GREY WATER REUSE IN THE EU

Legal Obstacles, Shared Solutions and Future Challenges

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1. INTRODUCTION

According to certain data, less than 1 per cent of global water resources are actually fresh and renewable.[1] Except for in the most developed countries, the vast majority of wastewater is discharged directly into the environment without adequate treatment.[2] Pollution will be driven by higher populations and economic growth, and the lack of wastewater treatment will result in an additional reduction in water resources.[3] After it has been used, water is all too often seen as a burden to be disposed of, or a nuisance to be ignored.[4] As Emmerson claims, "[p]eople commonly say we 'use' water, however, it is more accurate to say we dirty it."[5]

The lack of fresh water is one of the world's main problems, and results from overpopulation, urbanisation and climate change: each of these factors will be considered below.

When we think about these three factors, we can also recall the words of Italo Calvino, who, writing about Marco Polo's visit to Kublai Khan, says:

> Hell, if there be such a thing – is not tomorrow. Hell is right here, and today we live in it; together we make it up. There are only two ways to avoid suffering in this Hell. The first way out is easy for most people: Let Hell be, live it up, and stop noticing it.

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1 *D. Brooks, O. Brandes and S. Gurman*, *Making the Most of the Water We Have: The Soft Path Approach to Water Management*, London: Earthscan, 2009, pp. 4–20.

2 *UNESCO World Water Assessment Programme*, *The United Nations World Water Development Report 2017: Wastewater, the untapped resource*, Paris: UNESCO 2017, Executive Summary, pp. 1–12.

3 *A. Boretti and L. Rosa*, "Reassessing the projections of the World Water Development", *npj Clean Water*, pp. 2, 15, 2019, p. 3.

4 *UNESCO*, *World Water Assessment Programme*, supra note 2.

5 *G. Emmerson*, "Every Drop is Precious: Greywater as an Alternative Water Source", Queensland Parliamentary Library, Research Bulletin no. 4/98, Brisbane, 1998, p. 11.

> The second way is risky. It demands constant attentive curiosity to find out who and what in midst of this Hell is not part of it, so as to make it last by giving space to it.[6]

The situation in the world will be aggravated by unequal population growth in various geographical areas, unrelated to local resources. Many regions and countries in the world will face problems arising from the increase in their populations. This will lead to the phenomenon of overpopulation, which will stretch current water resources to their limits, cause an increase in water pollution, and, potentially, lead to the danger of civil and international conflicts, especially over existing water supplies. One of the main consequences of overpopulation is the pressure on available water resources used to supply the population. It is necessary to prepare for the future thoroughly and rationally. According to Food and Agricultural Organization (FAO) data, in addition to the agricultural sector, which is responsible for 70 per cent of water abstraction worldwide,[7] large increases in water demand for industry and energy production are projected.

One definition of urbanisation is that it is "a complex socio-economic process that transforms the built environment, converting formerly rural into urban settlements, while also shifting the spatial distribution of a population from rural to urban areas".[8] According to expectations and certain estimates, if the current trend continues, the twenty-first century will be the century when the world's population becomes predominantly urban.[9] The global urban population exceeded the global rural population in the year 2007, for the first time in history.[10] Taking into account that, by 2018, half of the world's population lived in cities, it is estimated that, by end of this decade, that percentage will increase to 60 per cent, and one in every three people will live in cities with at least half a million inhabitants.[11] The expansion of municipal water supply, sanitation systems and urbanisation contributes to the rising demand for water. The regulation of the relationship between humanity and water is closely linked to how political power is exercised. The structure of the powers within the community is also conditioned by the bond that is established between people and the water resource.[12] As the urban population grows, increasing quantities of water are diverted to cities; however, those diversions require

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6 *I. Calvino*, *Le città invisibili*, Milan: Mondadori, 2020, p. 160.

7 *FAO*, *Water pollution from agriculture: a global review*, Rome: UN, 2017, p. 2.

8 *United Nations*, *World Urbanization Prospects 2018*, New York: Department of Economic and Social Affairs, Population Division, 2019, p. 1.

9 *A. Gregory and M. Hall*, *Urban water sustainability*, Clayton, Australia: CSIRO, 2011, p. 75.

10 *United Nations*, *World Urbanization Prospects 2018*, supra note 8, p. 5.

11 *United Nations*, *The World's Cities in 2018 – Data Booklet*, Department of Economic and Social Affairs, Population Division, New York: UN, 2018.

12 *R. Louvin*, *Aqua Æqua Dispositivi giuridici, partecipazione e giustizia per l'elemento idrico*, Torino: G. Giappichelli Editore, 2018, p. 68.

massive infrastructure, and affect aquatic ecosystems from which water is taken. Moreover, water conveyance requires substantial energy inputs. Supplying the increasing urban demand thus has major implications for energy use, and consequently for greenhouse gas emissions.

Climate change has become an inevitable phenomenon in recent years and is expected to gain momentum in the coming period. The most significant force that drives climate change is anthropogenically released greenhouse gases.[13] According to scientists, dry regions will become drier, and wet regions wetter.[14] In other words, evaporation may dry out some areas and cause water to fall as excess precipitation on others. As water is a common component of the entire climate system (i.e. the atmosphere, hydrosphere, cryosphere and biosphere), any change in the climate impacts on water through different means.[15] Thus, more and more solar energy will be trapped, which will lead to the intensification of the hydrological cycle, resulting in changes of the precipitation pattern. Such changes will worsen the situation with floods and droughts, and will have a drastic impact on the availability of fresh water.[16] Furthermore, a warmer temperature increases the rate of evaporation of water into the atmosphere, and thus increases the atmosphere's capacity to hold water.[17] Consequently, as temperatures rise, more water is needed for people and animals to maintain their health and thrive, but also for diverse economic activities, such as growing food crops, raising livestock and producing energy for power plants. A higher temperature can reduce the toxic levels, facilitating biodegradation of chemicals, but may also increase toxicity.[18] In areas that are experiencing increases in rainfall, diverse types of problems can emerge. Some of these concern water infrastructure, sewer systems, water treatment plants, etc.[19]

Changing climate events, such as extreme weather ranges, will lead to more untreated wastewater. Emerging needs, accompanied by climate change, consist of adaptation of wastewater management. Namely, there is considered to be a vicious cycle involving climate change and wastewater management, with each problem intensifying the other. During wastewater treatment, the emission of greenhouse gases occurs, contributing to the problem of climate change.[20]

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13 *International Panel for Climate Change*, *Fifth assessment report for climate change*, Geneva: WMO, UNEP, 2013, pp. 13–14.

14 *R.P. Singh A.S. Kolok and S.L. Bartelt-Hunt* (eds.), *Water Conservation, Recycling and Reuse: Issues and Challenges*, Singapore: Springer, 2019, p. 204; See also *M.G. Donat et al.*, "More extreme precipitation in the world's dry and wet regions", *Nature Climate Change*, 2016, pp. 508–513.

15 *R.P. Singh, A.S. Kolok and S.L. Bartelt-Hunt*, supra note 14, p. 207.

16 Ibid.

17 *FAO*, supra note 7.

18 *R.P. Singh, A.S. Kolok and S.L. Bartelt-Hunt*, supra note 14, p. 206.

19 *Ibid.*, pp. 205–206.

20 *Ibid.*, p. 203.

Therefore, it can easily be said that the influence is mutual and reciprocal. Various issues are associated with climate change and wastewater treatment operations. Climate change not only affects freshwater resources, but also affects wastewater treatment, through an overabundance of water or a lack of water, and through poor water quality. The impacts on the wastewater infrastructure can be directly or indirectly associated with climate change. The indirect impacts are reflected in the decreasing usage of water that flows into the wastewater transmission and treatment systems. Further, this implies a decrease in the overall water volume, but not the waste load.[21]

In reality, numerous urban water systems are already under pressure, and may face additional challenges, while associated structures and facilities are vulnerable to the adverse effects of climate change.[22] Floods, whether they are the result of increased rainfall or are created during storms, affect wastewater treatment plants' efficiency. Significant damage can be caused to the environment and people by floods, which have a strong potential to release untreated waste into the ecosystem, if they affect wastewater facilities.[23] Damage caused to wastewater treatment plants can take some time to repair, further implying a possible release of untreated waste. The rise in temperature may also impose certain unwanted effects on wastewater treatment plants, reflected in a rising likelihood of sewer corrosion and odour problems.[24] Warmer temperatures may indirectly cause grave weather conditions, exacerbated by urban heat islands, which could, in turn, result in additional convective thunderstorms, hail, cyclonic events, and higher winds, that may exceed the design capacity of the infrastructure.[25] Moreover, a higher temperature may reduce the quality of wastewater. Facilitating the growth of algal bloom in wastewater will reduce the dissolved oxygen concentration. With a higher temperature, organic matter decomposition could increase, releasing the nutrients (nitrogen and phosphorus) into water, thereby increasing the eutrophication of wastewater.[26]

Given all the above facts, contributing to higher water stress, ever-increasing water demand, and a growing gap between water supply and demand, it is no surprise that global water demand is projected to increase significantly over the coming decades.

If current trends continue, water quality will continue to deteriorate over the coming decades, especially in resource-poor countries, endangering human health and ecosystems, contributing to water scarcity, and limiting sustainable

21 *A. Zouboulis and A. Tolkou*, *Effect of Climate Change in Wastewater Treatment Plants: Reviewing the Problems and Solutions*, Cham: Springer, 2015, p. 10.
22 *R.P. Singh, A.S. Kolok and S.L. Bartelt-Hunt*, supra note 14, p. 209.
23 *A. Zouboulis and A. Tolkou*, supra note 21, p. 7.
24 *R.P. Singh, A.S. Kolok and S.L. Bartelt-Hunt*, supra note 14, p. 207.
25 *A. Zouboulis and A. Tolkou*, supra note 21, p. 6.
26 *R.P. Singh, A. S. Kolok and S.L. Bartelt-Hunt*, supra note 14, p. 107.

economic development.[27] The question of quality entails the no less important question of quantity, from which emerges the concern of whether we will have enough water to meet our needs. Moreover, humanity's bad habits, combined with his lifestyle, play a significant part in an irrational relationship with water.

2. THE IMPORTANCE OF GREY WATER REUSE

> Unless one merely thinks the man was intended to be an all-conquering and sterilising power in the world, there must be some general basis for understanding what it is the best to do. This means looking for some wise principle of co-existence between man and nature.[28]

The economic value and environmental importance of grey water are often underestimated. Grey water should be viewed as a valuable resource, not as waste. Grey water, with its nutrients, has the potential to replace commercial fertilisers. Its reuse could result in various benefits, such as reduced water and fertiliser costs, reductions in water bills, etc.[29] The benefits of water reuse are economic, social and environmental, such as:

a) increased availability of drinking water, by using drinking water for drinking and reclaimed water for other purposes;
b) reduced production costs for the use of high-quality reclaimed water;
c) reduced energy consumption, which would be consumed by using deep groundwater;
d) increased agricultural production;
e) reduced nutrient loads to receiving waters;
f) reducing water imports or the need for desalination;
g) enhanced environmental protection by restoration of streams, wetlands and ponds;
h) increased employment and local economy;
i) integrated and sustainable use of water resources.[30]

Grey water management is gaining more and more attention, because improper wastewater management is one of the most important causes of environmental

[27] *D.A. Caponera*, *Principles of Water Law and Administration*, Rotterdam: Brookfield, 1992, pp. 14–15.
[28] *C.S. Elton*, *The Ecology of Invasions by Animals and Plants*, Chicago: University of Chicago Press, 1958, p. 145.
[29] *A. Morel and S. Diener*, *Greywater Management in low and middle-income countries, review of different treatment systems for households or neighbourhoods*, Dübendorf: Swiss Federal Institute of Aquatic Science and Technology (Eawag), 2006, p. 7.
[30] *L.A. Sanz and B. M. Gawlik*, Water Reuse in Europe – Relevant guidelines, needs for and barriers to innovation, Luxembourg: JRC Science and Policy Reports, 2014, pp. 9–10.

pollution and diseases. Although less contaminated than other wastewater sources, untreated grey water contains pathogens, salts, solid particles, fat, oil and chemicals.[31] Hence, the two main risks are the presence of pathogenic microorganisms and toxic heavy metals. The microbial risk implies two abilities: one is the ability to reproduce in the environment; the other is to survive, and to be transmitted to humans directly via contact with grey water, or indirectly via insect vectors. A long-term risk for humans and animals is a concentration of heavy metals in grey water.[32] Grey water management is a precondition for clean and healthy living conditions.[33] If reuse practices are inappropriate, the substances described above may potentially cause harm to human health, and to soil and groundwater quality.[34] Using untreated grey water for irrigation purposes is highly inadvisable.[35] Its harmful effects on soil can include changing the soil's hydrochemical characteristics.

One potential alternative means of mitigating water insecurity is grey water treatment, to provide sufficient quantities and reserves of fresh water in the future, while not endangering the environment. If given the necessary attention, this practice could help reduce overreliance on freshwater resources, and reduce pollution caused by the discharge of untreated grey water into freshwater resources.

An alternative source of water, including safe wastewater management, could be of enormous help to protect ecosystems, energy, nutrients and other renewable materials.[36] Compared with rainwater harvesting, which is dependent on hydrological conditions, grey water reuse has been considered a reliable method of ensuring water security.[37] In any case, discharging grey water into the sewer is a missed opportunity to save resources.

Therefore, there is a need for proper and harmonised European legislation that will address different types of water reuse. To achieve this, it is necessary, first, to set out a common understanding/definition of grey water, and to recognise its different grades, and its distinction from black water.

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31 *A. Morel and S. Diener*, supra note 29, p. 6.

32 *R.M.S. Mohamed, A.A. Saeed Al-Gheethi and A.H.M. Kassim*, *Management of Greywater in Developing Countries: Alternative Practices, Treatment and Potential for Reuse and Recycling*, Cham: Springer, 2019, p. 46.

33 *B. Imhof and J. Mühlemann*, *Greywater treatment on household level in developing countries – a state of the art review*, Zurich: Swiss Federal Institute of Technology, 2005, p. 35.

34 *L.A. Sanz and B. M. Gawlik*, supra note 30, pp. 9–10.

35 Ibid.

36 *B. Dabić, E. Mladenović and J. Grabić*, "Potencijali sive vode za navodnjavanje urbanog zelenila: Osvrt na stanje u Republici Srbiji", *Glasnik Šumarskog fakulteta Univerziteta u Banjoj Luci*, 2018, p. 104.

37 *M. Oteng-Peprah, M. Agbesi Acheampong and N.K. deVries*, "Greywater Characteristics, Treatment Systems, Reuse Strategies and User Perception – a Review", *Water Air Soil Pollution*, 2018, p. 225.

3. CHARACTERISTICS OF GREY WATER

In general terms, grey water is a type of wastewater that is generated from household activities.[38] As it is less polluted than sewage, grey water also represents one of the best sources of potable water. "Grey water" can be defined as "untreated wastewater from washbasins, baths, showers and laundry facilities that excludes WC, urinal, bidets, soiled laundry water, cleaner's sinks, kitchen sinks and dishwashers or other wastewater which is of non-domestic origin".[39] It is called grey water because, if stored for even short periods, the water will often cloud, turning a grey colour.[40] Various different countries have different definitions of grey water: some of these include water sourced from the kitchen and dishwasher, but other countries do not include wastewater from the washing machine.[41] However, there is a consensus on the distinction between grey water and black water. Both can be reused, after different levels and methods of treatment. The separation of grey water from black water is considered a critical step for proper management aimed at facilitating the treatment process. Grey water has a lower quality than potable water, and a higher quality than black water (toilet wastewater). Grey water contains its own division: there is light grey water and dark grey water. Whereas light grey water includes wastewater from the bathroom, showers and tubes, dark grey water includes more contaminated waste, from laundry facilities, dishwashers and kitchen sinks.[42]

The characteristics of grey water depend on several factors. Important roles are played by customs, lifestyles, chemical household products and other household activities. No less important is the distribution link of drinking water or grey wastewater, and the quality of supply.[43] Grey wastewater has different characteristics depending on where it is generated:[44] whether it originates from the bathroom, laundry, kitchen, or is of mixed origin. It follows that different types of grey wastewater will have different pre-treatment needs, but will also be suitable for different types of reuse. The analysis of grey water characteristics in the different categories shows that kitchen grey water and laundry grey water are higher in both organics and physical pollutants, compared with bathroom

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38 *R.M.S. Mohamed, A.A. Saeed Al-Gheethi and A.H.M. Kassim*, supra note 32, p. 3.

39 *D.T.K. James et al.*, "Grey water reclamation for urban non-potable reuse – challenges and solutions a review", 2016, p. 4.

40 *G. Emmerson*, supra note 5, p. 8.

41 *WHO, Overview of greywater management health considerations, Discussed and approved at the regional consultation on national priorities and plans of action on management and reuse of wastewater, Amman, Jordan* (Report WHO-EM/CEH/125/E), Geneva: WHO, 2006, p. 8.

42 *A. Albalawneh and C. Tsun-Kuo*, "Review of the Greywater and Proposed Greywater Recycling Scheme for Agricultural Irrigation Reuses", *International Journal of Research – Granthaalayah*, 2015, p. 17.

43 *E. Eriksson et al.*, "Characteristics of grey wastewater", Environment & Resources DTU, Technical University of Denmark, Lyngby, 2002, p. 86.

44 Ibid.

and mixed grey water.[45] Bathroom grey water is deficient in both nitrogen and phosphorus, due to the exclusion of urine and faeces.[46] Also deficient in nitrogen are laundry grey water and mixed grey water. Kitchen grey water features high levels of organic substances, suspended solids, turbidity and nitrogen.[47] Kitchen grey water does not lack nitrogen and phosphorus. Due to its lower quality, many grey water reuse standards prohibit the use of kitchen effluent.[48] However, to maintain an optimal COD:[49] N:P ratio in the biological treatment process of grey water, it is suggested that a small amount of kitchen grey water should be collected with other streams.[50] Either way, bathroom and laundry grey water are less contaminated by microorganisms than kitchen grey water.[51] Storage is also an important element. Grey water should not be stored for longer than about 48 hours, but to improve its quality, it is best for it to be stored for at least 24 hours.[52]

4. THE LEGAL CONTEXT OF WATER REUSE

Water reuse has been practiced for a long time. Its potential and importance as a valuable resource have been recognised. The European continent is characterised by different legislations, both within its largest part, which consists of the European Union (EU) Member States, and within its smaller part, which consists of non-EU countries. Concerning the EU, Directive 91/271/EEC (the Urban Waste Water Treatment Directive) requires treated wastewater be reused whenever appropriate.[53] The Urban Waste Water Treatment Directive has played an important role: its implementation has contributed to obtaining treated wastewaters of quite high quality, which can be reused for specific applications.[54]

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45 *F. Li, K. Wichmann and R. Otterpohl*, "Review of the technological approaches for grey water treatment and reuses", *Science of The Total Environment*, 2009, p. 3440.

46 *S. Vinitha*, "Effect of Greywater Characteristics on its Chemical Coagulation", *International Journal Of Engineering Technology and Management Sciences [IJETMS]*, 2020, p. 1; See also *I. Bodnar et al.*, "Qualitative characterization of household greywater in the northern great plain region of Hungary", *Environmental Engineering and Management Journal*, 2014, pp. 11-19; *S. N. Abed and M. Scholz M.*, "Chemical simulation of greywater", *Environmental Technology*, 2016, pp. 1631-1646.

47 *F. Li, K. Wichmann and R. Otterpohl*, supra note 45.

48 *A. Maimon, E. Friedler and A. Gross*, "Parameters affecting greywater quality and its safety for reuse", *Science of The Total Environment*, 2014, p. 21.

49 Chemical oxygen demand.

50 *F. Li, K. Wichmann and R. Otterpohl*, supra note 45.

51 *A. Maimon, E. Friedler and A. Gross*, supra note 48, p. 18.

52 *A. Dixon et al.*, "Measurement and modelling of quality changes in stored untreated grey water", *Urban Water*, 2000, p. 292.

53 Art. 12 of Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment, OJ L 135, 30/05/1991.

54 *N. Voulvoulis*, "Water reuse from a circular economy perspective and potential risks from an unregulated approach", *Current Opinion in Environmental Science & Health* 2018, p. 33.

Furthermore, the non-exclusive list of supplementary measures provided for in Part B of Annex VI to Directive 2000/60/EC[55] contains, among other things, water reuse measures.[56] Since directives are legislative Acts that require EU countries to achieve a certain goal or a specific result, but leave them free to choose how to do so,[57] each Member State was free to establish its own standards for water reuse. The outcome is, for example, that the French criteria are based on the revised World Health Organization (WHO) criteria and Australian guidelines, whereas, on the other hand, the Greek and Italian regulations are based on Californian regulations.[58] In addition to the most usual standards on water reuse from the EU Member States (e.g., France, Greece, Italy), Cyprus, Portugal and Spain also have their own standards.[59] The reality is that only a small number of Member States are practicing water reuse, and have adopted national legislation or standards in that regard. It can be noted that, while the standards of Cyprus, France, Greece, Italy and Spain are regulations within national legislation, in Portugal the standards on water reuse are merely guidelines.[60] Further, not all standards have the same purpose, parameters, limit values, water quality levels, monitoring requirements, etc. It follows that national legislations are uneven, and may lead to the creation of barriers and obstacles, and differences in health standards, in relation to products irrigated with reclaimed water, as well as endangering public confidence in the reuse of water. Since water problems are multidimensional, multisectoral and multiregional, the sensible opinion is that this can be resolved only through multi-institutional coordination and cooperation. As water is multidimensional, the approach to dealing with these problems must be the same, and help must be sought from the results of several scientific disciplines. By harmonising requirements for safe water reuse, better protection of the environment, and of human and animal health, will be achieved.

As one of the main elements in the transformation towards a circular economy is providing more sustainable practices for resources and waste management,[61] the EU has included reclaimed water as part of the circular

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55 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ, 22/12/2000.

56 Recital 8 of Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse, OJ L 177, 05.06.2020 (Regulation 2020/741/EU).

57 *M. Cini and N. Pérez-Solórzano Borragán*, *European Union Politics* (6th ed.), Oxford: Oxford University Press, 2016, p. 195.

58 *Water Board of Oldenburg and East Frisia (OOWV)*, "Methodology to collect successful practices in monitoring and assessing and ensuring compliance with water reuse standards", *Aquares Interreg Europe*, 2018, p. 11.

59 *L.A. Sanz and B.M. Gawlik*, supra note 30, p. 22.

60 Ibid.

61 *M. Smol, C. Adam and M. Preisner*, "Circular economy model framework in the European water and wastewater sector", *Journal of Material Cycles and Waste Management*, 2020, p. 682.

economy. Water reuse in the EU is influenced by strategic documents, such as the Commission Communication on Water Scarcity and Droughts,[62] the Blueprint for Safeguarding European Waters,[63] and the Circular Economy Strategy.[64] Regarding the transition to a circular economy, the overall sustainability of water reuse is of vital importance. An important step toward harmonisation within the EU has been made by Regulation 2020/741/EU on minimum requirements for water reuse.[65] Considering the low effect of national regulations on this important matter, the idea is to stimulate safe reuse of wastewater for irrigation by harmonising minimum quality requirements. Regulation 2020/741/EU represents a cornerstone in the implementation of reclaimed water for agricultural irrigation; it establishes minimum requirements for water quality and monitoring, and contains provisions on risk management, and for the safe use of reclaimed water, in the context of integrated water management. Pursuant to Article 3(4) of the Regulation, reclaimed water is defined as "urban wastewater that has been treated in compliance with the requirements set out in Directive 91/271/EEC and which results from further treatment in a reclamation facility in accordance with Section 2 of Annex I to this Regulation". Said Regulation is based on two communications of the European Commission:

1. The 2012 Blueprint to Safeguard Europe's Water Resources.
2. The 2015 EU Action Plan for the Circular Economy.

The 2012 Blueprint to Safeguard Europe's Water Resources aimed to remove obstacles to greater use of alternative water supply options, and thus to reduce water shortages and the vulnerability of supply systems, and also proposed instruments to regulate water reuse standards.[66]

The 2015 EU Action Plan for the Circular Economy concerned the Commission's obligations to promote the reuse of treated water, as well as to take steps on legislative proposals concerning minimum requirements for the reuse of water.[67]

Regulation 2020/741/EU contributes to the achievement of the Sustainable Development Goals of the United Nations 2030 Agenda for Sustainable Development, in particular Goal 6 on the availability and sustainable management of water and sanitation for all, and Goal 12 on sustainable consumption and

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62 *European Commission*, Water Scarcity and Drought-Environment. Available at: https://environment.ec.europa.eu/topics/water/water-scarcity-and-droughts_en.

63 *European Commission*, Water Blueprint-Environment. Available at: https://environment.ec.europa.eu/topics/water_en.

64 *E. Mesa-Pérez and J. Berbel*, "Analysis of Barriers and Opportunities for Reclaimed Wastewater Use for Agriculture in Europe", *Water*, 2020, p. 2.

65 Regulation (EU) 2020/741 supra note 56.

66 Recital 3 of Regulation 2020/741/EU, supra note 56.

67 Ibid., Recital 6.

production.[68] However, the importance of this Regulation lies not only in its application to the reuse of treated wastewater for agricultural irrigation, but also in relation to the use of reclaimed water for other purposes, for example environmental purposes.

5. REFLECTION ON THE CURRENT EU LAW POSITION ON WATER REUSE AND ITS ENFORCEMENT IN THE MEMBER STATES

For too long, the lack of EU-level standards on water reuse represented a problem. The previous regulatory framework was not directed towards regulating the reuse of treated wastewater.[69] The new Regulation on Minimum Requirements for Water Reuse took almost 30 years to be adopted, after the Urban Waste Water Treatment Directive, and 20 years after the Water Framework Directive (WFD). Of course, this cannot be without consequences; the result is that most Member States do not practice water reuse, and have not developed national legislation or standards. Establishing minimum standards, and thus unifying the rules for water reuse at the EU level, will undoubtedly be an ambitious solution for some Member States. The enforcement of the Regulation itself will probably take place at several speeds, where particular needs, and the development of technology, will play important roles.

However, an important point of the Regulation is that, in addition to caring for the environment and human health, it also introduces care for animal health. Further, harmonising standards on minimum requirements for water reuse will not only contribute to the replacement of freshwater resources, which are already limited, but will also enhance sustainable agricultural production.

The Regulation itself does not prohibit water reuse for other purposes, for example environmental purposes.[70] This gives the Member States greater freedom in choosing for which purposes, other than agriculture, water reuse could be used. Nevertheless, this approach also represents a risk of not using the full potential of water reuse. The potential of grey water does not lie exclusively in its use for agricultural purposes, i.e. in rural areas; it could also be used to advantage in urban areas, such as for athletics fields, lawns, cemeteries, parks, golf courses, car washing, domestic gardens, etc.[71] The definition of urban

68 Ibid., Recital 14.

69 *J. Fawell, K. Le Corre Pidou and P. Jeffrey*, "Common or independent? The debate over regulations and standards for water reuse in Europe", *International Journal of Water Resources Development*, 2016, pp. 559–572.

70 Annex I, s. 1 of Regulation 2020/741/EU, supra note 56.

71 *E. Eriksson et al.*, supra note 43, p. 85; See also *D.A. Okun*, "Distributing reclaimed water through dual systems", *American Water Works Association Journal*, 1997, pp. 52–64.

wastewater in the Regulation follows the definition provided in Article 2(1) of Directive 91/271/EEC,[72] thereby missing a chance to address wastewater of different origins. Therefore, acknowledgement of different types of water reuse followed by the guidelines is necessary to provide various options in more detail, and give the Member States the possibility to make decisions according to their own particular needs. Initiatives for harmonisation should also be strengthened for water reuse applications other than agricultural ones. Otherwise, Member States may practice water reuse only in order to comply with the minimum requirements set in the Regulation.

Investment in wastewater treatment also depends on the administrative barriers in individual countries. As long as fresh water is economically more profitable, in terms of its use for agricultural purposes, the justifications for not using treated wastewater will be more robust. For water reuse to become more attractive and widely used, and, at the same time, to address the direct costs of water reuse to farmers, it is necessary to develop economic initiatives, such as stimulants, i.e., subventions. In addition to investments in, and funding for, more sustainable methods of performing agricultural activities, placing products irrigated with treated wastewater on the market creates an additional burden for farmers: how the "yuck" factor can be overcome. To address the market, eco-labelling of such products is one of the possible options.[73] Additionally, the "yuck" factor is certainly less prominent in the case of grey water than in the case of black water. On the other hand, consumers of such products are interested, among other things, on the safety of their use. Concerns may arise regarding E. coli levels, as one of the measurements that reclaimed water needs to meet for safe irrigation,[74] since it has already been established not to be a reliable factor, because of its rapid decay outside its natural environment.[75]

Regarding the countries not yet practising wastewater reuse, it remains unclear how to deal with this. The high level of investment needed to upgrade wastewater treatment plants, and lack of funding, are indicated among the main reasons for the low uptake of water reuse in the EU.[76] Possible solutions could be found on site, or in source treatment practices, also known to be less costly and

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72 "Urban wastewater" means domestic wastewater or the mixture of domestic wastewater with industrial wastewater and/or run-off rainwater.

73 *A. B. Suman and A. Toscano*, "Public Acceptance of Water Reuse for Agriculture in the Wake of the New EU Regulation: Early Reflections", *Journal for European Environmental & Planning Law* 18, 2021, p. 234.

74 Annex 1, s. 2 of Regulation 2020/741/EU, supra note 56.

75 *EU Water Directors*, *Guidelines on Integrating Water Reuse into Water Planning and Management in the context of the WFD: Common Implementation Strategy for the Water Framework Directive and the Floods Directive*, Amsterdam: European Environment Agency, 2016, p. 39.

76 Recital 13 of Regulation 2020/741/EU, supra note 56.

more effective, decreasing the pressure on local wastewater treatment plants in their daily operations.[77]

However, the impact of politics should not be ignored; the extent to which the water reuse concept takes off will depend on political prioritisation and support. It is not known what impact the new Regulation will have on third countries, namely on candidate countries to the EU, and on the obligation to harmonise national legislation with EU law.

6. CONCLUSIONS

Various pressures on freshwater resources have forced today's humanity to think about alternative solutions that, ultimately, concern their survival. As previously described, freshwater resources are unevenly and irregularly distributed, and some regions of the world are experiencing an extreme shortage of water.[78] Deteriorating water quality, as well as shortages caused by unpredictable weather conditions, climate change and droughts, have not left the EU immune from these pressures.

One potential source to mitigate water insecurity is grey water treatment, to provide sufficient quantities and reserves of freshwater in the future while not endangering the environment. If given the necessary attention, this practice could help reduce overreliance on freshwater resources, and reduce pollution caused by the discharge of untreated grey water into freshwater resources. However, the economic value of grey water often remains underestimated. Grey water should be viewed as a valuable resource, not as waste. The potential of reusing grey water is, undoubtedly, great, mainly because of its ability to replace freshwater uses in various contexts.

As previously described, the attitude of the EU towards water can clearly be seen, based on directives, strategies, plans and other documents that preceded Regulation 2020/741/EU, which was published on 25 May 2020, in the midst of the coronavirus pandemic. The EU is an essential factor in international relations, but at the same time it exerts both a direct and indirect influence with its decisions, on both Member States and non-Member States. This implies a great responsibility, and an outstanding obligation, because it will be subject to the judgement of history about what could have been done, and what was actually done.

Although there are initiatives to harmonise standards on a critical issue, such as water reuse, the possibility of barriers along the way should not be underestimated. The kind of future that awaits water reuse is very uncertain to

77 *R.M.S. Mohamed, A.A. Saeed Al-Gheethi and A.H.M. Kassim*, supra note 32, p. 118.

78 *P.H. Gleick*, "Water and Conflict: Fresh Water Resources and International Security", *International Security*, 1993, p. 79.

at this point, as it is uncertain whether there will be a general acceptance of the idea. Science should provide the final word on that, and in applying scientific achievements, politics should not have any interest narrower than human interest. Numerous factors will probably influence the general application of the idea of water reuse shortly. Barriers could be political, economic or cultural; they could arise in social attitudes and public support, or depend on the diversity of situations from country to country, and region to region.

As analysed in this contribution, Regulation 2020/741/EU lacks general definitions of diverse types of treated wastewater. Providing definitions with clear distinctions, divisions and subdivisions would further contribute to a stronger acceptance of the idea of water reuse. Indeed, further investments in wastewater management are needed, to separate wastewater of different origins. In the long term, this would have a positive effect on wastewater treatment plants that are already under pressure. At the same time, the challenges that may arise during the enforcement of the new Regulation must also be considered, along by possible solutions.

Finally, as the finite nature of clean drinking-water supplies begins to reach into national and worldwide consciousnesses more deeply, the rational incentives for reusing grey water will continue to be strengthened.[79]

Grey water reuse is a large, ambitious and significant project of the future. Every day, in the world, vast amounts of drinking water are used for technical uses, from industry to domestic households and various services (for example, car washing), and irretrievably lost. In addition, this pollutes the environment, which harms nature, human health and animal health.

To build more rational relationships between humanity and nature, and between humanity and itself, the idea of grey water reuse requires overcoming the existing situation, for which there are at least two prerequisites: the removal of legal obstacles – that is, the achievement of the necessary level of national legislation and its standardisation – and, on the other hand, economic investment in infrastructure.

Today's world is faced with overpopulation in certain regions, increased urbanisation, and climate change. All three factors affect humanity's need to solve the problems described above, according to people and their living environments. It is about factors which must be taken care of or taken into account, and rational solutions must be sought. The path to those solutions also leads through the idea of grey water reuse, and the path to such reuse leads through stronger efforts to remove legal obstacles and unify national legislation. The investments required are big, but the result will be significant. Today's human needs to think about the condition in which they will leave the planet to their descendants.

79 *S. Charlesworth, C.A. Booth and K. Adeyeye*, *Sustainable Water Engineering*, Amsterdam: Elsevier, 2021, p. 49.