for pre-Accession
MDGs - Millennium Development Goals
MH – Ministry of Health
MS – Member States
RegNet - International Network of Drinking-Water Regulators
TFEU - Treaty on the Functioning of the European Union
UN - United Nations
UNDP - United Nations Development Programme
UNEP- United Nations Environment Programme
UNU-INWEH - United Nations University – Institute for Water, Environment and Health
WASH- Water, Sanitation and Hygiene
WHO - World Health Organization
WSSD - World Summit for Sustainable Development, Johannesburg

Drinking water: Legislation, policy and economic aspects. Case studies from Cluj-Napoca (Romania)

Abstract. The paper presents an analysis of how drinking-water quality depends on the existence of adequate legislation, standards, and codes. Therefore, the aim of drinking-water quality regulations should be to ensure that the consumer has access to sustainable, sufficient and safe drinking-water. Presentation of the relevant provisions of EU directives and national legislation in the field constitutes the main approach of the first part of this scientific approach. The second part of the paper discusses the realtionship natural environment – company – consumers and its connection to sustainbility. It also presents the results of two studies: one is a simple random survey conducted on consumers' perceptions and habits related to a regional Water Company, environment protection and water consumption. This survey showed water is well appreciated by most consumers (very good and good: purity – 42%, taste – 53%, smell – 55%, turbidity – 49%, safety – 28%). The other study analyzes consumers' attitude towards drinking water: what they think, believe and do. According to its results, most of consumers tested (62%) drink between 1-2 liters of liquids per day and the most used liquid is water. There is a statistically significant difference in the levels of daily water consumption of men and women ($p<0.01$), but we found no difference according to age (below 30 years and above 30) ($p>0.05$) and no difference according to the presence of children in the family ($p>0.05$). Regarding their water intake, most consumers (71%) perceive it as sufficient. There is a statistically significant difference between evaluation of their daily water intake of men and women ($p<0.05$). Within subject's water consumption by type and quantity in total amount of water consumed monthly, the first places belong to bottled plain water and tap water.

Key Words: water, sustainability, legislation, policy, drinking water, consumers, perceptions, behaviour.

Part I. Legislation and policy

1. Introduction: Why is this issue important? Both natural processes and human activities influence the quality of surface waters and groundwater. Domestic use, agricultural activities, industrial production, forestry practices, mining can alter chemical, biological and physical characteristics of water in ways that can threaten ecosystem integrity and human health (UN 2011). Domestic and industrial sectors are consuming high levels of water due to the continuing global population growth and the ever-accelerating pace of urbanization (UN 2011). Present water usage of our society cannot be considered sustainable; too much high-quality water is taken away from the eco-systems and too much polluted water is discharged (Terpstra 1999).

In most countries the principal risks to human health associated with the consumption of polluted water are microbiological in nature. Epidemiological investigations indicate that all aspects of the quality of water supply services influence health, as do hygiene behaviours and sanitation. Turbidity, colour, taste, and odour, whether of natural or other origin, affect consumer perceptions and behaviour. In extreme cases, consumers may avoid aesthetically unacceptable but otherwise safe supplies in favour of more pleasant but less wholesome sources of drinking-water (WHO 1997).

According to UNEP (2010), there are four fundamental strategies for combatting water quality problems that can then form the basis of policy solutions:

1. Prevention of pollution: it implies reduction/elimination of waste at the source;
2. Treatment of polluted water: waste water must be treated before discharging;
3. Safe use of waste water;
4. Restoration and protection of ecosystems.

Therefore, key policy interventions include (UNEP 2010):

- A better understanding of water quality through improved monitoring, data collection and analysis, and scenario building;
- More effective communication, education and advocacy;
- Improved financial and economic approaches;
- Improved legal and institutional arrangements;
- Improved technology and infrastructure.

Adequate policies and programs must support regulations. Policy statements should be consistent with the achievement of the Millennium Development Goals (http://www.un.org/millenniumgoals/) as laid out in the United Nations Millennium Declaration. They should also reflect the access guidelines outlined in the General Comment 15 on the Right to Water of the United Nations Committee on Economic, Social and Cultural Rights (WHO 2011). The United Nations Millennium Declaration enshrines the commitment to adopt: a new ethic of conservation and stewardship in all environmental actions. This includes the aim to stop the unsustainable exploitation of water resources by developing water management strategies at the regional, national and local levels which, in turn, promote both equitable access and adequate supplies; policies to halve, by the year 2015, the proportion of the world's people whose income is less than one dollar a day and the proportion of people who suffer from hunger as well as, by the same date, the proportion of people who are unable to reach or to afford safe drinking water (UN 2000). And because the Declaration on the Right to Development (UN 1986) focuses on human well-being (art. 2), lasting progress towards the implementation of the right to development requires effective development policies at the national level, as well as equitable economic relations and a favorable economic environment at the internatioal level (Vienna Declaration and Programme of Action 1993). The right to water has been recognized in a wide range of international documents, including treaties, declarations and other standards. For instance, Article 14, paragraph 2, letter h, of the Convention on the Elimination of All Forms of Discrimination against Women (United Nations Entity for Gender Equality and the Empowerment of the Women 1979) stipulates that signatory parties shall ensure to women the right to "enjoy adequate living conditions, particularly in relation to […] water supply". Article 24, paragraph 2, letter c, of the Convention on the Rights of the Child (United Nations General Assembly, 1989) requires signatory states to combat disease and malnutrition through "the application of readily available technology and through the provision of adequate nutritious foods and clean drinking-water, taking into consideration the dangers and risks of environmental pollution". The right to water is also and more often expressed within non-legally binding resolutions and declarations. These instruments, both international and regional in scope, promote the idea that fundamental human rights, such as life, health, and well-being are dependent upon ensuring people access to sufficient quality and quantity of water.

The following list outlines some of these legal instruments, which recognize a right to water to varying degrees (Scanlon et al 2004): Stockholm Declaration (UNEP 1972): Principle 1: "Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment...", Principle 2: "The natural resources of the earth including the air, water, land, flora and fauna and especially representative samples of natural ecosystems must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate"; Specific water instruments, such as the Action Plan from the United Nations Water Conference held in Mar del Plata in 1977, recognized water as a "right", declaring that all people have the right to drinking water in quantities and of a quality equal to

their basic needs (UN 1977). The primary outcome of this conference was the launching of the International Drinking Water Supply and Sanitation Decade (1980–1990) with the slogan 'Water and Sanitation for All'; Principle 4 of the Dublin Conference on Water and Sustainable Development (1992) explicitly reaffirmed the human right to water: "… it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price"; Chapter 18 of Agenda 21, on freshwater, notes that a right to water entails three elements: access, quality and quantity, including not only a "general objective (…) to make certain that adequate supplies of water of good quality are maintained for the entire population of this planet", but also to provide that "all peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic human needs" (UN 1992). There are also numerous legal instruments, at a regional level, which explicitly or implicitly recognize a right to water (Scanlon et al 2004): The 2001 European Charter on Water Resources that affirms in article 5 that everyone has the right to a sufficient quantity of water for his or her basic needs; The 1961 European Social Charter confirms that the right to the protection of health obligates signatory states to remove as far as possible the causes of ill health (art. 11) and this necessitates the provision of safe water; The 1950 European Convention for the Protection of Human Rights and Fundamental Freedoms.

2. The human right to water and sanitation. According to the World Health Organization (WHO 2013), 89% of the world population was using an improved drinking-water source by the end of 2011. 55% of the world population enjoyed the convenience and associated health benefits of a piped supply on their living premises. On the other hand, an estimated 768 million people did not use an improved source for drinking-water in 2011 and 185 million people relied on surface water to meet their daily drinking-water needs. In 2000, heads of state gathered at the United Nations headquarters in New York and adopted the Millennium Declaration, which formed the basis for the formulation of the eight Millennium Development Goals (MDGs). Goal number 7, on environmental sustainability, included an initial target (target C) on access to drinking-water, to which a sanitation component was added later, at the World Summit on Sustainable Development (Johannesburg, 2002): "To halve, by 2015, the proportion of people without sustainable access to safe drinking-water and basic sanitation." This target is one of 22 MDG targets, giving rise to two out of a total of 60 indicators (UNICEF & WHO 2011).

On 28 July 2010, the UN General Assembly adopted Resolution 64/292 recognizing that safe and clean drinking water and sanitation is a human right essential to the full enjoyment of life and all other human rights, but it was the General Comment no. 15 issued by the Committee on Economic, Social and Cultural Rights in 2002 which explicitly recognizes a human right to water and sanitation and that provides for a certain standard to be achieved (Salman & McInerney-Lankford 2004). This is embodied in the normative content of the right, which has been described in terms of the following interrelated elements (de Albuquerque 2011):

1. Availability: the human right to water and sanitation is limited to personal and domestic uses. The amount of water available, and the number of sanitation facilities, must be sufficient for these uses. The quantity of water available for each person should correspond to World Health Organization guidelines. Some individuals and groups may also require additional water due to health concerns, climate, and work conditions (Gleick 1996).
2. Quality: water has to be safe to drink and use. Sanitation facilities must be hygienically and technically safe to use. Access to water for cleansing and hand washing is also essential.
3. Acceptability: sanitation facilities, in particular, have to be culturally acceptable. This will often require gender-specific facilities, constructed in a way that ensures privacy and dignity.
4. Accessibility: water and sanitation services must be accessible to everyone in the household or its vicinity on a continuous and reliable basis. Accessibility has four

overlapping dimensions (Committee on Economic, Social and Cultural Rights 2003):

(i) Physical accessibility: water, and adequate water facilities and services, must be within safe physical reach for all sections of the population. Sufficient, safe and acceptable water must be accessible within, or in the immediate vicinity, of each household, educational institution and workplace. All water facilities and services must be of sufficient quality, culturally appropriate and sensitive to gender, life-cycle and privacy requirements. Physical security should not be threatened during access to water facilities and services;

(ii) Economic accessibility: Water, water facilities and services must be affordable for all, and this is not the same thing as free. The direct and indirect costs and charges associated with securing water must be affordable;

(iii) Non-discrimination: Water, water facilities and services must be accessible to all, including the most vulnerable or marginalized sections of the population, de jure and de facto, without discrimination on any of the prohibited grounds;

(iii) Information accessibility: accessibility includes the right to seek, receive and impart information concerning water issues.

Under international human rights law, water is implicitly and explicitly protected as a human right. Water is not mentioned explicitly in the 1948 Universal Declaration of Human Rights or in the two 1966 International Covenants on Economic, Social and Cultural Rights (ICESCR), and, respectively, Civil and Political Rights (ICCPR), but it is regarded as an integral component of other recognized rights, such as the right to life, to an adequate standard of living, to health, to housing and to food (http://www.who.int/water_sanitation_health/humanrights/en/index1.html).

So, according to WHO, the human right to water consists of various dimensions: *Right to water for life and survival; Right to clean drinking water; Right to water and sanitation for health; Right to water for adequate standard of living; Right to food and nutrition; Right to water and sanitation as part of the right to housing; Right to water for food preparation; Right to water for food production; Right to water as part of the right to development; Right to water as part of the right to natural resources; Right to water as an element of the right to environment; Right to water as an element of the right to property*.

The UN resolution on the human right to water and sanitation acts as a catalyst for further policy discussions between the relevant stakeholders and across the relevant sectors, as well as in the development of programs that make possible the full realization of the rights of individuals and communities. The integration of these human rights also emphasizes the role of water and sanitation in ensuring water security, an area identified as a major bottleneck for the progressive realization of universal access (UNU-INWEH 2013). Implementation is both the key and the biggest stumbling block for any working water legal regime. Without consistent implementation, access to water becomes insecure (Mechlem 2012). Therefore, one of the ways of human rights protection consists of ensuring the effective functioning of the judicial system in protecting the application of environmental legislation. In this regard international and national courts of justice, such as the ECHR or the EUCJ play an important role, as it can be seen below.

From the case law of ECHR (European Court of Human Rights)

Case Butane and Dragomir v. Romania, judgment of 14 February 2008(Application no. 40067/06) European Court of Human Rights

The case originated in application number 40067/06, against Romania, which was introduced by Romanian citizens, Mr. Traian Nicolae Butane and Mrs. Constanta Dragomir (applicants). They have appealed to the Court on 15 May 2006 pursuant to art. 34 of the Convention for the Protection of Human Rights and Fundamental Freedoms (the Convention).

Circumstances of the case

A. The origin of the case:

Applicants' access to drinking water was discontinued starting with 20 October 2001, when the neighbors who live on the lower floors of the same building cut water pipes, stopping the water supply to the apartment occupied by the applicants. Drinking water distribution through the public distribution network is based on a single contract concluded by the Building Owners association with the company providing the public service, i.e. Apanova SA. The applicant is the owner of flat no. 4, which she shares with her son. This apartment is located on the top floor of a building. As a result of disagreements with their neighbors, the applicants asked Apanova SA to conclude with them a separate contract for water supply. Apanova refused to sign a contract with the applicants and, by the letter of 21 August 2003, the company announced the refusal for a separate exclusive connection to the water supply outside of the building as a whole. The previous year, on 11 April 2002, the applicants had notified the municipal authorities of the problem, complaining of obstacles in their water supply. The municipality had sent a letter to Apanova to check the reported facts. In a judgment of 11 September 2003 (which has become definitive), and following legal action brought by the applicants, a Bucharest court ordered neighbors to reopen the water tap for access to drinking water. According to the signed minutes for a meeting of July 9, 2004, the owners of the other apartments in the building decided that from July 10, 2004, at 10 a.m., access to tap water in the bath and kitchen of flat no. 4, belonging to Constanta Dragomir and her son, would be restored.

During the period between 15 November 2003 and 15 November 2004, the applicant - Traian Nicolae Butan - was forced to rent another house because of the lack of running water. His mother Constanta Dragomir continued to live in that apartment.

B. Action against the public service company responsible for drinking water distribution:

On 26 January 2003, the applicants filed a legal action with the Bucharest Court responsible for City District 1, against Apanova SA, with the goal of forcing the company to conclude a contract for the supply of drinking water. On 16 March 2004, the District Court declined jurisdiction in favor of the Bucharest Tribunal. By a judgment of 26 October 2004, the Bucharest Tribunal dismissed the case on the grounds that the company provided drinking water for the entire building and it could not be blamed for the fact that the neighbors had interrupted access to water. The Tribunal also found that the existing technical outfit, namely fittings which connect the building to the public system, serves the whole building and that separate fittings need to be installed before the company may provide water under a contract concluded only with the applicants.

The Court of Appeal upheld this ruling, through a decision delivered on 18 May 2005. The Court of Appeal stated that the water distribution rules adopted by the Bucharest Local Council only required the water supplier to ensure the branching of each building and not of each apartment. Installing additional fittings was subject to certain obligations on the part of the beneficiary, such as the obligation to obtain permits and licenses, including from the supplying company, or to pay for the expenses. The Court of Appeal concluded that the water distribution company could not be forced to conclude a supply contract with the applicants, without these obligations being fulfilled by the beneficiaries.

The plaintiffs appealed this decision and, in a final decision of 22 November 2005, the High Court of Cassation and Justice upheld their appeal and ordered the company to conclude a supply contract for the supply of drinking water with the applicant Constanta Dragomir, as owner of the apartment. *The High Court held that providing public water supply services materializes, primarily, through a contract for the supply of water.* Subsequently, the decision was rendered enforceable. By a notification dated May 4, 2006, the applicants asked the water supply company to abide by the judgment of 22 November 2005.

In a letter dated 15 May 2006, the supply company responded to the applicants that it intended to follow the judgment of the High Court, showing readiness to conclude the contract for the apartment no. 4, but only after installing new fittings at the expense of the plaintiffs. Therefore, it refused to sign the contract immediately.

Thereafter, the applicants filed an action at the Bucharest Tribunal, based on art. 580^3 of

the Code of Civil Procedure, requiring the imposition of a fine on the company for failing to abide by the judgment of 22 November 2005.
By its final decision of 14 May 2007, the Tribunal upheld the application and obliged the water supply company to pay to the state a fine of 20 Romanian lei (RON = Romanian New Leu) for each day of delay following the 22 November 2005 legal decision.
It appears from legal documents that the ruling of 22 November 2005 remains unenforced to the present day.

The law
I. Upon the alleged VIOLATION OF ARTICLE. 6 para. 1 of the Convention
Applicants claim that the failure to comply with the judgment of 22 November 2005 prevented them access to a court as required by art. 6 para. 1 of the Convention, which provides as follows:
Article 6 para. 1: "Everyone is entitled to a fair hearing (…) by a court (...) which will decide (…) on the infringement of his rights and obligations of civil nature".
A. Upon the admissibility:
Considering that this complaint is not manifestly ill-founded within the meaning of art. 35 para. 3 of the Convention and that it is not inadmissible on any other grounds, the Court declared it admissible.
B. Upon the substance:
Parties allegations:
1. The Romanian Government notes that the executed debtor is a private company, therefore a third party. Therefore it claims that only the state is obliged to acquire a suitable and sufficient arsenal to ensure the fulfillment of the state's positive obligations when it comes to the enforcement of judicial decisions in civil matters between individuals. It also argues that the state cannot be held responsible for the execution of each civil matter ruling, under all circumstances. On this basis, the Government notes that the Bucharest Tribunal through the decision of 14 May 2007, which fined the debtor, solved the conflict between the applicants and their debtor concerning the enforcement of the 22 November 2005 ruling. In the view of the Romanian Government, this is about an effective legal mechanism open to applicants, which was actually used to ensure enforcement of civil obligations incumbent upon an individual. Finally, given the recent date of the decision of 14 May 2007, the Government estimates that it would be premature to consider this as a default. The Government also notes that, even if the applicants' request for enforcement was dated 4 May 2006, their appeal regarding the enforcement of the 22 November 2005 ruling required a certain period of time to be completed.
2. Applicants oppose this claim.
They state that they have used all legal means to obtain enforcement of the final ruling pronounced in their favor, but that state authorities defaulted in their obligation to enforce final judicial decisions. They also note that it was due to the lack of assistance from state authorities in eliminating the neighbors' illegal obstacles in the water supply of their home, that they were forced to demand a separate contract for their water supply. They assert that the legal decision of 22 November 2005 does not require the installation of separate fittings as a precondition for concluding the water supply contract.
Regarding the argument of the Government concerning the premature nature of their complaint, they state that the final legal decision awaiting execution dates from 22 November 2005, i.e. from more than two years ago. Furthermore, they have not been supplied with water since 2001, which has resulted in very difficult living conditions.
Applicants call for the fiscal authorities to ensure implementation of the legal decision of 14 May 2007, regarding the fining of the water supply company for failing to abide by the final ruling of 22 November 2005. In this regard, they note that the small fine has not proven effective in ensuring enforcement.
The applicants reveal that on the basis of the Regulation on public service water supply adopted by a decision of the General Council of Bucharest no. 157 of 14 July 2005, public servants are responsible for sanctioning any unlawful hindrance of access to the public water supply network. However state agencies have not applied any sanctions against

the water company.
3. Findings of the Court:
The Court finds that, despite the final decision of the High Court of Cassation and Justice of 22 November 2005 ordering the water company to conclude a supply contract with the applicants and, despite efforts taken for its execution, the decision was not enforced.
The Court finds that in this case the obligation was imposed on an individual, namely a private company. However, it also grants that the company, as a supplier of public water supply service, is bound by an administrative law contract to the municipality, and its performance should be controlled by public authorities. The Court found that despite all the efforts of the applicants, the debtor permanently opposed the execution of the legal decision given in their favor. Furthermore, despite the relationship of authority between the debtor, as the provider of a public service and the state, the refusal of the first one to comply with a final decision was not sanctioned by the latter. In addition, the Government has not shown that the 20 RON penalty per day of delay, imposed by the Bucharest Tribunal ruling of 14 May 2007, was actually enforced.
In fact, the applicants did not receive any justification for an objective impossibility of enforcement through a formal judicial or administrative ruling (Sabin Popescu v. Romania, no. 48102/99, para. 72, March 2, 2004).
In respect to the claim by the debtor that new connections to the public water supply system are required, prior to concluding a contract, the Court first notes the lack of any such prerequisite in the ruling of 22 November 2005 and, secondly, that the company has already refused to install such new connections.
In respect to existing case law, the Court had previously held that the State, in its capacity as holder of public authority was responsible for acting promptly and assisting creditors in the enforcement of the final legal ruling rendered in their favor (see, inter alia, Ruianu v. Romania, no. 34647/97, para. 72, June 17, 2003).
In light of the foregoing facts, the Court considers that in this case, the national authorities have not taken all reasonable measures expected of them, to enforce the final legal ruling favorable to the plaintiffs.
These elements are sufficient for the Court to conclude that, in this case, by their inaction, the national authorities had deprived the applicants of effective access to a court.
Accordingly, in the present case, art. 6 para. 1 of the Convention has been violated. Also, by invoking articles 8, 3 and 13 of the Convention, the applicants complain of inaction on the part of the authorities to put an end to the violations of their right to respect of the residence and to remedy the inhumane conditions which they had to bear due to a lack of water sanitation in their home.
In accordance with art. 41 of the convention, "If the Court finds that there has been a violation of the Convention or the Protocols thereto, and if the internal law of the High Contracting Party concerned allows only partial reparation of the consequences of this decision, the Court shall, if necessary, grant a satisfaction. "
The applicants alleged pecuniary and moral damage. As regards pecuniary damage, which results from the impossibility of enjoying the use of their home, the applicants ask for 32.800 Euro, i.e. eighty-two times the monthly rent of 400€ for an apartment of 60 m² located in the same neighborhood. As regards non-pecuniary damage, the applicants ask each for 90.000 Euro. They claim to have suffered serious physical and psychological consequences due to the prolonged lack of water in their home, despite the existing legal rulings in their favor.
The Romanian Government opposes these claims and argues that the estimation of material damage is speculative. In addition, the Government claims that the finding of a violation of art. 6, para. 1 of the Convention provides sufficient legal satisfaction in and of itself. The Court reiterates that a decision finding an infringement imposes a legal obligation on the respondent State to put an end to the breach and to make reparations so as to restore the situation to its previous state to the extent possible (Metaxas, para. 35 and Iatridis v. Greece (satisfaction) [GC], no. 31107/96, para. 32, ECHR 2000-XI).
The Court considers, moreover, that the applicants had suffered both material injury due to the non-execution of legal rulings, as well as moral damage due mainly to a deep

sense of injustice resulting from the failure to receive effective protection of their rights. It believes that this injury is not sufficiently compensated by a simple finding of an infringement. Given these considerations, the Court, sitting in equity, as required by art. 41, grants applicants jointly 10.000 EUR for all damages.
Court ruled:
a) that the respondent State is to pay the applicants jointly, within three months of the date the ruling becomes final, in accordance with art. 44 para. 2 of the Convention, 10.000 EUR (ten thousand euros) for pecuniary and non-pecuniary damage, plus any amount that may be chargeable as tax;
b) that any delay in payment past the mentioned deadline should result in the amount being increased by a simple interest, whose rate is equal to the interest rate for the marginal lending facility of the European Central Bank, to which should be added three percentage points;
c) those amounts will be converted into the currency of the respondent State at the rate applicable on the date of payment.

Source: adapted after ECHR, Case Butane and Dragomir v. Romania, judgment of 14 February 2008, http://hudoc.echr.coe.int/sites/fra/Pages/search.aspx#{"fulltext":["Butan"],"documentcollectionid2":["GRANDCHAMBER","CHAMBER"],"itemid":["001-85121"]}

3. The European context surrounding Romania's water reuse: the current situation. According to the European Commission & TYPSA (2013), Romania's water resources present a particular feature: 97.8 % of the rivers are collected by the Danube river which flows for 1 075 km of its total length of 2 860 km over Romanian territory or along Romania's national borders. The long-term annual average (LTAA) available freshwater resource is 125 billion m^3, of which 40 billion are in interior rivers. Further 85 billion are the Romanian share of the average annual flow of the Danube, plus an annual available groundwater resource estimated at 9.6 billion m^3. Consequently, usable water resources, including the Danube, amount to 2 660 m^3 per person per year, which, compared to the European average of 4 000 m^3/person/year, places Romania among the countries with relatively scarce usable water resources.

In respect to the volume of collected waste water, it has been established that: the total volume of collected waste water was of 4840.944 M m^3, out of which 2910.658 M m^3 (60%) wastewater that needed to be treated; and out of the volume of 2910.658 M m^3 of waste water, 740.403 M m^3 (25%) were treated; 1290.421 M m^3 (44%) were insufficiently treated and 879.834 M m^3 (30%) remained untreated. In the 1990s, the region of Central and Eastern Europe (CEE, more than 1 million km^2 and 100 million inhabitants) went through fundamental political, economic and social changes which eventually led to the European integration process. This, in turn, positively influenced the management of urban and waste water, which had previously exhibited an unbalanced structure and a rather low level of development (Somlyódy & Patziger 2012). The proportion of the population benefiting from urban waste water treatment covers those households that are connected to any kind of sewage treatment – see Table 1. This share was above 80 % in approximately half of the EU Member States for which data are available (mixed reference years), rising to 99 % in the Netherlands, 97 % in England and Wales, 95 % in Germany and Luxembourg, and 97% in Switzerland. At the other end of the range, less than one in two households were connected to urban waste water treatment in Malta, Bulgaria, Cyprus and Romania (29% in 2009), as well as in Croatia and the former Yugoslav Republic of Macedonia; new treatment plants are under construction in Malta and it is expected that this will result in high connection rates soon (European Commission 2012).

Table 1

Population connected to urban waste water treatment, 1999-2009 (% of Source: European Commission, Eurostat, 2012 Water Statistics, http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Water_statistics

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Belgium	39	41	46	48	51	53	54	57	69	71	:
Bulgaria	36	37	38	39	40	40	41	41	42	44	45
Czech Republic	62	64	65	70	71	71	73	74	75	76	:
Denmark	:	:	:	:	:	:	:	:	:	:	:
Germany	:	:	93	:	:	94	:	:	95	:	:
Estonia	69	69	69	70	70	72	74	74	74	80	80
Ireland	66	:	70	:	:	:	84	:	:	:	:
Greece	:	:	:	:	:	:	:	:	85	:	87
Spain	:	:	:	:	:	:	:	91	:	92	:
France	:	:	79	:	:	80	:	:	:	:	:
Italy	69	:	:	:	:	:	:	:	:	:	:
Cyprus	13	14	16	18	23	28	30	:	:	:	:
Latvia	:	:	:	65	70	66	66	65	65	:	:
Lithuania	:	:	:	57	59	:	69	69	69	70	71
Luxembourg	93	:	:	:	95	:	:	:	:	:	:
Hungary	29	46	50	57	:	:	54	57	:	:	:
Malta	13	36	36	36	36	36	36	36	35	42	48
Netherlands	98	98	98	99	99	99	99	99	99	99	99
Austria	:	85	86	86	89	89	:	92	:	93	:
Poland	52	54	55	57	58	59	60	61	62	63	64
Portugal (1)	:	:	:	57	60	:	65	72	69	70	:
Romania	:	:	:	:	:	27	27	28	28	29	29
Slovenia	21	23	25	25	26	34	37	52	51	52	52
Slovakia	50	51	51	52	53	54	55	55	57	:	:
Finland	80	80	81	81	:	:	:	:	:	:	:
Sweden	:	86	:	85	:	86	:	86	:	:	:
United Kingdom											
England and Wales	92	95	99	98	96	97	97	99	99	97	97
Scotland	:	:	80	90	92	89	91	:	:	:	:
Northern Ireland	83	:	:	:	83	83	83	85	86	80	81
Iceland	16	33	33	50	50	50	57	:	:	:	:
Norway	73	73	74	74	75	76	77	78	78	77	79
Switzerland	96	96	96	96	:	:	97	:	:	:	:
Croatia	:	9	:	:	:	15	28	28	29	:	:
FYR of Macedonia	:	5	6	6	6	6	7	7	7	7	7
Turkey	23	26	27	28	30	36	36	42	:	46	:

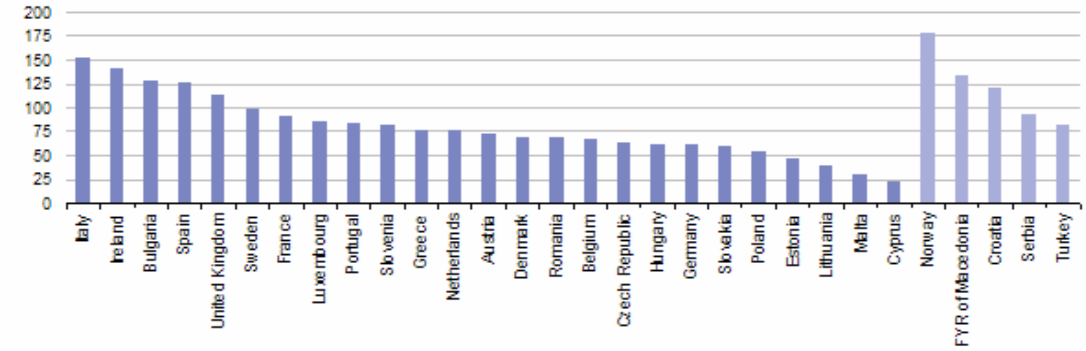
(1) The totals for urban wastewater treatment also contain values for preliminary treatment and for undefined treatment. These values refer to the public urban wastewater treatment, including collective septic tanks.
Source: Eurostat (online data code: env_watq4)

Source: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Population_connected_to_urban_wastewater_treatment,_1999-2009_(%25_of_total).png&filetimestamp=20121203155027

Public water supply: In Romania, only about 65% of the population benefits from a main drinking water supply and indoor plumbing. This includes 98% of the urban population and 33% of the rural population. These are quite low ratios in comparison with those in Europe, where 96 - 100% of the urban population and 87% of the rural population are connected to the public water supply network (Frone & Frone 2011).

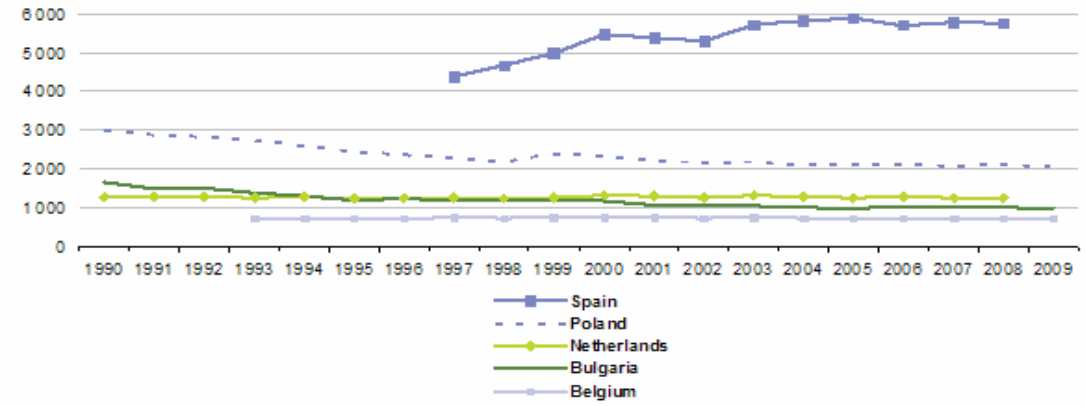
While the share of the public water supply sector in total water abstraction depends on the economic structure of a given country and can be relatively small, it is nevertheless often the focus of public interest, as it comprises the amount of water that is directly used by the population. Most EU Member States had annual rates of freshwater abstraction of between 50 m³ and 100 m³ per inhabitant – see Figure 1. The outliers in terms of freshwater abstraction are characterized by specific conditions: for example, in Ireland (141 m³ per inhabitant) the use of water from the public supply is still free of charge; while in Bulgaria (129 m³ per inhabitant) there are particularly high losses from the public network. Abstraction rates were also rather high in some non-member countries, notably Norway, the former Yugoslav Republic of Macedonia and Croatia. At the other end of the scale, Estonia and Lithuania reported low abstraction rates, in part

resulting from below-average connection rates to the public supply, while Malta and Cyprus have partially replaced groundwater by desalinated seawater. An analysis of the development of abstraction rates over time is shown for selected EU Member States in Figure 2. A comparison of the earliest and latest available annual data between 1990 and 2009 shows that there has been a marked decrease in abstraction in many of the Member States that joined the EU in 2004 or 2007 (the examples of Bulgaria and Poland are shown in the figure). Abstraction rates remained relatively stable in the majority of the remaining Member States (see the examples of Belgium and the Netherlands), with a pattern of gradually decreasing abstraction rates commonly observed. Nevertheless, there has been a substantial increase in abstraction in Ireland, Spain, Luxembourg and Portugal (see the example of Spain) and a smaller increase in Belgium. It is likely that the reduction in abstraction observed in many EU Member States is a result of various factors, including the introduction of water-saving household appliances and an increasing level of consciousness concerning the cost or value of water and the environmental consequences of wasting it (European Commission 2012).



(1) Spain, Italy, the Netherlands, Austria, Portugal, the United Kingdom and Turkey, 2008; Germany, Ireland, Greece, France, Slovakia, Sweden and Norway, 2007; Latvia and Finland, not available.
Source: Eurostat (online data code: env_watq2)

Figure 1. Total freshwater abstraction by public water supply, 2009 (1) (m^3 per inhabitant).
Source: European Commission, Eurostat, 2012 Water Statistics, http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Water_statistics



Source: Eurostat (online data code: env_watq2)

Figure 2. Total freshwater abstraction for public water supply, selected countries, 1990-2009
Source: European Commission, Eurostat, 2012 Water Statistics, http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Water_statistics

In some European countries, such as Romania or Germany, the water distributors must ensure that microbially and chemically clean water reaches water meters. After that, the owner of the building is responsible for the water quality (Vasile et al 2012). Up to the water meter, the drinking water quality is very good, but the drinking water collected from the customer tap could have a lower microbial and chemical quality than the water produced and distributed (Volker & Schreiber 2010). In most European countries, the quality of drinking water is not routinely monitored at the household level, but rather throughout the distribution system, as waterworks and authorities have limited access to private homes, as well as limited control over household plumbing and operation (Vasile et al 2012). Significant levels of trace metals could be detected after the water stagnates in the distribution system, especially during nighttime (Haider et al 2002; Zietz & Lass 2007). All these studies reported increased concentration of lead, cadmium, copper, iron and nickel in household tap water in Austria, Germany and Romania, following water stagnation. According to Romanian legislation, the last segments checked by the water distribution companies are the branch pipe and the water meter. Less than 0.1% of the domestic network of customers is included in the monitoring plan of drinking water; usually, tap water is controlled only at the request or complaint of specific customers (Vasile et al 2012). Several factors might influence the amount of water consumed, including seasonal and/or regional weather effects, the aesthetic quality of drinking water, cultural differences, but also age, gender, physical activity and diet (Mons et al 2007). From the available studies not many conclusions could be drawn regarding the influence of these factors on tap water consumption. Some found an influence of season, age or gender on water consumption (Hopkin & Ellis 1980; Shimokura et al 1998; Gofti-Laroche et al 2001; Westrell et al 2004), but conclusions were contradictory.

3.1. The profile of Cluj County, Romania. *Location.* Cluj County is located in the North-Western half of the country, being in the contact area of three representative natural units: the Apuseni Mountains, the Transylvanian Somes Plateau and the Transylvanian Plain (Figure 3, Geographic location of Cluj County). In terms of the share of national land area owned, Cluj County ranks 12 in the country, covering 2.8% of the total national territory. The landscape is predominantly hilly and mountainous, with the highest altitude reached in the massifs Vlădeasa (1842 m) and Muntele Mare (1826 m). The climate is moderate continental. Annual thermal amplitude varies between 23 to 25 degrees Celsius in the highlands and decreases to 17-19 degrees Celsius in the mountains. The city of Cluj-Napoca is situated in the heart of Transylvania. It covers an area of 179.5 km, it is located in the center of Cluj County and it is the capital city of the county.

Population. The administrative county network includes 434 human settlements, grouped into 81 administrative units. On October 20, 2011, resident population of Romania was 20,121,641, of which 10,333,064 women (51.4%). According to 2011 census, Cluj County is 5th in the country in population, after Bucharest (1,628,426 inhabitants) and after Iasi, Constanta and Prahova. The county's population is about 720,000 people, of which over 65% live in urban areas (Cluj County Council, http://www.cjcluj.ro/judet/). Cluj County has 5 cities: Cluj-Napoca, Campia Turzii, Dej, Gherla, Turda and Huedin.

By the fact, Cluj-Napoca is a university town, out of the total 10 years and over resident population in Cluj County (628,182 inhabitants), 17% have university degree (107,818 inhabitants) (see Table 2).

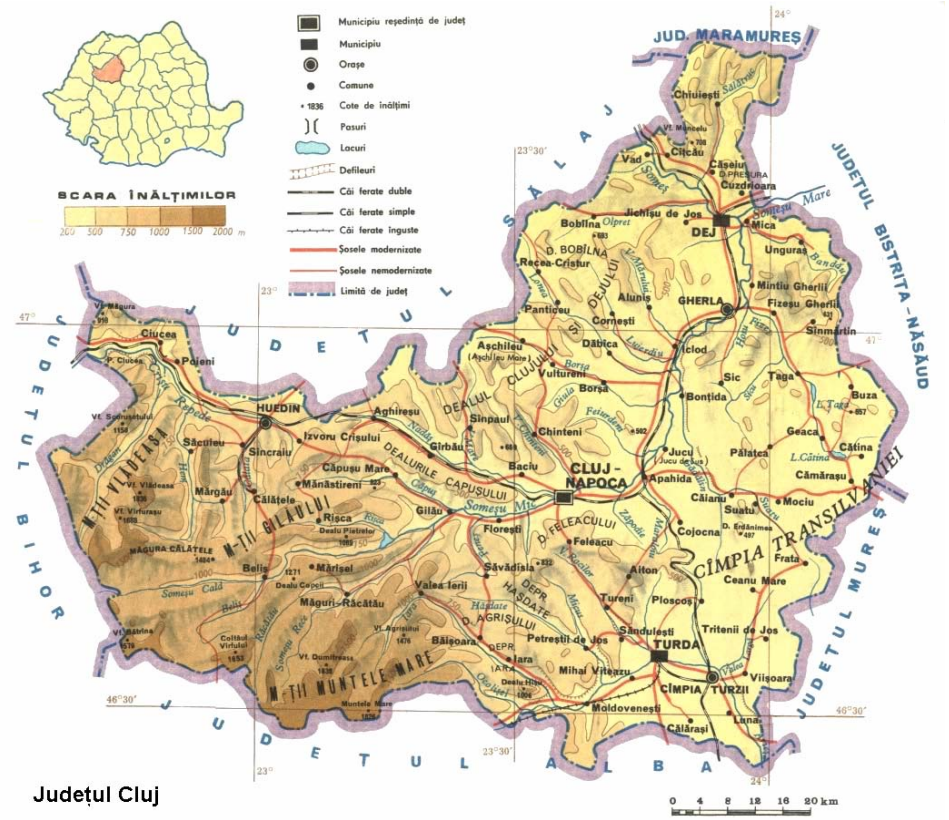


Figure 3. Geographic location of Cluj County
Source: http://pe-harta.ro/cluj/

Table 2. Total 10 years and over resident population by sex, by education level in Cluj County and its cities

Total 10 years and over resident population by sex, by education level in Cluj County and its cities

Develop-ment Macro region County	10 years and over resident population	Level of graduated education									
		Higher education		Post-secondary education and foremen school	Secondary				Primary	Without graduated school	
	TOTAL	Total	Of which:		Total	Higher		5-8 grades		Total	Of which:
			Bachelor level			High school	Foremen school				Illiterate persons
(A)											
CLUJ	1	2	3	4	5	6	7	8	9	10	11
Both sexes	628182	131030	107818	21622	398717	183498	80571	134648	62934	13879	4873
Male	300277	59230	49575	10539	198992	87427	53365	58200	25598	5918	1733
Female	327905	71800	58243	11083	199725	96071	27206	76448	37336	7961	3140
A. Cities and Towns											
Both sexes	419786	113001	92812	17965	256885	143928	51783	61174	25930	6005	1697
Male	197727	51167	42694	8581	124483	67191	32800	24492	10702	2794	678
Female	222059	61834	50118	9384	132402	76737	18983	36682	15228	3211	1019

CLUJ-NAPOCA City	299065	94877	76677	11666	175283	107122	32214	35947	14220	3019	716
Both sexes	139670	42754	35125	5298	84271	49846	19932	14493	5952	1395	247
Male	159395	52123	41552	6368	91012	57276	12282	21454	8268	1624	469
Female											
CAMPIA TURZII City	20135	2708	2423	1026	13779	5704	3614	4461	2103	519	166
Both sexes	9681	1277	1154	615	6758	2647	2398	1713	804	227	72
Male	10454	1431	1269	411	7021	3057	1216	2748	1299	292	94
Female											
DEJ City	30318	5082	4475	1834	20337	9775	4983	5579	2459	606	106
Both sexes	14554	2392	2147	893	10021	4691	3249	2081	946	302	41
Male	15764	2690	2328	941	10316	5084	1734	3498	1513	304	65
Female											
GHERLA City	18972	2651	2364	851	13191	5633	3268	4290	1839	440	190
Both sexes	9420	1228	1095	426	6658	2761	2076	1821	879	229	108
Male	9552	1423	1269	425	6533	2872	1192	2469	960	211	82
Female											
TURDA City	43070	6507	5797	2297	28921	13156	6776	8989	4341	1004	286
Both sexes	20428	2988	2686	1209	14099	6083	4458	3558	1706	426	88
Male	22642	3519	3111	1088	14822	7073	2318	5431	2635	578	198
Female											

Source: adapted after National (Romanian) Institute of Statistics, 2011. Total resident population (10 years and over) by sex, by education level in counties, cities, towns, communities (at http://www.recensamantromania.ro/rezultate-2/, last view 1.10.2013).

Human activity affects the quality of drinking water indirectly, through its impact on surface water and groundwater through afforestation, urbanization, land drainage or pollutant discharge. Consequently, the level of education of the population may have an important role in managing environmental issues, with a subsequent strong impact on water quality.

3.2. The public water supply system in Cluj. "Somes" Water Company S. A. (Compania de Apa Somes, CASSA) is one of the few public services in Romania that holds certification for the entire served system (Cluj and Salaj) on Integrated Management System EN ISO 9001: 2008, EN ISO 14001: 2005 and SR OHSAS18001/2008.

CASSA samples water for quality analysis purposes. Water quality is continuously monitored (Table 3) at the 46 points of the entire distribution system and at the Gilau water treatment plant. The water bulletins are available for public information. CASSA provides the second cheapest water in Romania's cities and towns who have benefited from development programs.

Table 3

Water analysis report

No.	Determined Parameters	MU	Obtained value	allowed limit according to Law 458/2002 and 311/2004 with modifications**	Method of analysis
1	Turbidity	NTU	1.68	≤5	SR EN ISO 7027/2001
2	pH	Uni. ph	7.10 (20.3°C)	≥6.5≤9.5	SR ISO 10523/2009
3	Hardness	°G	2.14	≥5	SR ISO 6059/2008
4	*Residual chlorine	mg/L	<0.05	≥0.1≤0.5	Kit Hannna, DPD method
5	Permanganate index	mg[O]/L	<0.5	5	SR EN ISO 84672001
6	Ammonium	mg/L	<0.01	0.5	SR ISO 7150-1 2001
7	Nitrites	gmg/L	0.108	0.5	SR EN 26777 2002
8	Nitrates	mg/L	1.83	50	SR ISO 7890-1 1998
9	*Lead	µg/L	<0.0346	25	SR EN ISO 15586/2004
10	No. of colonies at 37 °C	nr/mL	Comply	No abnormal changes	SR EN ISO 6222/2004
11	Coliform bacteria	nr/100mL	0	0	SR EN ISO 9308-1/2004
12	*Escherichia coli*	nr/100mL	0	0	SR EN ISO 9308-1/2004
13	Enterococci	nr/100mL	0	0	SR EN ISO 7899-2/2002

*Parameter uncovered by laboratory accreditation; **Quality parameters provided by L.458/2002 L.311/2004 with further modifications are aligned to EU standards.
Date: 29.09.2013 (Because the results of microbiological tests are interpreted at 48 hours after sampling, so the newsletter is therefore offset). Sampling point: Grigorescu district. Source: CASSA, 2013. Water analysis report, available at: http://www.casomes.ro/index.php?pid=27, last view 1.10.2013

Price / current tariff for water distribution and tariff collection / treatment (unique values in the entire area served, for all clients)

A. PRICE / Tariff
Price for drinking water and sewage charge / water treatment from 1 August 2013, applicable on the entire operating area of Cluj County
• Drinking water produced and distributed directly to consumers: 2.63 RON/mc (3.26 RON/m^3 with VAT 24%*);
• Collection / waste water treatment: 2.79 RON/mc (3.46 RON/ m^3 with VAT 24%*).
The invoiced amount of waste water is 100% of potable water consumption. The exceptions include businesses that can prove, based on their calculation summary that they input some of the water they consume in their final output, as well as household customers in rural areas for whom (since May 1, 2010 and according to the decision

nr.8/22.04.2010 ARDIBHST) the quantity of invoiced waste water is calculated as 80% of water consumed.

B. SPECIAL FEES
Special fees established by Cluj-Napoca City Council for city customers (City council decision no. 19/2012): 0.072 RON/ m^3 for population; 0.12 RON/ m^3 for companies.
Special fees established by Gherla City Council: 0.04 RON/ m^3.
Special fees established by Baciu City Council: 0.01 RON/ m^3 for population + public sector; 0.05 RON/ m^3 companies.
Special fees established by Jucu: 0.05 RON/ m^3 for population; 0.1 RON/ m^3 legal entities.
Special fees established by Aghiresu City Council: 0.01 RON/ m^3 for population; 0.02 RON/ m^3 companies.
Special fees established by Gilau City Council:
Water: 0.02 RON/ m^3 for population; 0.08 RON/ m^3 companies;
Collection / treatment: 0.06 RON/ m^3 – all users.
Special fees established by Floresti City Council: 0.01 RON/ m^3 for population +public sector; 0.05 RON/ m^3 companies.
Special fees established by Iclod City Council: 0.02 RON/ m^3 for population +public sector; 0.04 RON/ m^3 companies.
Special fees established by Bontida City Council: 0.01 RON/ m^3 for population; 0.05 RON/ m^3 companies.
C. "Polluter pays" tariff
From 1 January 2013 the entire area served by Compania de Apa Somes, in Cluj county is subject to the same tariff:
• 0.22 RON/ m^3 for risk group no. 1*(0.27 with VAT 24%)
• 0.42 RON/ m^3 for risk group no. 2** (0.52 with VAT 24%)
***** Risk group no. 1 - monitored agents for organic load, pH, TSM (total suspended matter), fat and ammonia nitrogen (NH4+).
****** Risk group no. 2 – loading toxic pollutants, phenols, metals, cyanides, sulfides, pH, TSM, petroleum substances, detergents.

4. European and Romanian regulatory frameworks and supporting policies and programs. The European Union has a history of over 30 years of drinking water policy. This policy ensures that water intended for human consumption can be consumed safely on a lifelong basis, thus ensuring a high level of health protection. The main pillars of the policy are (http://ec.europa.eu/environment/water/water-drink/index_en.html):

I. Ensure that drinking water quality is controlled through standards based on the latest scientific evidence;
II. Secure efficient and effective monitoring, assessment and enforcement mechanisms for drinking water quality;
III. Provide the consumers with adequate, timely and appropriate information;
IV. Contribute to the broader EU water and health policy.

Legal frameworks play a crucial role for effective water governance. They provide the basis and starting point for policy development and they turn policy decisions into rights and obligations (Mechlem 2012). Drinking water quality depends ideally on the existence of adequate legislation, standards, and codes. The aim of drinking water quality regulations should be to ensure that the consumer has access to sustainable, sufficient and safe drinking water. Enabling legislation should provide broad powers and scope to related regulations and include public health protection objectives, such as the prevention of waterborne disease and the provision of an adequate supply of drinking water (WHO 2011). Drinking water quality regulations are not the only mechanism by which public health can be protected. Other regulatory mechanisms include those related to source water protection, infrastructure, water treatment and delivery, surveillance and response to potential contamination and waterborne illness events (WHO 2011).

Source water protection regulations should be formulated in a way that ensures their effective implementation and enforcement. Roles and responsibilities of all stakeholders, both governmental and non-governmental, as well as compliance measures (including the authority to ensure regulations are adequately implemented and enforced) should be clearly defined. When developing and implementing regulations, attention should be paid to the capacity of all stakeholders to comply with them. Unrealistic provisions or timelines may place excessive burdens on specific stakeholder groups and lead to non-compliance (WHO).

At the EU level, water-related issues are addressed by a set of legislative acts that follow, mainly, two different approaches:

1. Setting water quality objectives for specific water types;

2. Setting emission limit values for specific water uses in reference to the concept of best available technologies (BAT).

A common framework is provided by the Water Framework Directive, often referred to as "a complex piece of legislation" (European Commission 2008). This legislation introduces a number of key principles, such as the integrated management of all waters, river basins as management units, water pricing and cost recovery, and public participation (Petrescu-Mag & Petrescu-Mag 2010). The EU water policy is based on the set of legal regulations established under the Drinking Water Directive 98/83/EC, the Bathing Water Directive 76/160/EEC, 2006/7/EC, the Urban Waste Water Treatment Directive 91/271/EEC, the Nitrates Directive 91/676/EEC, the Water Framework Directive 2000/60/EC and the Groundwater Directive 2006/118/EC.

There have been two important periods of EU water legislation. The first period was between 1975–1980, resulting in a number of directives and decisions laying down water quality objectives for specific types of water (the Surface Water, Fish Water, Shellfish Water, Bathing Water and Drinking Water Directives) or establishing emission limit values for specific water uses (the Dangerous Substances Directive and the old Groundwater Directive). The second major period of EU water legislation, 1980 -1991, introduced additional Directives, including the Nitrates Directive, the Urban Waste Water Treatment Directives, the Integrated Pollution Prevention and Control (IPPC) Directive, as well as several directives implementing the Dangerous Substances Directive (see table no. 4).

Table 4

European Union water and related legislation

Field	Legal act
The Framework Legislation	• Water Framework Directive (WFD) (2000/60/EC).
Water Quality Objective oriented	• Bathing Water Directive (76/160/EEC; to be repealed and replaced by the new Bathing Directive 2006/7/EC at the latest by 2014). • Drinking Water Directive (98/83/EC). • Directive on Surface for Drinking Water Abstraction (75/440/EEC; integrated into the WFD, to be repealed under the WFD 2000/60/EC as from 22.12.07). • Freshwater Fish Directive (78/659/EEC); integrated into the WFD, to be repealed under the WFD 2000/60/EC as from 22.12.13). • Shellfish Water Directive (79/923/EEC; integrated into the WFD, to be repealed under the WFD 2000/60/EC as from 22.12.13).
Emission-Control oriented	• Urban Waste Water Treatment Directive (91/271/EEC) and related Decision 93/481/EEC. • Nitrates Directive (91/676/EEC). • Ground Water Directive (80/68/EEC; integrated into the

	WFD, to be repealed under the WFD 2000/60/EC as from 22.12.13; after 2013 the protection regime should be continued through the WFD and the new Groundwater Daughter Directive (2006/118/EC) adopted on 12/12/2006). • Dangerous Substances Directive (76/464/EEC; to be repealed under the WFD 2000/60/EC as from 22.12.2013; proposal for a new Directive setting limits for 41 substances was adopted on 17/07/2006 (COM (2006)397 final)). • Daughter Directives of the Dangerous Substances Directive (to be replaced and repealed under the Directive proposed 17/07/2006). • Integrated Pollution Prevention and Control Directive (96/61/EC).
Diffuse source emission controls	• Plant Protection Products (91/414/EC). • Marketing and Use of Dangerous Substances and Preparations (76/769/EEC). • Biocides (98/8/EC).
Monitoring and Reporting	• Directive on the Measurement of Surface (Drinking) Water (79/869/EEC; to be repealed under the WFD 2000/60/EC as from 22.12.07). • Common Procedures for Exchange of Information (Decision 77/795/EEC).

Source: European Commission, 2003. Handbook on the Implementation of EC Environmental Legislation; Guide on Convergence with EU Environmental Legislation in Eastern Europe, Caucasus and Central Asia, Office for Official Publications of the European Communities.

The current water policy of the European Union recognizes the following overarching principles (European Commission 2008):

- The need for a high level of protection, taking into account the diversity of situations in the various regions of the Community;
- The precautionary principle;
- Preventative action;
- Rectification of pollution at source;
- Polluter pays principle;
- The integration of environmental protection into other Community policies – e.g. agriculture, transport and energy;
- The promotion of sustainable development.

These principles underline the following water policy objectives and elements (European Commission 2008): the development of integrated policies for the long-term sustainable use of water, and their application in accordance with the principle of subsidiarity; the expansion of the scope of water protection to all waters, surface waters, (including coastal waters), and groundwater; the achievement of "good status" for all waters by a certain deadline, and the preservation of such a status where it already exists; water management focused on river basins, with appropriate co-ordination provisions for international river basin districts; the establishment of prices for water use, while taking into account the principle of cost recovery and in accordance with the polluter pays principle; the encouragement of greater participation by citizens; the streamlining of legislation.

Council Directive 80/778/EEC of 15 July 1980, designed to expire five years after the entry into force of Directive 98/83/EC, was related to the quality of water intended for human consumption as amended by Council Directives 81/858/EEC and 91/692/EEC (further amended by Council Regulation 1882/2003/EC). *The Drinking Water Directive (DWD), Directive 98/83/EC,* is a cornerstone of EU water legislation. Its objective is to protect human health from the adverse effects of any contamination of drinking water by ensuring that it is wholesome and clean (KWR 2011). DWD establishes standards for water intended for human consumption. DWD imposes on member states the obligation

to ensure regular monitoring of the quality of water intended for human consumption. This implies that water shall be monitored at the point where it is made available to the user in order to check whether it meets the requirements laid down in Annex I (microbiological, chemical and organoleptic parameters). According to article 4, the Directive shall not apply to:

(a) natural mineral waters recognized or defined as such by the competent national authorities;

(b) medicinal waters recognized as such by the competent national authorities.

Directive 98/83/EC refers to the quality of water supplied by all public water supply systems, as well as by the individual supply systems serving more than 50 persons or more than 10m^3 delivered daily, to the quality of bottled water which is sold as drinking water and to the quality of water used in the food industry.

Directive 98/83/EC on the quality of water intended for human consumption has been incorporated into Romanian legislation by:

- Primary legislation: Law no. 458/2002 on drinking water quality, republished under art. II of Law no. 182/2011 approving Government Ordinance no. 1/2011 amending and supplementing Law no. 458/2002 on drinking water quality published in the Official Gazette of Romania, Part I, no. 733 of 19 October 2011
- Secondary llegislation: Government decision no. 974/2004 on the rules of supervision, health inspection & monitoring of drinking water, Ministry of Health Order no. 299/2010 - on methodology for granting exemptions, Ministry of Health Order no. 764/2005 - Procedure for registration to the Ministry of Health for laboratories performing water quality monitoring, Ministry of Public Health Order no. 341/2007 regarding hygiene and notification procedure for bottled drinking water.

Romania was also granted the benefit of transition periods until 31 December 2015, as follows (Romanian Government 2004):

- Until 31 December 2010:

For the oxidability, ammonium, aluminum, iron, pesticides and manganese for for localities with population over 100,000 inhabitants;

For oxidability and turbidity for localities with population between 10,000 and 100,000 inhabitants;

For oxidability for localities under 10,000 inhabitants;

- Until 31 December 2015:

For ammonium, nitrate, aluminum, iron, lead, cadmium, pesticides and manganese for localities with population between 10,000 and 100,000 inhabitants;

For ammonium, nitrates, turbidity, aluminum, iron, lead, cadmium and pesticides for localities with population under 10,000 inhabitants.

The granting of transition periods is required for the following reasons (Romanian Government 2004):

- The current capacity for the self-monitoring of water quality is reduced, being limited to about 45% of all producers.

- Significant investments are needed, approximately 5.6 billion Euros. Investments should be made in parallel and concurrent with the program for implementing the Directive on waste water and the Directive on waste management, and it requires a significant capital mobilization (see Table 5).

- Small towns are currently deprived of the ability to design, fund and execute large investment projects. The transition period will help increase institutional capacity and the capacity of local authorities to develop and implement integrated technical upgrading projects, with the purpose of ensuring the quality of drinking water supplied to consumers;

- Utilities that should be modernized are complex and multifunctional and simultaneous investments in treatment plants, distribution networks and wastewater treatment plants are needed. This would place an unnecessary strain on the capacity to generate and use local funds;

- Increased costs for water and utilities will generate unacceptable social costs for poor communities for which paying for the water supply will become impossible;

- Rapid implementation of rehabilitation and upgrading projects would lead to an artificial increase in construction costs.

Table 5

Breakdown of expected costs during the requested transition period

FINANCING SOURCES				
Years	State budget and local budget	E.U. funds	Other sources	Total annual
2004	27000000	19000000	5000000	51000000
2005	26000000	74000000	10000000	110000000
2006	25000000	77000000	10000000	112000000
2007	25000000	80000000	10000000	115000000
2008	86000000	260000000	74000000	420000000
2009	92000000	270000000	78000000	440000000
2010	120000000	410000000	110000000	640000000
2011	127000000	495000000	106000000	728000000
2012	137000000	505000000	106000000	748000000
2013	142000000	505000000	106000000	753000000
2014	139000000	500000000	106000000	745000000
2015	137000000	495000000	106000000	728000000
Total	1083000000	3690000000	827000000	5600000000

Source: Romanian Government, 2004. Implementation Plan for Directive 98/83/EC on the quality of water intended for human consumption, p.33.

The costs of drinking water treatment and distribution will be borne by users and primarily by Romanian families, which will have to bear simultaneously the costs for implementing other directives related directly to environmental protection (urban waste water treatment, waste management etc).

These costs also include the share of the costs borne by the population in financing public works, individual works connection, as well as in the exploitation and maintenance costs caused by the operation and maintenance of the systems.

- A study conducted in the PHARE RO project- 00/IB/EN-01, 2001 estimated that sustainable compliance of Romania to European rules in the field of water policy can be achieved in a period between 12 and 30 years. This estimation takes into account the costs of public and private works, resulting from EU requirements in the field of water, wastewater and water quality policy, compared to population's incomes. The estimation also considers the most optimistic scenario under the worst prognosis for economic growth.
- Based on the experience of EU countries, water costs should not exceed 5% of the family budget in order to be sustainable. Very fast implementation of the provisions of the water EU directives would lead, in the short term, to a much larger increase in prices which, in turn, could lead to a rejection of the water service use and therefore, of the infrastructure;
- For a family not connected to water utilities (water, wastewater and sanitation system) infrastructure and equipment costs may vary between 500 and 1500 Euros.

Economic impact: Increasing drinking water tariffs.

Necessary investments, including water quality monitoring by the producer, are expected to lead to increased prices for drinking water. However, it should be considered that access to safe drinking water is not a luxury but a primary requirement for humans. Growth in water prices can lead to reduced consumption and changes in water quality. Reductions in the water consumption may then be followed by a loss in producer revenue and by layoffs. For the period 2004 - 2018, total required investments in Romania for compliance with European Directives on drinking water and wastewater were estimated at the huge amount of 19 billion euros. The funds, allocated by the Sectoral Operational Programme (funded by the Cohesion Fund and by national co-financing) and by the

National Rural Development Programme (funded by the European Regional Development Fund for Agriculture) cover only about 17% of these needs (Administratia Nationala Apele Romane, 2010).

4.1. Romanian Water Legislation in Context and Environmental Legal Instruments. Environmental aspects play an increasingly prominent role in water legislation. These include environmental criteria for water permits, pollution prevention and abatement standards, environmental impact assessment requirements, the relative prioritization of water allocations for environmental purposes, groundwater exploitation controls for ensuring the viability of dependant ecosystems, protected areas, and general environmental perspectives in water legislation (Eckstein 2010; Viman et al 2010).

Law no. 458/2002 on drinking water quality, republished under art. II of Law no. 182/2011 approving Government Ordinance no. 1/2011 amending and supplementing Law no. 458/2002 on drinking water quality published in the Official Gazette of Romania, Part I, no. 733 of 19 October 2011, (the text law being renumbered) contains detailed provisions on the conditions of water quality, on water quality monitoring, on remedial measures and use restrictions, on exceptions, on quality assurance of processes, equipment, substances and materials in contact with drinking water, on information and reporting offenses and crimes, as well as a series of transitional and final provisions.
According to article 1 of Law no 458/2002 (republished), this law regulates drinking water quality, with the objective of protecting human health against any type of contamination of drinking water by maintaing a high-quality, clean and sanogenous water.

The law defines a number of terms such as:
1. Drinking water means water intended for human consumption as follows:

a) any kind of water in the natural state or after treatment, used for drinking, cooking food or for other domestic purposes, regardless of its origin and whether it is supplied through the distribution network, from the reservoir or it is distributed in bottles or other containers;

b) all water used in the food industry as a source for production, processing, preservation or marketing of products or substances intended for human consumption, unless the Ministry of Health, Ministry of Agriculture and Rural Development approve the use of water and it is shown the used water does not affect the quality and wholesomeness of the foodstuff in its finite form;

c) water from local sources, such as wells, springs and so on, used for drinking, cooking and other domestic purposes; depending on the specific local county public health authorities, there may be exceptions to the quality parameters values, but not to the point of endangering the health of consumers.

By internal distribution system or installation it means all pipes, fittings and appliances installed between water taps normally used for human consumption and the outside distribution network, but only when they are not under the responsibility of the water supplier, as manufacturer and / or distributor of water, in accordance with the law.

In accordance with art. 3 (1), the provisions of the law do not apply to the following waters:

a) natural mineral waters recognized as such by the competent authorities in accordance with law;
b) waters having therapeutic properties in the sense of legal provisions laid down by law or by regulations or administrative procedures relating to pharmaceuticals;

(2) Shall be exempted from provisions of this law:

a) water intended exclusively for special uses, for which the Ministry of Health is satisfied with its quality, and which does not influence, directly or indirectly, the consumer health it is intended for;

b) drinking water coming from an individual water producer, who provides less than 10 m^3 in average / day or serves less than

50 persons, unless the water is produced as part of a business or public activity.

Regarding water quality, drinking water must be clean, sanogenous, free from micro-organisms, parasites and substances which, in numbers or concentrations, constitute a potential danger to human health, and it has to meet the minimum requirements set out in Tables 1A, 1B and 2 of Annex 1 of the law. Taste, color and odor complaints are the ones that appear most frequently in consumer complaints. Taste and smell complaints are related to the presence of free residual chlorine whose concentration exceeds the limit of perception. The color is influenced by the distribution networks, especially the interior ones. For centralized systems where the concentration of certain parameters (including pesticides and nitrates) exceeds allowable limits for limited periods of time, the water supply system operator has to use an additional source to mix water with that coming from the main source (and thus to decrease the concentration of pollutant) or to use activated carbon systems.

Drinking water quality is appropriate when the specified values for quality parameters are consistent in the following sampling points (art.6):

- at the consumer's tap and at the point of entry into the building, when the drinking water is supplied through the distribution network;
- at the point of flowing water from the tank, in the case of drinking water supplied in this way;
- at the point where the water is filled in bottles or other containers, for bottled water;
- at the point at which water is taken into the production process, in the case of water used in the food industry.

As a journey in time, remember that the first standard for drinking water quality in Romania, dating from 1952, contained only chemical indicators. The introduction of microbiological indicators was made nearly 20 years later. Publication of STAS 1342/1984 which contained chemical, microbiological and radioactivity indicators and which was based on the WHO scientific recommendations of the Guidelines for Drinking Water Quality, represented an important evolution of the national legislation in the field (Rojanschi & Vasilescu 2010). The most important legislative change for Romania, in this respect, occurred in 2002 when it moved from STAS 1342-1391-Quality of drinking water to the EU acquis, by the publishing of Law no. 458 transposing Directive 98/83/EC (Rojanschi & Vasilescu 2010).

The producer, distributor and county public health authority are the ones that provide the monitoring of drinking water quality.

A legal mechanism that allows producers to provide consumers with an inconsistent water quality, but without any risk to their health, for a limited period of time, and in the context of compliance requirements, is called "exemption". This is regulated in Chapter V of the Law.

Secondary legislation:

Government decision no. 974/2004 on the rules of supervision, health inspection & monitoring of drinking water.

Ministry of Health Order no. 299/2010 - on methodology for granting exemptions. This order approves the methodology for granting exemptions for chemical parameters in accordance with art. 9 of Law no. 458/2002 on drinking water quality, as it was amended. The methodology provided in paragraph (1) establishes administrative and technical conditions under which the county public health departments, respectively that of Bucharest or National Institute of Public Health may approve, at the request of the producer or distributor of water, exemptions for a period of time from the chemical parametric values established in Table. 2 of the Annex no. 1 of Law no. 458/2002 on drinking water quality, as amended and supplemented, or pursuant to art. 5. (2) of the act.

Ministry of Health Order no. 764/2005 - Procedure for registration to the Ministry of Health laboratories performing water quality monitoring.

Ministry of Public Health Order no. 341/2007 regarding hygiene and notification procedures for bottled drinking water. These hygiene rules establish general conditions

for the collection, treatment, conditioning, storage, transport, labeling and release for sale of various bottled drinking water other than natural mineral waters and spring waters and which are marketed for direct consumption under the title of water table. According to this piece of legislation, bottled drinking water / bottled water is water that is bottled in containers of composition, under various shapes and sizes, tightly closed, being clean and suitable for direct consumption without further treatment. Bottled drinking water is considered food. Bottled drinking water other than natural mineral waters and spring waters is water destined for human consumption and may contain minerals naturally or intentionally added. It may also contain carbon dioxide naturally or intentionally added. It does not contain any sugars, flavorings or other food. According to article 8 of chapter 3, bottled water must meet the following conditions:

1. All bottled drinking water must be collected, transported, stored and, when necessary, treated and bottled according to the regulations currently in force;
2. Sources of water used for bottled drinking water must be sanitarily approved according to the law;
3. For a source of water to be used for producing bottled drinking water, it must first undergo a long process (at least one year) of analyzing the chemical and microbiological composition of the water in order to take into account seasonal variations in the quality and quantity of water;
4. The results of the hydrological studies decide whether the catchment area and the perimeter [the area around the natural emergings (springs) or artificial emergings (wells, drains, wells)] are exposed to sources of contamination;
5. These critical areas should be protected to the maximum under the law in force:

a) all possible precautions must be taken inside the perimeter protection in order to avoid the pollution or any external influence on the quality of water from groundwater or surface water, including removing all liquid waste, solid or gas that could contaminate the water;

b) removing pollutants in the catchment area (such as microorganisms, fertilizers, oils, detergents, pesticides, phenolic compounds, toxic metals, radioactive substances and other soluble organic and inorganic substances);

c) water resources should not be in close proximity to potential groundwater contamination sources, such as waste sources, septic tanks, industrial water treatment, chemical tankers, gas pockets or pipelines and storage facilities for solid waste;

6. Groundwater sources used for bottling must be regularly inspected and tested to determine the constant nature of the microbiological, chemical, physical and, when necessary, radiological features; frequency of testing is determined by hydrological assessment and the historical uniformity schema of the water source in question;
7. If, after testing, contamination is determined, the water bottling process should be stopped until water quality returns to the set parameters;
8. The manner of selecting surface waters for bottling should generally be very strict, even if the water will be subjected to further treatment.

Government decision no. 974/2004 establishes the rules of supervision, health inspection & monitoring of drinking water, modified by Decision no. 342 of 04 June 2013. The content of this decision applies, according to art. 1 of Annex 1 to: a) public or private systems supplying drinking water to the population, b) drinking water bottling plants, c) ice manufacturing plants for human consumption d) sources of drinking water used in food industry, e) wells and individual installations of drinking water for family, public or commercial use. Article 2 provides definitions for terms such as: territorial public health authority (which is a public health authority organized by various counties and the Bucharest Municipality, according to the law); consumer (a person who receives drinking water, in accordance with present legislative requirements, from a producer or distributor of drinking water); sanitary inspection (an on-site assessment of the conditions of sanitary protection, hygiene conditions of the treatment plant, water storage tanks and the distribution networks using evaluation sheets and sanitary inspection specified in the annex hereto); disinfection (the process by which water pathogens are removed or inactivated so that it corresponds to Law no. 458/2002); and so on. According to the

Government decision no. 974/2004, drinking water must be sanogena and clean, satisfying the following conditions:

a) be free from micro-organisms, parasites and substances which, in numbers or concentrations, constitute a potential danger to human health;
b) meet the minimum requirements of Tables 1A, 1B and 2 of Annex no. 1 of Law no. 458/2002 and comply with the provisions of art. 5-8 and 10 of Law no. 458/2002.

Drinking water is considered clean and sanogena if the sample taken at the exit from the reservoir storage is consistent with the values for coliform bacteria, E. coli and faecal streptococci provided in Tables 1A and 3 of Appendix 1 of Law no. 458/2002.

Drinking water is considered clean and sanogena at the point of exit from the storage tank, if the results of the tests for coliform bacteria show their absence in 95% of samples taken during a calendar year.

Monitoring of the quality of drinking water, under the provisions of Law no. 458/2002, is performed only by laboratories registered for this purpose with the Ministry of Health. For compliance with Law no. 458/2002, water samples must be collected throughout the year, from points uniformly distributed in space and time. Table 1 of Appendix 1 to the Standards indicates control monitoring of drinking water quality at the exit of the treatment plant and the number of samples taken annually (in our text numbered as Table 6).

Table 6

Standards indicate control monitoring of drinking water quality at the exit of the treatment plant and the number of samples taken annually

Analyzed parameters	Average volume of water produced in m³ / day	Reduced number of samples collected / year	Standard number of samples collected / year
1. *E.coli* 2.Enterococci 3.Total and free chlorine 1)	< 20	2	4
	20-1,999	2	4
	2,000-5,999	18	36
	6,000-11,999	90	180
	>12,000	104	208
4.Coliform bacteria 5.Colony no. at 22 degrees C and 37 degrees C (interpretation is made in relation to the data / historical results) 6.*Clostridium perfringens* (including spores) 7.Ammonium 8.Aluminium 3) 9.Conductivity 10.Chloride 11.Colour 12.Total hardness (the value is applicable when using a water softener method) 13.Total Iron 4) 14.Taste 15.Manganese 5) 16.Smell 17.Nitrates 18.Nitrites 19.Oxidability 6) (or total organic carbon for which interpretation is made in relation to the of data / historical results) 20.pH 21.Sodium 22.Sulfide and hydrogen sulfide 23.Sulphates 24.Turbidity	< 20	-	1
	20-99	2	4
	100-399	2	4
	400-999	3	6
	1,000-2,999	4	8
	3,000-5,999	8	12
	6,000-19,999	18	36
	20,000-29,999	45	90
	30,000-39,999	52	104
	40,000-49,999	78	156
	50,000-59,999	104	208
	60,000-99,999	130	260
	100,000-125,000	260 + 1 sample for each 25,000 cubic meters / day of additional volume	520 +1 sample for each 25,000 cubic meters / day of additional volume
	> 125,000		

Source: Decision no. 342/2013.

Table 7

The control monitoring of drinking water quality to the consumer and the number of samples taken annually

Analyzed parameters	Number of population in the distribution area	Reduced number of samples collected / year	Standard number of samples collected / year
1.*E.coli* 2.Enterococci	<100	-	2
3.Coliform bacteria 4.Total and free chlorine 1)	>/= 100	-	8 at every 5.000 inhabitants
5.Aluminium 2) 6.Ammonium	<100	1	2
7.*Clostridium perfringens* (including spores)	100-499	1	2
2[1)] 8.Conductivity 9.Total hardness (the value is applicable when using a water softener method)	500-1.999	2	4
	2,000-4,999	3	6
	5,000-14,999	5	10
	15,000-29,999	10	24
	30,000-99,999	20	48
10.Total Iron 3) 11.Taste 12.Smell 13.Nitrates 14.Nitrites 15.Oxidability 4) (or total organic carbon for which interpretation is made in relation to the of data / historical results)16.pH 17.Turbidity	100,000-149,999	40	90
	150,000-199,999	56	104
	200,000-299,999	104	156
	300,000-499,999	130	208
	> 500,000	208 + 1 sample for each additional 5,000 residents	390 + 2 sample for each additional 5,000 residents

Source: Decision no. 342/2013

Table 8

Monitoring the quality of bottled water in bottles or other containers and ice made from potable water for human consumption, and the number of samples taken annually

Analyzed parameters	Water volume daily bottled (expressed as an annual average)	Number of samples taken before bottling / year	Number of samples taken after bottling / year
1.*E. coli* 2.Enterococci	</= 10	1	1
3.*Pseudomonas aeruginosa*	10 – </= 60	6	6
4.No. of colonies at 22°C and 37°C 5.Coliform bacteria 6.Colour 7.Conductivity 8.Taste 9.Smell 10.pH 11.Turbidity 12.Aluminium 13.Ammonium 14.Total hardness 15.Total Iron 16.Nitrates 17.Nitrites 18.Oxidability	>60	1 for every 10 bottled cubic meters	1 for every 10 bottled cubic meters

Source: Decision no. 342/2013

The Government decision no. 974/2004, modified by Decision no. 342 of 04 June 2013, contains information on the monitoring procedure of water quality used in the food industry as well as on the annual frequency of sampling and analysis of samples by the producer. It also incorporates the criteria for the interpretation of radioactivity parameters and the mode of action.

Chapter 4 is dedicated to radioactivity parameter indicative.

In the event that water quality does not meet the requirements of Annex no. 1 of Law no. 458/2002, in the sampling points established under this law, the water producer (art. 26) must immediately inform the territorial public health authority and mayor (para. 2), and he or she has to take whatever steps necessary to identify the causes. These steps should strive: a) to identify all quality parameters that do not comply with the provisions of Law no. 458/2002; and b) to determine the causes of non-compliance for each parameter (para. 3). If the operation was temporarily sanitarily authorized, the water producer is obliged to subject himself or herself to the provisions of paragraph (2), for failure to comply with the conditions stipulated in the authorization. The producer shall immediately communicate their findings and the conclusions of their investigation to the authorities mentioned in para. (2), specifying the following (para.5):

a) the possibility of repetitive non-compliance in each of the parameters identified as non-compliant;

b) the actions subsequently taken by the producer, where non-compliance was due to the internal distribution system or to its maintenance mode. This includes the obligation to inform affected consumers.

In the cases when the water producer discovers that noncompliance occurred because of the internal distribution system or of its maintenance mode, he or she must inform consumers about the nature of the deficiencies and advise consumers on appropriate precautions (para. 6). In the event that non-compliance is detected as that provided in para. (6) for lead or copper, the producer has to take immediate measures for changing or replacing the outer pipe distribution system, if the lead or copper in this system are what contributes to the deficiencies (para.7). In the event that water quality does not meet the requirements of Annex no. 1 of Law no. 458/2002, due to temporary deterioration of the quality of the water supply, local territorial public health authority, water management authorities and local governments establish measures to ensure water quality at the source (para.8).

The competent territorial public health authority is the one responsible for authorizing the production and distribution of potable water (the use for public consumption of water taken from a natural environment)

According to article 2 of the Annex 2, obtaining a sanitary authorization involves the creation of a dossier submitted by the producer/ distributor of drinking water as well as the preparation of an essay and of an evaluation form prepared by the territorial public health authority for the supply system in question.

Law no. 241/2006 for service water supply and sewerage, republished in 2013. According to art. 1, this law establishes a uniform legal framework regarding the establishment, organization, management, financing, operation, monitoring and control of the supply / rendering public service for water supply and sewerage of towns.

Technical terms used in this Law are defined according to art. 3 as follows (by way of example):

a) water supply and sanitation service; all the activities of public and general economic and social interest made for the collection, treatment, transport, storage and distribution of drinking and industrial water for users on the territory of a municipality, and for the collection, transport, treatment and disposal of wastewater, storm water and surface water derived from the built-up area.

b) water service supply; all activities necessary to:

- abstraction of raw water from surface or groundwater sources;
- treatment of raw water;
- transport of drinking or industrial water;
- water storage;
- distribution of drinking or industrial water.

c) sewerage service; all activities necessary to:

- the collection, transportation and disposal of waste water from users to sewage plants;
- waste water treatment and discharge of treated water into the emissary
- the collection, disposal and treatment of waste from discharged stormwater and the attempts to ensure their functionality;
- the disposal, treatment and storage of sludge and other similar waste derived from the activities mentioned above;
- the drainage of rainwater and surface water from the urban areas.

g) public water distribution network - part of the public water supply network that consists of pipes, fittings and other such construction-related aspects, for the purpose of water distribution for two or more independent users;

h) public sewage network - part of the public sewerage system, made up of sewers, water homes, discharge points and construction-related aspects, that provides the acquisition, disposal and transport of sewage from two or more independent users;

By definition, the following are not considered public networks:

- internal networks of use belonging to buildings with several apartments, even if they are owned by several individuals or legal persons;
- networks belonging to a private property or a public institution where there are more buildings, regardless of destination, that are separated by green areas and interior private alleys;
- networks belonging to industrial platforms, where the access roads and green spaces are private property, even if they are administrated by more legal persons;

i) water supply branching - part of the public water supply network that provides the link between the public system water supply and the interior network of an enclosure or a building. The branch serves a single user. In well justified cases, when technical conditions do not allow any other option, multiple users can share the same power branching. The parts of a branching are specified in the Framework Regulation Service for Water Supply and Sanitation. The branching up to the counter, including the home service connection and the meter, belong to the public distribution network, regardless of who provided the financing for the execution. The operator, respectively the user, depending on the installation's boundary point, shall ensure the financing for the branch execution. The location for the home service connection shall be set at the boundary point installations, ordinarily at the user's property boundary, in compliance with the legal regime and based only on approved documentation by the operator.

For existing condominiums, the separation and individualization of consumption at the individual apartment level are made by mounting individual apartment meters. Expenditure relating to consumption individualization shall be borne by the co-owners of the condominium, the operator having only the obligation to install the main meter branching at the level of the property boundary.

Supplied drinking water must satisfy in their branching, under art. 4, al. 2, the conditions of potability provided in the technical and legal regulations, as well as flow and pressure parameters specified in the relevant agreements and supply contracts.

According to art.5:

(1) The sewage system shall ensure, in particular, the collection, transport, treatment and disposal in a natural receptor, of waste water coming from water supply service users and of rainwater or surface water collected within localities.

(2) Sludges from water treatment plants, sewage systems and treatment plants of domestic waste water are treated and processed according to legal regulations on environmental protection and conservation, respectively on hygiene and health.

(3) Waste water discharged into sewage systems must comply with the conditions set forth in the agreement to take over the public channel or in the service contract, as well as those imposed by technical regulations, so by nature, quantity or their quality they are not to lead to:

a) degradation of plant construction and sewage system components;

b) reduced transport capacity of sewer networks;
c) disruptions in the normal operation of the treatment plant, by overcoming load flow or by inhibiting treatment processes;
d) emergence of hygiene and public health hazards or related to the personnel operating the system;
e) increased risk of explosions.

(4) The evacuation, in natural receptors, of treated waste water and sludge storage from sewage treatment plants is made only in accordance with the qualitative and quantitative terms specified in permits and environmental permits issued by the competent authorities; and in accordance with the regulations currently in force for the protection of water quality and with environmental regulations, so as to guarantee the protection and preservation of the environment, hygiene and health.

(5) Waste water from industrial operators or other users that are not connected to the public water supply, may be incorporated into the sewage system only if the system capacity is not exceeded in terms of hydraulic loading or contaminating substances and only if the additional water does not contain toxic pollutants or pollutants which can inhibit or block the process of purification.

Chapter II covers relevant authorities and their attributes in the organization and deployment of the public service of water supply and sewerage. Chapter III of the law is devoted to the organization and functioning of the water supply and sanitation service, and Chapter IV to operators and users. According to art. 26, the suppliers/ providers of water supply and sanitation services that provide the operation, management, administration and exploitation of the water supply systems and waste water and related services operating under license, have the status of operators. Operators of water supply and sewage services are defined according to Law no. 51/2006, as amended and supplemented. According to art. 28, any natural or legal person, which qualifies as owner or having a right of use of a building which has its own branching for drinking water or own sewage connection, and which has concluded an individual contract with the operator for the supply/provision of water, has the quality of an individual user of the water supply and sanitation service. Natural or legal persons are considered individual users of the water supply and sanitation service, even if they do not have proper drinking water branching, respectively own sewage connection, if there are technical conditions for the delimitation/separation of installations between users, for individualizing consumption and for conclusion of the supply / provision service contracts on their own.

Users of water supply and sewage service are:

a) economic operators;
b) public institutions;
c) individual home users, natural persons;
d) collective home users, associates of the owners / tenants with legal personality.

The terms of service and the supply service contract establish the legal relations between the operator and users, as well as the rights and obligations of users and operators.

According to art. 33, the rights and obligations of operators in relation to local authorities are provided in the terms of service for the water supply and sanitation service, aiming to ensure a contractual balance based on the following principles:

- collection of prices and tariffs for public services delivered/rendered, established under the rules in force;
- periodic adjustment of prices and tariffs in relation to changes in costs;
- changing prices and tariffs, in accordance with the law, if there has been a significant change in the contractual balance or cost structure.

From Romanian case law

Law case on payment for water supply service

Moinesti Court, File no. 6793/260/2011, Civil judgment no. 96/2013
Object –Claims: Payment for the water supply service
Having deliberated on the civil case, the court finds the following:
By a civil action registered on 30.08.2011 at Moineşti Court, under no. 6793/260/2011, the applicant sued the defendant, asking the latter to pay the following: the sum of 280.79 RON representing the value of drinking water supply service, 3.4 RON representing delay penalties computed until 31.07.2011 for failure to pay invoices, and late payment penalties calculated from 31.07.2012 until the payment in full is received.
In the claim, the applicant stated that the water supply and sanitation services in Moineşti belonged, until December 2010, to SC Moineşti. Through the decision no. 132/19.11.2010, theCity Council approved the delegation of the water supply and sanitation service to the regional operator SC.
The applicant stated he provided for the defendant water utility services under the service contract no. 2204/31.03.2009 which was concluded by SC with the defendant, the contract being signed and endorsed by both parties. Although these services have been supplied and invoiced, the defendant has not paid the invoices issued for these services. According to the contract provisions and to the Law no. 241/2006, art. 30 para. 4, the applicant computed the appropriate delay penalties for non-payment of water and sewage services. The service contract states that when the consumer does not honor his or her financial obligations by the deadline, the supplier is entitled to impose a penalty payment equal to those for non-payment to the state budget. Penalties were computed until 31.07.2011, but the applicant also requests penalties from that date onwards and until full payment is received.
According to art. 1361 of the Civil Code "the main obligation of the buyer is to pay the price on the day and place determined by the contract." Also, according to art. 1073 of the Civil Code "the creditor has the right to acquire the exact fulfillment of the obligation and otherwise he is entitled to compensation" and according to art. 969 of the Civil Code "agreements legally concluded have the force of law between the contracting parties." The applicant states that they accurately fulfilled the requirement of water supply as reflected in the invoices. Invoices were not disputed by the debtor. The defendant failed to fulfill an obligation under the contract and there is no evidence of a settlement of that obligation. According to art. 720 of the Civil Procedure Code, the applicant stated that the defendant was called for conciliation, but he has not responded to that invitation.
Provisions of art. 969, paragraph 1069. 2 of the Civil Code, provisions of Law no. 51/2006, provisions of Law no. 241/2006 and the Regulation of organization and operation of water supply services and sewerage, approved by IDA Bacau no. 44/23 11.2010, were invoked.
On 23.11.2013, the applicant has submitted details showing that the total unpaid amount is represented by the sum of 226.72 RON representing 217.57 RON direct cost and 9.15 RON delay penalties, and for penalties calculated after 31.07.2011 the applicant stated that they are at the level of 0.04% per day of delay.
Analyzing documents and materials, the court held as follows:
By civil action, the applicant require the defendant to pay the sum of 226.72 RON representing a value of 217.57 RON for the drinking water supply service, to pay 9.15 RON delay penalties calculated until 31.07.2011 for failure to pay in time the invoices, to pay delay penalties calculated from 31.07.2011 until payment is received in full, and to pay the costs of the judicial proceedings.
Parties have developed commercial relations under contract no. 2204/31.03.2009. Under these terms, the applicant rendered the defendant services for water supply and the defendant was obliged to pay the required amount for such services. The applicant has provided the invoices for the period April 2011-July 2011 (5-8 files), worth 217.57 RON, in the case file.

In the present case, the applicant proved that an attempt at direct conciliation procedure was made by the letter no. 2310/15.06.2011, and in accordance to art. 720 of the Civil Procedure Code. Also, more than 30 days have passed from the date the defendant received that notification to the date the applicant filed a legal case, i.e. from 20.06.2011 until 30.08.2011.
The court found that the applicant, who had the burden of proving the existence of the defendant's obligation to pay for the services supplied, has succeeded in proving the obligation derived from the contractual obligations undertaken by the parties. The defendant provided, in turn, no proof of payment or non-performance of such obligations, although the burden of proof in this case was for the defendant.
Therefore, the court finds that the applicant's request has legal merit and orders the defendant to pay the sum of 217.57 RON to cover unpaid water services. In respect to the applicant's request to order the defendant to pay delay penalties calculated for the period 01.08.2011 to 30.11.2011 and delay penalties from 31.07.2011 until the debt is paid in full, the court finds as follows:
These delay damages are equivalent to the loss suffered by the creditor for the debtor defaults. The assessment of these damages may be legal, judicial or conventional. In the present case the defendant owes penalties under Law no. 241/2006, as the law is the common law regulating the water supply and sanitation service.
According to art. 30, para. 4 of Law no. 241/2006, failure of the user to pay the invoice within 30 days of the due date attracts penalties for delay established under the regulations in force, as follows: a) penalties are due from the first day after the due date; b) penalties are equal to the interest for unpaid budgetary obligations; c) the total amount of penalties shall not exceed the invoice value and it becomes operator's income.
The court finds that the applicant has annexed the method of calculation of penalties (43 files) according to art. 12 of the parties, therefore the court will admit the head of claim to order the defendant to pay the sum of 9.15 RON delay penalties calculated for the period 01.08.2011 till 30.11.2011. However, the court finds that the applicant's request to order the defendant to pay penalties from 31.07.2011 until full payment of the debt exceeds the legal framework established by the Law no. 241/2006. In these circumstances, the applicant's request to order the defendant to pay penalties from 31.07.2011 until full payment of the debt is unfounded and the court will dismiss it.
Pursuant to art. 274 of the Civil Procedure Code, the court compels the defendant to pay 30.5 RON proceeding costs representing the judicial stamp fee and the judicial stamp.

Source: (Adapted after: Moinesti Court, File no. 6793/260/2011, civil judgement no. 96/2013, Object –Claims: Payment water supply service consideration http://legeaz.net/spete-civil-2/plati-96-2013)

Operators have the following obligations, art. 33, para. (2), to water supply and sanitation service users:

a) supply/provide water supply and sewage service under a contract with service users;

b) to comply with the contractual provisions;

c) to serve all users in the area for which they were authorized under the provisions of Service Regulation;

d) to meet performance indicators approved by local authorities in administrative decisions, respectively in the guidelines for administrative delegation;

e) to provide local authorities and ANRSC with any information they request and to provide access to all information needed to verify and assess the functioning and development of the service in accordance with the terms of the delegation and the legal provisions in force;

f) to implement efficient management methods, which help to reduce operating costs, including the application of competitive procedures laid down by the law in force for the procurement of works, goods and services;

g) to equip the users' branching in the delimiting point installations with meters, within the deadlines set by local councils in accordance with the law, but no later than 2 years after the entry into force of this law.

(3) Penalties and sanctions for non-compliance by operators of these service performance indicators are provided in the administrative delegation contract.

Financing of the water supply and sanitation service is regulated in Chapter V.

Violation of this law will result in disciplinary, civil, contravention or criminal liability of the guilty, as appropriate.

From Romanian case law

Law case: Damage to the water system. The water supplier liability

According to art. 216, para. 1 of Decree no. 88/2007 of ANSCR "the indoor supply facility includes all plumbing, from the tap installed behind the water meter (the power point), all the way up in the direction of the water flow, up to the fitting". The Malfunction and the water loss occurred in this case before the water tap installed behind the water meter and therefore both the crack and the water consumption occurred in the branch portion that falls within the defendant's responsibility. The responsibility of the defendant is even greater since fissure detection was continually hampered by the fact that the water meter pit was flooded by groundwater, as it was also on the date of the technical expertise. The legal responsibility for this technical condition of the equipment falls upon the operator, according to art. 3 letter. i, u and v of Law. 241/2006 and art. 7 of Decree no. 88/2007 of ANRSC,

Bistriţa-Năsăud Tribunal, ruling no. 1341/ October 11, 2011

By the legal action initially registered at Bistrita court under no. 1687/190/2010, plaintiff MG sued the defendant SC SA, requesting the court to deliver a sentence by which to compel the defendant to reconnect the building flat no. 18, located in Bistrita, the property of the applicant and of his wife MA, to the water supply system of the municipality; to order the defendant to cancel the invoice no. 1252822/20.08.2009 improperly issued in relation to the numerous verbal or written complaints made before and after July 2009, as well as to cancel the aberrant penalties incurred for not paying the bills; to oblige the defendant to issue an invoice for the month of July-August 2009 with an average annual consumption of 12 cubic meters per month, in order to amicably remediate an anomalous bill for 267 cubic meters of drinking water, a bill already paid with the receipt no. 244568/27.01.2010; to order the defendant to pay pecuniary and moral damages for abusively stopping the supply of drinking water during winter time; to take measure against the responsible officials of the mentioned water company that have not taken into account the applicant's complaints, although the applicant has fulfilled his or her financial obligations throughout 2009; to order the defendant to pay the costs of the legal proceedings.

Based on the existence of a service contract for water supply and waste water disposal concluded with the defendant - a private legal person authorized to provide a public service – and on the fact that the applicant has indicated in his or her application the Law no. 554/2004 as the legal basis of the claims to be decided, the court held that this case is not under its jurisdiction and therefore, by the civil sentence no. 2839/2010 declined jurisdiction in favor of Bistrita Nasaud Tribunal. The plaintiff appealed against this ruling on the ground that the action is not administrative and therefore jurisdiction lies with the Bistrita Court.

The Tribunal noted that the defendant SC A SA is a business, and that the case object does not consist of a legal relationship between a company and a local governmental authority, but of a legal relationship between a company and a consumer. Consequently, it established that the cause of action does not focus on a problem of administrative authority, but on the disposal of water and sewage supply for a sum of money. It therefore ruled that the previous court had erroneously held that this case fell within the administrative law jurisdiction.

Accordingly, the appeal was upheld and the initial ruling was amended in part, in the sense that the jurisdiction to hear the case rests with the Commercial, Administrative and Fiscal Section of Bistrita Nasaud Tribunal.

After declining jurisdiction, the file no. 6339/112/2010 was formed at the Bistrita Nasaud Tribunal.

Noting that a legal case already exists in this jurisdiction between the same parties, with the same quality and the same cause, namely file no. 263/112/2010 under the provisions of art. 164 Code of Civil Procedure, it has been decided to join file no. 6339/112/2010 to the file no. 263/112/2010.

By administrative action nr. 263/112/2010, the plaintiff MG sued the defendant SC SA Bistrita asking the court:

1) cancellation of the invoice no. 11252822 of 20/08/2009 and of the penalties claimed by the defendant for the failure of the applicant to pay the bills;

2) to order the defendant to issue an invoice for the months of July-August 2009 with an average consumption of 12 cubic meters per month, consumption amiably agreed by both parties;

3) to order the defendant to pay pecuniary and moral damages caused by abusively stopping the drinking water supply, in the conditions of a provider monopoly and during winter time; the amount of damages will be further specified in the first hearing;

4) sanctions of the defendant official's employees due to their work incompetence and negligence which has generated the present situation.

The court established the following facts, following a close analysis of the legal file documents and materials and those of related legal files.

The applicant is the consumer in the contract for the supply of drinking water, sewage system and meteoric water no. 5030/4.12.2000 concluded with the former Regia Autonomă Judeţeană de Apă Bistriţa-Năsăud, currently the defendant SC A SA.

On 20.07.2009, when the plaintiff paid the invoice no. 1224466/14.07.2009, he notified the defendant cashier through an official complaint that the amount on the invoice is double that of the previous month, claiming the presence of some damage to the installation.

In the following days, several teams of plumbers came to the place and inspected the manhole chamber of water meters, but did not fix the damage. The area where the meters were located was filled with water above the water meters. After a team of plumbers hired by the defendant helped to manually remove the water from the water manhole chamber,the plaintiff succeed to read his water counter, which was 1.830 cubic meters on 29.07.2009, at 17, 00.

In the following days, the plaintiff went on a holiday, during which an employee of the defendant contacted him. The employee informed the applicant that his water meter indicated a large consumption of water and that he was to contact Mr. H., which the plaintiff subsequently did. It was decided to temporarily bill the applicant the average consumption for two 8 cubic meters and to further settle the issue after 15.08.2009, when he returned to Bistrita.

However, the meter home continued to be flooded, which prevented the correct identification of the damage to the installation. Later, an employee of the defendant handed the plaintiff's wife the invoice no. 1252822/20.08.2009, with a billed consumption of 267 cubic meters. Although on 1.09.2009 the defendant was in possession of the original complaint, which, among others, also concerned the bill above, on 2.09.2009 he was issued the invoice no. 1267669 by which he was billed a consumption of 12 cubic meters of water, worth 44.60 RON. The plaintiff paid the bill with the receipt no. 224418/17.09.2009.

Upon receiving no reply to his complaint, the plaintiff communicated with the general manager for the defendant company, who admitted that the defendant company is responsible for the technical condition of water and that the company will address the situation.

In September, the applicant received the invoice no. 1290329/12.10.2009, with a billed consumption of 12 cubic meters, which translated into an increase of

36.75 RON. The last invoice for 2009 (no. 1357530) was paid on the day it was due (on 26.01.2010, with the receipt no. 329 362/26.01.2010) and it reflected the consumption of 16 cubic meters of water.

As time passed without his complaint being addressed, the complainant later turned to the Bistrita Consumer Protection Office, to the Bistrita County Department of Public Health and eventually to ANRSC Bistrita.

In January 2010, seeing that the defendant still refused to remedy the technical situation of the water pit, the plaintiff contacted the defendant with a proposal for the peaceful settlement of the conflict. This was not achieved and therefore, on February 2, 2010, the defendant suspended the supply of cold water for reasons related to non-payment by the applicant (according to the report nr. 16/02.02.2010). In order not to remain without water and heating during winter, the plaintiff consequently paid the defendant the sum of 1074 RON, as proved by a series of receipts (see CAS2, dated February 25, 2010). Following payment, the defendant has resumed the supply of water to the applicant's home.

Based on both evidence and witness testimony, it appears that the high consumption of water of 267 cubic meters, registered by the applicant's water counter, was not due to the amount actually consumed by the plaintiff and his wife, but it resulted from a series of cracks located on the water equipment. The applicant had subsequently remedied the situation by changing the pipe. Based on this finding, both the defendant and the expert that has conducted the technical expertise claim that the user is the one responsible for the technical condition of the existing facility beyond the water meter, and therefore also for the water losses produced by the technical fault occurring on that portion of the supply line. In this regard, the technical expert states that "The fault occurred between the water meter and the first tap behind the water meter, so in the user outfit." Expert observation is correct to a point, in the sense that the fault occurred between the water meter and the plaintiff's manual tap, which at the time of the incident was at a distance of 8-10 m from the water counter, similarly to those of the other apartment block users. After the incident, the applicant moved the tap.

But the court does not endorse the conclusions of the defendant and the expert regarding the claim that the portion of the equipment, at the time the incident occured, was within the area of the applicant's responsibility. According to art. 216 para. 1 of Decree no. 88/2007 of ANSCR "the indoor supply facility includes all plumbing, from the tap behind the water meter (power point), all the way in the direction of the water flow, up to the fittings". Therefore, as noted above, the technical damage and the water loss occurred before the tap water behind the water meter and consequently both dealing with the crack and with the subsequent water consumption fall within the area of the defendant's responsibility.

The defendant's responsibility is heightened by the fact that the detection of the crack was continually hampered by flooding of the water meter pit with groundwater, as it was established during the technical expertise. The technical condition of the water meter pit is the responsibility of the operator, according to art. 3 letter. i, u and v of Law. 241/2006 and to art. 7 of Decree no. 88/2007 of ANRSC.

Also, for this reason, the defendant was sanctioned by the contravention report no. 427/30.12.2009, concluded by CJPC Bistriţa-Năsăud.

Therefore, the defendant is also responsible for the higher amounts of water consumption (267 cubic meters) recorded by the water meter and for which the applicant has paid the amount of 1030.30 RON, with the receipt series CAS2, no. 249 592 from 25.02.2011.

Consequently, it is noted that for the period June-July of that year, the average water consumption for two people, as in the case of the applicant, is 12 cubic meters, worth 44.60 RON. The defendant has already acquiesced to this amount by accepting the payments made by the applicant, as illustrated through existing receipts.

In conclusion, this court will require the defendant to return the plaintiff the difference between 1074.90 RON and 44.60 RON, i.e. the sum of 1030.30 RON.

With regard to pecuniary damages, the applicant claimed that the defendant should pay the sum of 1856 RON in damages, due to the problems caused by the defendant's employees to his car. In this respect, the applicant notes that in February 2010, at a water meter pit intervention, the defendant's employees moved the plaintiff's car, in his absence, in order to gain access into the home of the water meters. On that occasion, the applicant claims that they caused damages to his car worth 1586 RON, as reflected in the document issued by the car service company Rombat Automobile Bistrita. Therefore, the court will compel the defendant to pay that amount, together with the sum of 1030.30 RON, for a total sum of 2616.30 RON.

The applicant has not demonstrated the appropriate justification for the rest of the claimed pecuniary damages up to 6464.61 RON, and therefore, they will not be granted in this amount.

As to the requested moral damages in the amount of 53.500 RON, due to the fact that the applicant was deprived of water and heat during winter in the period of February 2, 2010 - 25 February 2010 (the date of payment of 1074 RON), the court considers that they are not justified. This is because the applicant had the opportunity to avoid this situation by paying the full amount in due time, before having the opportunity to engage in legal recourse, as he ended up doing later. However, given the obvious discomfort that was caused to the plaintiff as a result of the technical failure due to the culpable conduct of the defendant, as well as due to the fact that the plaintiff attempted numerous interventions, the court considers that the defendant should pay damages in the amount of 1000 RON.

Based on art. 274 of the Civil Procedure Code, the court shall order the defendant to pay the applicant the sum of 1013.57 RON to cover expenses incurred in both cases, no. 263/112/2010 and 1687/190/2010 representing stamp duty, stamp judicial and expert fees. Present judgment is based on art. 1000 par. 3 Civil Code art. 3 letter i, u, v of Law. 241/2006 and art. 7 para. 1 and 2 and art. 216 para. 1 of Decree no. 88/2007 of ANRSC.

Source: adapted after Bistriţa-Năsăud Tribunal, http://portal.just.ro/112/Lists/Jurisprudenta/DispForm.aspx?ID=480

5. Institutional framework. The basic and essential requirements to ensure the safety of drinking water represent a "framework" for safe drinking water, comprising health-based targets, established by a competent health authority, adequate and properly managed systems (adequate infrastructure, proper monitoring and effective planning and management) and a system of independent surveillance (WHO 2011). An effective organizational framework depends on a clear delineation of responsibilities among the institutions involved in one way or another in the management of groundwater and on the successful coordination among the ministries, governmental departments or other authorities responsible for specific or sectoral aspects of water resources. Gaps and overlaps in competences, as well as the lack of horizontal coordination among different ministries or the lack of vertical coordination across different levels, render the implementation of legislation cumbersome or ineffective (Mechlem 2012).

Over time, the United Nations has played a pivotal role in creating and developing competent institutions, with direct or indirect responsibilities on environmental protection. On 21 November 1947, the General Assembly adopted resolution 174 (II) establishing the *International Law Commission* and approving its statute. The International Law Commission is the body of the United Nations system mandated to codify and progressively develop international law. It is composed of 34 independent experts in international law. The International Law Commission has authored a number of documents central to international law today, a number of which have become international treaties. At the 2002 World Summit for Sustainable Development in Johannesburg (WSSD), the EU launched a *Water Initiative* (EUWI) designed to contribute to the achievement of the Millennium Development Goals (MDGs) and the WSSD targets for drinking water and sanitation. A number of working groups has been established.

Working groups have either a regional focus (e.g. Africa, Mediterranean, EECCA and Latin America) or they concentrate on cross-cutting issues (e.g. Research, Finance). The Coordination Group (CG) ensures coherence of all EUWI activities.

Institutions such as the *International Court of Justice, UNEP, the European Court of Human Rights, The Court of Justice of the European Union, national courts* and other international, national or regional institutions and bodies play a key role in overseeing the quality of environmental factors, often playing the role of surveillance agencies and of mediators between the different interests of the main players on the international scene. *The surveillance agency:* Surveillance of drinking water quality can be defined as "the continuous and vigilant public health assessment and review of the safety and acceptability of drinking water supplies" (WHO 1976). Surveillance is an investigative activity undertaken to identify and evaluate potential health risks associated with the quality of drinking water. Surveillance contributes to the protection of public health by promoting the improvement of the quality, quantity, accessibility, coverage (i.e. populations with reliable access), affordability and continuity of drinking water supplies (termed "service indicators"). The surveillance authority must have the authority to determine whether a water supplier is fulfilling its obligations (WHO 2011). The main role of surveillance in the management of community water supplies is to assess the safety and acceptability of the water distributed to the public so that consumers are consistently and reliably protected from the health hazards of contaminated supplies (WHO 1997).

Surveillance of the quality of drinking water requires an institutional framework that reflects its objectives and functions and gives key responsibilities to the relevant bodies - not just to the agencies in charge of supplying water and promoting health, but to all the institutions with relevant normative, developmental, educational, and control functions. Surveillance requires a systematic programme of surveys, which may include auditing, analysis, sanitary inspection and institutional and community aspects. It should cover the whole of the drinking water system, including sources and activities in the catchment, transmission infrastructure, treatment plants, storage reservoirs and distribution systems (whether piped or unpiped) (WHO 2011).

The role of the water supplier *community participation* is an essential component of the surveillance framework. They represent a resource that can be drawn upon for local knowledge, experience, financial support, and labor. They are the people who are most likely to notice problems in the water supply first and can therefore take immediate remedial action. Community participation: The right of consumers to information on health-related parameters of the water supplied to them for domestic purposes is fundamental (WHO 1997).

At the EU level, the *European Commission*, in its quality as the "guardian" of the European Union (EU) and according to article 258 of the Treaty on the Functioning of the European Union – TFEU, is responsible for ensuring that EU law is correctly applied (Petrescu-Mag 2013). The European Commission has to ensure that the provisions of the community treaties and the measures taken by the European institutions are applied. The infringement procedure that the European Commission exercises together with the *Court of Justice of the EU* applies to all three forms of national infringements, i.e. cases, where a Member State did not transpose (or transpose with delay) EC secondary legislation into its national legal order (non-transposition), where the Member State transposed secondary EC legislation in an incomplete or incorrect way (incorrect transposition), or where a Member State did not correctly apply primary or secondary Community law in concrete cases (incorrect application) (Moreno Molina 2006; Petrescu-Mag 2013). The implementation of EU environmental legislation is to be ensured in the first place by the Member States. Close cooperation between national authorities and the European Commission contribute to a better implementation. Regional and local authorities are also key players and their co-operation with the Committee of the Regions is facilitated by a *Technical Platform for Cooperation on the Environment.* Next to administrative authorities, judges in the Member States have to play a very important role since rights and obligations deriving from Community law are enforced on daily basis by national courts and tribunals. *The European Union Forum of Judges for the Environment - EUFJE,* created in 2004, contributes to the promotion of the enforcement of national, European

and international environmental law by securing access to better knowledge for judges of environmental law.

In Romania, according to Law no. 458/2002 (republished) the following institutions and services have duties in the implementation of the Directive 98/83/EC:

- The Ministry of Health (MH): drinking water quality control, informing the population on risk health situations, taking corrective actions, granting exemptions.

The Ministry of Health, through the central public authority: provides the necessary legislative framework for the implementation of the Directive; takes measures to ensure capacity to achieve audit monitoring of drinking water quality, in order to prevent public health risks; informs the European Commission on the derogation granted; informs the European Commission on the quality of drinking water. The same ministry, through the National Institute of Public Health prepares the triennial report of national drinking water quality, conducts the National Program for monitoring of living and working environmental determinants, develops many activities for the surveillance of drinking water quality and the health of the population in relation to water.

The Ministry of Health, through the county public health authorities: provides supervision and control of the drinking water quality monitoring to verify compliance with water quality requirements provided to consumers; ensures that drinking water does not create a risk to public health; ensures audit monitoring of drinking water quality; may decide to conduct additional monitoring; considers whether the inconsistency in the values set for the parameters for drinking is a risk to human health and may order the necessary remedial measures to restore water quality to protect the health; and so forth;

-Local authorities: coordinate the development of compliance plans, including the timing and cost of measures necessary to ensure compliance of producers and distributors with drinking water quality requirements;

- Ministry of the Interior: centralization, monitoring and enforcement of compliance plans;

- Producers of drinking water: water quality assurance, preparing compliance plans.

An *Interdepartmental Committee for Sustainable Development* was established at the executive level, under the direct supervision of the Prime Minister, including representatives from ministries and other central institutions involved in the the implementation of the National Strategy for Sustainable Development. The goal of this body is to assess programmatic documents, as well as national, regional and sectoral strategies and programs, and their correlation with the principles and practices of sustainable development (Petrescu-Mag et al 2013), the dynamic evolution of EU regulations. In the same context, a *Consultative Council for Sustainable Development* was set up, which includes prestigious personalities and specific competencies, representing scientific, academic community and civil society, which will operate under the aegis of the Romanian Academy (Muntean et al 2013).

- Units under the coordination of the Ministry of the Environment: the National Institute of Research – the Development for Environmental Protection - Bucharest, "Grigore Antipa" Marine National Institute of Research and Development - Constanta, "Delta Dunarii" National Research and Development Institute - Tulcea, Environment Fund Administration – Bucharest, "Apele Romane" National Administration.

- Units subordinated to the Ministry of the Environment: National Environmental Protection Agency, National Environment Guard, "Delta Dunarii" Biosphere Reserve – Tulcea.

- Units under the authority of the Ministry of the Environment: National Administration of Meteorology.

Apart from the Ministry of Environment, other ministries of the Government of Romania have various tasks related to environmental protection. These include the Ministry of Regional Development and Public Administration, the Ministry of Health, and the Ministry of Agriculture and Rural Development.

6. Key messages with respect to drinking water sustainability

- Focus on pollution prevention;
- Rational water utilization schemes for the development of surface and underground water-supply sources;
- Promotion of water conservation through improved water-use efficiency, including the development of water-saving devices (water meters);
- Promotion of access to environmental information and awareness-creation programs;
- Establishing and strengthening education and training programmes on water-related topics, within an environmental and developmental context;
- Public participation and access to justice in environmental matters;
- Correlation between the evolution of investments in the water supply and sewerage networks and treatment plants. Reconciliation of urban development planning with the availability and sustainability of water resources;
- Upgrading treatment plants, rehabilitation of distribution networks and internal networks of blocks;
- Need for centralized water supply in rural areas, where the local situation allows;
- Apply up-to-date technical knowledge through best practices;
- Improved risk management and risk communication practiced by all stakeholders responsible for water safety;
- Control of industrial /agricultural pollution sources to protect water resources;
- Carrying out reliable water-quality monitoring;
- Strengthening of administrative and legislative measures on water-related topics;
- Establish a research agenda to address major scientific and technical gaps and emerging issues on water quality and introduction of the precautionary approach in water-quality management, where appropriate;
- Assigning new values for principle of integration of environmental protection requirements into the definition and implementation of EU sectoral policies;
- Application, with priority, of the principle of prevention;
- Application, when appropriate, without concessions of the "polluter pays" principle.

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Annexes to Part I

Terminology

EU directives are developed in legislative processes at the EU level but then have to be transposed into domestic law, i.e. the content of EU directives becomes part of the domestic legal system. In case members states fail to transpose EU directives the European Commission can initiate an infringement procedure before the European Court of Justice which may impose financial penalties. Under certain circumstances, EU directives may also be directly effective in member states' national legal orders (Mechlem 2012).

An **improved drinking-water source** is one that by the nature of its construction adequately protects the source from outside contamination, in particular from faecal matter. (WHO 2013)

Improved drinking-water supply includes sources that, by the nature of their construction or through active intervention, are protected from outside contamination, particularly faecal matter. These include piped water in a dwelling, plot or yard and other improved sources, including public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection (WHO 2012).

Improved sanitation includes facilities that ensure hygienic separation of human excreta from human contact. They include 1) flush or pour-flush toilet/latrine to piped sewer system, septic tank or pit latrine, 2) ventilated improved pit latrine, 3) pit latrine with slab or 4) composting toilet (WHO 2012).

Large drinking-water systems include potable water treatment plants, intake works, storage, water supply pumping stations and large-scale transmission/conveyance and distribution systems (WHO 2012).

Large sanitation systems include trunk sewers and sewage pumping stations and domestic and industrial wastewater treatment plants (EUWi/OECD, 2012).

Regulation is used generally to refer to the broad range of government instruments that are legally binding, including constitutions, legislation, decrees, acts, by-laws, orders and ordinances (WHO).

Water security is defined as the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability. (UNESCO 2012)

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THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community and, in particular, Article 130s (1) thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the Economic and Social Committee (2),

Having regard to the opinion of the Committee of the Regions (3),

Acting in accordance with the procedure laid down in Article 189c (4),

(1) Whereas it is necessary to adapt Council Directive 80/778/EEC of 15 July 1980 relating to the quality of water intended for human consumption (5) to scientific and technological progress; whereas experience gained from implementing that Directive shows that it is necessary to create an appropriately flexible and transparent legal framework for Member States to address failures to meet the standards; whereas, furthermore, that Directive should be re-examined in the light of the Treaty on European Union and in particular the principle of subsidiary;

(2) Whereas in keeping with Article 3b of the Treaty, which provides that no Community action should go beyond what is necessary to achieve the objectives of the Treaty, it is necessary to revise Directive 80/778/EEC so as to focus on compliance with essential quality and health parameters, leaving Member States free to add other parameters if they see fit;
(3) Whereas, in accordance with the principle of subsidiary, Community action must support and supplement action by the competent authorities in the Member States;
(4) Whereas, in accordance with the principle of subsidiary, the natural and socio-economic differences between the regions of the Union require that most decisions on monitoring, analysis, and the measures to be taken to redress failures be taken at a local, regional or national level insofar as those differences do not detract from the establishment of the framework of laws, regulations and administrative provisions laid down in this Directive;
(5) Whereas Community standards for essential and preventive health-related quality parameters in water intended for human consumption are necessary if minimum environmental-quality goals to be achieved in connection with other Community measures are to be defined so that the sustainable use of water intended for human consumption may be safeguarded and promoted;
(6) Whereas, in view of the importance of the quality of water intended for human consumption for human health, it is necessary to lay down at Community level the essential quality standards with which water intended for that purpose must comply;
(7) Whereas it is necessary to include water used in the food industry unless it can be established that the use of such water does not affect the wholesomeness of the finished product;
(8) Whereas to enable water-supply undertakings to meet the quality standards for drinking water, appropriate water-protection measures should be applied to ensure that surface and groundwater is kept clean; whereas the same goal can be achieved by appropriate water-treatment measures to be applied before supply;
(9) Whereas the coherence of European water policy presupposes that a suitable Water Framework Directive will be adopted in due course;
(10) Whereas it is necessary to exclude from the scope of this Directive natural mineral waters and waters which are medicinal products, since special rules for those types of water have been established;
(11) Whereas measures are required for all parameters directly relevant to health and for other parameters if a deterioration in quality has occurred; whereas, furthermore, such measures should be carefully coordinated with the implementation of Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market (6) and Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market (7);
(12) Whereas it is necessary to set individual parametric values for substances which are important throughout the Community at a level strict enough to ensure that this Directive's purpose can be achieved;
(13) Whereas the parametric values are based on the scientific knowledge available and the precautionary principle has also been taken into account; whereas those values have been selected to ensure that water intended for human consumption can be consumed safely on a life-long basis, and thus represent a high level of health protection;
(14) Whereas a balance should be struck to prevent both microbiological and chemical risks; whereas, to that end, and in the light of a future review of the parametric values, the establishment of parametric values applicable to water intended for human consumption should be based on public-health considerations and on a method of assessing risk;
(15) Whereas there is at present insufficient evidence on which to base parametric values for endocrine-disrupting chemicals at Community level, yet there is increasing concern regarding the potential impact on humans and wildlife of the effects of substances harmful to health;

(16) Whereas in particular the standards in Annex I are generally based on the World Health Organization's 'Guidelines for drinking water quality`, and the opinion of the Commission's Scientific Advisory Committee to examine the toxicity and ecotoxicity of chemical compounds;
(17) Whereas Member States must set values for other additional parameters not included in Annex I where that is necessary to protect human health within their territories;
(18) Whereas Member States may set values for other additional parameters not included in Annex I where that is deemed necessary for the purpose of ensuring the quality of the production, distribution and inspection of water intended for human consumption;
(19) Whereas, when Member States deem it necessary to adopt standards more stringent than those set out in Annex I, Parts A and B, or standards for additional parameters not included in Annex I but necessary to protect human health, they must notify the Commission of those standards;
(20) Whereas Member States are bound, when introducing or maintaining more stringent protection measures, to respect the principles and rules of the Treaty, as they are interpreted by the Court of Justice;
(21) Whereas the parametric values are to be complied with at the point where water intended for human consumption is made available to the appropriate user;
(22) Whereas the quality of water intended for human consumption can be influenced by the domestic distribution system; whereas, furthermore, it is recognized that neither the domestic distribution system nor its maintenance may be the responsibility of the Member States;
(23) Whereas each Member State should establish monitoring programmes to check that water intended for human consumption meets the requirements of this Directive; whereas such monitoring programmes should be appropriate to local needs and should meet the minimum monitoring requirements laid down in this Directive;
(24) Whereas the methods used to analyze the quality of water intended for human consumption should be such as to ensure that the results obtained are reliable and comparable;
(25) Whereas, in the event of non-compliance with the standards imposed by this Directive the Member State concerned should investigate the cause and ensure that the necessary remedial action is taken as soon as possible to restore the quality of the water;
(26) Whereas it is important to prevent contaminated water causing a potential danger to human health; whereas the supply of such water should be prohibited or its use restricted;
(27) Whereas, in the event of non-compliance with a parameter that has an indicator function, the Member State concerned must consider whether that non-compliance poses any risk to human health; whereas it should take remedial action to restore the quality of the water where that is necessary to protect human health;
(28) Whereas, should such remedial action be necessary to restore the quality of water intended for human consumption, in accordance with Article 130r(2) of the Treaty, priority should be given to action which rectifies the problem at source;
(29) Whereas Member States should be authorized, under certain conditions, to grant derogations from this Directive; whereas, furthermore, it is necessary to establish a proper framework for such derogations, provided that they must not constitute a potential danger to human health and provided that the supply of water intended for human consumption in the area concerned cannot otherwise be maintained by any other reasonable means;
(30) Whereas, since the preparation or distribution of water intended for human consumption may involve the use of certain substances or materials, rules are required to govern the use thereof in order to avoid possible harmful effects on human health;
(31) Whereas scientific and technical progress may necessitate rapid adaptation of the technical requirements laid down in Annexes II and III; whereas, furthermore, in order to facilitate application of the measures required for that purpose, provision should be

made for a procedure under which the Commission can adopt such adaptations with the assistance of a committee composed of representatives of the Member States;
(32) Whereas consumers should be adequately and appropriately informed of the quality of water intended for human consumption, of any derogations granted by the Member States and of any remedial action taken by the competent authorities; whereas, furthermore, consideration should be given both to the technical and statistical needs of the Commission, and to the rights of the individual to obtain adequate information concerning the quality of water intended for human consumption;
(33) Whereas, in exceptional circumstances and for geographically defined areas, it may be necessary to allow Member States a more extensive timescale for compliance with certain provisions of this Directive;
(34) Whereas this Directive should not affect the obligations of the Member States as to the time limit for transposition into national law, or as to application, as shown in Annex IV,
HAS ADOPTED THIS DIRECTIVE:
Article 1 Objective
1. This Directive concerns the quality of water intended for human consumption.
2. The objective of this Directive shall be to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.
Article 2 Definitions
For the purposes of this Directive:
1. 'water intended for human consumption` shall mean:
(a) all water either in its original state or after treatment, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether it is supplied from a distribution network, from a tanker, or in bottles or containers;
(b) all water used in any food-production undertaking for the manufacture, processing, preservation or marketing of products or substances intended for human consumption unless the competent national authorities are satisfied that the quality of the water cannot affect the wholesomeness of the foodstuff in its finished form;
2. 'domestic distribution system` shall mean the pipe work, fittings and appliances which are installed between the taps that are normally used for human consumption and the distribution network but only if they are not the responsibility of the water supplier, in its capacity as a water supplier, according to the relevant national law.
Article 3 Exemptions
1. This Directive shall not apply to:
(a) natural mineral waters recognized as such by the competent national authorities, in accordance with Council Directive 80/777/EEC of 15 July 1980 on the approximation of the laws of the Member States relating to the exploitation and marketing of natural mineral waters (8);
(b) waters which are medicinal products within the meaning of Council Directive 65/65/EEC of 26 January 1965 on the approximation of provisions laid down by law, regulation or administrative action relating to medicinal products (9).
2. Member States may exempt from the provisions of this Directive:
(a) water intended exclusively for those purposes for which the competent authorities are satisfied that the quality of the water has no influence, either directly or indirectly, on the health of the consumers concerned;
(b) water intended for human consumption from an individual supply providing less than 10 m^3 a day as an average or serving fewer than 50 persons, unless the water is supplied as part of a commercial or public activity.
3. Member States that have recourse to the exemptions provided for in paragraph 2(b) shall ensure that the population concerned is informed thereof and of any action that can be taken to protect human health from the adverse effects resulting from any contamination of water intended for human consumption. In addition, when a potential

danger to human health arising out of the quality of such water is apparent, the population concerned shall promptly be given appropriate advice.

Article 4 General obligations

1. Without prejudice to their obligations under other Community provisions, Member States shall take the measures necessary to ensure that water intended for human consumption is wholesome and clean. For the purposes of the minimum requirements of this Directive, water intended for human consumption shall be wholesome and clean if it:

(a) is free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health, and

(b) meets the minimum requirements set out in Annex I, Parts A and B;

and if, in accordance with the relevant provisions of Articles 5 to 8 and 10 and in accordance with the Treaty, Member States take all other measures necessary to ensure that water intended for human consumption complies with the requirements of this Directive.

2. Member States shall ensure that the measures taken to implement this Directive in no circumstances have the effect of allowing, directly or indirectly, either any deterioration of the present quality of water intended for human consumption so far as that is relevant for the protection of human health or any increase in the pollution of waters used for the production of drinking water.

Article 5 Quality standards

1. Member States shall set values applicable to water intended for human consumption for the parameters set out in Annex I.

2. The values set in accordance with paragraph 1 shall not be less stringent than those set out in Annex I. As regards the parameters set out in Annex I, Part C, the values need be fixed only for monitoring purposes and for the fulfillment of the obligations imposed in Article 8.

3. A Member State shall set values for additional parameters not included in Annex I where the protection of human health within its national territory or part of it so requires. The values set should, as a minimum, satisfy the requirements of Article 4(1)(a).

Article 6 Point of compliance

1. The parametric values set in accordance with Article 5 shall be complied with:

(a) in the case of water supplied from a distribution network, at the point, within premises or an establishment, at which it emerges from the taps that are normally used for human consumption;

(b) in the case of water supplied from a tanker, at the point at which it emerges from the tanker;

(c) in the case of water put into bottles or containers intended for sale, at the point at which the water is put into the bottles or containers;

(d) in the case of water used in a food-production undertaking, at the point where the water is used in the undertaking.

2. In the case of water covered by paragraph 1(a), Member States shall be deemed to have fulfilled their obligations under this Article and under Articles 4 and 8(2) where it can be established that non-compliance with the parametric values set in accordance with Article 5 is due to the domestic distribution system or the maintenance thereof except in premises and establishments where water is supplied to the public, such as schools, hospitals and restaurants.

3. Where paragraph 2 applies and there is a risk that water covered by paragraph 1(a) would not comply with the parametric values established in accordance with Article 5, Member States shall nevertheless ensure that:

(a) appropriate measures are taken to reduce or eliminate the risk of non-compliance with the parametric values, such as advising property owners of any possible remedial action they could take, and/or

other measures, such as appropriate treatment techniques, are taken to change the nature or properties of the water before it is supplied so as to reduce or eliminate the risk of the water not complying with the parametric values after supply;

and
(b) the consumers concerned are duly informed and advised of any possible additional remedial action that they should take.
Article 7 Monitoring
1. Member States shall take all measures necessary to ensure that regular monitoring of the quality of water intended for human consumption is carried out, in order to check that the water available to consumers meets the requirements of this Directive and in particular the parametric values set in accordance with Article 5. Samples should be taken so that they are representative of the quality of the water consumed throughout the year. In addition, Member States shall take all measures necessary to ensure that, where disinfection forms part of the preparation or distribution of water intended for human consumption, the efficiency of the disinfection treatment applied is verified, and that any contamination from disinfection by-products is kept as low as possible without compromising the disinfection.
2. To meet the obligations imposed in paragraph 1, appropriate monitoring programmes shall be established by the competent authorities for all water intended for human consumption. Those monitoring programmes shall meet the minimum requirements set out in Annex II.
3. The sampling points shall be determined by the competent authorities and shall meet the relevant requirements set out in Annex II.
4. Community guidelines for the monitoring prescribed in this Article may be drawn up in accordance with the procedure laid down in Article 12.
5 (a) Member States shall comply with the specifications for the analyses of parameters set out in Annex III.
(b) Methods other than those specified in Annex III, Part 1, may be used, providing it can be demonstrated that the results obtained are at least as reliable as those produced by the methods specified. Member States which have recourse to alternative methods shall provide the Commission with all relevant information concerning such methods and their equivalence.
(c) For those parameters listed in Annex III, Parts 2 and 3, any method of analysis may be used provided that it meets the requirements set out therein.
6. Member States shall ensure that additional monitoring is carried out on a case-by-case basis of substances and micro-organisms for which no parametric value has been set in accordance with Article 5, if there is reason to suspect that they may be present in amounts or numbers which constitute a potential danger to human health.
Article 8 Remedial action and restrictions in use
1. Member States shall ensure that any failure to meet the parametric values set in accordance with Article 5 is immediately investigated in order to identify the cause.
2. If, despite the measures taken to meet the obligations imposed in Article 4(1), water intended for human consumption does not meet the parametric values set in accordance with Article 5, and subject to Article 6(2), the Member State concerned shall ensure that the necessary remedial action is taken as soon as possible to restore its quality and shall give priority to their enforcement action, having regard inter alia to the extent to which the relevant parametric value has been exceeded and to the potential danger to human health.
3. Whether or not any failure to meet the parametric values has occurred, Member States shall ensure that any supply of water intended for human consumption which constitutes a potential danger to human health is prohibited or its use restricted or such other action is taken as is necessary to protect human health. In such cases consumers shall be informed promptly thereof and given the necessary advice.
4. The competent authorities or other relevant bodies shall decide what action under paragraph 3 should be taken, bearing in mind the risks to human health which would be caused by an interruption of the supply or a restriction in the use of water intended for human consumption.
5. Member States may establish guidelines to assist the competent authorities to fulfill their obligations under paragraph 4.

6. In the event of non-compliance with the parametric values or with the specifications set out in Annex I, Part C, Member States shall consider whether that non-compliance poses any risk to human health. They shall take remedial action to restore the quality of the water where that is necessary to protect human health.
7. Member States shall ensure that, where remedial action is taken, consumers are notified except where the competent authorities consider the non-compliance with the parametric value to be trivial.
Article 9 Derogations
1. Member States may provide for derogations from the parametric values set out in Annex I, Part B, or set in accordance with Article 5(3), up to a maximum value to be determined by them, provided no derogation constitutes a potential danger to human health and provided that the supply of water intended for human consumption in the area concerned cannot otherwise be maintained by any other reasonable means. Derogations shall be limited to as short a time as possible and shall not exceed three years, towards the end of which a review shall be conducted to determine whether sufficient progress has been made. Where a Member State intends to grant a second derogation, it shall communicate the review, along with the grounds for its decision on the second derogation, to the Commission. No such second derogation shall exceed three years.
2. In exceptional circumstances, a Member State may ask the Commission for a third derogation for a period not exceeding three years. The Commission shall take a decision on any such request within three months.
3. Any derogation granted in accordance with paragraphs 1 or 2 shall specify the following:
(a) the grounds for the derogation;
(b) the parameter concerned, previous relevant monitoring results, and the maximum permissible value under the derogation;
(c) the geographical area, the quantity of water supplied each day, the population concerned and whether or not any relevant food-production undertaking would be affected;
(d) an appropriate monitoring scheme, with an increased monitoring frequency where necessary;
(e) a summary of the plan for the necessary remedial action, including a timetable for the work and an estimate of the cost and provisions for reviewing;
(f) the required duration of the derogation.
4. If the competent authorities consider the non-compliance with the parametric value to be trivial, and if action taken in accordance with Article 8(2) is sufficient to remedy the problem within 30 days, the requirements of paragraph 3 need not be applied.
In that event, only the maximum permissible value for the parameter concerned and the time allowed to remedy the problem shall be set by the competent authorities or other relevant bodies.
5. Recourse may no longer be had to paragraph 4 if failure to comply with any one parametric value for a given water supply has occurred on more than 30 days on aggregate during the previous 12 months.
6. Any Member State which has recourse to the derogations provided for in this Article shall ensure that the population affected by any such derogation is promptly informed in an appropriate manner of the derogation and of the conditions governing it. In addition the Member State shall, where necessary, ensure that advice is given to particular population groups for which the derogation could present a special risk.
These obligations shall not apply in the circumstances described in paragraph 4 unless the competent authorities decide otherwise.
7. With the exception of derogations granted in accordance with paragraph 4 a Member State shall inform the Commission within two months of any derogation concerning an individual supply of water exceeding 1 000 m^3 a day as an average or serving more than 5 000 persons, including the information specified in paragraph 3.
8. This Article shall not apply to water intended for human consumption offered for sale in bottles or containers.
Article 10 Quality assurance of treatment, equipment and materials

Member States shall take all measures necessary to ensure that no substances or materials for new installations used in the preparation or distribution of water intended for human consumption or impurities associated with such substances or materials for new installations remain in water intended for human consumption in concentrations higher than is necessary for the purpose of their use and do not, either directly or indirectly, reduce the protection of human health provided for in this Directive; the interpretative document and technical specifications pursuant to Article 3 and Article 4 (1) of Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (10) shall respect the requirements of this Directive.

Article 11 Review of Annexes

1. At least every five years, the Commission shall review Annex I in the light of scientific and technical progress and shall make proposals for amendments, where necessary, under the procedure laid down in Article 189c of the Treaty.

2. At least every five years, the Commission shall adapt Annexes II and III to scientific and technical progress. Such changes as are necessary shall be adopted in accordance with the procedure laid down in Article 12.

Article 12 Committee procedure

1. The Commission shall be assisted by a committee composed of representatives of the Member States and chaired by a Commission representative.

2. The Commission representative shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority laid down in Article 148(2) of the Treaty in the case of decisions which the Council is required to adopt on a proposal from the Commission. The votes of the representatives of the Member States within the committee shall be weighted in the manner set out in that Article. The chairman shall not vote.

3. The Commission shall adopt measures which shall apply immediately. However, if those measures are not in accordance with the committee's opinion, the Commission shall communicate them to the Council forthwith. In that event:

(a) the Commission shall defer application of the measures which it has adopted for a period of three months from the date of communication;

(b) the Council, acting by a qualified majority, may take a different decision within the time limit referred to in point (a).

Article 13 Information and reporting

1. Member States shall take the measures necessary to ensure that adequate and up-to-date information on the quality of water intended for human consumption is available to consumers.

2. Without prejudice to Council Directive 90/313/EEC of 7 June 1990 on the freedom of access to information on the environment (11), each Member State shall publish a report every three years on the quality of water intended for human consumption with the objective of informing consumers. The first report shall cover the years 2002, 2003 and 2004. Each report shall include, as a minimum, all individual supplies of water exceeding 1 000 m^3 a day as an average or serving more than 5 000 persons and it shall cover three calendar years and be published within one calendar year of the end of the reporting period.

3. Member States shall send their reports to the Commission within two months of their publication.

4. The formats and the minimum information for the reports provided for in paragraph 2 shall be determined having special regard to the measures referred to in Article 3(2), Article 5(2) and (3), Article 7(2), Article 8, Article 9(6) and (7) and 15(1), and shall if necessary be amended in accordance with the procedure laid down in Article 12.

5. The Commission shall examine the Member States' reports and, every three years, publish a synthesis report on the quality of water intended for human consumption in the Community. That report shall be published within nine months of the receipt of the Member States' reports.

6. Together with the first report on this Directive as mentioned in paragraph 2, Member States shall also produce a report to be forwarded to the Commission on the measures they have taken or plan to take to fulfill their obligations pursuant to Article 6(3) and Annex I, Part B, note 10. The Commission shall submit, as appropriate, a proposal on the format of this report in accordance with the procedure laid down in Article 12.

Article 14 Timescale for compliance

Member States shall take the measures necessary to ensure that the quality of water intended for human consumption complies with this Directive within five years of its entry into force, without prejudice to Notes 2, 4 and 10 in Annex I, Part B.

Article 15 Exceptional circumstances

1. A Member State may, in exceptional circumstances and for geographically defined areas, submit a special request to the Commission for a period longer than that laid down in Article 14. The additional period shall not exceed three years, towards the end of which a review shall be carried out and forwarded to the Commission which may, on the basis of that review, permit a second additional period of up to three years. This provision shall not apply to water intended for human consumption offered for sale in bottles or containers.

2. Any such request, grounds for which shall be given, shall set out the difficulties experienced and include, as a minimum, all the information specified in Article 9(3).

3. The Commission shall examine that request in accordance with the procedure laid down in Article 12.

4. Any Member State which has recourse to this Article shall ensure that the population affected by its request is promptly informed in an appropriate manner of the outcome of that request. In addition, the Member State shall, where necessary, ensure that advice is given to particular population groups for which the request could present a special risk.

Article 16 Repeal

1. Directive 80/778/EEC is hereby repealed with effect from five years after the entry into force of this Directive. Subject to paragraph 2, this repeal shall be without prejudice to Member States' obligations regarding deadlines for transposition into national law and for application as shown in Annex IV.

Any reference to the Directive repealed shall be construed as a reference to this Directive and shall be read in accordance with the correlation table set out in Annex V.

2. As soon as a Member State has brought into force the laws, regulations and administrative provisions necessary to comply with this Directive and has taken the measures provided for in Article 14, this Directive, not Directive 80/778/EEC, shall apply to the quality of water intended for human consumption in that Member State.

Article 17 Transposition into national law

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive within two years of its entry into force. They shall forthwith inform the Commission thereof.

When the Member States adopt those measures, these shall contain references to this Directive or shall be accompanied by such references on the occasion of their official publication. The methods of making such references shall be laid down by the Member States.

2. The Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field covered by this Directive.

Article 18 Entry into force

This Directive shall enter into force on the 20th day following its publication in the Official Journal of the European Communities.

Article 19 Addressees

This Directive is addressed to the Member States.

Done at Brussels, 3 November 1998.

For the Council

The President

B. PRAMMER

(1) OJ C 131, 30.5.1995, p. 5 and

OJ C 213, 15.7.1997, p. 8.

(2) OJ C 82, 19.3.1996, p. 64.
(3) OJ C 100, 2.4.1996, p. 134.
(4) Opinion of the European Parliament of 12 December 1996 (OJ C 20, 20.1.1997, p. 133), Council common position of 19 December 1997 (OJ C 91, 26.3.1998, p. 1) and Decision of the European Parliament of 13 May 1998 (OJ C 167, 1.6.1998, p. 92).
(5) OJ L 229, 30.8.1980, p. 11. Directive as last amended by the 1994 Act of Accession.
(6) OJ L 230, 19.8.1991, p. 1. Directive as last amended by Commission Directive 96/68/EC (OJ L 277, 30.10.1996, p. 25).
(7) OJ L 123, 24.4.1998, p. 1.
(8) OJ L 229, 30.8.1980, p. 1. Directive as last amended by Directive 96/70/EC (OJ L 299, 23.11.1996, p. 26).
(9) OJ 22 9.2.1965, p. 369. Directive as last amended by Directive 93/39/EEC (OJ L 214, 24.8.1993, p. 22).
(10) OJ L 40, 11.2.1989, p. 12. Directive as last amended by Directive 93/68/EEC (OJ L 220, 30.8.1993, p. 1).
(11) OJ L 158, 23.6.1990, p. 56.
ANNEX I
PARAMETERS AND PARAMETRIC VALUES
PART A
>TABLE>
The following applies to water offered for sale in bottles or containers:
>TABLE>
PART B
>TABLE>
PART C
>TABLE>
ANNEX II
MONITORING
TABLE A Parameters to be analyzed
1. Check monitoring
The purpose of check monitoring is regularly to provide information on the organoleptic and microbiological quality of the water supplied for human consumption as well as information on the effectiveness of drinking-water treatment (particularly of disinfection) where it is used, in order to determine whether or not water intended for human consumption complies with the relevant parametric values laid down in this Directive.
The following parameters must be subject to check monitoring. Member States may add other parameters to this list if they deem it appropriate.
Aluminium (Note 1)
Ammonium
Colour
Conductivity
Clostridium perfringens (including spores) (Note 2)
Escherichia coli (E. coli)
Hydrogen ion concentration
Iron (Note 1)
Nitrite (Note 3)
Odour
Pseudomonas aeruginosa (Note 4)
Taste
Colony count 22 °C and 37 °C (Note 4)
Coliform bacteria
Turbidity
Note 1: Necessary only when used as flocculant (1*).
Note 2: Necessary only if the water originates from or is influenced by surface water (2*).
Note 3: Necessary only when chloramination is used as a disinfectant (3*).
Note 4: Necessary only in the case of water offered for sale in bottles or containers.

2. Audit monitoring
The purpose of audit monitoring is to provide the information necessary to determine whether or not all of the Directive's parametric values are being complied with. All parameters set in accordance with Article 5(2) and (3) must be subject to audit monitoring unless it can be established by the competent authorities, for a period of time to be determined by them, that a parameter is not likely to be present in a given supply in concentrations which could lead to the risk of a breach of the relevant parametric value. This paragraph does not apply to the parameters for radioactivity, which, subject to Notes 8, 9 and 10 in Annex I, Part C, will be monitored in accordance with monitoring requirements adopted under Article 12.
TABLE B1 Minimum frequency of sampling and analyses for water intended for human consumption supplied from a distribution network or from a tanker or used in a food-production undertaking
Member States must take samples at the points of compliance as defined in Article 6(1) to ensure that water intended for human consumption meets the requirements of the Directive. However, in the case of a distribution network, a Member State may take samples within the supply zone or at the treatment works for particular parameters if it can be demonstrated that there would be no adverse change to the measured value of the parameters concerned.
>TABLE>
Note 1: A supply zone is a geographically defined area within which water intended for human consumption comes from one or more sources and within which water quality may be considered as being approximately uniform.
Note 2: The volumes are calculated as averages taken over a calendar year. A Member State may use the number of inhabitants in a supply zone instead of the volume of water to determine the minimum frequency, assuming a water consumption of 200 l/day/capita.
Note 3: In the event of intermittent short-term supply the monitoring frequency of water distributed by tankers is to be decided by the Member State concerned.
Note 4: For the different parameters in Annex I, a Member State may reduce the number of samples specified in the table if:
(a) the values of the results obtained from samples taken during a period of at least two successive years are constant and significantly better than the limits laid down in Annex I, and
(b) no factor is likely to cause a deterioration of the quality of the water.
The lowest frequency applied must not be less than 50 % of the number of samples specified in the table except in the particular case of note 6.
Note 5: As far as possible, the number of samples should be distributed equally in time and location.
Note 6: The frequency is to be decided by the Member State concerned.
TABLE B2 Minimum frequency of sampling and analysis for water put into bottles or containers intended for sale
>TABLE>
(1*) In all other cases, the parameters are in the list for audit monitoring.
ANNEX III
SPECIFICATIONS FOR THE ANALYSIS OF PARAMETERS
Each Member State must ensure that any laboratory at which samples are analyzed has a system of analytical quality control that is subject from time to time to checking by a person who is not under the control of the laboratory and who is approved by the competent authority for that purpose.
1. PARAMETERS FOR WHICH METHODS OF ANALYSIS ARE SPECIFIED
The following principles for methods of microbiological parameters are given either for reference whenever a CEN/ISO method is given or for guidance, pending the possible future adoption, in accordance with the procedure laid down in Article 12, of further CEN/ISO international methods for these parameters. Member States may use alternative methods, providing the provisions of Article 7(5) are met.
Coliform bacteria and *Escherichia coli* (*E. coli*) (ISO 9308-1)

Enterococci (ISO 7899-2)
Pseudomonas aeruginosa (prEN ISO 12780)
Enumeration of culturable microorganisms - Colony count 22 °C (prEN ISO 6222)
Enumeration of culturable microorganisms - Colony count 37 °C (prEN ISO 6222)
Clostridium perfringens (including spores)
Membrane filtration followed by anaerobic incubation of the membrane on m-CP agar (Note 1) at 44 ± 1 °C for 21 ± 3 hours. Count opaque yellow colonies that turn pink or red after exposure to ammonium hydroxide vapours for 20 to 30 seconds.
Note 1: The composition of m-CP agar is:
>TABLE>
Dissolve the ingredients of the basal medium, adjust pH to 7.6 and autoclave at 121 °C for 15 minutes. Allow the medium to cool and add:
>TABLE>
2. PARAMETERS FOR WHICH PERFORMANCE CHARACTERISTICS ARE SPECIFIED
2.1. For the following parameters, the specified performance characteristics are that the method of analysis used must, as a minimum, be capable of measuring concentrations equal to the parametric value with a trueness, precision and limit of detection specified. Whatever the sensitivity of the method of analysis used, the result must be expressed using at least the same number of decimals as for the parametric value considered in Annex I, Parts B and C.
>TABLE>
2.2. For hydrogen ion concentration the specified performance characteristics are that the method of analysis used must be capable of measuring concentrations equal to the parametric value with a trueness of 0.2 pH unit and a precision of 0.2 pH unit.
Note 1 (1*): Trueness is the systematic error and is the difference between the mean value of the large number of repeated measurements and the true value.
Note 2 (2*): Precision is the random error and is usually expressed as the standard deviation (within and between batch) of the spread of results about the mean. Acceptable precision is twice the relative standard deviation.
Note 3: Limit of detection is either:
- three times the relative within batch standard deviation of a natural sample containing a low concentration of the parameter,
or
- five times the relative within batch standard deviation of a blank sample.
Note 4: The method should determine total cyanide in all forms.
Note 5: Oxidation should be carried out for 10 minutes at 100 °C under acid conditions using permanganate.
Note 6: The performance characteristics apply to each individual pesticide and will depend on the pesticide concerned. The limit of detection may not be achievable for all pesticides at present, but Member States should strive to achieve this standard.
Note 7: The performance characteristics apply to the individual substances specified at 25 % of the parametric value in Annex I.
Note 8: The performance characteristics apply to the individual substances specified at 50 % of the parametric value in Annex I.
3. PARAMETERS FOR WHICH NO METHOD OF ANALYSIS IS SPECIFIED
Colour
Odour
Taste
Total organic carbon
Turbidity (Note 1)
Note 1: For turbidity monitoring in treated surface water the specified performance characteristics are that the method of analysis used must, as a minimum, be capable of measuring concentrations equal to the parametric value with a trueness of 25 %, precision of 25 % and a 25 % limit of detection.
(1*) These terms are further defined in ISO 5725.
ANNEX IV
>TABLE>

ANNEX V
>TABLE>

International Organization for Standardization (ISO) standards for sampling of drinking-water supplies:
ISO 5667-1:1980 Sampling—Part 1 Guidance on the design of sampling programmes
ISO 5667-2:1991 Sampling—Part 2 Guidance on sampling techniques
ISO 5667–3:1994 Sampling—Part 3 Guidance on the preservation and handling of samples
ISO 5667-4:1987 Sampling—Part 4 Guidance on sampling from lakes, natural and man-made
ISO 5667-5:1991 Sampling—Part 5 Guidance on sampling of drinking water and water used for food and
beverage processing
ISO 5667-6:1990 Sampling—Part 6 Guidance on sampling of rivers and streams

International Organization for Standardization (ISO) standards for microbiological analysis:
ISO 6222:1988 Enumeration of viable micro-organisms. Colony count by inoculation in or on a nutrient agar culture medium.
ISO 7899-1:1984 Detection and enumeration of faecal streptococci—
Part 1: Method by enrichment in a liquid medium.
ISO 7899-2:1984 Detection and enumeration of faecal streptococci—
Part 2: Method by membrane filtration.
ISO 8199:1988 General guide to the enumeration of micro-organisms by culture.
ISO 9308-1:1990 Detection and enumeration of coliform organisms, thermo tolerant coliform organisms and presumptive
Escherichia coli—Part 1: Membrane filtration method.
ISO 9308-2:1990 Detection and enumeration of coliform organisms, thermo tolerant coliform organisms and presumptive
Escherichia coli—Part 2: Multiple tube (most probable number) method.

7. X-Raying an omnipresent trio: natural environment – company – consumers

The Water Company is an important actor that comes between the final water consumer and the natural environment in both sequences of man-environment interaction (see Figure 4):

1. when the natural resource is taken from the environment (raw water withdrawal) to be used;

2. when the resource is sent back into the environment, after being used: water modified in quality (used, waste, polluted and treated water) and quantity (diminished) compared to its state in sequence 1.

The importance of the Water Company derives from at least two sources:

A. Dependence: in urban and some rural areas, people depend on the Water Company to a high degree, as they are not able to obtain the water resource on their own; besides, in most cases they are not able either to find alternatives for other services provided by a Water Company (waste water collection, waste water treatment etc.);

B. Direct influence on the natural environment: the activity of a Water Company is directly linked to the environment, which is directly affected by the way the Water Company operates (raw water withdrawal and treatment, waste water treatment, waste water discharge etc.).

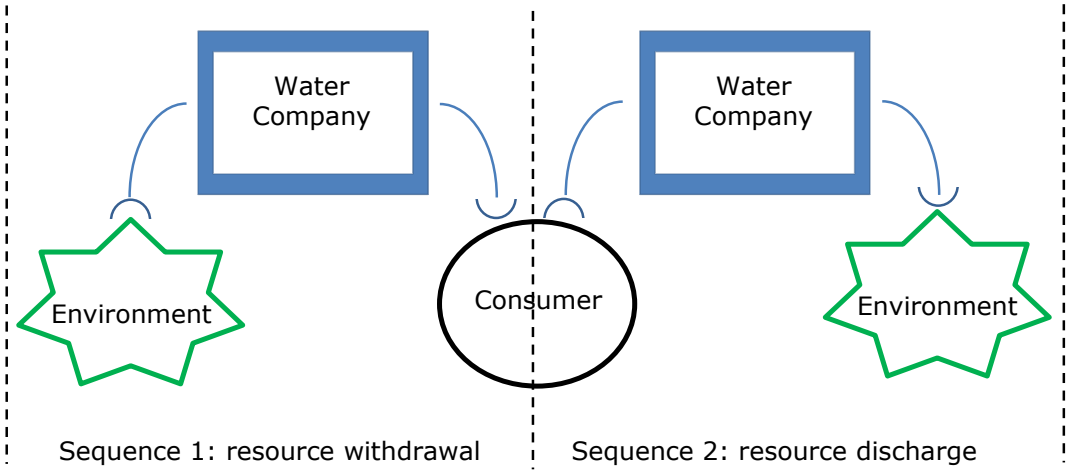

Figure 4. Two-sequence model of the environment – Water Company – consumer interactions
Source: author's elaboration

While for other resources supplied by private or public operators, like electricity or gas, there are alternatives to the traditional way of obtaining them, for instance by using green energy sources (geothermal, photovoltaic, wind etc.), when it comes to water, there is no substitute in most of its uses, especially for life support. At the same time, the global water demand is increasing and the global water supply is declining due to reduction of available reserves and increased contamination, both consequences of population growth (especially in arid and water-short regions), incorrect pollution management and inefficient utilization of available supplies. Clean water shortages generate a high risk of geopolitical conflicts, increased food imports, population shifts, health problems, environmental decline, etc. The fresh water available for human consumption is a very small fraction of all water on Earth, as shown in Table 9.

Table 9

Water distribution on Earth

Water source	Water volume, in km^3	Percent of freshwater	Percent of total water
Oceans, Seas, & Bays	1,338,000,000	--	96.5
Ice caps, Glaciers, Permanent Snow	24,064,000	68.6	1.74
Ground water	23,400,000	--	1.7
Fresh	10,530,000	30.1	0.76
Saline	12,870,000	--	0.93
Soil Moisture	16,500	0.05	0.001
Ground Ice, Permafrost	300,000	0.86	0.022
Lakes	176,400	--	0.013
Fresh	91,000	0.26	0.007
Saline	85,400	--	0.007
Atmosphere	12,900	0.04	0.001
Swamp Water	11,470	0.03	0.0008
Rivers	2,120	0.006	0.0002
Biological Water	1,120	0.003	0.0001

Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (ed.), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources, Oxford University Press, New York, apud http://ga.water.usgs.gov/edu/earthwherewater.html

According to UNEP (United Nations Environment Programme), the total volume of water on Earth is about 1.4 billion km3 and the volume of freshwater resources is about 35 million km3, 2.5% of the total volume (http://www.unwater.org/statistics_use.html). However, not all of it is accessible to humans and the available part is unevenly distributed in relation to human needs. When the global population was still six billion, people worldwide consumed more than half (54%) of all the accessible freshwater from rivers, lakes and underground aquifers and water use has been growing at a rate more than twice compared to population growth during the last century (http://www.unwater.org/statistics_use.html, apud Food and Agriculture Organization of the United Nations, World Water Assessment Programme). At the same time, freshwater withdrawals have tripled over the past 50 years; the demand for freshwater is increasing by 64 billion cubic meters a year (64 km^3/year); the world's population is growing by roughly 80 million people each year and changes in lifestyles and eating habits in recent years have required more water consumption per capita (http://www.worldometers.info/water/). An OECD projection of future global water demand estimates a consumption of 7517 km^3 for 2050 (compared with 5565 km^3 in 2000;http://www.oecd.org/environment/environmentthewaterchallengesharingaprecious commodity.htm). The only way to secure water availability for the near and distant future is sustainability and integration of water issues in other related fields (agriculture, climate change, consumer protection etc.) whenever necessary (Brown et al 2010; Cai et al 2011; Cohen & Winn 2007; Doria et al 2009; Hubbard et al 2011; Ji et al 2006; Soboll 2011; Viman 2010).

In Romania, drinking water comes from surface water– 63.2% – and groundwater sources – 36.8%. The available amount of water is: from rivers – 13.95 billion m^3 / year, from the Danube – 20 billion m^3 / year, from groundwater sources – 5.41 billion m^3 / year (Hârceag & Cârlan 2012). The water domestic demand was of 21.7 million inhabitants (according to 2002 census); from these, 14.7 million people (68%) benefits from drinking water from the public network: 11.3 million people in the urban area (which represents 77% of the population supplied with water and 98% of the urban population) and 3.4 million in rural areas (representing 23% of the population supplied with water and 33% of the rural population) (Hârceag & Cârlan 2012). Romania is a country with scarce water resources compared to other European countries (see Table 10). Therefore, it is very important to use water wisely in all activities, including domestic consumption.

Table 10

Water resources — long-term annual average (1 000 million m³)

Country	Fresh water resources	Country	Fresh water resources
Belgium	19.9	Netherlands	89.7
Bulgaria	107.2	Austria	84.0
Czech Republic	16.0	Poland	63.1
Denmark	16.3	Portugal	73.6
Germany (until 1990: FRG)	188.0	**Romania**	**42.3**
Ireland	51.0	Slovenia	32.1
Greece	72.0	Slovakia	80.3
Spain	111.1	Finland	110.0
France	185.3	Sweden	186.2
Italy	175.0	United Kingdom	164.3
Cyprus	0.3	Iceland	170.0
Latvia	33.7	Norway	384.0
Lithuania	24.5	Switzerland	53.5
Luxembourg	1.6	Serbia	175.4
Hungary	116.4	Turkey	234.3
Malta	0.1		

Source: Eurostat (online data code : env_watq1a), apud
http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Water_statistics

The need to enhance sustainability, in general, and, water sustainable behavior, in particular (through communication, involvement etc.), generated the objective of this study: to know the main features of the relationship water – company – consumer from consumers' perspective, because the consumer is an important actor at social, economic and environmental point of view and he can have a high power both on the marketplace and the environmental protection, if the consumer is aware of his power, knows how to use it, wants and decides to do so. Thus, within the context of consumer perspective (what consumers think, feel and do), a complex relationship is born between the Water Company, the environment (protection) and water consumption (in general and for drinking), as represented in Figure 5. Some examples of influences are: (a) Consumer behavior → Water Company: the use of bottled water instead of tap water, water savings; (b) Water Company → Consumer behavior: water services prices; (c) Consumer behavior → Environment: water pollution; (e) Environment → Consumer behavior: abundance or scarcity of water; (d) Water Company → Environment: raw water withdrawal, waste water treatment and discharge; (f) Environment → water distribution, abundance or scarcity of water.

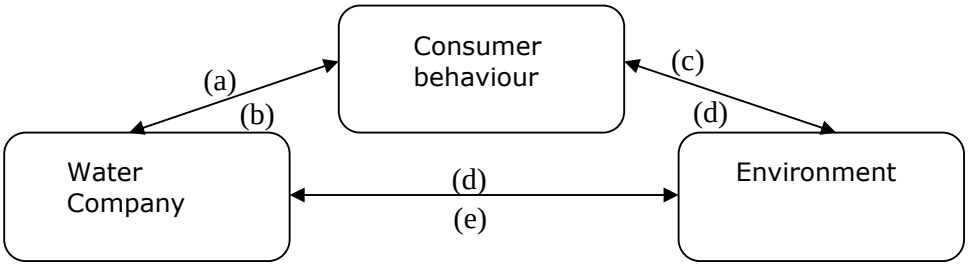

Figure 5. The relationship Water Company – environment – water consumption from consumer's perspective
Source: author's elaboration

The information targeted by the research was what consumers think in relation to: (A) their Water Company, (B) its connection to environmental protection, (C) their water consumption – financial (money) and physical (volume of water) points of view, and (D) drinking water attitude – perceptions, feelings, actions. In order to see how the image of the Water Company in consumers' mind, we took into account five variables: (1) its presence in mass-media; (2) type of image in: mass-media, group of friends, consumer's conversations; (3) investment awareness, presence through actions/works for service improvement; (4) importance of the Water Company by characteristics; (5) tap water evaluation by characteristics. The Water Company image can be integrated in a broader context, related to environmental protection and to economic aspects. For this purpose, we investigated the perception of waste water destination and consumers' water saving behaviour. Consumers' main form of active involvement in the relationship natural resource – company – consumer is water consumption and it has two associated components: water consumption and payment for water services.

The questions used to obtain the information mentioned at points (A), (B), (C) were:

- "*How often do you hear about the Water Company in mass-media?*"
- "a) *What do you think about the information released in mass-media (newspapers, radio, TV etc.) regarding the Water Company?*", "b) *How do you consider your friends talk about the Water Company?*", "c) *How do you consider you talk about the Water Company?*"
- "*Do you know any measures the Water Company took in order to improve its services?*"
- "*Rank by importance the following characteristics/activities of the Water Company: state of the water-sewerage network, the drinking water quality, transparency (public access to water-sewerage information), quick response (to damages, information request, complaints etc.), employees' polite attitude to customers (customer-oriented attitude), execution of works (to repair damages, etc.), accession of European funds for the modernization of water-sewerage network, environment-oriented attitude through waste water collection and treatment, accessible prices.*"
- "*How do you appreciate: a) tap water purity; b) tap water taste; c) tap water smell; d) tap water turbidity; e) tap water safety (for human health)?*"
- "*Where does the waste water go after they it is collected in the sewerage system?*"
- "*By saving water we understand self-application of conscious restrictions on water consumption in order to reduce the amount of water we consume. Do you usually save water?*"
- "*Why do you save water: 1) to reduce the costs, 2) to protect the environment, 3) to respect the principle <<It is not appropriate to waste>>, 4) other reasons?*"
- "*How much do you pay for your monthly water bill?*"
- "*How much water does your family use monthly?*"

The questions used to obtain information on consumers' attitude to drinking water – perceptions, feelings, actions, mentioned at point (D), were:

- *"What is the average quantity of liquids you drink daily? (Liquids may be soup, water, coffee, tea, juice, alcohol, etc.)."*
- "*Rank the following liquids according to how often you consume them monthly: water, tea/infusion, coffee, soup, fruits/vegetables fresh, soft drinks with gas, soft drinks without gas, other (assign the 1st place to the liquid that you consume most often, ..., the 7th place – to the liquid you consume most rarely)*".
- "*Which of the following liquids do you use most often to quench your thirst: bottled still water, water with gas, tap water, tea/infusion, coffee, fruits/vegetables fresh, soft drinks with gas, soft drinks without gas, other? Rank the first three.*"
- "*How do you evaluate your daily fluid intake in relation to what you think would be ideal for your health: sufficient, too low, too high*?"

- "*How do you evaluate your daily water intake in relation to what you think it would be ideal for your health: sufficient, too low, too high*?"
- "*Of all types of water that represent your average monthly consumption, indicate how much you consume of each type (we refer to plain water, not water as tea, syrup, coffee, etc.).*"
- "*Of all types of water that represent your family's average monthly consumption, indicate how much you consume of each type (we refer to plain water, not water as tea, syrup, coffee, etc.).*"
- "*Why do you drink bottled water? Options: you never drink it; other reasons: ...; to quench your thirst; because your friends / acquaintances do so; due to specialists' recommendation (doctors, researchers, etc.); because it is healthier than other liquids; due to its mineral content; due to bad experiences with tap water; due to habit; due to your friends' recommendations; due to low content of nitrates, nitrites; due to your doctor's recommendations; due to the positive effects you noticed on others' health; due to the positive effects you noticed on your health*".
- Indicate how much you agree/disagree with the following statement: "*I have high confidence in bottled water.*"
- Indicate how much you agree/disagree with the following statement: "*I have high confidence in tap water.*"
- Indicate how much you agree/disagree with the following statement: "*Bottled water has a higher quality than tap water.*"
- Indicate how much you agree/disagree with the following statement: "*For young children, bottled water is better than tap water.*"

8. Study on consumers' perceptions and habits related to a Water Company, environmental protection and water consumption

A simple random survey was implemented, using home interviews. The margin of error of the survey was 5% and confidence level was 95%. The total number of valid questionnaires completed was 384. From the survey perspective, the univers population is composed of the adult domestic customers of CASSA in Cluj-Napoca city (more precisely, domestic users of CASSA services). The survey was carried out in 2010. From geographical point of view, the research included the municipal area of Cluj-Napoca (NW of Romania; Cluj-Napoca had 376000 inhabitants, permanent or short and medium term residents, and was the third biggest city in Romania). All inhabitants of the city are customers of the Water Company, all the statistical requirements of survey methodology were strictly respected, so the results can be seen as representative for the whole population of Cluj-Napoca. The survey was implemented within ISPA measure ISPA 2000/RO/16/P/PE/008 Rehabilitation and Modernization of the Water and Sewerage Infrastructure for the Area of Cluj, by SC Compania de Apa Somes SA (Romania) and its Project Implementation Unit (***, 2010, Report...).

Consumers' actions, opinions and beliefs are influenced by internal and external factors. One important factor of the second category is information. Consumers are influenced by the type and quantity of information that reaches them: the extent to which an actor (the Water Company in our case) is present/involved in the social space of the customer influences the image that customer will have on that actor; the content of the information is one main ingredient of the final opinion or belief of the customer. Based on this assumption, we tried to discover how much and what type of information people received about the Water Company. Mass-media has the capacity to disseminate the highest number of messages to the highest number of subjects in the population under study; so, the first question asked was "*How often do you hear about the Water Company in mass-media?*" (Figure 6).

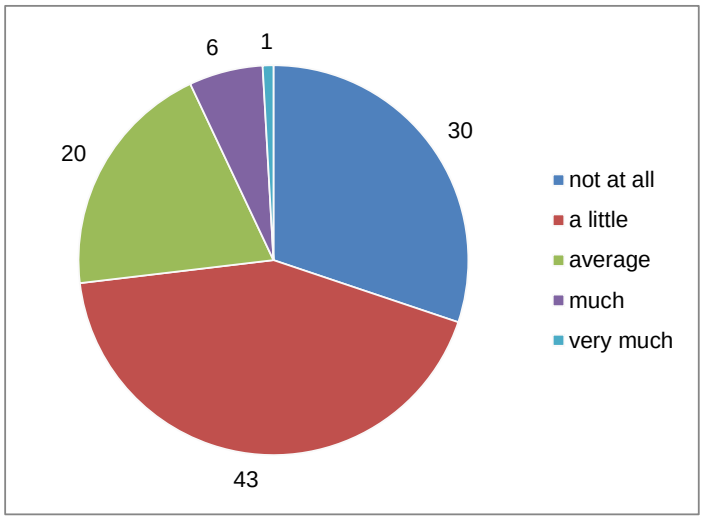

Figure 6. Consumers' perception of the presence level of the Water Company in mass-media (% of total sample)
Source: author's elaboration based on survey data

The majority of the subjects recalled they received little information about CASSA through mass-media. 73% of the subjects recalled they didn't receive any or little information via mass-media. Those who believed they received average and much through mass-media represented 26%. This is a measure of how much information people believed or remembered they had received, and not a measure of how much information was actually sent or received. It represents the image of the company's presence in mass-media as it is projected in consumers' mind. Taking into consideration that the presence of CASSA in mass-media increased over time, the results are the consequence of the following factors: the level of media consumption was low, especially the media where the information on the Water Company was released, most of the information about the Water Company is positive and people tend to remember especially negative aspects and forget or consider the positive ones as normal and therefore disregard them. The situation can be understood as follows: on the one hand, the situation needs to improve, that is the Water Company should be more present in its customers' mind; on the other hand, the mass-media was more oriented towards negative, scandal news and information, which are usually given precedence in people's memory. In this context, not being remembered by consumers could be seen as an important achievement.

The second question targeted the type of information received by the customers about the Water Company. We have considered that three sources of information have the highest influence on consumers' opinions and we tested them: mass-media, consumers' friends, consumers' own statements. The questions were: "a) *What do you think about the information released in mass-media (newspapers, radio, TV etc.) regarding the Water Company?*", "b) *How do you think your friends talk about the Water Company?*", "c) *How do you consider you talk about the Water Company?*" (Figures 7, 8, 9).

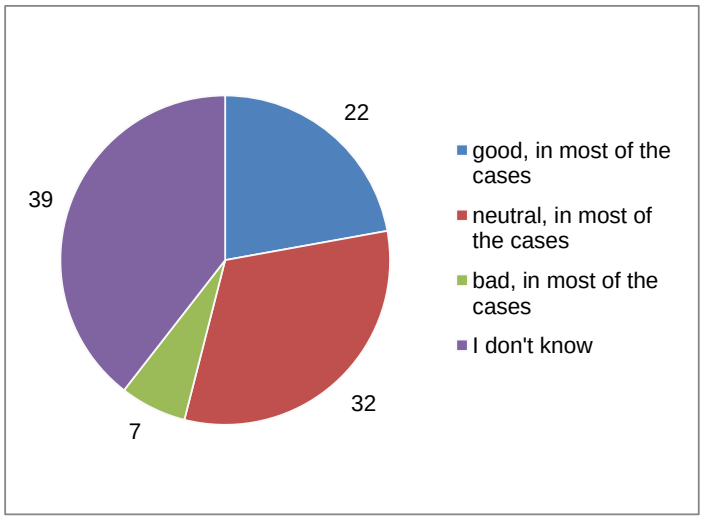

Figure 7. Consumers' perception of the quality of the Water Company image in mass-media (%)
Source: author's elaboration based on survey data

More than half of the customers perceive a positive or neutral image of the Water Company in mass-media and almost half have no opinion on the matter, while only 7% of the customers consider the image bad. This is a rather good for the Water Company (from the image quality point of view) because we have only a very small percentage of the population perceiving a bad image, while all the rest (93%) consider it either positive image or have a perception with no high negative possible influence. Almost a quarter of the subjects having a positive perceptions is a good percentage; one third of the customers perceiving the image as neutral is good again because they do not expect it to stand out among other economic actors and undertake positive actions, so they do not feel disspointed about it. An expected service (Collins, B. 1995. Marketing for engineers. In Sampson, D. (ed.), Management for Engineers, Melbourne: Longman Cheshire, apud Payne 2005) is usually enough for them; in our case an expected service would be drinking water delivery (generic service) plus raw water treatment, waste water collection, and, possibly, waste water treatment (the minimal purchase conditions that need to be met). From a social perspective, in a context where the Water Company is present in the mass-media, the situation needs improvement because it shows a population with low implication, interest in and knowledge about a company that manages and supplies them with a highly preciuous resource.

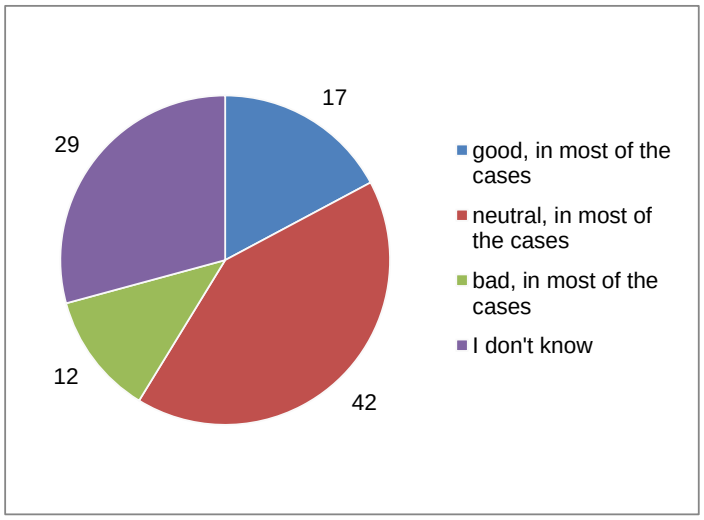

Figure 8. Consumers' perception of the quality of the Water Company image among their friends (%)
Source: author's elaboration based on survey data

For most Water Company customers (98%), the Water Company appears in their friends' conversations as a positive or neutral actor: the majority of the people consider their friends say good (about one fifth) or neutral (almost half) things about the Water Company; almost one third doesn't know how their friends talk about it, which means the Water Company doesn't appear as a conversation subject among them or it is not remembered. A relatively small percentage (12%) consider their friends have negative things to say about the Water Company.

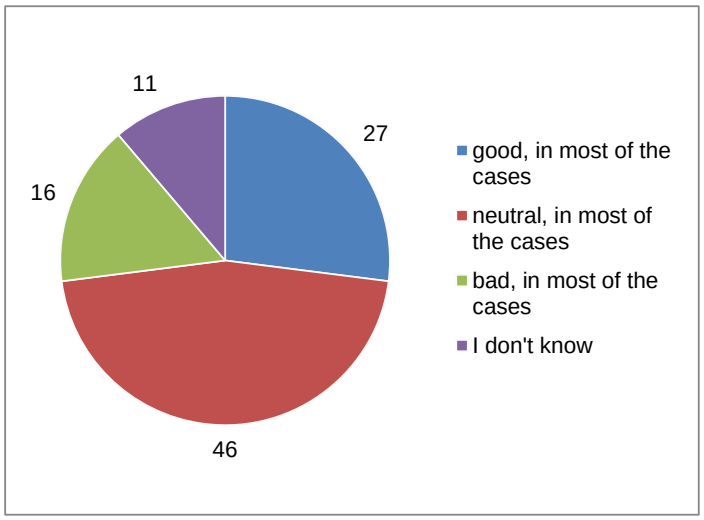

Figure 9. Consumers' perception of the quality of the Water Company image in their own conversations (%)
Source: author's elaboration based on survey data

Almost three quaters of the customers (73%) declare they say good or neutral things about the Water Company, which is a positive aspect for the company; however, for a company that invested so much in the extension and modernization of the water-sewerage network, the percentages must be increased. A small part cannot have an opinion about it or do not want to share it. 16% admit they have negative things to say in most occasions. The dissatisfaction causes must be identified and neutralised. Other questions of the survey indicated that a very frequent reason for dissatisfaction was in

fact a situation that did not depend on the Water Company's actions – the quality of the tap water in blocks. For consumers livings in blocks, the water quality is influenced by the state of the interior water pipes network, which is the property of the tenant associations and not of the Water Company. Taking into account that the water quality delivered by the the Water Company is very good and complies with all legal standards, as the water analysis proves it (Odagiu et al, 2013; Rosu et al, 2008; ***, 2014, Buletin de analiza a apei), the state of interior pipes is the factor that alters tap water and consumers must be aware of it.

The image of the Water Company is influenced by the notoriety of its actions. The investments made are very high (compared to investments of other public utility companies) and very visible due to the extention and duration of the works involved. We wanted to see if these actions were kown by their final beneficiaries, the consumers and we asked: "*Do you know any measures the Water Company took in order to improve its services?*" (Figure 10).

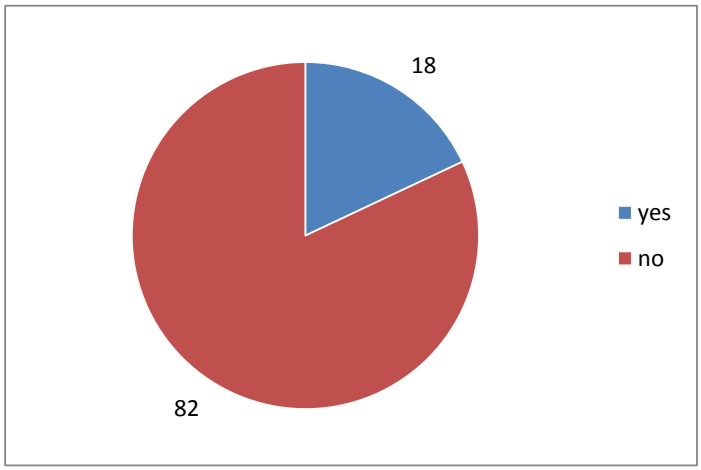

Figure 10. Awareness of the investments made by the Water Company (%)
Source: author's elaboration based on survey data

More than three quarters of the consumers are not aware or do not remember measures the Water Company took to improve its services. Consumers must be more aware of the costs associated to the quality of the water they receive and of everything these involve – financial costs, institutional efforts etc – in order to assign this resource a more accurate value.

A highly important aspect in the relationship customers – Water Company is the evaluation of the services delivered by the Water Company. From an extended list of actions performed and services provided by the Water Company we selected the ones most relevant for the study. The customers were ask to: "*Rank by importance the following characteristics/activities of the Water Company: state of the water-sewerage network, the drinking water quality, transparency (public access to water-sewerage information), quick response (to damages, information request, complaints etc.), employees' polite attitude to customers (customer-oriented attitude), execution of works (to repair damages, etc.), accession of European funds for the modernization of water-sewerage network, environment-oriented attitude through waste water collection and treatment, accessible prices.*" (Tables 11, 12, Figure 11).

Table 11

Evaluation of the importance of the Water Company characteristics (% of persons of total sample giving a certain evaluation for a characteristic)

	1st place	2nd place	3rd place	4th place	5th place	6th place	7th place	8th place	9th place
state of the water-sewerage network	12	32	24	9	9	5	3	4	2
water quality	57	23	7	2	2	2	2	3	2
transparency	3	4	8	11	9	10	17	13	25
quick response	3	5	13	24	18	12	10	8	7
customer oriented attitude	3	6	6	7	10	15	17	19	17
execution of works	5	8	13	13	19	14	10	9	9
accession of European funds	7	6	7	10	13	16	13	15	16
environment oriented attitude through waste water collection and treatment	5	9	10	11	12	11	14	18	9
accessible price	16	22	20	10	9	7	6	4	6

Source: author's elaboration based on survey data

In consumers' opinion, the most important service that the Water Company must provide is water quality: we can say that at the 95% confidence level, at least 57.03% of the inhabitants of Cluj-Napoca put in first place. Water price came in second place (at least 15.63%). When forced to make a ranking and give a different position to each item and not just to do a scale evaluation ("very important—not at all important"), most of the customers (25%) put transparency in the last place. This doesn't mean it is not important for them, just that it is less important than other aspects.

In order to see an average position of a characteristic, we calculated a score for each of them: we took the total number of persons that assigned the first place to a certain characteristic and multiplied it by 9, those who assigned the second place and multiplied by 8, those who gave the third place and multiplied by 7, etc. We calculated the sum of these results for each characteristic and obtained a final score (last column on the right). The scores can range from 384 to 3456. The highest importance is given to water quality, second came the state of the water-sewerage network and third an accessible price.

Table 12

Evaluation of the importance of the Water Company characteristics by scores and ranking

	score	rank
state of the water-sewerage network	2806	IV
water quality	3210	I
transparency	2818	III
quick response	2532	IX
customer oriented attitude	2780	V
execution of works	2613	VII
accession of European funds	2745	VI
environment oriented attitude through waste water collection and treatment	2722	VII
accessible price	2831	II

Source: author's elaboration based on survey data

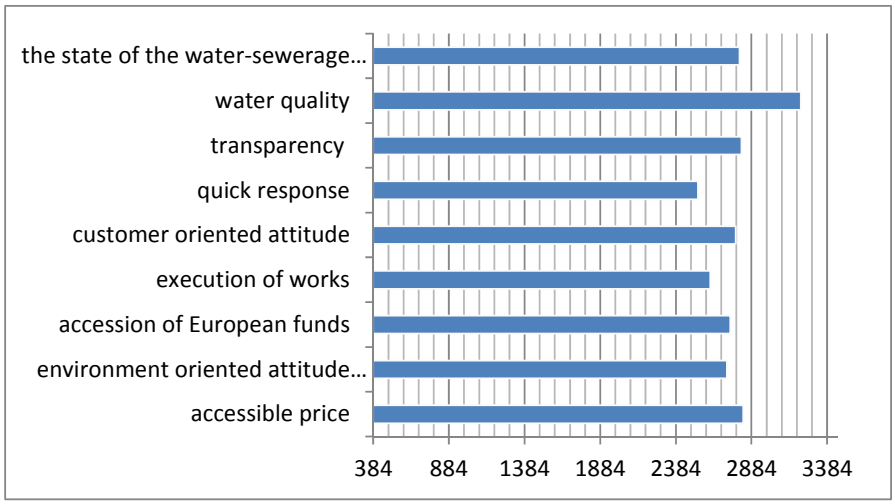

Figure 11. Evaluation of the importance of the Water Company characteristics (scores from 384 to 3456)
Source: author's elaboration based on survey data

Of all the nine tested characteristics, we can make four main groups: water services (water quality, the state of the water-sewerage network), price (accessible price), customer treatment (transparency, quick response, customer oriented attitude), other activities (execution of works, accession of European funds, environment oriented attitude through waste water collection and treatment). The corresponding scores are calculated as mean of the scores of the characteristics included in the group. The ranking is presented in Figure 12.

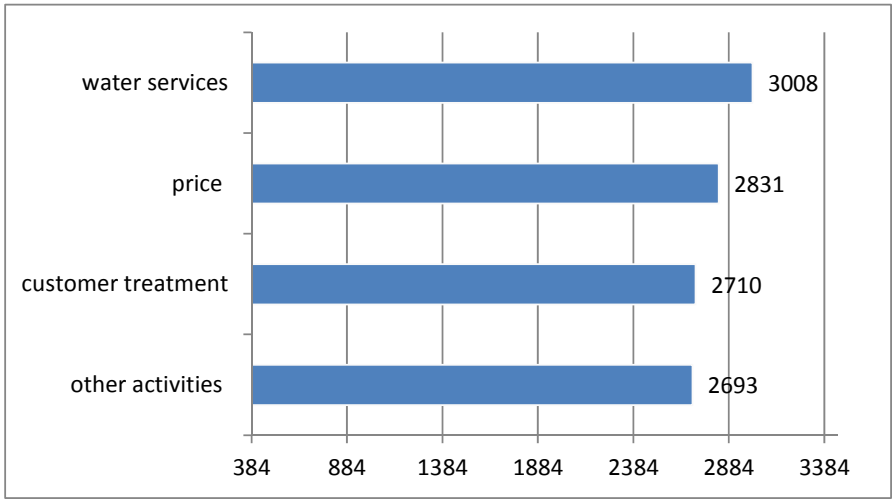

Figure 12. Evaluation of the importance of the Water Company characteristics - 4 groups (scores)
Source: author's elaboration based on survey data

If we want to take the environment separately, five groups result as seen in Figure 13.

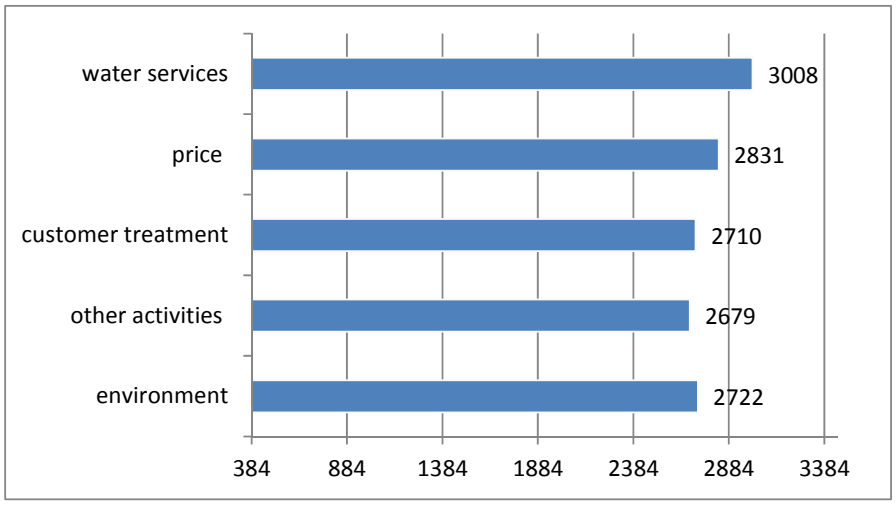

Figure 13. Evaluation of the importance of the Water Company characteristics - 5 groups (scores)
Source: author's elaboration based on survey data

The environment is very important to customers, at least at declarative level: more important that customer treatment and other activities.

Water quality is essential to customers and influences the quality of their life. The perceptions of water quality will influence the use of the product, the relationship with the Water Company and its image in consumers' mind. The quality of the drinking water can be seen as a sum of several characteristics. For this study, and based on a pre-test, we took into consideration the ones that appeared as most important: purity, taste, odour, turbidity (clarity), safety. Other studies may choose a different set of variables, according to their specificity: risk perception, attitudes towards water chemicals, contextual cues provided by the supply system, familiarity with specific water properties, trust in suppliers, past problems attributed to water quality, information provided by the mass media and interpersonal sources (de França Doria 2010), taste, clarity, purity and safety (Huerta-Saenz et al 2012). We ask the customers to evaluate their drinking the water according to them: "*How do you appreciate: a) tap water purity; b) tap water taste; c) tap water smell; d) tap water turbidity; e) tap water safety (for human health)?*" (Table 13, Figures 14, 15).

Table 13
Consumers' evaluations of specific tap water characteristics (% of consumers of the total sample; score – points; rank: place)

	very good	good	average	bad	very bad	I don't know	score	rank
purity	4	38	38	12	1	7	1194	III
taste	5	48	31	11	2	3	1283	I
smell	13	42	25	7	3	10	1248	II
turbidity	7	42	36	11	1	3	1283	I
safety	3	26	18	17	5	31	814	IV

Source: author's elaboration based on survey data

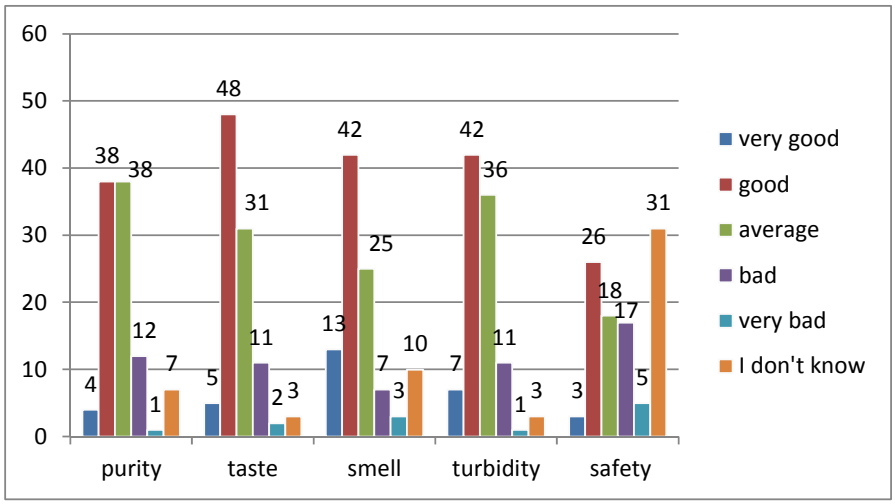

Figure 14. Consumers' evaluations of tap water quality by characteristics (% of consumer of the total population)
Source: author's elaboration based on survey data

The evaluations of the water characteristics are favourable: about half of the subjects perceive all water characteristics as very good and good; the negative evaluations are always lower than the positive ones. However, improvements should be made by solving, when is possible, the problems of the 10-22% who evaluated them as bad and very bad. Efficient communication can decrease the percentage of the "average" evaluations in favour of "good" and "very good" ones. Safety seems to be the feature customers find most difficult to evaluate. The main reason is they do not have the means to measure it directly, like in the case of taste (by tasting water), smell (by smelling it), purity and turbidity (by looking at it). They rely on external information and associate to it the evaluations of the other characteristics (bad taste/smell etc. = not safety). Good communication regarding this aspect (through water bulletin and other means) can reduce the percentage of "I don't know".

We can also calculate a general score for each characteristic (very good x 5 + good x 4 + average x 3 + bad x 2 + very bad x 1 + I don't know x 0). The scores and rankings are shown in Table 13 and Figure 15.

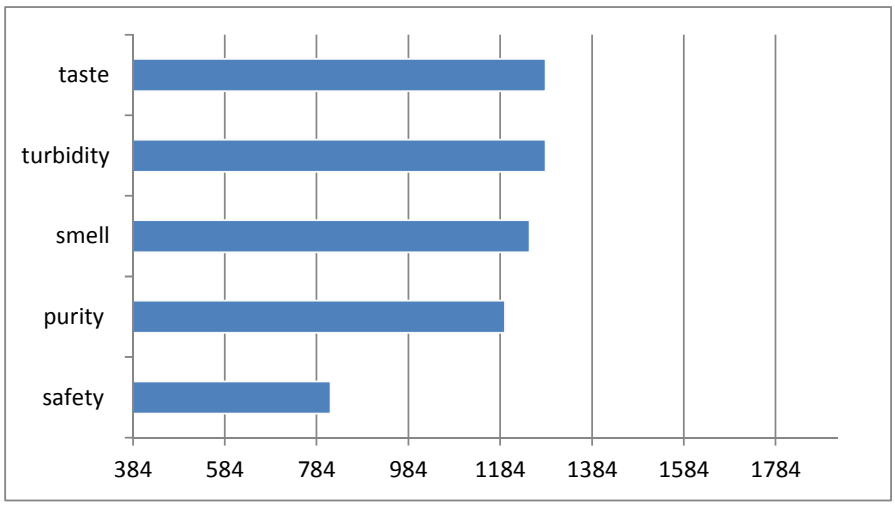

Figure 15. General evaluation of water quality based on 5 characteristics (scores from 384 to 1920)
Source: author's elaboration based on survey data

A more accurate evaluation of water quality can be done if all the stages of the water consumption process are known. One of these stages concerns the destination of waste water. At the same time, this information is useful for deeper investigation of environmental perceptions and habits. We wanted to test the awareness of waste water destination and we asked consumers: "*Where does the waste water go after they it is collected in the sewerage system?*" (Figure 16).

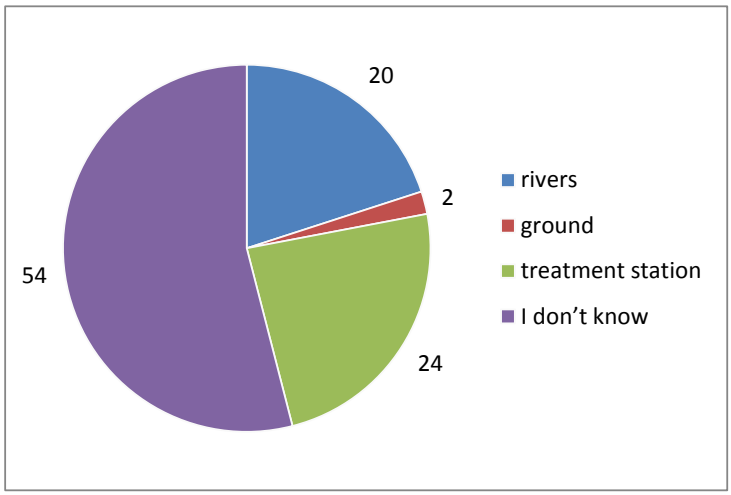

Figure 16. Awareness of the water treatment (consumers who believe that waste water has a specific destination – % of the total sample)
Source: author's elaboration based on survey data

Almost one quarter of the subjects know that water is treated. Another 21% believe it goes back in the rivers or into the ground and more than half (54%) declare they don't know what happens with it. Water treatment is a very important part of the Water Company activity. This means many people are not aware that the Water Company is doing a part of its job (treatment of waste water and, thus, protection of the environment and human health) and consequently they do not know what they are paying for. The water must comply with the water law, including the European Water Directive, which establishes a legal framework for the protection and management of water resources throughout the EU. The Water Company complies with all legal provisions. In the European Union, water legislation is one of the first sectors that was covered by the environmental policy and it comprises more than 25 water-related directives and decisions (Petrescu-Mag & Petrescu 2010). The current perception of the waste water destination must change in order to create the image of an environment oriented company for the Water Company, as it really is.

An important action that characterizes the water-related behavior is water saving. We explained first what water saving means in order to reduce errors generated by a different understanding of this action and then we asked consumers if they were engaged in saving water: "*By saving water we understand self-application of conscious restrictions to water consumption in order to reduce water consumption. Do you usually save water?*" (Figure 17).

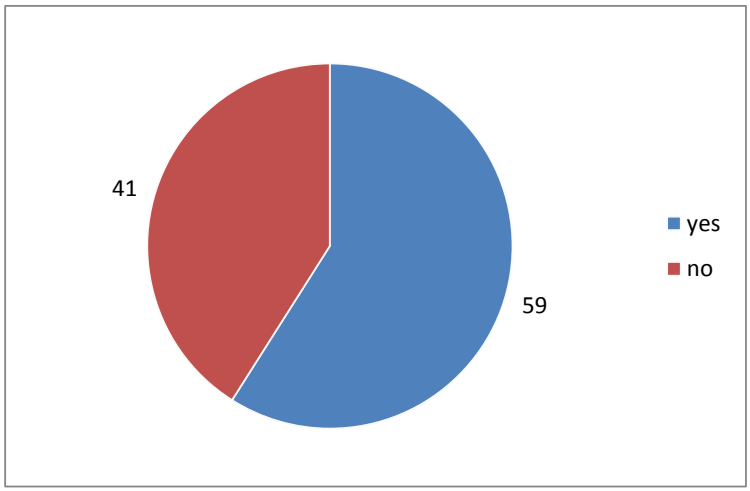

Figure 17. Presence of water saving behavior (%)
Source: author's elaboration based on survey data

More than half of the customers declare they save water. The fact that they save water is a good start for creating a more sustainable behavior.

The reasons why consumers save water are essential to understand their behavior. Consequently, we asked them why they saved water: "*Why do you save water: 1) to reduce the costs, 2) to protect the environment, 3) to respect the principle <<It is not appropriate to waste>>, 4) other reasons?*" (more than one option could be chosen) (Figure 18).

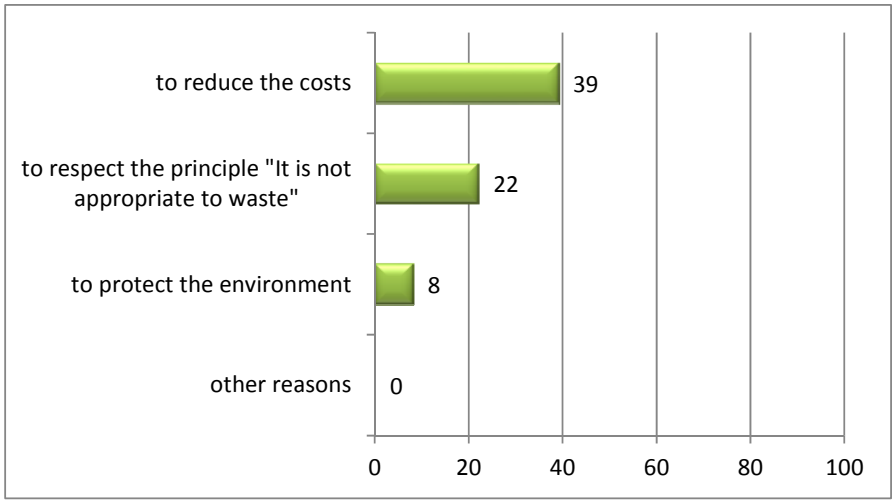

Figure 18. Reasons for saving water (% of total sample)
Source: author's elaboration based on survey data

The most frequent reason for saving water is "to reduce costs". Another frequent reason is to follow the principle "*It is not appropriate to waste*". A relatively small part of people (8%) think about environmental protection when they save water. This motivation can be related to the reason "it is not appropriate to waste", using intelligent communication, in order to power the incentive to save water; thus, the quantity of saved water per person and the number of people saving water can be increased, as there is a general interest to save water within a sustainable development vision. No other reasons for saving water besides these were mentioned.

As half of consumers save water and mostly for economic reason, knowing how many people are aware of their water consumption level and invoice value adds useful information about their attitude towards water. The question used to clarify this aspect were: "*How much do you pay for your monthly water bill?*" (Figure 19) and "*How much water does your family use monthly?*" (Figure 20).

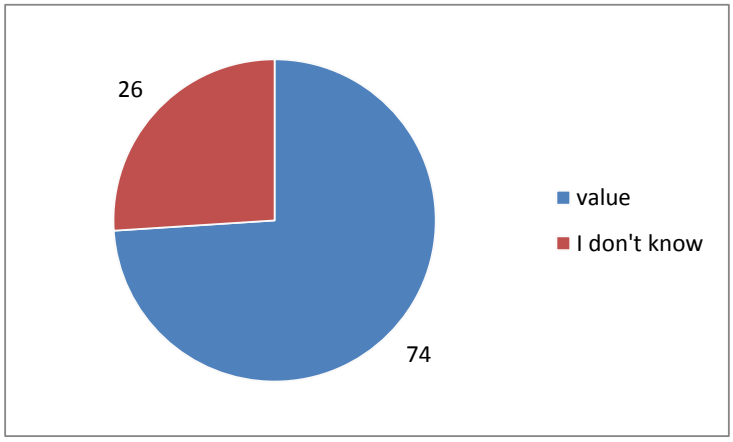

Figure 19. Awareness of the water bill value (%)
Source: author's elaboration based on survey data

At least one quarter of the respondents don't know how much they pay for water. The others mentioned a value, but it was not possible to verify its accuracy within this study.

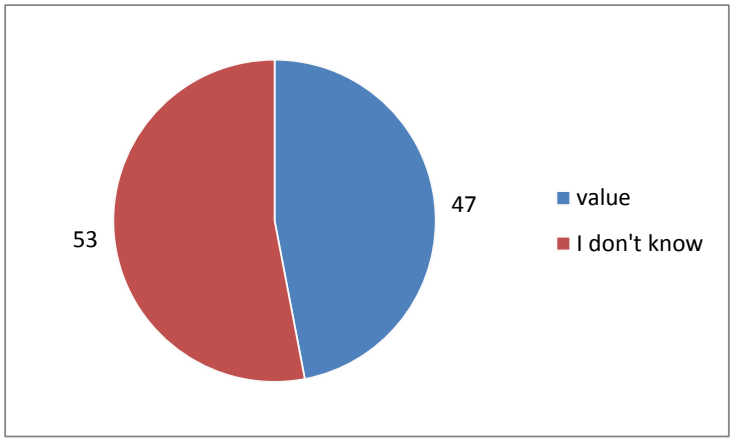

Figure 20. Awareness of the water consumption level (%)
Source: author's elaboration based on survey data

More than half of consumers cannot evaluate their monthly water consumtion. This means that they are not aware of the water price per cubic meter or the price of other services included in the water bill. The other half of respondents mentioned a value, but, again, due to objective reasons, it was not possible to verify the accuracy of the estimations.

9. Study on consumers' drinking water attitude: what they think, believe and do

The study of consumers' perceptions, opinions, actions related to drinking water is based on a convenience sample of 482 urban consumers from Cluj-Napoca (NW of Romania). The research was carried out in 2013. We considered it was more relevant for the understanding of consumers' drinking water behavior to contextualize drinking water and to analyze it next to other liquids consumers use, than to take it out of the natural drinking water consumption behavior (where various liquids are present). Consequently, the variables chosen to characterize the drinking water behaviour were: the quantity of liquids consumers drink, consumption frequency of each liquid they drink (in relation to each other), evaluation of the liquids most often used for thirst, consumers' perception of their individual and family daily fluid intake, evaluation of quantities of consumed drinking water types at individual and family level, identification of reasons for drinking bottled water, measurement of confidence in bottled water, measurement of confidence in tap water, identification of perception of bottled water quality versus tap water quality (in two forms – direct and indirect appreciation).

Statistical analysis was carried out using the software SPSS version 21. For comparison of differences regarding a categorical variable, between two groups, we used the Mann-Whitney U test. The level of statistical significance was set at $p<0.05$. To test if there is a relationship between two categorical variable, we used chi-square test (Yates' Correction for Continuity) or Fisher's Exact Probability Test, when appropriate. The level of statistical significance was set at $p<0.05$.

Some of the variable that can influence drinking water perceptions and behaviour are gender, age and presence of children in the family, which let to them being included in the questionnaire. The structure of the sample according to these variables is showed in Figures 21, 22, 23.

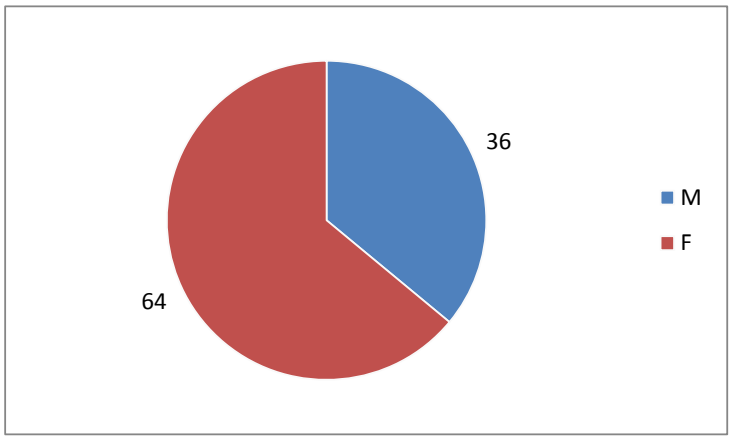

Figure 21. Sample structure by gender (%)
Source: author's elaboration

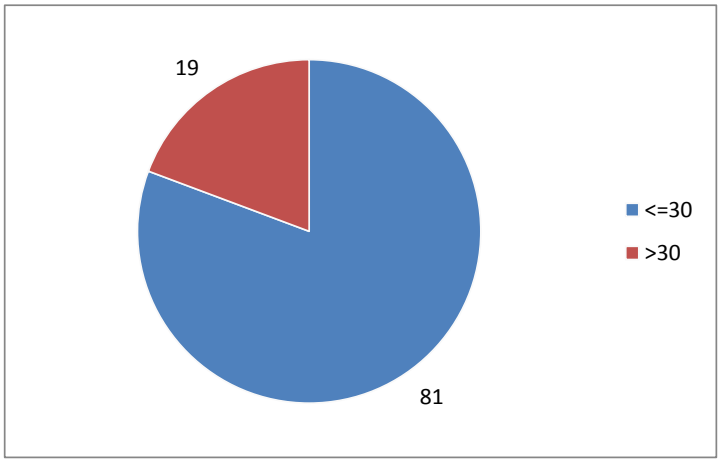

Figure 22. Sample structure by age (%)
Source: author's elaboration

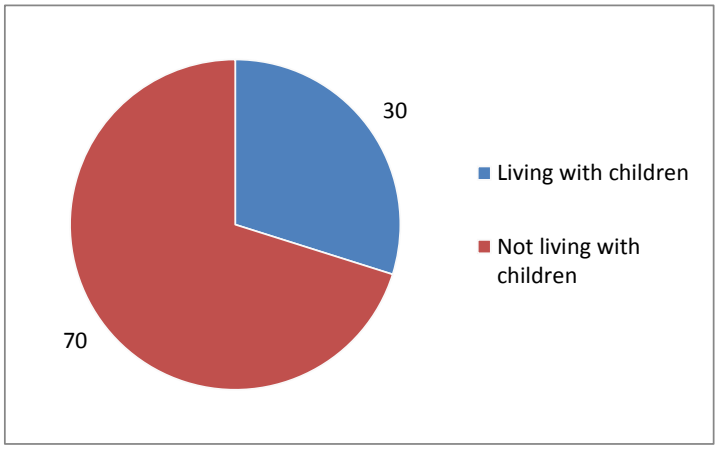

Figure 23. Sample structure by the presence of children in the family (%)
Source: author's elaboration

The quantity consumed of a product and the attitude to that product influence each other, so the first question aimed to measure the daily liquid intake. Therefore, we asked consumers the following: "*What is the average quantity of liquids that you drink daily? (The liquids may be soup, water, coffee, tea, juice, alcohol etc.)*" (Figure 24).

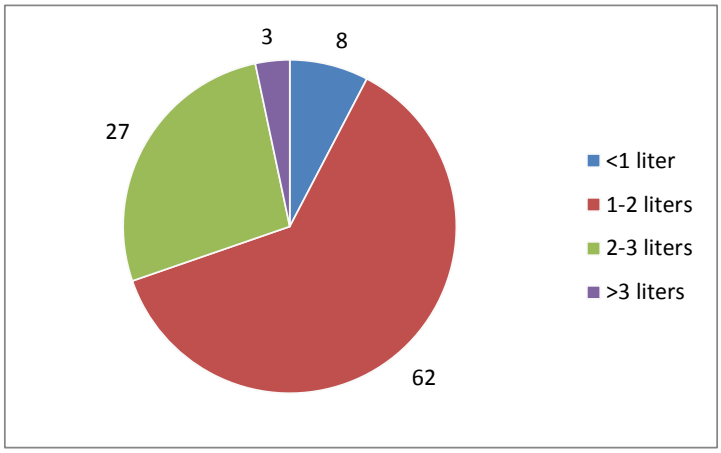

Figure 24. Daily liquid intake – self-evaluation (%)
Source: author's elaboration

More than half of the sample say they drink approximately 1-2 liters of liquids daily. One third say they have between 2 and 3 liters of liquids per day. For more than a decade, promotion in mass media has been advising people to "*drink at least 2 liters of liquids per day*" to maintain their good health, so the situation is very good as the great majority of consumers fall into this good standard.

We investigated (using Mann Whitney U test) if *men and women differ in terms of their levels of daily water consumption*; we obtained p=0.000, which means the probability value (p) is less than .05, so the result is significant. There is a statistically significant difference in the levels of daily water consumption of men (2, (2, 3)) and women (2, (2, 2)).

We investigated (using Mann Whitney U test) if *people under 30 (inclusive) and those above 30 differ in terms of their levels of daily water consumption*; we obtained p=0.270, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference in the levels of daily water consumption of people 30 or younger (2, (2, 3)) and people older than 30 years (2, (2, 3)).

We investigated (using Mann Whitney U test) if *people living with children and those living without children differ in terms of their levels of daily water consumption?*"; we obtained p=0.731, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference in the levels of daily water consumption of people living with children (2, (2, 3)) and those living without children (2, (2, 3)).

After determining the quantity of liquids consumed, the next logic step would be to investigate how much consumers drink of these. In the pre-test, we determined the liquids used by consumers and from these we selected for the study those consumed most frequently. We created a list and included them in the final questionnaire: water (all types), tea/infusion, coffee, soup, fruits/vegetables fresh, soft drinks with gas, soft drinks without gas, other liquids. The consumers were asked to estimate their liquid consumption frequency. We asked them: "*Rank the following liquids according to how often you consume them monthly: water, tea/infusion, coffee, soup, fruits/vegetables fresh, soft drinks with gas, soft drinks without gas, other (assign the 1st place to the liquid that you consume most often, ..., the 7th place – to the liquid you consume most rarely)*" (Tables 14, 15, Figure 25).

Table 14

Consumption frequency of various liquids (%)

	1st place	2nd place	3rd place	4th place	5th place	6th place	7th place	8th place
Water	85	8	3	2	1	1	0	0
Tea/Infusion	3	24	18	19	14	11	11	0
Coffee	4	26	17	13	8	8	22	2
Soup	1	19	29	21	15	9	5	1
Fruits/vegetables fresh	0	4	11	15	20	23	25	2
Soft drinks with gas	5	11	11	13	14	21	23	2
Soft drinks without gas	1	5	11	17	26	26	13	1
Other	0	1	1	1	1	2	2	92

Source: author's elaboration

The most frequent answers in "Other" category were: beer and alcohol (7% of the total sample mentioned them) and milk (3% of the total sample mentioned it).

In order to see an average position of the liquids, we calculated a score for each (number of choices for the first place x 8 + number of choices for the second place x 7 + …. + number of choices for the eighth place x 1). The scores can range from 482 to 3856 (Table 15).

Table 15

Ranking of consumption frequency of various liquids (scores and ranking)

	score	ranking
Water	3715	I
Tea/Infusion	2440	III
Coffee	2322	IV
Soup	2510	II
Fruits/vegetables fresh	1796	VII
Soft drinks with gas	2012	V
Soft drinks without gas	1950	VI
Other	609	VIII

Source: author's elaboration

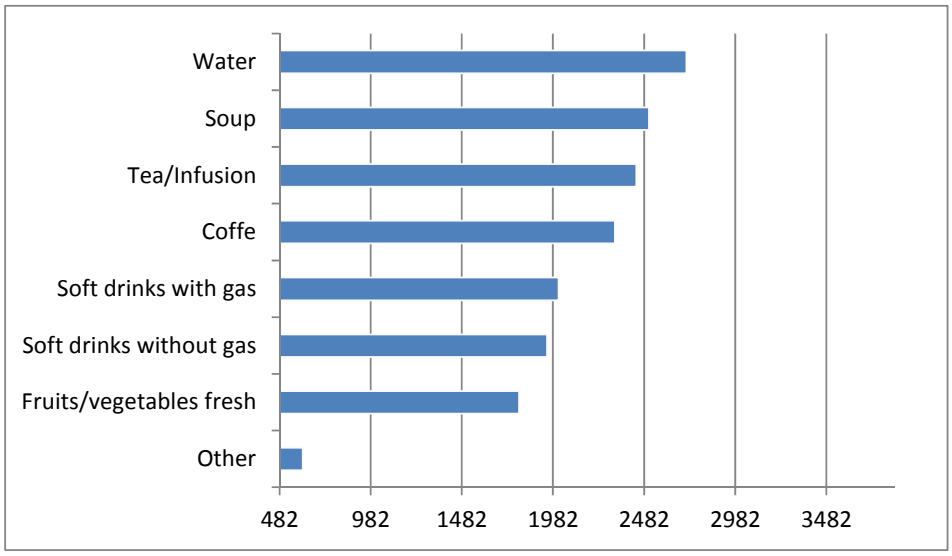

Figure 25. Ranking of consumption frequency of various liquids (scores)
Source: author's elaboration

As the study was focused on water, we wanted to test if the levels of water consumption frequency differed according to gender, age, presence of children in the family (Mann Whitney U test was used)

We investigated if *men and women differ in terms of their levels of* ***water*** *consumption frequency*; we obtained p=0.323, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference in the water consumption frequency of men (1, (1, 1)) and women (1, (1, 1)).

We investigated if *people under 30 (inclusive) and those above 30 differ in terms of their levels of* ***water*** *consumption frequency*; we obtained p=0.330, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference in the water consumption frequency of people 30 or younger (1, (1, 1)) and people older than 30 years (1, (1, 1)).

We investigated if *people living with children and those living without children differ in terms of their* ***water*** *consumption frequency*; we obtained p=0.877, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference in the water consumption frequency of people living with children (1, (1, 1)) and those living without children (1, (1, 1)).

Thirst is one of the main reasons why people drink liquids, so we referred to thirst when we tested the frequency consumption for various liquids. We asked: "*Which of the following liquids do you use most often to quench your thirst: bottled still water, water with gas, tap water, tea/infusion, coffee, fruits/vegetables fresh, soft drinks with gas, soft drinks without gas, other? Rank the first there. Mention the first three of them.*" (Table 16, Figure 26). For this question, we put a special focus on water; we first made a list with different possible types of drinking water and from these we chose the most common ones (during a pretest) and included them in this question: bottled still water, water with gas (also bottled), tap water.

Table 16
Consumption frequency of various liquids (the first three most consumed) used for thirst (%; score; rank)

	1st place	2nd place	3rd place	Score	Rank
Bottled still water	62	13	7	1062	I
Water with gas	6	10	11	233	V
Tap water	22	21	9	562	II
Tea/Infusion	2	21	14	299	IV
Coffee	0	5	6	79	VIII
Soft drinks without gas	1	6	14	141	VII
Soft drinks with gas	5	15	20	314	III
Fruits/vegetables fresh	0	7	15	150	VI
Other	0	2	4	47	IX

Source: author's elaboration

The most frequent answers in "Other" category were: beer (4% of total sample), milk (2% of the total sample) and soup (1% of the total sample). The scores can range from 0 to 1446.

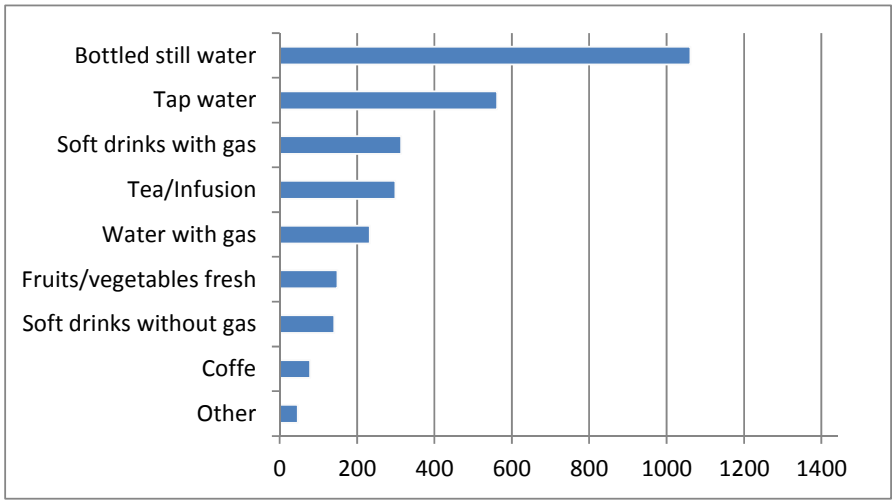

Figure 26. Ranking of consumption frequency of various liquids (scores) used to quench thirst (the first three places)
Source: author's elaboration

During the last decade, the promotion of water and liquid daily consumption increased (in Romania): advertising in mass media and frequent medical advice have been encouraging people to consume "at least 2 liters of water or other liquids" (non-alcoholic). At global level, consumption of bottled water is increasing by ten percent every year (Hu et al 2011), a trend also visible in Romania. We wanted to investigate consumers' perception of their own daily liquids intake. The comparison could have been made with various reference points: the 2 liters mentioned by doctors and advertising

spots, consumers' estimation of an optimum quantity, past intakes, etc. Health is a primary concern for most people, so we chose this aspect as reference point (at the same time, it assimilates recommendations and information of optimum intake). The question we formulated was: "*How do you evaluate your daily fluid intake in relation to what you think it would be ideal for your health: sufficient, too low, too high*?" (Figure 27).

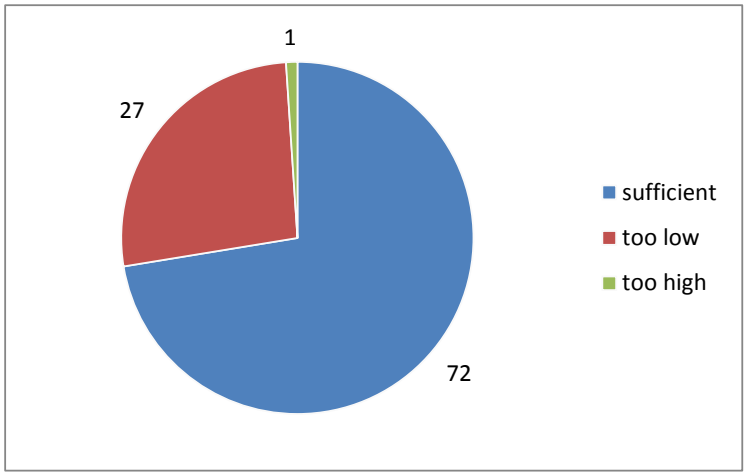

Figure 27. Self-evaluation of daily liquid intake (% of people giving a certain evaluation)
Source: author's elaboration

The majority consider they drink the right quantity of liquids, one quarter think they do not drink enough liquids and only a few (1%) believe they drink too much liquids. The main reasons why they do not have enough liquidsare: they don't feel the need to drink, they don't feel thirsty (almost half of those who perceive their liquid consumption as low) and lack of time (16%) (Figure 28). Those who say they drink too much motivate: addiction to Coke and habit.

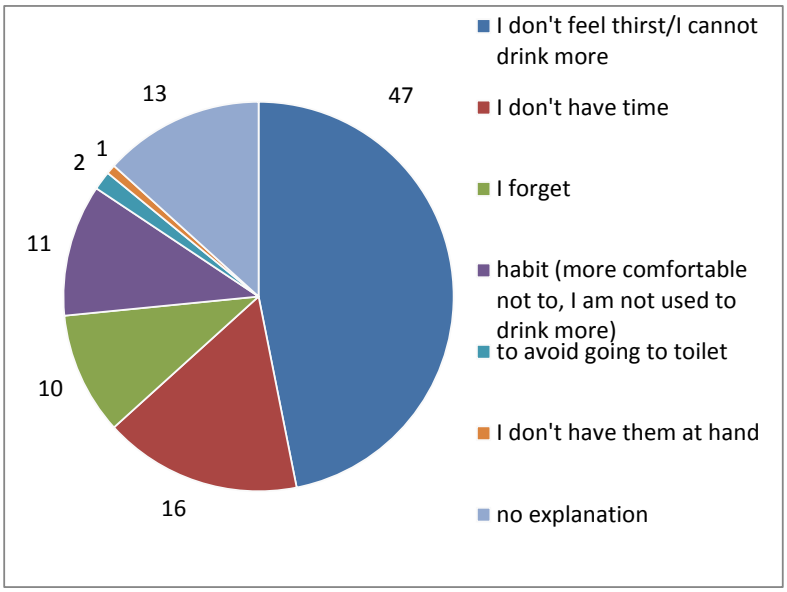

Figure 28. Main causes/reasons for low liquid intake (%)
Source: author's elaboration

We investigated (using Mann Whitney U test) if *men and women differ in terms of their evaluation of their own daily liquids intake*; we obtained p=0.008, which means the probability value (p) is less than .05, so the result is significant. There is a statistically significant difference between evaluation of their daily liquids intake of man (1, (1, 1)) and women (1, (1, 2)).

We investigated (using Mann Whitney U test) if *people under 30 (inclusive) and those above 30 differ in terms of their evaluation of their own daily liquid intake*; we obtained p=0.674, which means the probability value (p) is higher than .05, so the result is not significant. There is not a statistically significant difference between evaluation of their daily liquid intake of people under 30 (1, (1, 2)) and those above 30 (1, (1, 2)).

We also wanted to know consumers' perception of their own daily intake of water. We asked: "*How do you evaluate your daily water intake in relation to what you think it would be ideal for your health: sufficient, too low, too high*?" (Figure 29).

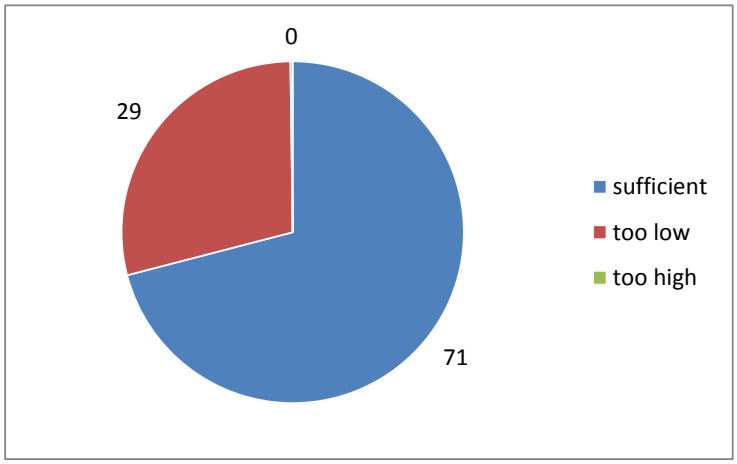

Figure 29. Self-evaluation of daily water intake (% of people giving a certain evaluation)
Source: author's elaboration

The general perception on water intake is similar to the one on liquid intake: almost three quarters believe they drink just the right quantity of water and about one quarter think they do not have enough. The following are the main reasons for insufficient water intake: consumers don't feel the need to drink, they do not feel thirsty (almost half of those who perceive their water consumption as low) and lack of time (13%) (Figure 30). Among "other reasons", the most frequent one was that they drink other liquids.

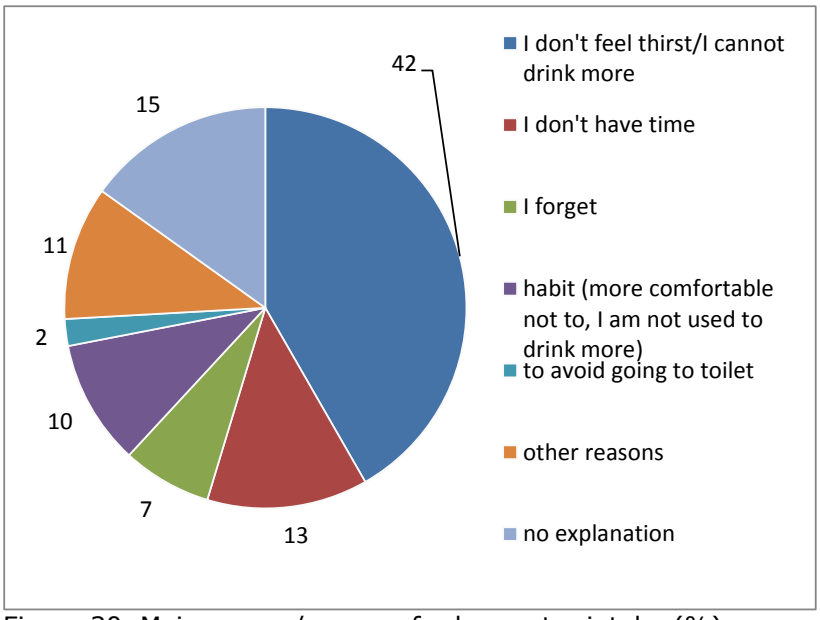

Figure 30. Main causes/reasons for low water intake (%)
Source: author's elaboration

We investigated (using Mann Whitney U test) if *men and women differ in terms of their evaluation of their own daily water intake*; we obtained p=0.008, which means the probability value (p) is less than .05, so the result is significant. There is a statistically significant difference between evaluation of their daily water intake of men (1, (1, 1)) and women (1, (1, 2)).

We investigated (using Mann Whitney U test) if *people under 30 (inclusive) and those above 30 differ in terms of their evaluation of their own daily water intake*; we obtained p=0.226, which means the probability value (p) is higher than .05, so the result is not significant. There is not a statistically significant difference between evaluation of their daily water intake of people under 30 (1, (1, 2)) and those above 30 (1, (1, 1)).

Water is the most consumed liquid, therefore additional information on its consumption is important. We identified the available types of water: simple tap water, filtered tap water, bottled plain water, bottled sparkling water (with high or low gas). We wanted to see how much consumers drink of each. We asked: "*Of all water that you consume on average during one month, specify how much of each type do you drink (we refer to plain water, not in the form of tea, syrup, coffee, etc.)*" (Table 17, Figure 31).

Table 17

Water consumption by type and quantity in the total amount of water consumed monthly (percentage of consumers of the total sample; scores for the last column)

	0	1-25%	26-50%	51-75%	>75%	scores
tap water	22	29	18	21	10	801
filtered tap water	67	20	8	3	2	263
bottled plain water	7	24	30	22	17	1054
bottled sprinkle water	27	47	16	6	4	536

Source: author's elaboration

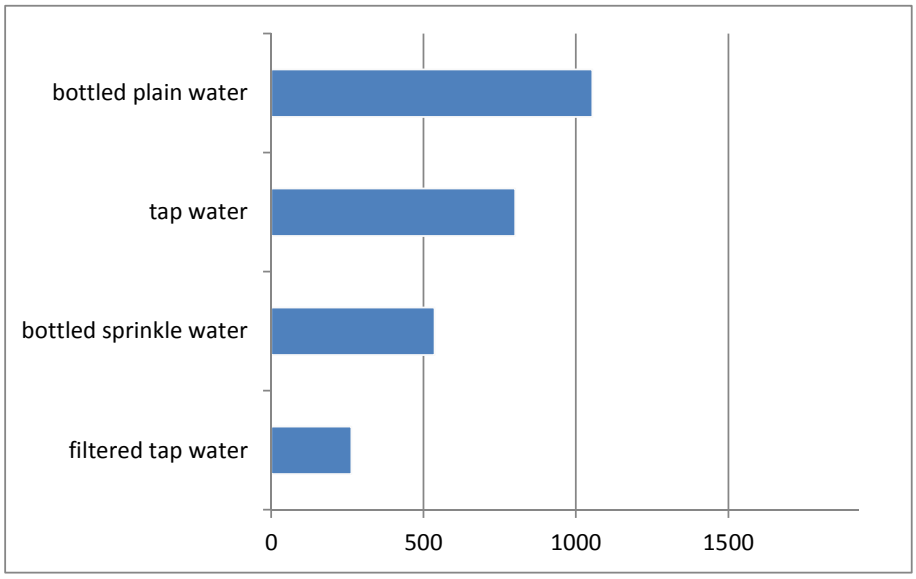

Figure 31. Subjects' ranking of water types and quantity consumed monthly (scores)
Source: author's elaboration

Consumers estimate that, of the four water types, their monthly consumption is especially of bottled still (plain) water; tap water comes in the second place. The score for each type of water was calculated like this: number of subjects that chose "0" x 0 + no subjects that chose "1-25%" x 1 + no subjects that chose "26-50%" x 2 + no subjects

that chose "51-75%" x 3 + no subjects that chose ">75%" x 4. The scores can range from 0 to 1928.

We investigated (using Mann Whitney U test) if *men and women differ in terms of their monthly intake of: (a) tap water, (b) filtered tap water, (c) plain water, (d) sparkling water.* We obtained p=0.331, p=0.734, p=0.431, p=0.022 which means the probability value (p) is higher than .05, in the first three cases, so the result is not significant, and lower than .05 in the last case, so the result is significant. There is not a statistically significant difference between men and women in terms of their monthly intake of: (a) tap water [men(1, (1, 3)), women(2, (1, 3))], (b) filtered tap water [men(0, (0, 1)), women(0, (0, 1))], (c) plain water [men(2, (1, 3)), women(2, (1, 3))] and there is a statistically significant difference between men and women in terms of their monthly intake of (d) sparkling water [men(1, (1, 2)), women(1, (0, 1))].

We also inquired on the water consumption of the whole family: "*Of all water that your family consumes on average during one month, specify how much of each type do your family drink (we refer to plain water, not in the form of tea, syrup, coffee, etc.)*" (Table 18, Figure 32).

Table 18

Family water consumption by type and quantity in the total amount of water consumed monthly (percentage of consumers of the total sample; scores for the last column)

	0	1-25%	26-50%	51-75%	>75%	scores
tap water	27	25	20	19	9	756
filtered tap water	67	19	8	3	3	273
bottled plain water	9	25	32	21	13	976
bottled sprinkle water	20	43	23	11	3	653

Source: author's elaboration

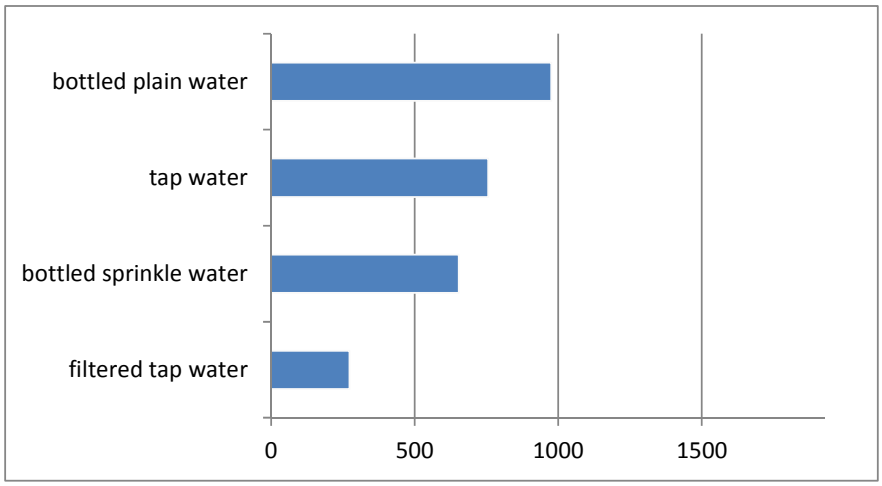

Figure 32. Family's ranking of water types and quantity consumed monthly (scores)
Source: author's elaboration

Family water consumption is similar to personal consumption. According to consumers' estimations, of the four types of water, bottled plain water dominates in terms of monthly consumed quantity by the family; tap water comes in the second place. The score for each type of water was calculated as in the previous case. The scores can range from 0 to 1928.

We investigated (using Mann Whitney U test) if *families living with children and those without children differ in terms of their monthly intake of: (a) tap water, (b)*

filtered tap water, (c) plain water, (d) sparkling water. We obtained p=0.291, p=0.530, p=0.191, p=0.500 which means the probability value (p) is higher than .05 in all cases, so the result is not significant. There is no statistically significant difference between families living with children and those without children in terms of their monthly intake of: (a) tap water [with children(1.5, (1, 3)), without children(1, (0, 3))], (b) filtered tap water [with children (0, (0, 2)), without children (0, (0, 2))], (c) plain water [with children (2, (1, 3)), without children (2, (1, 3))] and (d) sparkling water [with children (1, (1, 2)), without children (1, (1, 2))].

Bottled water is intensively promoted as a pure and healthy option and, due to this it has become the major alternative to tap water. Besides, many consumers believe it is superior to tap water even if such assumptions are not necessarily true all the time. Studies conducted on bottled water consumption have shown that the main reasons consumers turn to this alternative are: better taste, convenience, mistrust, perceived purity, health concerns (Huerta-Saenz et al 2012; Hu et al 2011; Gorelick et al 2011). However, there is little evidence to support the fact that bottle water is safer than tap water; for example, in the US, the largest bottled water consumer in the world, municipal tap water has to comply with more rigorous standards and more frequent monitorization than bottled water (Saylor et al 2011). Bottled water was also found in various studies to be contaminated and to bring health risks (Gorelick et al 2011). Environmental pressure caused by bottled water production, distribution and disposal is a weak point compared to tap water that may influence consumer behaviour. For this study, as we wanted to know the reasons behind bottled water consumption, we asked consumers the following question: "*Why do you drink bottled water? Options: you never drink it; other reasons: ...; to quench your thirst; because your friends / acquaintances do so; due to specialists' recommendation (doctors, researchers, etc.); because it is healthier than other liquids; due to its mineral content; due to bad experiences with tap water; due to habit; due to your friends' recommendations; due to low content of nitrates, nitrites; due to your doctor's recommendations; due to the positive effects you noticed on others' health; due to the positive effects you noticed on your health*" (Figure 33, Tables 19, 20, 21).

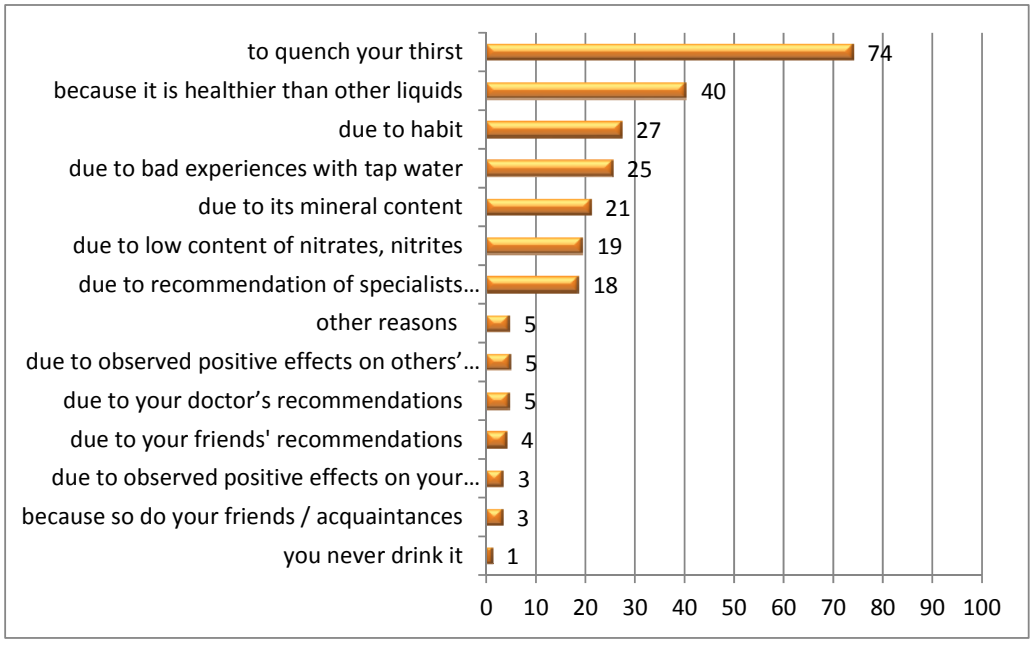

Figure 33. Reasons for drinking bottled water (percentage)
Source: author's elaboration

The reason mentioned by most consumers was thirst, followed by the fact that bottled water is healthier than other liquids. Other frequent motivations were habit, due to bad

experience with tap water, mineral content, low nitrates content, specialists' recommendations. The most frequent other reasons were: convenience – it is easier to find or handle it; purity, good filtration; taste.

To test if there is a relationship between gender and various reasons to drink bottled water we used chi-square test (Yates' Correction for Continuity) or Fisher's Exact Probability Test, when appropriate. The research questions are: "*Is there a relationship between gender and the habit to drink bottled water?*" and "*Is there a relationship between gender and a specific reason for drinking bottled water?*" (Table 19).

Table 19

Proportion of males and females that have a certain reason for drinking bottled water

	Consumption of bottled water				Other reasons		
	Yes	No	*p*		Yes	No	*p*
M	98.8%	1.2%	1.00	M	95.3%	4.7%	1.00
F	99%	1%		F	95.2%	4.8%	

	To quench thirst				Because so do my friends/ acquaintances		
	Yes	No	*p*		Yes	No	*p*
M	70.2%	29.8%	0.21	M	2.9%	97.1%	1.00
F	75.9%	24.1%		F	3.2%	96.8%	

	Due to recommendation of specialists				Because it is healthier than other liquids		
	Yes	No	*p*		Yes	No	*p*
M	21.1%	78.9%	0.34	M	45%	55%	0.14
F	17%	83%		F	37.6%	62.4%	

	Due to its mineral content				Due to bad experiences with tap water		
	Yes	No	*p*		Yes	No	*p*
M	25.7%	74.3%	0.07	M	28.7%	71.3%	0.25
F	18.3%	81.7%		F	23.5%	76.5%	

	Due to habit				Due to friends' recommendations		
	Yes	No	*p*		Yes	No	*p*
M	23.4%	76.6%	0.20	M	5.8%	94.2%	0.18
F	29.3%	70.7%		F	2.9%	97.1%	

	Due to low content of nitrates, nitrites				Due to your doctor's recommendations		
	Yes	No	*p*		Yes	No	*p*
M	5.6%	94.4%	0.72	M	7.6%	92.4%	**0.03**
F	18.6%	81.4%		F	2.9%	97.1%	

	Due to positive effects that you noticed that it had on others' health		
	Yes	No	*p*
M	7%	93%	0.14
F	3.5%	96.5%	

	Due to positive effects that you noticed that it had on your health		
	Yes	No	*p*
M	3.5%	96.5%	1.00
F	3.2%	96.8%	

Source: author's calculations

We obtained $p>0.05$ for all variables except for "Due to your doctor's recommendations", so the result is not significant for all cases except for the above mentioned one. This means that the proportion of males that drink bottled water is not significantly different from the proportion of females that drink bottled water; it also means that the proportion of males that drink bottled water for a certain reason is not significantly different from the proportion of females that drink bottled water for the same reason, in all the cases tested except for the reason "Due to your doctor's recommendations". The proportion of males that drink bottled water due to their doctor's recommendations differ significantly from the proportion of females that drink bottled water because their doctor recommended it ($p=0.032$). This means personal doctor recommendations may have a different persuasion power (self-acknowledged by consumers) on women than on men.

To test if there is a relationship between age (people under 30 years, inclusive, and those above 30) and various reasons to drink bottled water we used chi-square test (Yates' Correction for Continuity) or Fisher's Exact Probability Test, when appropriate. The research questions are: "*Is there a relationship between the age and the habit to drink bottled water?*" and "*Is there a relationship between age and a specific reason for drinking bottled water?*" (Table 20).

Table 20

Proportion of people under 30, inclusive, and above 30 that have a certain reason for drinking bottled water

	Consumption of bottled water		
	Yes	No	*p*
<=30	0.5%	99.5%	0.052
>30	3.2%	96.8%	

	Other reasons		
	Yes	No	*p*
<=30	4.9%	95.1%	1.00
>30	4.3%	95.7%	

	To quench thirst		
	Yes	No	*p*
<=30	75.3%	24.7%	0.17
>30	67.7%	32.3%	

	Because so do my friends/ acquaintances		
	Yes	No	*p*
<=30	3.1%	96.9%	1.00
>30	3.2%	96.8%	

	Due to recommendation of specialists		
	Yes	No	*p*
<=30	17.2%	82.8%	0.20
>30	23.7%	76.3%	

	Because it is healthier than other liquids		
	Yes	No	*p*
<=30	41.1%	58.9%	0.49
>30	36.6%	63.4%	

	Due to its mineral content		
	Yes	No	*p*
<=30	16.7%	83.3%	**0.00**
>30	38.7%	61.3%	

	Due to bad experiences with tap water		
	Yes	No	*p*
<=30	25.4%	74.6%	0.99
>30	24.7%	75.3%	

	Due to habit		
	Yes	No	*p*
<=30	29.6%	70.4%	**0.023**
>30	17.2%	82.8%	

	Due to friends' recommendations		
	Yes	No	*p*
<=30	3.6%	96.4%	0.39
>30	5.4%	94.6%	

	Due to low content of nitrates, nitrites		
	Yes	No	*p*
<=30	18%	82%	0.18
>30	24.7%	75.3%	

	Due to your doctor's recommendations		
	Yes	No	*p*
<=30	3.3%	96.7%	**0.022**
>30	9.7%	90.3%	

	Due to positive effects that you noticed that it had on others' health		
	Yes	No	*p*
<=30	4.1%	95.9%	0.18
>30	7.5%	92.5%	

	Due to positive effects that you noticed that it had on your health		
	Yes	No	*p*
<=30	2.1%	97.9%	**0.005**
>30	8.6%	91.4%	

Source: author's calculations

We obtained $p>0.05$ for the variables: bottled water consumption; other reasons; to quench your thirst; because so do your friends/acquaintances; due to recommendation of specialists (doctors, researchers, etc.); because it is healthier than other liquids; due to bad experiences with tap water; due to your friends' recommendations; due to low content of nitrates, nitrites; due to positive effects that you noticed that it had on others' health. This means that the result is not significant. We can conclude that the proportion of people under 30 (inclusive) that drink bottled water is not significantly different from the proportion of people above 30 that drink bottled water. We can also understand that the proportion of people under 30 (inclusive) that drink bottled water for one of the reasons mentioned above is not significantly different from the proportion of people above 30 that drink bottled water for the same reason.

We obtained $p<0.05$ for the variables: due to its mineral content; due to habit; due to your doctor's recommendations; due to positive effects that you noticed that it had on your health. This means that the result is not significant in these cases. We can conclude that the proportion of people under 30 (inclusive) that drink bottled water for one of the reasons mentioned above is significantly different from the proportion of people above 30 that drink bottled water for the same reason; in other words, these reasons have a higher power to trigger consumption on one group than on the other.

To test if there is a relationship between the presence of children in the family and various reasons to drink bottled water we used chi-square test (Yates' Correction for Continuity) or Fisher's Exact Probability Test, when appropriate. The research questions are: "*Is there a relationship between the presence of children in the family and the habit to drink bottled water?*" and "*Is there a relationship between the presence of children in the family and a specific reason for drinking bottled water?*" (Table 21).

Table 21

Proportion of people with children in the family and without children that have a certain reason for drinking bottled water ("+"= "with children", "-" = without children)

	Consumption of bottled water		
	Yes	No	*p*
+	2.8%	97.2%	**0.03**
-	0.3%	99.7%	

	Other reasons		
	Yes	No	*p*
+	5.6%	94.4%	0.77
-	4.4%	95.6%	

	To quench thirst		
	Yes	No	*p*
+	73.6%	26.4%	1.00
-	74%	26%	

	Because so do my friends/ acquaintances		
	Yes	No	*p*
+	1.4%	98.6%	0.25
-	3.8%	96.2%	

	Due to recommendation of specialists		
	Yes	No	*p*
+	19.4%	80.6%	0.82
-	18%	82%	

	Because it is healthier than other liquids		
	Yes	No	*p*
+	35.4%	64.6%	0.19
-	42.3%	57.7%	

	Due to its mineral content		
	Yes	No	*p*
+	23.6%	76.4%	0.42
-	19.8%	80.2%	

	Due to bad experiences with tap water		
	Yes	No	*p*
+	18.1%	81.9%	**0.025**
-	28.4%	71.6%	

	Due to habit		
	Yes	No	*p*
+	25%	75%	0.56
-	28.1%	71.9%	

	Due to friends' recommendations		
	Yes	No	*p*
+	2.8%	97.2%	0.55
-	4.4%	95.6%	

	Due to low content of nitrates, nitrites		
	Yes	No	*p*
+	21.5%	78.5%	0.49
-	18.3%	81.7%	

	Due to your doctor's recommendations		
	Yes	No	*p*
+	4.2%	95.8%	0.97
-	4.7%	95.3%	

	Due to positive effects that you noticed that it had on others' health		*p*
	Yes	No	
+	4.2%	95.8%	0.86
-	5%	95%	

	Due to positive effects that you noticed that it had on your health		*p*
	Yes	No	
+	5.6%	94.4%	0.94
-	2.4%	97.6%	

Source: author's calculations

We obtained $p>0.05$ for all variables except for "Consumption of bottled water" and "Due to bad experiences with tap water", so the result is not significant for all cases except for the two cases mentioned above. This means that the proportion of people with children that drink bottled water is significantly different from the proportion of people without children that drink bottled water. It also means that the proportion of people with children that drink bottled water for a certain reason is not significantly different from the proportion of people without children that drink bottled water for the same reason, in all the cases tested except for the one mentioned above. The proportion of people with children that drink bottled water due bad experiences with tap water differ significantly from the proportion of people without children that drink bottled water because of bad experiences with tap water.

To test the direct perception of compared quality of bottled and tap water, we asked consumers directly to say how much they agree/disagree with the statement: "*Bottled water has a higher quality than tap water.*" (Figure 34).

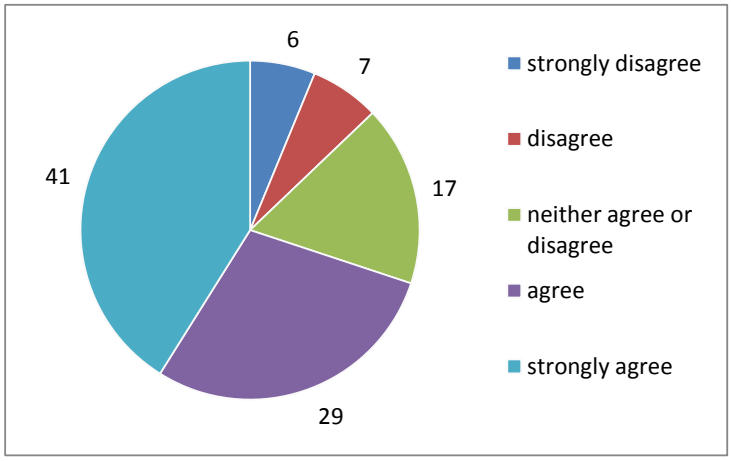

Figure 34. Consumers' evaluation of bottled water quality vs tap water quality (%)
Source: author's elaboration

Water quality in the area where consumers were investigated (Cluj-Napoca, Romania) complies with all legal standards and is high, according to chemical analyses at deliverance point (Rosu et al 2008; ***, 2014, Buletin de analiza a apei). This means the objective quality of tap water is at least equal to that of bottled water. However, bottled water is perceived as better and, usually, it is the perceived quality, not the real (objective) one, that influences consumption actions. This perception can be generated by two facts: drinking water perception and water consumption behavior has changed in the favor of bottled water by the intense promotion of the benefits of the latter; tap water is indeed of poor quality, despite the high quality of the water delivered by the Water Company. This is due to the fact that private water network are old and degraded altering the quality of the drinking water delivered by the Water Company (private water networks are those installed between the street water meter and the tap and they are the property of the final customers – people living in houses, blocks etc.). Thus, for these cases, even if the Water Company delivers good water to its customers, what gets to the tap is bad-smelling, bad-tasting, high-turbidity water.

We investigated (using Mann Whitney U test) if *men and women differ in terms of appreciation of bottled water quality vs tap water quality*; we obtained p=0.010, which means the probability value (p) is lower than .05, so the result is significant. There is a statistically significant difference between men (4, (4, 5)) and women (4, (3, 5)) in terms of their appreciation of bottled water quality vs tap water quality.

We investigated (using Mann Whitney U test) if *people under 30 (inclusive) and those above 30 differ in terms of appreciation of bottled water quality vs tap water quality*; we obtained p=0.302, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference between people under 30 (4, (3, 5)) and those above 30 (4, (3, 5)) in terms of their appreciation of bottled water quality vs tap water quality.

Young children (and babies) are very sensitive and parents need to pay special attention to their nutrition. For this reason, we considered they were the best reference point for evaluating the water quality: if it is good for little children, it is also good for other consumers. We asked: Indicate how much you agree/disagree with the statement: "*For young children, bottled water is better than tap water.*" (Figure 35).

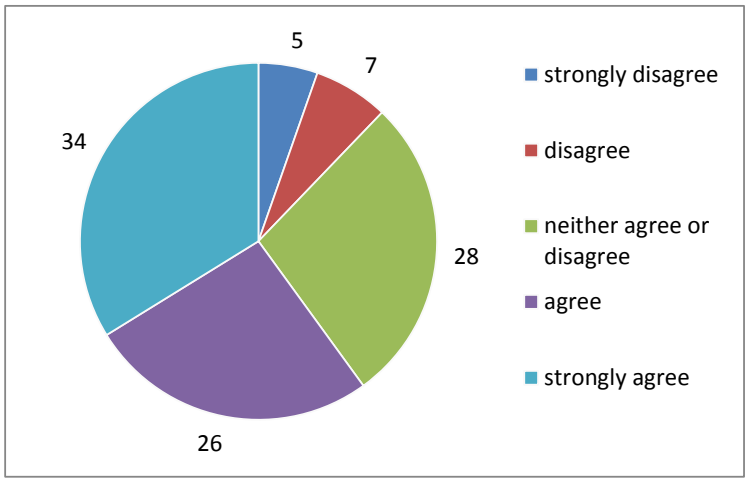

Figure 35. Consumers' evaluation of bottled water vs tap water in terms of being suitable for little children (%)
Source: author's elaboration

We investigated (using Mann Whitney U test) if *men and women differ in terms of appreciation of bottled water vs tap water being suitable for babies*; we obtained p=0.606, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference between men (4, (3, 5)) and women (4, (3, 5)) in terms of their appreciation of bottled water vs tap water being suitable for babies.

We investigated (using Mann Whitney U test) if *people under 30 (inclusive) and those above 30 differ in terms of appreciation of bottled water vs tap water being suitable for babies*; we obtained p=0.720, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference between people under 30, inclusive (4, (3, 5)) and those above 30 (4, (3, 5)) in terms of their appreciation of bottled water vs tap water being suitable for babies.

We investigated (using Mann Whitney U test) if *people living with children and those without children differ in terms of appreciation of bottled water vs tap water being suitable for babies*; we obtained p=0.946, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference between people living with children (4, (3, 5)) and those without children (4, (3, 5)) in terms of their appreciation of bottled water vs tap water being suitable for babies.

The beliefs concerning water quality influence water consumption. We wanted to see how much consumers trust tap and bottled water and to compare the results. We asked them to indicate how much they agree/disagree with the statement: "*I have high confidence in bottled water.*" (Figure 36).

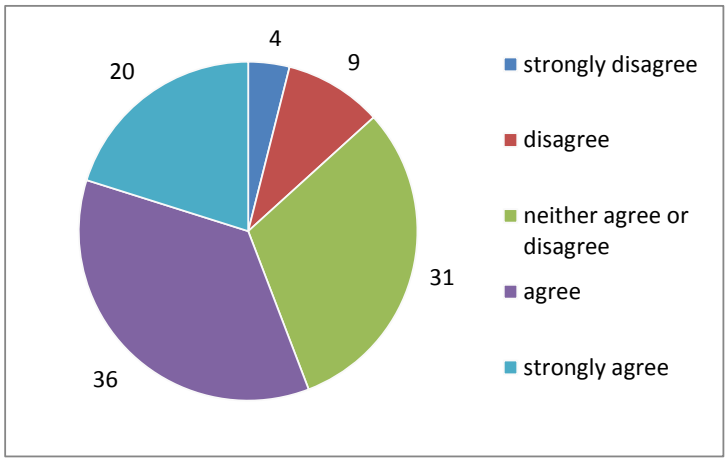

Figure 36. Consumers' trust in bottled water (%)
Source: author's elaboration

We investigated (using Mann Whitney U test) if *men and women differ in terms of their confidence in bottled water quality*; we obtained p=0.806, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference between men (4, (3, 4)) and women (4, (3, 4)) in terms of their confidence in bottled water quality.

We investigated (using Mann Whitney U test) if *people under 30 (inclusive) and those above 30 differ in terms of their confidence in bottled water quality*; we obtained p=0.371, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference between people under 30, inclusive, (4, (3, 4)) and those above 30 (4, (3, 4)) in terms of their confidence in bottled water quality.

Consumers were also asked to to indicate how much they agree/disagree with the statement: "*I have high confidence in tap water.*" (Figure 37).

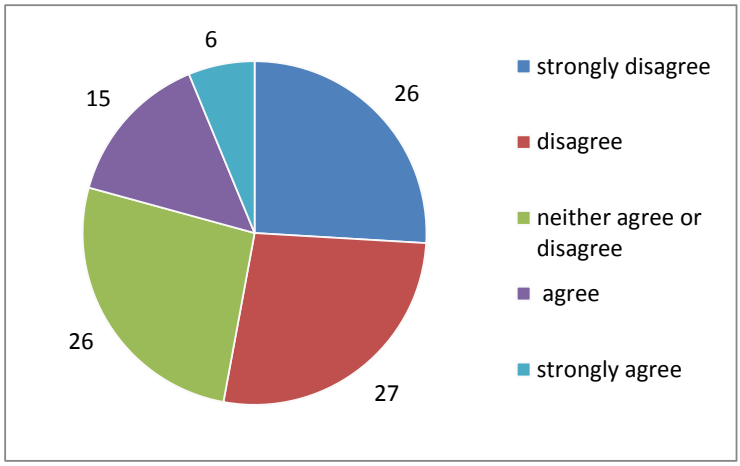

Figure 37. Consumers' confidence in tap water (percentage)
Source: author's elaboration

We investigated (using Mann Whitney U test) if *men and women differ in terms of their confidence in tap water quality*; we obtained p=0.806, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant

difference between men (2, (1, 3)) and women (3, (1, 3)) in terms of their confidence in tap water quality.

We investigated (using Mann Whitney U test) if *people under 30 (inclusive) and those above 30 differ in terms of their confidence in tap water quality*; we obtained p=0.328, which means the probability value (p) is higher than .05, so the result is not significant. There is no statistically significant difference between people under 30, inclusive, (2 (1, 3)) and those above 30 (3, (2, 3)) in terms of their confidence in tap water quality.

To compare the average confidence level of bottled and tap water we calculated the scores for each (number of subjects giving the evaluation "strongly disagree" x 1 + ... + number of subjects giving the evaluation "strongly agree" x 5) (Figure 38).

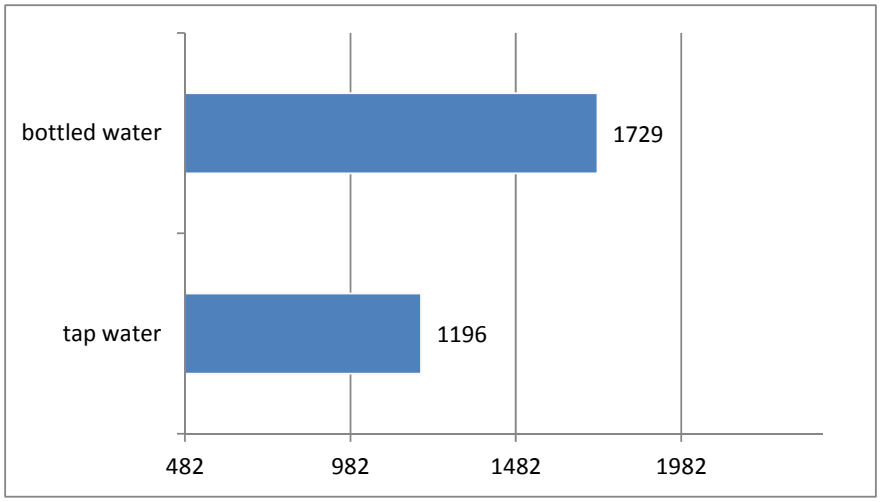

Figure 38. Consumers' trust in tap and bottled water (scores)
Source: author's elaboration

10. In brief: water and consumers

We studied consumers to find out what they think/do in relation to (A) their Water Company, (B) its connection to environmental protection, (C) their water consumption from two perspectives –financial (money) and physical (volume of water) (see Figure 39) and what is their (D) drinking water attitude – perceptions, feelings, actions (see Figure 40). To understand the image of the water company in consumers' mind we took into account five variables: (1) its presence in mass-media; (2) type of image in: mass-media, group of friends, consumer's conversations; (3) investment awareness, presence through actions/works for service improvement; (4) importance of the Water Company by characteristics; (5) tap water evaluation by characteristics. The Water Company image can be integrated in a broader context, related to environmental protection and to economic aspects. To do this, we took into account awareness of waste water destination, water saving behavior, awareness of water bill value and of amount of water consumed monthly.

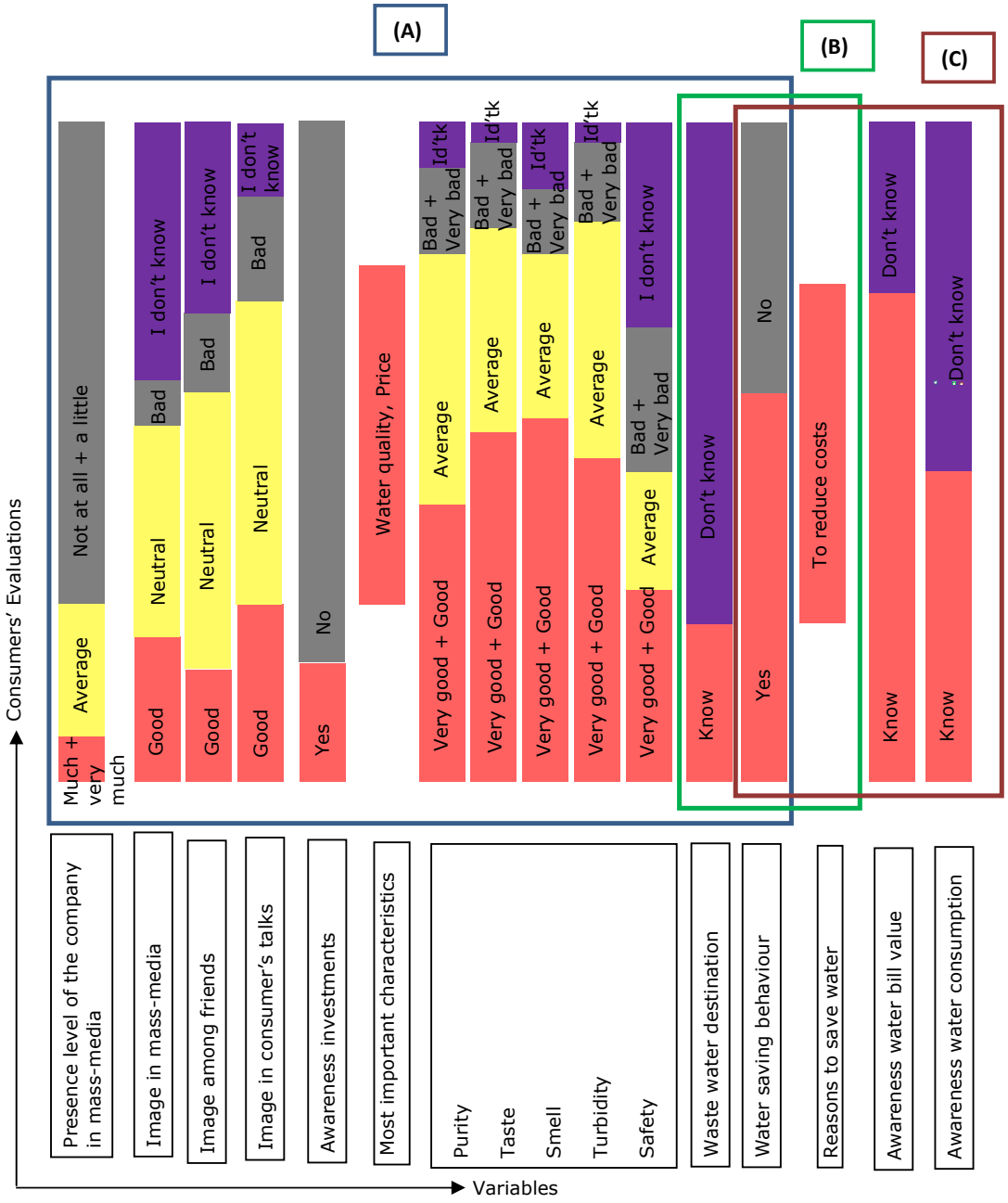

Figure 39. Synthesis of consumers' perceptions, beliefs, habits in relation to: (A) their Water Company, (B) its connection to environmental protection, (C) their water consumption (financial and physical)
Source: author's elaboration

From the point of view of its presence in mass-media, the water company is mostly absent, according to consumers' perceptions (73%). The type of image is predominantly positive and neutral (in mass-media – 54%, in consumers' friends' discussions – 59%, in consumer's discussions – 73%). The investments of the Water Company are little remembered (18%). Consumers care the most about water quality and price, from all characteristics tested in the study. The water is well appreciated by most consumers (very good and good evaluations were given by most consumers: purity – 42%, taste – 53%, smell – 55%, turbidity – 49%, safety – 28%). Most consumers are not aware of the waste water destination (76%). Around half consumers save water (59%), especially

to reduce costs. The majority knows (or have the impression they know) the value of their water bill (74%) and around half know (or have the impression they know) the volume of water they consumed (47%).

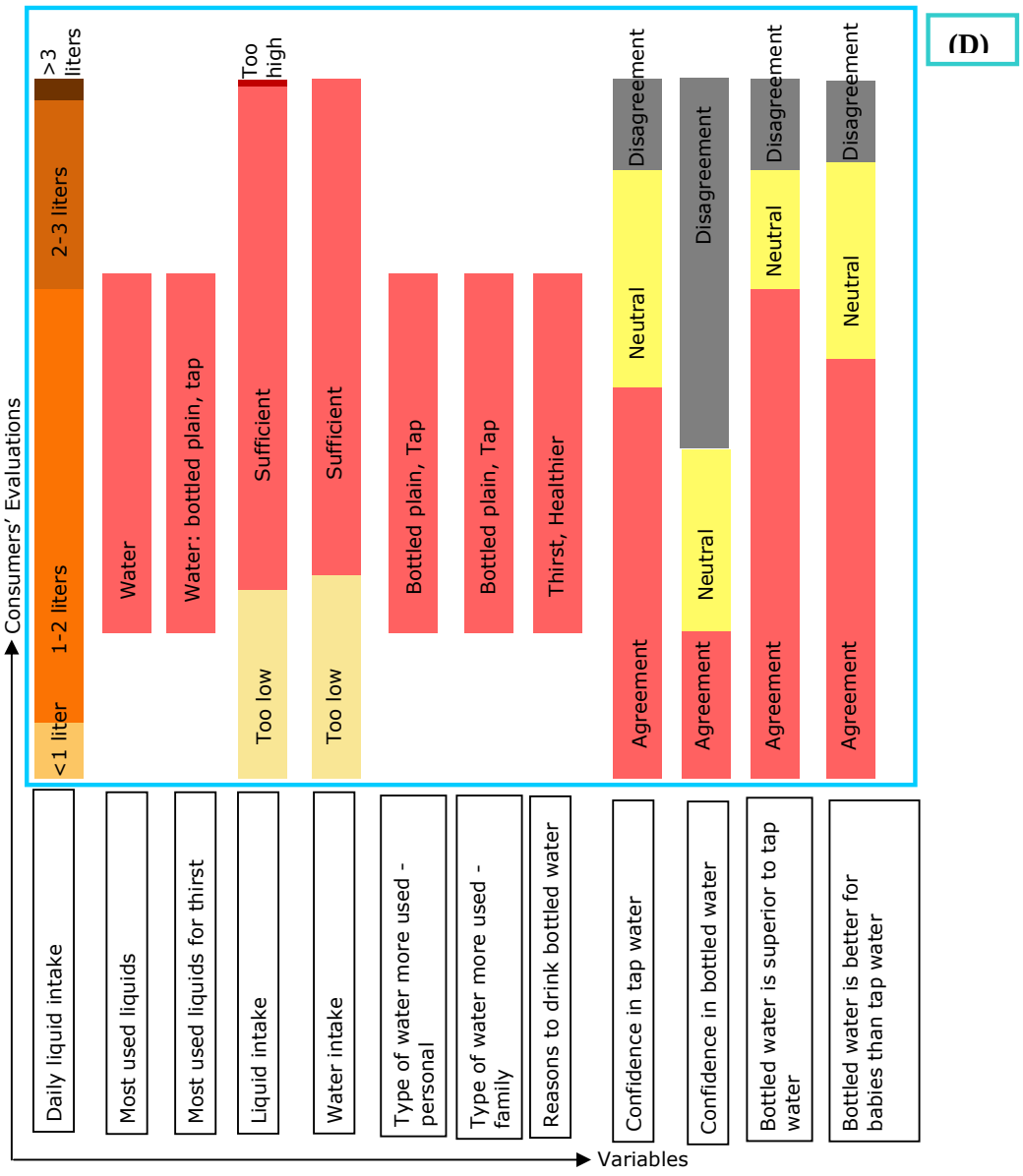

Figure 40. Synthesis of consumers' drinking water attitude (D)
Source: author's elaboration

Drinking water attitude was investigated by putting the water in a broader context that took into account the consumption of various liquids. We focused on information about: quantity of daily liquids intake, consumption frequency of various liquids (including water), consumption frequency of various liquids (including water) for thirst, self-evaluation of personal and family daily fluid intake, personal and family consumption pf various types of water, reasons to drink bottled water, perception of tap water and bottled water quality.

Statistical analysis was carried out using the software SPSS version 21. For comparison of differences regarding a categorical variable, between two groups, we used the Mann-Whitney U test. The level of statistical significance was set at $p<0.05$. To test if

there is a relationship between two categorical variables we used chi-square test (Yates' Correction for Continuity) or Fisher's Exact Probability Test, when appropriated. The level of statistical significance was set at $p<0.05$.

Most of consumers tested (62%) drink between 1-2 liters of liquids per day and the most used liquid is water. There is a statistically significant difference in the levels of daily water consumption of men and women, but we found no difference according to age (below 30 years and above 30) and no difference according to the presence of children in the family. The liquid used most often for thirst is water, in form of bottled still water and tap water. The levels of water consumption frequency do not differ significantly according to gender, age, presence of children in the family.

Most consumers (72%) perceive their daily liquid intake as good, sufficient. There is a statistically significant difference between evaluation of their daily liquids intake of men and women, but we found no statistically significant difference between people under 30 years (inclusive) and those above 30 years old.

Regarding their water intake, again, most consumers (71%) perceive it as good, sufficient. There is a statistically significant difference between evaluation of their daily water intake of men and women, but there is not a statistically significant difference between people under 30 years (inclusive) and those above 30 years old.

Within subject's water consumption by type and quantity in total amount of water consumed monthly, the first places belong to bottled plain water and tap water. The same situation occurs for their total family water consumption. There is not a statistically significant difference between men and women in terms of their (declared) monthly intake of: tap water, filtered tap water, plain water and there is a statistically significant difference between men and women in terms of their monthly intake of sparkling water. There is no statistically significant difference between families living with children and those without children in terms of their (declared) monthly intake of: tap water, filtered tap water, plain water and sparkling water.

The main reasons to drink bottled water are thirst and the fact that is perceived as healthier than other liquids. The proportion of men that drink bottled water is not significantly different from the proportion of women that drink bottled water. The proportion of men that drink bottled water for a certain reason is not significantly different from the proportion of women that drink bottled water for the same reason, in all the cases tested except for the reason "Due to your doctor's recommendations"; here, the proportion of men that drink bottled water due to their doctor's recommendations differ significantly from the proportion of women that drink bottled water because their doctor recommended it. The proportion of people under 30 (inclusive) that drink bottled water is not significantly different from the proportion of people above 30 that drink bottled water. The proportion of people under 30 (inclusive) that drink bottled water for the following reasons is not significantly different from the proportion of people above 30 that drink bottled water for the same reason: to quench your thirst; because so do your friends/acquaintances; due to recommendation of specialists (doctors, researchers, etc.); because it is healthier than other liquids; due to bad experiences with tap water; due to your friends' recommendations; due to low content of nitrates, nitrites; due to positive effects that you noticed that it had on others' health; other reasons. The proportion of people under 30 (inclusive) that drink bottled water for one of the following reasons is significantly different from the proportion of people above 30 that drink bottled water for the same reason: due to its mineral content; due to habit; due to your doctor's recommendations; due to positive effects that you noticed that it had on your health. The proportion of people with children that drink bottled water is significantly different from the proportion of people without children that drink bottled water. The proportion of people with children that drink bottled water for a certain reason is not significantly different from the proportion of people without children that drink bottled water for the same reason, in all the cases tested except for the reason "Due to bad experiences with tap water"; the proportion of people with children that drink bottled water due bad experiences with tap water differ significantly from the proportion of people without children that drink bottled water because of bad experiences with tap water.

Around half (56%) of subjects have confidence in bottled water. There is no statistically significant difference between men and women in terms of their confidence in bottled water quality and there no significant difference between people under 30 (inclusive) and those above 30 in terms of their confidence in bottled water quality.

One fifth (21%) of tested consumers have confidence in tap water. There is no statistically significant difference between men and women and between people under 30 (inclusive) and those above 30 in terms of their confidence in tap water quality.

Most of consumers tested (70%) believe bottled water is superior to tap water. There is a statistically significant difference between men and women in terms of their appreciation of bottled water quality vs tap water quality. There is no statistically significant difference between people under 30 (inclusive) and those above 30 in terms of their appreciation of bottled water quality vs tap water quality.

More than half (60%) of consumers believe that bottled water is better for young children than tap water. There is no statistically significant difference in terms of their appreciation of bottled water vs tap water being suitable for babies between men and women, between people under 30 (inclusive) and those above 30, between people with children and those without children in the family.

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