Water Europe
Technology & Innovation

Human Capital in the European Water Sector

First approach to identifying challenges and good practices

EUROPEAN JUNIOR WATER PROGRAMME

Water Europe
Technology & Innovation

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ABREVIATIONS

DG EAC	Directorate General Education, Youth, Sport and Culture
DG ENVI	Directorate General Environment
DG RTD	Directorate General Research Technology Development
EEA	European Environmental Agency
EU	European Union
HC	Human Capital
IWA YWP	International Water Association programs for young professionals
JRC	Joint Research Center
NGO	Non-governmental Organisation
OECD	Organisation for Economic Cooperation and Development
RTD	Research and Technology Development
RTO	Research and Technology Organisation
SME	Small and Medium Enterprise
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

INTRODUCTION

The European Junior Water Programme[1] aims to build a community of young European water management professionals who share a deep commitment to addressing current and future water and climate change issues. It is designed to provide participants with the tools, the skills and the appropriate co-creation and cooperation network to find new solutions and share knowledge for building and maintaining a sustainable and safe water management system in Europe.

Water Europe (WE) [2] is the voice and promoter of water-related innovation and RTD in Europe. WE is a membership-based multi-stakeholder organisation representing over 200 members from academia, technology providers, water users, water service providers, civil society, and public authorities. WE activities and positions are guided by its Water Vision "The Value of Water: Towards a Future-Proof European Water-Smart Society" [3].

As water is a key element for our society, economy and environment, the two organisations consider human capital as a key tool to achieve a Water-Smart Society. However, defining human capital is a challenge in itself. The most famous thought leader on this concept is Gary Becker, the author of *Human Capital*[4]. He defines human capital as a collection of non-exhaustive features such as skills, knowledge, experience and backgrounds.

This paper is a living document that has been developed by the European Junior Water Programme in collaboration with Water Europe. It is a mapping exercise based on a survey carried out in July 2019 which aimed to identify best practices and challenges of the European water sector for its human capital agenda. A selection of the most significant results of this research exercise is introduced below under four categories: general overview, education, demography and indirect investments. The survey delivered responses from eight European countries as listed in Annex 2.

Methodology and Summary of Results

For the purpose of this project, we decided to use the definition of human capital of the OECD. According to the OECD, human capital is defined as *"the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being".*[5]

The project had two main research components, a desktop research and a survey (cf. annex 1). For the desktop research, the 8 participants in the EJWP have carried out a brief scan of available public information on 4 main aspects of human capital: general situation, education, indirect investment and demography, for the 8 countries of origin of the participants: France, Belgium, Netherlands, Norway,

[1] https://juniorwaterprogramme.eu/
[2] http://watereurope.eu
[3] Water-Smart Society is a society in which the true value of water is recognised and realised, and all available water sources are managed in such a way that water scarcity and pollution of groundwater are avoided. Water and resource loops are largely closed to foster a circular economy and optimal resource efficiency, while the water system is resilient against the impact of climate change events. (cf. Water Europe definition)
[4] Gary S. BECKER, *Human capital: A theoretical and empirical analysis, with special reference to education,* Columbia University Press, 1964, pp.187.
[5] *Keeley. B (2007) Human Capital: How what you know shapes your life, chapter 2*

the UK, Romania, Italy and Slovakia (cf. annex 2). The results of the desktop research were gathered in a document and analysed, further laying the basis for formulating the survey questions.

The second component of the project consisted of a survey with approximately 20 open-ended and multiple-choice questions, grouped around the four themes listed above. The survey was sent to approximately 250 contacts selected from the network of the 8 participants and Water Europe. The survey was carried via an electronic form and was available online for 4 weeks.

Out of the 250 organisations contacted, we received 37 filled in surveys coming from 35 unique organisations including private companies, utilities, public environmental organisations, research institutes, universities, and other types of organisations such as independent consultancies and sector/network organisations.

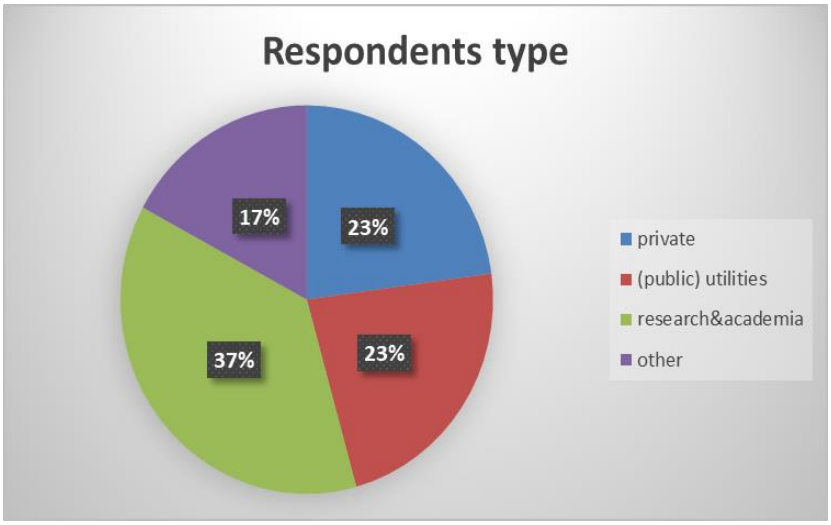

Figure 1 show the percentage of respondents per 4 main categories of organisations; private, public, academic, and others. showing a more or less equal representation in the survey analysis of human capital at EU level (8 countries).

Figure 1 Respondents per 4 main categories

Below, the main findings for the four themes of general situation, education, indirect investment and demography is presented, together with a short discussion and suggestions for improvement of the human capital agenda for the EU water sector.

GENERAL OVERVIEW

Despite some initiatives such as Erasmus+, EURES portal and others, European human capital policy faces 3 general limits to set up a strong HC agenda at the European level: a fragmented water sector, lack of data at the EU level and the weakness of the EU institutions in social policy.

Human Capital agenda as a common EU interest

As mentioned in the introduction, human capital is only very broadly defined making it difficult to collect data from respondents with different understandings of the concept. Moreover, the water sector is fragmented and composed by a diverse array of stakeholders. The recent creation of two new colleges[6] in Water Europe's membership points out the necessity to constantly open up the scope of the sector. With now 7 colleges, this organisation expects to bring together and address the full value chain of the water sector from utilities, suppliers, SMEs, RTOs to Universities, NGOs and local authorities.[7] This sector fragmentation and diversity can also be seen at national level, for example in a recent research on the Flemish Water Sector (Xavier GELLYNCK 2016) [8].

Moreover, though guided by EU directives, regulatory implementation at national level leads to country specific variations in water governance. For example, the French water sector is mainly based on concessions to private utilities with local municipalities responsible for monitoring the well-functioning of the service. In the UK, the evolution of the water-related legislation encouraged private water management[9] while regionalisation occurred in Italy[10] and Belgium[11]. Despite this diversity, the EU institution can find a common denominator in the human capital for the water sector.

A recent common trend in Europe is achieving a Water Smart Society[12,13]. The sector needs investment also in labour to be able to tackle the new water-related challenges as climate change, water scarcity and emerging compounds[14]. The EC recognised the mounting importance of investments in environment and climate change and has consequently increased their budget for programmes such as Life+, and has been supporting human capital development in its member states through Structural and Cohesion funds for decades. However, such investments are not covering the needs at EU level, creating a gap that other organisations can fill.

Encourage a EU agenda for water-related Human Capital

Information on different aspects of the water sector is gathered at national, European and international level. For human capital, the World Bank[15] and the World Economic Forum[16] have

[6] Water Europe has divided its members by 7 colleges representing the multiplicity of the stakeholders and the whole value chain of the water sector.
[7] www.watereurope.eu
[8] file:///C:/Users/loicc/Downloads/Waterstudie_UGent_2016.pdf
[9] https://www.cairn.info/revue-regards-croises-sur-l-economie-2007-2-page-200.htm
[10] https://www.arera.it/allegati/audizioni/pubbliche/13-idrico/Althesys.pdf
[11] http://www.belgaqua.be/document/Structures.pdf
[12] https://smartwatermagazine.com/news/european-commission/daniel-calleja-we-are-committed-circularity-water-commission
[13] A society in which the true value of water is recognised and realised, and all available water sources are managed in such a way that water scarcity and pollution of groundwater are avoided. Water and resource loops are largely closed to foster a circular economy and optimal resource efficiency, while the water system is resilient against the impact of climate change events. (cf. Water Europe definition)
[14] https://smartwatermagazine.com/news/european-commission/eu-budget-2021-2027-brussels-agrees-funding-environment-and-climate-action
https://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/hungary/2014hu05m2op001
[15] https://datacatalog.worldbank.org/dataset/human-capital-index
[16] http://www3.weforum.org/docs/WEF_Global_Human_Capital_Report_2017.pdf

developed two indexes to gather data per country. However, this is done at a very general level. At the European level, the European Environmental Agency collects water data. In collaboration with the Joint Research Centre (JRC) and Eurostat, the EEA has created WISE Freshwater, a platform to gather water-related data. However, human capital is not included in this platform.[17]

From the survey carried out in this project, only 50% of respondents have indicated to have a human capital policy in their organization and to collect data on it. It indicates that only half of the European water sector stakeholders monitor this field of their activities. While some multinationals such as Nalco have developed HC programmes[18], the survey results highlight that development and adoption of a human capital agenda is mainly spearheaded by the Netherlands (cf. figure 1). The Dutch water sector is the only one among responding countries implementing a clear human capital strategy[19]. We therefore extrapolate that the quality and quantity of the collected data regarding human capital cannot be satisfactory to develop the right skills for the future of the sector and therefore achieve a Water Smart Society in Europe.

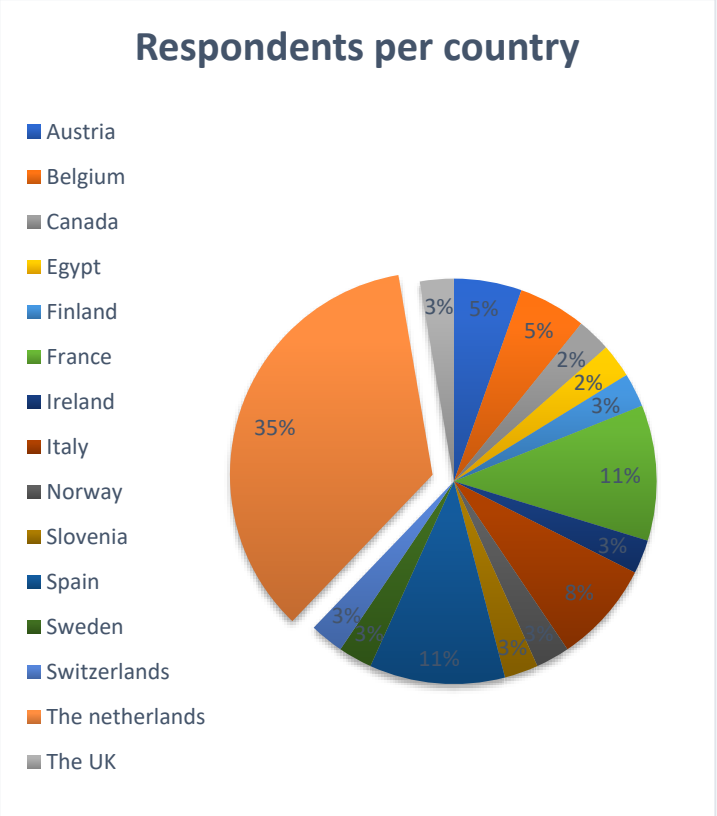

Figure 2 Respondents per country of provenance

A strong European support for a Human Capital policy in the water sector

Besides lack of data, the research carried out in this project identified a second barrier to the development of a strong human capital policy for the European Water sector. Weakness of the European institutions in this field cannot encourage the creation of a strong HC agenda. Human Capital aspects are only included in the supporting competences of the EU[20]. The power of the European institutions is therefore limited and cannot strongly support this area particularly for the innovative water sector which also suffers from a lack of unity. It is mainly three directorates general that are responsible for HC in the water sector: DG RTD for innovation, DG ENVI for water and DG EAC for Education and youth[21].

[17] https://water.europa.eu/freshwater
[18] https://www.workingmother.com/diversity-best-practices-inclusion-index-2019
[19] http://www.topsectorwater.nl/wp-content/uploads/2017/04/TsW-Strategienota-17.pdf
[20] Art. 6 TFUE
[21] https://ec.europa.eu/info/departments_en

Undoubtedly, we welcome any initiative from the EU institutions to develop the skills of the future for a Water Smart Society such as EURES portal[22], RESAVER (cf. below)[23], Erasmus +[24] or Marie Curie actions[25] but it remains mainly private and national organisations which support initiatives for the water sector. Only 16% of our survey respondents are aware of EU initiatives concerning human capital development and only one is participating in EU funds for this policy area (EIT Materials' funds).

RESAVER PROGRAMME

"RESAVER is a multi-employer occupational pension solution for research organisations in Europe and their employees. It enables employees to stay with the same pension plan when moving between different countries or employers".

This programme aims to facilitate increasing the stock of knowledge in Europe and encourage the knowledge transfer between the member and associate states by removing the pension scheme and insurance barriers for R&D&I European carriers.

RESAVER has an indirect impact on the European human capital putting in place the right drivers to create free circulation of this capital across the continent. Particularly for the water sector, this initiative from the European Commission is welcome to support the need of investment in human capital to collaborate and innovate for a water Europe Future-proof model[26] and achieve a Water Smart Society.

[22] https://ec.europa.eu/eures/public/en/homepage
[23] https://www.resaver.eu/glossary/index.html#glossaryitem1040
[24] https://ec.europa.eu/programmes/erasmus-plus/node_en
[25] https://ec.europa.eu/research/mariecurieactions/node_en
[26] A model and framework that gives structure to the required research, development and innovations with respect to the current water system, in order to fulfil the vision of a Water Smart Society. (cf. Water Europe definition)

EDUCATION

Proper education is a condition *sine qua non* for developing and maintaining human capital. In Europe most organisations are already participating in programs to transfer knowledge on a local, national, European and/or international level (75% of the respondents to the survey) or contribute to a platform to exchange data.

Knowledge transfer programs in Europe

Knowledge transfer programs in Europe can be broadly classified in two categories namely educational programs such as university training or the European Junior Water Program, and research programs such as Horizon 2020 research projects and international cooperation programs.

However, not all of these programs address the water sector directly. Often water is not identified as a specific topic/sector as it is intertwined with many other different topics such as the European project SIM4NEXUS[27] which focuses on the water-energy-land-food and climate nexus. In the same vein, the project *Aquavet*[28] was developed to improve water efficiency in the construction sector.

The Need for a Wide Range of Skills

Moreover, the European water sector needs a broad panel of skills and/or knowledge for its future. The outcome of the survey confirms this statement. Respondents were asked to name the different kind of skills and/or knowledge required. Digital, financial, technical, linguistic, environmental, human, innovative, political, and social skills were all filled in as essential. On top of this, it is not enough to master only one but to be able to integrate several of these different skills is even more relevant for employers.

Employees can further gain these different skills during their work experiences after their formal school education. However, to ensure that current and future employees acquire the needed set of skills, it is imperative that employers also organize or give access to trainings, seminars, and team-building programs. The survey showed that there is a very strong belief that the acquisition of the desired skills can be obtained through participation in educational programs as 99% of the respondents indicated this.

Investment in Common Platforms

Besides knowledge transfer programs, it is also important to invest in common platforms for the exchange of data to facilitate and stimulate cooperation between different organisations in the water

[27] https://www.sim4nexus.eu/
[28] http://www.aquavet.eu/home/default/

sector. It is an opportunity to exchange knowledge between European water-related stakeholders and therefore contribute to the competitiveness of the European water sector in the future.

Some countries in the European Union have already set up a system for this, in most countries this not yet established. However, the exchange platforms are often set up on a national scale in the language of the country for which it is set up, therefore limiting the cooperation to a national level. This is in fact the main reason for the establishment of the European Junior Water Programme. It is the first programme of its kind, uniting young professionals from different countries across Europe to exchange knowledge and work together on personal and sectoral development.

The most comprehensive platform at EU level is the Water Information System for Europe (WISE). WISE is a partnership between the European Commission (DG Environment, Joint Research Centre and Eurostat) and The European Environment Agency. It gathers data on both fresh and marine water and convers four themes: policy, projects, data and modeling. We would stress the importance of including Human Capital as a 5th theme in the WISE freshwater platform.

National Water Trainee Program

NATIONAAL WATERTRAINEESHIP

The National Water Trainee Program gives young professionals after graduation a start in their career. Young professionals can start this 2-year program, while working for an organisation in the water sector such as a waterboard, municipality, drinking water company, consultancy or a research institute.

During this 2-year program, the trainee's work 4 days at their organisation in the water sector and the fifth day is reserved for education. During this education day, trainee's work together on a project for an (other) organisation in the water sector, or they jointly have a training on personal development. The program is developed in such a way that after successfully finishing the program, young professionals can profile themselves as broadly oriented, self-managing water professionals based on personal leadership and the acquired knowledge and skills.

European Junior Water Programme

EUROPEAN JUNIOR WATER PROGRAMME

The European Junior Water Programme aims to build a community of young European water management professionals who share a deep commitment to addressing today's and future water and climate change issues. It is designed to provide participants with the tools, the skills and the appropriate cocreation and cooperation network to find new solutions and share knowledge for the purpose of creating and maintaining a sustainable and safe water management system in Europe.

The European Junior Water Programme offers young professionals a unique opportunity to learn essential teamwork and collaboration skills, build valuable networks, and share knowledge across European boundaries at an early stage in their careers.

DEMOGRAPHY

Another aspect considered in our study has been demography in terms of diversity of the workforce, gender and race equality, access for people with disability, age of the workforce, implementation of programs to train young professionals and for knowledge transfer between new and old generations of professionals. Despite some action on these matters, the European member states are still far away from implementing a structured and coherent human capital policy for the water sector.

General Support for Diversity

It is acknowledged that diversity of workforce is important in terms of skills, age and gender mainly[29]. A mix of skills, age and gender can provide flexibility and dynamism to a company and therefore increase its competitiveness for the future. Today, water management requires a great diversity of skills in different fields to achieve a Water Smart Society such as hydrology, chemistry, hydraulics, economics, biology, legal science, social science. Ensuring age diversity and transgenerational programs, companies have the opportunity to transfer and support skills continuously and brings innovations and fresh ideas.

For example, in the European countries there are specific regulated policies for gender equality, aging, transfer of knowledge, but at a general level, not specifically for the water sector. The most common workforce diversity elements regulated in Europe are disability, gender and age. For instance, any company in France which has more than 20 employees must have 6% of their staff disabled workers or should pay an additional contribution to Agefiph[30] [31]. The European Union is also promoting women innovators in Europe with an annual prize with the aim to encourage women to take the lead and hence tackle the gender gap in RTD[32].

Challenges in the Future

However EU countries have in general an ageing population and workforce[33] [34] [35] [36] and in the next years there will be issues related to the loss of experience and the need to fill vacancies. As an example, in the UK, the water supply sector has a lower percentage of workers aged below 24 than the average across all other sectors, and it said that an estimated 63,000 vacancies would need to be filled across the industry by 2027. Furthermore, in terms of gender equality in all EU countries, women's labor participation is lower than men's with a significant employment gap between women and men. Some water sectors in Europe have up to an 80:20 split of men to women[37].

To face these issues EU country developed programs for schools (primary, secondary), for teaching skills to young professors, on bachelor, master and postgraduate level, PhD programs and courses for

[29] Information based on the outcome of our survey.
[30] National association which supports the insertion of disable people on the market. https://www.agefiph.fr/
[31] Code du travail: art. L5212-1 to L5212-17, R5212-1 to R5212-4
[32] https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/prizes/eu-prize-women-innovators_en
[33] https://www.berenschot.nl/expertise/sectoren/fysieke-leefomgeving/watersector-complex-veelzijdig/bedrijfsvoering-watersector/
[34] http://www.prog.sav.sk/sites/default/files/2018-03/Vano_PP3_clanok_doplneny_c_4.pdf
[35] http://www.esig.sk/en/why-eastern-slovakia/labour-force
[36] http://www.esig.sk/en/why-eastern-slovakia/labour-force
[37] https://ec.europa.eu/info/sites/info/files/european-semester_thematic-factsheet_labour-force-participation-women_en_0.pdf

young professionals. There are also ongoing some transgenerational programs based on research projects, International Water Association programs for young professionals (IWA YWP) and projects with schools where experts from companies share their experiences in the classroom. In some companies the transgenerational transfer of knowledge is under development or is a more informal process used.

EU Prize for Women Innovators

EU PRIZE for WOMEN INNOVATORS

The EU Prize for Women Innovators was created by the European Union to award women who created a company which successfully brought an innovation to market. The three award criteria are : breakthrough innovation, impact and inspiration for others.

The EU institutions created this prize because they consider that: "Women are underrepresented in terms of creating innovative enterprises. This is untapped potential for Europe, which needs to optimise all available resources to remain competitive and find solutions to our societal challenges. This award recognises the role of women in bringing about game-changing innovations to market and honours the outstanding achievements of female entrepreneurs running innovative companies".

In 2019, one of the winners (Shimrit Perkol-Finkel) is the co-founder and CEO of ECOncrete Tech. This company provides services to improve the quality of water and develop hybrid green-grey infrastructures[38], reducing pollution and ecological footprint urban, costal and marine infrastructure[39].

[38] Hybrid Grey and Green Infrastructure is a combination of grey engineered infrastructure, green engineered infrastructure and natural systems, part of the water system that will be used for water extraction, treatment, distribution, reuse and resilience. (cf. Water Europe definition)
[39] https://econcretetech.com/about/

INDIRECT INVESTMENT IN WATER-RELATED HUMAN CAPITAL

Lastly, human capital in the water sector should consider indirect investments for citizens. We have investigated this topic through two main sources: awareness on water-related challenges and citizens' involvement through elections and involvement in regulatory or legislative processes related to water.

Investment in Citizens' Human Capital

Approximately 40% of the respondents say they consider the citizens impact on their activities as low or relatively low. Only 21% responded that citizens have a high impact on their activities. The answers differ within most countries represented in the survey, so no country stands out to have especially high impact on the answering organizations' activities.

All the countries subject to this research had some kind of investment in citizens[40], at least a museum or a festival related to water, and all of them had at least one event marking the world water day open for their citizens[41]. Many water-related organizations do also organize open days at least once a year. Some countries organize several other water-related competitions and events throughout the year such as the battle of the beach[42] and the clean water challenge[43] in the Netherlands or The flow partnership[44] at the European level.

The results of the survey confirm the relative importance for the respondents of this indirect investment in citizens' human capital, although the motivation behind might be more related to marketing objectives than to human capital development. Approximately 60% of them say they organize or co-organize public water-related activities for citizens. These activities include social media and communication, water-related projects, workshops, educational efforts and open days.

At the European level, Water Europe supports citizens' involvement in the processes for achieving a water smart society. Publishing an Atlas of Water Oriented Living Labs[45], Water Europe wants to foster cooperation between academia, authorities, private sector and citizens for innovative and resilient solutions. It aims also to raise the true value of water among citizens to achieve a water smart society.

Elections of water-related authorities

Therefore, Living Labs could be a good complementary initiative to citizens' involvement though elections - where water is a central theme, and citizens' possibility of involvement in the regulatory and/or legislative process.

[40] Investment in citizens' human capital includes festivals, museums, social media, water projects open for citizen participation etc. to increase knowledge or awareness about water.
[41] https://www.worldwaterday.org/events/
[42] https://www.onswater.nl/onderwerpen/battle-of-the-beach
[43] https://www.onswater.nl/onderwerpen/schoonwaterchallenge
[44] https://www.theflowpartnership.org/erasmus
[45] https://watereurope.eu/wp-content/uploads/2019/07/Atlas-of-the-EU-Water-Oriented-Living-Labs.pdf

JRC suggests in its report (David MAIR 2019)[46] to consider more citizens' opinions in the decision-making process. However, none of the countries subject to this research except the Netherlands[47] had any sort of formal citizens involvement that we could find. In the Netherlands they have elections for the *waterschappen*[48] (regional water authorities), citizens participation in the regulatory process[49] and volunteer jobs as dike guards for the regional water authorities[50].

Clearly, the Netherlands takes a step further than the other European countries regarding investments in citizens' human capital, activating and creating awareness on water amongst its citizens. National authorities let them directly involve themselves in the water-related policies through their ability to elect representatives to the regional water authorities. The Netherlands does also have a high number of water-related activities, competitions and programmes, and stands out in the crowd when it comes to indirect investments in water-related human capital. On the other hand, almost 67% of the Dutch companies in the survey responded that the citizens had little or no impact on their activities.

World Water Day

Created in 1992 by the United Nations General Assembly, the World Water Days aims to focus on water-related challenges and learn more about the importance of freshwater for our society, each 22 March[51]. It is also an opportunity to promote sustainable management to tackle climate change and water scarcity.

This day is an indirect investment on our people to better understand the Value of Water[52] and the creation of a Water Smart Society. It contributes to developing human capital of each nation. Each year the programme is based on the annual UN Water Report which highlights specific challenges :

- 2020 Report : Water and Climate Change
- 2019 Report : Leaving No One Behind
- 2018 Report : Nature-based Solutions
- 2017 Report : The Untapped Resource
- 2016 Report : Water and Jobs

Other initiatives can be found in the common UNESCO-Water Europe publication on the SDG 6.[53]

[46] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/understanding-our-political-nature-how-put-knowledge-and-reason-heart-political-decision
[47] From the survey it seems that only Egypt and the Netherlands has a possibility for the citizens to directly elect representatives of public water authorities. This result aligns well with the results of our initial research.
[48] https://www.waternatuurlijk.nl/water-natuurlijk-alle-regios/vallei-veluwe/water-board-elections-2019/
[49] https://aandeslagmetdeomgevingswet.nl/thema/inspiratiegids/participatie-wet/
[50] https://www.waterschappen.nl/vrijwillige-dijkwachters-krijgen-dijkentraining/
[51] https://en.unesco.org/commemorations/waterday
[52] The Value of Water expresses the importance of water for our society at large, including enabling all our economic activities, societal functions related to health and well-being, as well as the (potential) economic value of resources (nutrients, chemicals, metals, minerals) and energy embedded in our water streams. (cf. Water Europe definition)
[53] https://watereurope.eu/wp-content/uploads/2020/01/WE-UNESCO-publication_online_2020_updated.pdf

RECOMMENDATIONS

- Set up a European white book on water-related human capital. This initiative can be an opportunity for the European Union to additionally contribute to tackle climate change by identifying the key skills and knowledge that Europe needs to find innovative solutions and implemented it.
- Support additional analysis from the JRC and EEB to include human capital research in their reports on European water sector and furthermore encourage the exchange of data and cooperation through its WISE platform on this topic.
- Encourage professional training to make sure that Europe remains a competitive economy in the water sector and creates the right innovative solutions to achieve a water smart society
- Encourage and support diversity to provide flexibility and dynamism to the sector and therefore increase its competitiveness for the future
- Increase investment in European citizens' human capital to raise the importance of the value of water in our society. Water security will be the most important challenge in the decade and citizens play a key role to achieve a water smart society
- Encourage participation of citizens in the decision-making process, particularly in Living Labs to make sure that innovative solutions are accepted and fit with citizens needs and behavior.

Annex 1: Questions of the Survey

1. Has your organisation developed a policy related to human capital (skills, demography, and relation with citizens ...)?

If negative reply:

   a. Have you considered developing a human capital policy for your organisation?
   b. Why not?

If positive reply:

   a. Why does your organisation have this human capital policy?
   b. Since when does your organisation have this policy?
   c. Who is aware of this human capital policy of your organisation?
   d. Do you collect some data in your organisation to follow up on this human capital policy?

2. Which aspects are included in the developed human capital policy?
3. Which organisations are your partners for this policy?

4. Are you participating in EU funds for this policy?

If positive reply:

   a. Which one?

5. Are you aware of EU's actions in favour of human capital?

If positive reply:

   a. Which one?

6. Knowledge transfer and diversity look to be the two main fields that the European water-related organisations consider in their human capital policy. Are some other topics missing?

If positive reply:

   a. Which one?

7. Are you /or your organisation participating in programs to transfer knowledge?

If positive reply:

   a. At which level?
   b. What is/are the name(s) of the programme(s)?

8. In your opinion, what skills will be needed in the water sector in the future?
9. How would you ensure that your current or future employees acquire those skills ?

10. In your country/region, do citizens have the possibility to elect representatives of public water authorities?

If positive reply:

a. Which one?

11. How do you consider the impact of the citizens' participation in your activities?
12. Do you (co-)organise or participate in water-related award(s)?

If positive reply:

a. Which one?

13. Do you (co-)organise or participate in public water-related activities for citizens?

If positive reply:

a. Which one?

If negative reply:

a. Which not?

14. Do you believe that the diversity of the workforce is important for your company (age, gender, disability, race…)?
15. Which one are the most important for you?
16. How?
17. Which of the aspects of workforce diversity is regulated in your country?
18. Does your company have youth programs to train young professionals?

If positive reply:

a. Which one?

If negative reply:

b. Why?

19. Do you have transgenerational programs to transfer knowledge?

If positive reply:

a. Which one?

If negative reply:

a. Why?

Annex 2: Information on Human Capital in the Water Sector of Eight European Countries[54]

		Belgium	France	Italy	Norway	Romania	Slovakia	The Netherlands	The UK
General Situation	General information	Belgian water sector is not well defined and fragmented. Lack of data (no separate code for business)[55]	Fragmented Sector with local management. Strong private sector with demand for high-qualified employees Dynamic sector[56]	Fragmented sector with a focus on investment to get growth[57]	National centre of competence in the water-sector is planned, but not ready yet[58]. More practical competence needed[59]	Main developments driven by the nationwide programme funded by the EU under the Structural and Cohesion funds (POCU)[60]	Lack of students in universities with demand of professionals. Many actors. Statistical Office of the Slovak Republic provides data for the sector. Involvement in EU projects: LIFE+[61] Danube Transnational Programme 2014-2020	*Strategienota* Human Capital Topsector Water[62] Mobilisation of different governmental stakeholders to implement programs for human capital in the water sector to secure competitiveness for the future.	Recognition of the importance of Human Capital and identification of the weakness in the UK water sector. Multiple programmes throughout the UK looking to invest in young people to raise awareness in the water sector
	Main actors (examples)	B-IWA, Aquaflanders, watercircle, universities, VMM, De Vlaamse Waterweg, VLAKWA, VLARIO, VITO, Hydrologial information centre, NGOs	OIEAU Private companies (Suez, Veolia…) Local and regional authorities European Universities & RTOs (European Membrane house - ENH) Utilities NGOs	Environmental organizations (WWF, Legambiente scuola e formazione) Universities, AIAT, Water utilities	Norsk Vann Vannklyngen IWA Norway Municipalities Private waterworks Technology providers Mattilsynet Folkehelseinstituttet	ANAR,IHE, ROCS, Universities (RO_NL water platform own market research 2018	Non-government organisation (People and Water NGOs) government (Košický samosprávny kraj, Regional Public Health Authority in Košice)[63], research centres (Slovak Environment Agency, Slovak Hydrometeorological Institute Bratislava, Výskumný ústav vodného hospodárstva, Slovak Academy of Sciences)	Topsector water, Vereniging van Waterbouwers, Unie van Waterschappen, Netherlands Water Partnership, Envaqua, Ministerie van I&M, Centra voor Innovatief Vakmanschap (CIV's), Centers of Expertise (CoE's), Regionaal Investerings Fonds, Vertegenwoordigers van het Topteam Water, Kernteam en adviesraad Human Capital van Topsector Water.	Ofwat Uk Water companies Insiture of Water UK NGOs

[54] Table based on the information collected in eight country during preliminary research. These eight countries were chosen based on the nationality of the group of the European Junior Water programme. The information was collected during June 2019.
[55] https://www.watercircle.be/publicaties/item/download/243_75e1aac737d20a40298d2948e238410b
[56] http://www.fp2e.org/article/actualites-recentes/journee-mondiale-de-leau---des-entreprises-qui-font-de-leur-capital-humain-un-atout-dexcellence
[57] https://www.arera.it/allegati/audizioni/pubbliche/13-idrico/Althesys.pdf
[58] https://www.bygg.no/article/1399469
[59] https://www.vvsaktuelt.no/norsk-vannbransje-i-en-kritisk-fase-140038/nyhet.html
[60] http://www.fonduri-ue.ro/pocu-2014
[61] http://www.ludiaavoda.sk/life-project/
[62] http://www.topsectorwater.nl/wp-content/uploads/2017/04/TsW-Strategienota-17.pdf
[63] https://www.ruvzke.sk/sk/registre

Education	Transfer of Knowledge (international/national)	Focus on international transfer of knowledge to developing countries (IUPWARE program & VLIR-UOS scholarships for specific countries); B-IWA organises two networking events per year where knowledge can be disseminated; YWP Benelux: young water professionals network with biannual conference (part of IWA); event for generation of ideas of different sectors (pooling of resources, ideas)[64]	France focuses on knowledge transfer into the sector and with developing countries (eg. Afrialliance)[65] [66] Several actors participate in national or international programme to transfer knowledge	Ministry of Education (MIUR): national guidelines for programmes for schools more focused on rising awareness on environmental problems (also water) and on water sector[67] utilities academy: MM[68], AQP[69], Hera[70]	Collaboration with "Kirkens nødhjelp" - Norwegian help-organisation on water-related issues in development countries[71]. There is also a strong focus on transfer of knowledge in projects regarding the water sector.	Mostly receiver of knowledge transfer. Also funded through POCU[72]	Participation in projects at different levels: SIM4NEXUS[73], Danube Transnational Programme Creation of a green education fundings[74]. Nadacia sosna[75]. Organisation Of workshops and conferences[76].	With its leadership in the water sector and international reputation, the country is mostly provider of knowledge transfer with its ambition to increase water security and safety for urban delta regions[77]. Young Expert Program for young water professionals to work in developing countries[78] [79] and National watertraineeprogram for all young professional[80]. Besides the Dutch government is creating a personal development finance[81].	Whole of the UK water sector regulated by 1 authority OFWAT. UK Professional body for the water sector (Institute of water) - Good platform for knowledge sharing across the UK Lack of data to show good knowledge sharing with EU. WWT online publications.

[64] https://www.frontiersin.org/articles/10.3389/feart.2014.00026/full
[65] https://www.oieau.fr/content/afrialliance
[66] https://www.oieau.fr/International/cooperation-internationale/formation-professionnelle-gestion-ressources-humaines
[67] http://water-ideas.com/2018/en/ywp-workshop-ywp-vision-of-the-roadmap-17-oct-2018/
[68] http://www.aqpwateracademy.it/wp/formazione/
[69] https://www.gruppohera.it/gruppo/lavorare_gruppohera/heracademy_cu/chi_siamo/
[70] http://www.aqp.it/portal/page/portal/MYAQP/SALA_STAMPA/Comunicati_stampa?p_itemid=1842131&p_detailsLevel=full
[71] https://www.kirkensnodhjelp.no/gi-stotte/gi-gave/bedriftstotte/bedriftsgaver/samarbeidspartnere/norsk-vann/
[72] http://www.fonduri-ue.ro/pocu-2014
[73] https://www.sim4nexus.eu/
[74] http://zelenyvzdelavacifond.sk/
[75] http://www.sosna.sk/sebesta-nos/ekocentrum
[76] http://www.ludiaavoda.sk/life-project/
[77] https://www.rvo.nl/subsidies-regelingen/partners-voor-water-pvw/internationale-waterambitie
[78] https://www.yepprogrammes.com/#achternaam=&voornaam=&batchnummer=&continent=&land=&organisatie=&organisatietype=&thema=&m280b9ud_submit=Submit
[79] https://www.rijksoverheid.nl/documenten/brochures/2016/02/04/internationale-waterambitie
[80] https://nationaalwatertraineeship.nl
[81] https://www.rijksoverheid.nl/actueel/nieuws/2019/06/03/persoonlijk-ontwikkelbudget-voor-iedereen

	Awards/recogniti on system	B-IWA awards[82]	Prix Pierre Masse[83] Water Europe awards[84] (European Prize)	Young Water professionals[85] WaterIdeas (IWA conference Bologna) On specific topics or professionals from universities and professional groups[86] [87]	The Norwegian organisation "Norsk Vann" has awards for "reputation", "Sustainability" And "most active organisation" within the water industry[88].		Only personal awareness accessible	Large panel of awards in the water sector[89] [90] [91]	Institute of Water Awards Water industry Awards
	Platform to exchange data.	two main watercourse managers have joint website, with only focus on water quantity [92] Different website to consult data on water quality[93] or data on groundwater[94]	National exchange of data[95] European platforms from JRC and EEA (aforementioned).					Different water networks for data exchange [96] [97] [98]	Water UK[99] OFWAT[100]
	skill for the future/ life-long training							In NL the rapid (technological) development requires flexible professionals. Therefore, to continue trainings/learning during working life is important. There are pilots/experiments with education circulation at the workspace (e.g. mentoring, craftmanship development among employees). Besides strategic staff planning and sustainable employability is a part of the human capital agenda[101]	

[82] http://www.biwa.be/node/113
[83] https://www.oieau.fr/actualites/monde/lancement-du-prix-pierre-masse-prix-de-sciences-humaines-et-sociales-de-leau
[84] www.watereurope.eu
[85] https://www.mmspa.eu/wps/portal/mmspa/it/home/lavorare-in-mm/mm-academy
[86] https://www.ingegneriambientali.it/web/premilaurea
[87] https://www.labelab.it/ravenna2019/g100/
[88] https://www.vvsaktuelt.no/takk-og-priser-fra-norsk-vann-126132/nyhet.html
[89] https://www.dutchwatersector.com/news/salttech-wins-innovation-award-at-international-water-summit-in-abu-dhabi
[90] https://www.deltares.nl/en/news/coarse-sand-barrier-wins-2018-water-innovation-award/
[91] https://www.nwo.nl/en/news-and-events/news/2019/01/eight-dutch-awards-in-joint-programming-initiative-'closing-the-water-cycle-gap'.html
[92] http://www.waterinfo.be
[93] http://geoloket.vmm.be/Geoviews/
[94] https://www.dov.vlaanderen.be/
[95] https://www.eaufrance.fr/les-donnees-des-sites-eaufrance
[96] https://www.h2owaternetwerk.nl/knw-activiteiten-groepen/themagroepen/water-en-it
[97] https://www.watersector.nl
[98] https://www.hetwaterschapshuis.nl/index.html
[99] https://www.water.org.uk/
[100] https://www.ofwat.gov.uk/
[101] http://www.topsectorwater.nl/wp-content/uploads/2017/04/TsW-Strategienota-17.pdf

Demography	Investment in citizens' Human Capital linked to water	Big Jump[102], Citizen involvement to decrease concrete and increase infiltration[103].	Festival de l'OH[104] The role of French Aquariums to promote actions for water quality.	WWF event on #ProtectWater.	Vannsekken[105], Watermuseum being built at the moment.		The flow Partnership (Erasmus + project)[106]	more citizen participation in water projects[107] The Dutch watermuseum[108] a battle of the beach[109] clean water challenges[110]	
	Citizen involvement (political: election, participation in the legislative/regulatory process)							Elections for wateschappen[111], participation in the regulatory process[112], volunteer jobs as e.g. regional dike guard for regional water authorities[113].	
Indirect Investment	Gender Equality and other	No specific data for the water sector[114], since 2011 quotas for gender in boards[115]; overview gender equality in different EU countries[116]	National topic with some consequences on the water sector[117] [118]	No specific information for water sector	Differences between males and females in the water sector[119]	Not an issue in RO	No specific information for water sector[120] [121] [122]	Governmental projects for the education of women to increase women's emancipation and gender equality[123].	80% male workforce in the UK Women in Science and Engineering organisation (WISE) ENTHUSE Partnerships (STEM)

[102] https://www.goodplanet.be/nl/big-jump-nl/
[103] https://www.operatieperforatie.be/
[104] https://exploratheque.net/articles/festival-de-l-oh-envisager-l-eau-autrement ; https://www.valdemarne.fr/vivre-en-val-de-marne/rendez-vous/festival-de-loh
[105] https://vannkunnskap.no/vannsekken/
[106] https://www.theflowpartnership.org/erasmus
[107] https://www.kwrwater.nl/onderzoek/society/burgerbetrokkenheid/
[108] https://www.watermuseum.nl
[109] https://www.onswater.nl/onderwerpen/battle-of-the-beach
[110] https://www.onswater.nl/onderwerpen/schoonwaterchallenge
[111] https://www.waternatuurlijk.nl/water-natuurlijk-alle-regios/vallei-veluwe/water-board-elections-2019/
[112] https://aandeslagmetdeomgevingswet.nl/thema/inspiratiegids/participatie-wet/
[113] https://www.waterschappen.nl/vrijwillige-dijkwachters-krijgen-dijkentraining/
[114] https://igvm-iefh.belgium.be/sites/default/files/108_-_15_jaar_op_weg_naar_gendergelijkheid.pdf
[115] https://www.mo.be/analyse/gendergelijkheid-belgi-grote-stappen-voor-belgi-kleine-stappen-voor-vrouwen
[116] https://ec.europa.eu/info/sites/info/files/european-semester_thematic-factsheet_labour-force-participation-women_en_0.pdf
[117] https://www.suez.fr/fr-fr/actualites/egalite-femmes-hommes-des-resultats-qui-confirment-un-engagement-de-longue-date
[118] http://www.fp2e.org/article/actualites-recentes/journee-mondiale-de-leau---des-entreprises-qui-font-de-leur-capital-humain-un-atout-dexcellence
[119] https://www.ssb.no/nasjonalregnskap-og-konjunkturer/artikler-og-publikasjoner/_attachment/364438?_ts=16639e49e40
[120] https://spectator.sme.sk/c/20265635/slovakia-is-second-to-last-among-eu-members-in-gender-equality.html
[121] https://www.employment.gov.sk/files/slovensky/ministerstvo/medzinarodna-spolupraca/medzinarodne-organizacie/oecd-akosadarislovenskupublikacia2015.pdf
[122] https://ec.europa.eu/eurostat/data/database
[123] https://www.rijksoverheid.nl/onderwerpen/vrouwenemancipatie/arbeidsparticipatie-van-vrouwen

	Aging workforce	only 51% of 55+ is still working in Belgium, leading to loss of experience, focus necessary on workable work; interesting project on turning silver tsunami to silver lining in Finland[124]	National programme to support employment during the second part of the working period [125]	No specific data for water sector	No specific action for the water industry.	Sector is affected by low-quality education, braindrain and loss of experts[126]	No relevant data for water sector[127] [128]	There is aging in the water sector[129]	59,000 people work in the UK Water sector. Only 8% under the age of 24. Est.63,000 vacancies need to be filled by 2027
	Youth programs	Contest in high school for technicians[130]; Experience centre for children to learn everything about water (experiments, playground, movies,...)[131]; curriculum offer for schools on water[132]		AQP: agreement with a technical school (high school) on a new training course for water technicians[133]	Traineeship in water by Norsk Vann and Kirkens Nødhjelp[134].	Also addressed via POCU-programme specifically addressed to develop skills for young people. Not specifically on water but several sectors eligible[135].	Universities and research centres activities: Chem generation, Children University, European Researchers' Night, Living labs[136] [137] [138]	Online platform for primary and secondary education[139], Young Expert Program to work in developing countries[140], National programme[141]. Personal development finance[142]. Wavemakers are ambassadors to create awareness of water to our next generation[143]	All water companies now operate Graduate and apprenticeship programmes. Talent Source Network Young Dragons Future Water Association STEM

[124] https://ec.europa.eu/esf/transnationality/TPI-1476
[125] https://travail-emploi.gouv.fr/emploi/mesures-seniors/
[126] https://www.manpowergroup.com/wps/wcm/connect/72072968-00e8-477c-8d04-c8843abe952c/RO_RO_MEOS_1Q18.pdf?MOD=AJPERES&CACHEID=72072968-00e8-477c-8d04-c8843abe952c
[127] http://www.prog.sav.sk/sites/default/files/2018-03/Vano_PP3_clanok_doplneny_c_4.pdf
[128] http://www.esig.sk/en/why-eastern-slovakia/labour-force
[129] https://www.berenschot.nl/expertise/sectoren/fysieke-leefomgeving/watersector-complex-veelzijdig/bedrijfsvoering-watersector/
[130] http://www.scholenwedstrijd.be
[131] https://www.hidrodoe.be/
[132] https://lesplatform.dewatergroep.be/
[133] http://www.aqp.it/portal/page/portal/MYAQP/SALA_STAMPA/Comunicati_stampa?p_itemid=1842131&p_detailsLevel=full
[134] https://traineevann.no/
[135] http://www.fonduri-ue.ro/pocu-2014
[136] http://www.nocvyskumnikov.sk/european-researchers-night.html
[137] http://chemgeneration.com/?lang=sk
[138] https://detskauniverzita.tuke.sk/
[139] https://watereducatie.nl
[140] https://www.yepprogrammes.com/#achternaam=&voornaam=&batchnummer=&continent=&land=&organisatie=&organisatietype=&thema=&m280b9ud_submit=Submit
[141] https://nationaalwatertraineeship.nl
[142] https://www.rijksoverheid.nl/actueel/nieuws/2019/06/03/persoonlijk-ontwikkelbudget-voor-iedereen
[143] https://www.dutchwavemakers.nl

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