D.T1.1.2.

Report on Cross-country transboundary analysis of actual water safety mechanisms

Lead Institution	University of Ljubljana
Reviewers	Primož Banovec Barbara Čenčur Curk
Lead Authors	Ana Strgar Žiga Ščukovt
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Contributors

This document is a transnational overview of national documents (D.T1.1.1). For contributors to those documents, please see specific national documents (see References).

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1 Introduction

This document presents the transnational analysis of national consultations on water supply safety mechanisms. It includes key policies and legislation concerning water protection, drought and flood management and earthquake mitigation management in relation with WSS management in MUHA partner countries (Croatia, Greece, Italy, Montenegro, Serbia and Slovenia), overview of tools supporting water safety procedures, challenges WSS are facing as well as strengths and opportunities. Lastly common risks and hazards are summarized.

For specific and more elaborate overview of national water supply safety mechanism along with good practices and appendices, refer to D.T1.1.1 (Reports on National consultation on water supply safety mechanisms) for chosen country.

1.1 General drinking water data overview

One of the main aims of the MUHA ADRION project is improved Water safety plan (WSP) which emphasis on four external triggered hazards; flood, drought, accidental pollution and earthquake. To be able to have a general overview of water sector one of the first stages was to make Cross-country transboundary analysis of actual water safety mechanisms already established in all project countries (Croatia, Greece, Italy, Montenegro, Serbia and Slovenia). In the first table (Table 1.1), there is an overview of water snapshot among MUHA countries, presenting the slight differences among partner countries which can be seen as a base to define the disadvantages and good practices for further development of improved water safety plans.

Table 1.1: Country overview

Country	Groundwater supply (quantity abstraction) [%]	Surface water supply [%]	Mixed (SW and GW)	Brackish [%]	Percentage of population with access to public network water supply	Percentage of population using public water supply	Drinking water quality samples in full compliance [%]	Renewable fresh water [m3/person/year]	Number of Water distribution utilities
Croatia	78	14	5	3	87	91.5	97.6	24,882	353
Greece	59	39	0	2	99.3	99.3	99.45	NA*	259
Italy	48	52	0	0	100	100	N/A**	100,000	2,306
Montenegro	92	8	0	0	76	91	95.9	NA*	23
Serbia	55	5	40	0	91	90	94.7	18,451	1,197
Slovenia	98	2	0	0	98	95	96	5,475,000	98

NA* - Not available
N/A** - in the yearly reports the water quality parameters are in full compliance with the law

As shown (Table 1) there is quite significant difference among the MUHA countries in the source of raw water intended for human consumption. In general, the countries could be divided into two groups; the group with a majority of water supply sources abstracting from groundwater (Croatia, Montenegro and Slovenia) where the groundwater source presents from 78 – 98 % and second group where the groundwater source in comparison to surface water source represent approximately half of the amount of abstraction (Italy, Serbia and Greece). Special note is needed on the data concerning Serbia as quite significant amount (40%) of the raw water is from the mixed sourced (surface and groundwater). There are two countries with brackish water abstraction; Croatia (3%) and Greece (2%).

Percentage of population using public water supply is among all countries above 90% with a percentage of the population with access to public network water supply from 76 (Montenegro) – 100% (Italy). In Italy, approximately 2% of the water utilities are private or private/public. Anyway, water is public and water utilities are considered "managers of the service" and as such obliged to meet the same standards of the water public companies. The lowest percentage for access to safe drinking water among European Union countries is 87%.

From the table above the difference in renewable freshwater is relatively big with the lowest amount in Serbia with 18,451 m3/person/year and the highest amount in Slovenia with 5 475 000 m3/person/year. In the last column, the data is referring to the amount of water distribution utilities in the MUHA countries. Data cannot be directly compared, as the number of inhabitants and settlement distribution in the MUHA country is highly variable.

2 Concept of water supply safety in the country

2.1 National legislation in relation of safe water intended for human consumption with the Institutions involved in the decision making and implementing processes

In the following chapters are provided general information on the country legislation related to the water supply, such as defining the management of the water sector and other important variables in connection with EU directives.

The base of all countries water safety procedures is following the framework of the national requirements for food safety and EU drinking water directive requirements.

The water sector is governed at the national level among all countries as it is also involvement and responsibility of local governments in a shape of providing water services and are found as an important decision-making body in a sphere of water supply among all MUHA countries.

In the following tables, the legislation and institutions concerning water safety are divided into major fields that are dealing with water safety in relation to WSS. Data is provided for all project partners countries in the separate tables for quality of water, water protection, water management in terms of providing drinking water, sanitary protection zones and environmental quality, water safety plans, financing the WSS and additionally four tables about management of MUHA hazardous events; flood, drought, accidental pollution and earthquake.

Sectoral organization responsible for the laws for water quality for human consumption in each MUHA partner country is the Ministry of Health (Table 2.1). Other institutions concerning the water quality for human consumption that can be found are Ministries of the Environment and institutes engaging with public health, laboratories, inspectorates and local/regional governments or authorities.

Table 2.1: Institutions and national legislation concerning quality of water for human consumption in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Water quality (for consumption)		
Croatia	The Act on the State Inspectorate (OG No. 115/18) Act on the water intended for human consumption (OG No. 56/13, 64/15, 104/17, 115/18, 16/20), Ordinance on conformity parameters, analytical methods, monitoring and drinking water safety plans for public water suppliers (OG No. 125/17)	The Ministry of Health (HZJZ)
Greece	Joint Ministerial Decision Y2/2600/01 regarding the water quality for human consumption according the European Directive 98/83/EC (Official Gazette of the Greek Republic 892/11-7-01)	The Ministry of Health, The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water), Municipal Enterprises for Water Supply and Sewerage, Decentralized Administrations and Regional Authorities
Italy	Legislative decree n. 31/2001, legislative decree n. 152/2006	The Ministry of Health, The Ministry for Environment, Land and Sea Protection, National Institute of Health, The Regional Agencies for Environment Protection (ARPA), Regional governments, Regional/Local Health Institutions

Montenegro	Water Law (Official Gazette of MNE, No 27/07 , No 32/11 , No 47/11 , No 48/15 and No 52/16), Official Gazette of MNE, No 80/17), Official Gazette of MNE, No 57/15, Official Gazette of MNE, No 24/12, Official Gazette of MNE, No 66/12, Official Gazette of MNE, No 68/15 and No 17/16	The Ministry of Health, Public Health Institute, The Institute of Hydrometeorology and Seismology, The Directorate for Inspection Affairs
Serbia	OG Republic of Serbia No. 30/2010, 93/2010/95/2018, OG Republic of Serbia No.41/2009, 17/2019	The Ministry of Health, Institute of Public Health of Serbia, Municipalities and local governments, Municipalities and local governments, Public Health institutes
Slovenia	Official gazette RS, n.52/00, 42/02 in 47/04 – ZdZPZ, Official Gazette of the RS, št. 19/04, 35/04, 26/06, 92/06, 25/09, 74/15 in 51/17	The Ministry of Health, National institute of public health, Water utilities, National Laboratory for Health, Environment and Food

In comparison to legislation regarding water quality, the water protection sector is institutionally organized differently among MUHA partner countries (Table 2.2). Institutions include the Ministry for economic and/or sustainable development (Croatia, Montenegro), Ministry of Health (Greece), Ministry and Regional agencies of environment and/or energy (Greece, Italy, Serbia, Slovenia) and Ministry for Agriculture and Rural Development (Montenegro). All countries have only national authority bodies that are responsible for the field of water protection with ministries and their subordinate services with exception of Italy where also regional agencies and governments are involved in the process.

Table 2.2: Institutions and national legislation concerning water protection in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Water protection		
Croatia	Ordinance on sanitary, hygienic and other conditions that must be met by water supply facilities (OG No. 44/14).	The Ministry of Economy and Sustainable Development (Fund for Environmental Protection and Energy Efficiency (EPEEF))
Greece	Greek Law 3199/2003 "Protection and management of water - Harmonization with Directive 2000/60, Presidential Decree 51/2007 - Establishing measures and procedures for the integrated protection and management of water in accordance with the provisions of Directive 2000/60, JMD 51354/2641 / E103 - Determination of Environmental Quality Standards (EQS) for concentrations of certain pollutants and priority substances in surface water, Ministerial Decision 1811 (Official Gazette of the Greek Republic 3322/30-12-2011) for the determination of the maximum allowable concentrations of pollutants in groundwater	The Ministry of Health, The Ministry of Environment & Energy
Italy	The Ministry of Health, The Ministry for Environment, Land and Sea Protection, National Institute of Health, The Regional Agencies for Environment Protection (ARPA), Regional governments, Regional/Local Health Institutions	Ministry for Environment, Land and Sea Protection, Regional Agencies for Environment Protection (ARPA), Regional governments, Ministry of Agricultural food, forestry policies and tourism (for water intended for irrigation)
Montenegro	Water Pollution Protection Plan 2019-2024, No 32/11, 47/15, 52/16 and 84/18	The Ministry of Agriculture and Rural Development, The Ministry of Sustainable Development and Tourism, Republic Agency for Environmental Protection

Serbia	OG Republic of Serbia No. 135/04, 36/09, 72/09, 95/ 2018, OG Republic of Serbia No. 27/77, 24/85, 29/88, 49/89 and "Official Gazette RS", no. 46/91	Ministry of Agriculture, Forestry and Water Management – Republic Directorate for Water, Ministry for Environmental Protection, Republic Agency for environmental protection
Slovenia	Official gazette RS, n. 39/06 – 49/06 – ZMetD, 66/06 – odl. US, 33/07 – ZPNačrt, 57/08 – ZFO-1A, 70/08, 108/09, 108/09 – ZPNačrt-A, 48/12, 57/12, 92/13, 56/15, 102/15, 30/16, 61/17 – GZ, 21/18 – ZNOrg in 84/18 – ZIURKOE	Ministry of the Environment and Spatial Planning

Institutions responsible for water management in terms of providing drinking water are in most countries similar to those responsible for water protection (Table 2.3). They include environmental, health and agriculture sectors. Within undermentioned ministries sub-entity bodies are established; such as Head Office and water management department, Hydrocarbon Agency (Croatia); General Secretariat of Natural Environment and Water, Regional Authorities and Municipal Enterprises for Water and Sewerage (Greece); Institute for Environmental Protection and Research (ISPRA), Authority for Regulation Energy Networks and Environment (ARERA), District basin Authorities, Regional Agencies for Environment Protection, Regional governments (Italy); The Water Administration (Montenegro); Republic Directorate for Water, SrbijaVode and Vojvodina Vode (Serbia) and Municipalities (Slovenia).

Table 2.3: Institutions and national legislation concerning water management in terms of providing drinking water in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Water management in terms of providing drinking water		
Croatia	The Act on the State Inspectorate (OG No. 115/18), Act on the water intended for human consumption (OG No. 56/13, 64/15, 104/17, 115/18, 16/20)	The Ministry of Economy and Sustainable Development (Fund for Environmental Protection and Energy Efficiency (EPEEF), Hrvatske vode - Head Office and water management departments (WMDs), Hydrocarbon agency)
Greece	Presidential Decree 51/2007 - Establishing measures and procedures for the integrated protection and management of water in accordance with the provisions of Directive 2000/60	The Ministry of Health, The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water), Municipal Enterprises for Water Supply and Sewerage, Decentralized Administrations and Regional Authorities
Italy	Legislative decree n. 152/2006, Memoranda of Understanding 13/07/2016 among Ministry of Environment, District Basin Authorities, Regions and other stakeholders	Ministry for Environment, Land and Sea Protection, Institute for Environmental Protection and Research (ISPRA), Authority for Regulation Energy Networks and Environment (ARERA), District basin Authorities, Regional Agencies for Environment Protection (ARPA), Regional governments
Montenegro	Water Law (Official Gazette of MNE, No 27/07 , No 32/11 , No 47/11 , No 48/15 and No 52/16), Water Management Strategy (Ministry of Agriculture and Rural Development, june 2017), Official Gazette of MNE, No 2/18, 34/19, 38/20, Official Gazette of MNE, No 13/2007, Decision of the local self-government unit on the conditions of use and maintenance of rural water supply systems, public fountains, public wells and rural gaps	The Ministry of Agriculture and Rural Development, The Water Administration
Serbia	The Water Law (OG Republic of Serbia No. 30/2010, 93/2010/95/2018)Ordinance on drinking water supply (municipoality	Ministry of Agriculture, Forestry and Water Management – Republic Directorate for Water, SrbijaVode, Vode Vojvodine

	documents), Ordinance on drinking water supply (regional documents for regional WSS) Technical guidance documents for individual water utility (utility document)	
Slovenia	Official gazette RS, n. 35/06, 41/08, 28/11 in 88/12, Uradni list RS, št. 32/93, 30/98 – ZZLPPO, 127/06 – ZJZP, 38/10 – ZUKN in 57/11 – ORZGJS40, Official gazette RS, n. 94/07 – uradno prečiščeno besedilo, 76/08, 79/09, 51/10, 40/12 – ZUJF, 14/15 – ZUUJFO, 11/18 – ZSPDSLS-1, 30/18, 61/20 – ZIUZEOP-A in 80/20 – ZIUOOPE, Ordinance on drinking water supply (municipoality documents), Technical guidance documents for individual water utility (utility document)	Ministry of the Environment and Spatial Planning, Municipalities

One of the common and first protection of water sources are Drinking Water Protection Zones (DWPZ) which are found among all countries involved in the MUHA project. General responsibilities among ministries can be grouped to health ministry (Croatia) and ministries and directorates of the environment (Greece, Italy, Montenegro, Serbia and Slovenia). Along with mentioned ministries other agencies, secretariats and directorates are involved in this process as well (Table 2.4).

Table 2.4: National legislations on drinking water protection zones and institutions responsible for environmental quality standards in MUHA partner countries.

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
	Sanitary protection zones of water sources	**Environmental quality standards (in connection with recharge area)**
Croatia	Regulation on the conditions determining the sanitary protection zones (OG No. 66/11, 47/13), Ordinance on the determination of sanitary protection zones of springs	The Ministry of Health (HZJZ), Croatian waters (Hrvatske vode)
Greece	JMD Y2 / 2600/2001, Law 1650/86 on the environment and Law 1739/87 on the management of water resources	The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water)
Italy	Legislative decree n. 152/2006	The Minister for Environment, Land and Sea Protection
Montenegro	Official Gazette of MNE No. 66/2009	The Ministry of Agriculture and Rural Development, The Ministry of Sustainable Development and Tourism, Directorate for the Environment and the Directorate for Communal Services, Republic Agency for Environmental Protection
Serbia	OG Republic of Serbia No. 30/2010, 93/2010/95/2018, OG Republic of Serbia No.125/204	The Ministry for Environment, Land and Sea Protection, District Basin Authorities, Regional governments
Slovenia	Official gazette RS, n. 39/06 – 49/06 – ZMetD, 66/06 – odl. US, 33/07 – ZPNačrt, 57/08 – ZFO-1A, 70/08, 108/09, 108/09 – ZPNačrt-A, 48/12, 57/12, 92/13, 56/15, 102/15, 30/16, 61/17 – GZ, 21/18 – ZNOrg in 84/18 – ZIURKOE, Decree on the designation of buffer zones and measures to ensure the coverage of drinking water (municipality document)	National environmental agency (ARSO), Municipalities

Concerning the Water safety plans four out of six countries have the laws dealing with Water safety plans (WSP). National legislative bodies covering this field are Ministry of Health (Croatia, Italy), Ministry of Environment (Greece) and the Ministry of Interior, specifically Sector for Emergency Situations (Serbia). In Montenegro and Slovenia WSS are obligatory to have HACCP related protocol documents, but WSPs are not obligatory by law.

Table 2.5: Institutions and national legislation concerning water safety plans in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Water safety plans		
Croatia	Act on the Water Intended for Human Consumption (OG No. 56/13, 64/15, 104/17, 115/18, 16/20), Ordinance on conformity parameters, analytical methods, monitoring and drinking water safety plans, and keeping register of legal entities (OG No. 125/17, 39/20)	The Ministry of Health (HZJZ)
Greece	Technical Support to the General Secretariat for Water of the Ministry of Environment, Energy and Climate Change for the recording of the problems for the implementation of the Directive 98/83/EC	The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water), Municipal Enterprises for Water Supply and Sewerage, Decentralized Administrations
Italy	Decree of Ministry of Environment 14/06/2017	The Ministry of Health, The Ministry for Environment, Land and Sea Protection, National Institute of Health, The Regional Agencies for Environment Protection (ARPA), Regional governments, Regional/Local Health Institutions, Water Utilities
Montenegro	still HACCP (Law on Providing Safe Water for Human Consumption, Rulebook on the manner and scope of water quality control)	/ no legislation yet
Serbia	Food Safety Law (OG Republic of Serbia No.41/2009, 17/2019) - HACCP Disaster Risk reduction & Emergency Situation Management Law (OG Republic of Serbia No.87/2018)	WSs, Ministry of Interior – Sector for Emergency Situations,
Slovenia	Still HACCP related legislation (Drinking water regulations (Official Gazette of the Republic of Slovenia, Nos. 19/04 , 35/04 , 26/06 , 92/06 , 25/09 , 74/15 and 51/17); Annex II: Monitoring)	MZ, NIJZ

The MUHA project is specifically addressing four hazards; floods (Table 2.6), droughts (Table 2.7), accidental pollution (Table 2.8) and earthquake (Table 2.9). In the following table, we are providing the overlook of the laws addressing mentioned hazards.

Table 2.6: Institutions and national legislation concerning flood management in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Flood management		
Croatia	Official Gazette of natural disaster impact mitigation (OG 73/97, 16/19)	Hrvatske vode (central Flood Defense Centre)
Greece	D1S / GCo.8565 / 16-11-2017, D1S / GL doc.16330 / 28-02-2019, D1S / GL doc.52450 / 12-07-2019, Ministerial Decision 1299/2003	The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water), Municipal Enterprises for Water Supply and Sewerage, Decentralized Administrations, The General Secretariat of Civil Protection
Italy	Legislative decree n. 112/1998, law decree n. 180/1998/law n. 267/1998, decree of the Presidente of the Council of Ministers 29/09/1998, law n. 365/2000, directive of the President of the Council of Ministers 27/02/2004, legislative decree n. 49/2010, legislative decree n. 219/2010, law n. 221/2015, legislative decree n. 1/2018	Ministry for Environment, Land and Sea Protection, Regional governments, Presidente of the Council - Department of Civil Protection, Regional Civil Protection Services (centri funzionali), Ministry of Infrastructure and Transport
Montenegro	National Strategy for Emergency Situations, National and municipal plans for protection and rescue, The Strategy for Disaster Risk Reduction with Dynamic Plan of Activities for implementation of the Strategy for the period 2018-2023, Rulebook on the detailed content of the preliminary flood risk assessment and the flood risk management plan(Official Gazette of MNE, No 69/15), Law on Hydrometeorological Affairs	The Institute of Hydrometeorology and Seismology, Directorate for Emergency Situations
Serbia	The Water Law (OG Republic of Serbia No. 30/2010, 93/2010/95/2018) Republic of Serbia Water management Strategy by 2034 (OG RS No.3/2017) Law on Disaster Risk reduction & Emergency Situation Management (OG Republic of Serbia No.87/2018) Flood risk management plan , General and operational flood protection plan , Water Law art. 29, At the transboundary level for Danube and Sava Flood Risk Management Plan for river basin, for Tisza River Basin included in the Integrated Tisza River Basin Management Plan (2019) Disaster Risk reduction & Emergency Situation Management Law (OG Republic of Serbia No.87/2018) Regulation on content and approach for disaster risk reduction (DRR) plan development Methodology for content and development of disaster risk assessment and DRR plan	Ministry of Agriculture, Forestry and Water Management - Republic Directorate for Water, Republic of Serbia Hydrometeorological Service, PUCWM SrbijaVode, Vode PUCWM Vojvodine, Municipalities
Slovenia	Official gazette RS, n. 51/06 - 97/10 in 21/18 - ZNOrg and Drinking water supply plan in emergency situations (municipality document)	National environmental agency (ARSO), Administration of the Republic of Slovenia for Civil Protection and Disaster Relief, Municipalities

Table 2.7: Institutions and national legislation concerning drought management in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Drought management		
Croatia	Official Gazette of natural disaster impact mitigation (OG 73/97, 16/19)	/
Greece	D1S / GL doc.52450 / 12-07-2019	The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water)
Italy	No specific law, partly by D. Lgs. 152/2006 , Memoranda of Understanding 13/07/2016 among Ministry of Environment, District Basin Authorities, Regions and other stakeholders	The Ministry of Health, Ministry for Environment, Land and Sea Protection Regional Agencies for Environment Protection (ARPA), Regional governments, Ministry of Agricultural food, forestry policies and tourism (for water intended for irrigation)
Montenegro	National Strategy for Emergency Situations, The Strategy for Disaster Risk Reduction with Dynamic Plan of Activities for implementation of the Strategy for the period 2018-2023, Law on Hydrometeorological Affairs	The Institute of Hydrometeorology and Seismology of MNE, Directorate for Emergency Situations
Serbia	Included in following:The Water Law (OG Republic of Serbia No. 30/2010, 93/2010/95/2018) Environmental protection Law (OG Republic of Serbia No. 135/04, 36/09, 72/09, 95/ 2018) Republic of Serbia Water management Strategy by 2034 (OG RS No.3/2017) Law on Disaster Risk reduction & Emergency Situation Management (OG Republic of Serbia No.87/2018)	Republic Hydrometeorological Service of Serbia
Slovenia	Official gazette RS, n. 51/06 – 97/10 in 21/18 – ZNOrg	National environmental agency (ARSO - DMCSEE)

Table 2.8: Institutions and national legislation concerning accidental pollution management in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Accidental pollution management		
Croatia	Regulation on the conditions determining the sanitary protection zones (OG No. 66/11, 47/13)	/
Greece	Not available	The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water), Municipal Enterprises for Water Supply and Sewerage, Decentralized Administrations, The General Secretariat of Civil Protection
Italy	Legislative decree n. 152/2006	The Ministry of Health, Ministry for Environment, Land and Sea Protection Regional Agencies for Environment Protection (ARPA), Regional governments, Ministry of Agricultural food, forestry policies and tourism (for water intended for irrigation)

Montenegro	National Strategy for Emergency Situations, Strategy for Disaster Risk Reduction with Dynamic Plan of Activities for implementation of the Strategy for the period 2018-2023 , Water Pollution Protection Plan, Rulebook on methods for determining and maintaining sanitary protection zones for drinking-water sources and restrictions in the related zones	The Institute of Hydrometeorology and Seismology of MNE, Directorate for Emergency Situations,Republic Agency for Environmental Protection
Serbia	Water Law (OG Republic of Serbia No. 30/2010, 93/2010/95/2018) Republic of Serbia Water management Strategy by 2034 (OG RS No.3/2017) Environmental protection Law (OG Republic of Serbia No. 135/04, 36/09, 72/09, 95/ 2018) Public Health Law (OG Republic of Serbia No.15/2016) Drinking water supply sources management and protection Law (OG Republic of Serbia No. 27/77, 24/85, 29/88, 49/89 and "Official Gazette RS", no. 46/91) Law on Meteorological and Hydrological activities(OG Republic of Serbia 88/2010) Law on Disaster Risk reduction & Emergency Situation Management (OG Republic of Serbia No.87/2018) Regulation on Establishment and management of drinking water source protection zones (Official Gazette RS, no. 92/08) Plan for water protection according to Water Law, article 29	Republic Hydrometeorological Service of Serbia, Republic Agency for environmental protection
Slovenia	Official gazette RS, n. 51/06 – 97/10 in 21/18 – ZNOrg and Drinking water supply plan in emergency situations (municipality document)	Administration of the Republic of Slovenia for Civil Protection and Disaster Relief, Municipality

Table 2.9: Institutions and national legislation concerning earthquake mitigation management in relation with WSS management in MUHA partner countries

Country	Law / Act / Decree / Regulation / Strategy / Ordinance relating to	Institution
Earthquake mitigation management (in relation with WSS)		
Croatia	/	Local government institutions
Greece	Ministerial Decision 1299/2003	The Ministry of Environment & Energy (General Secretariat of Natural Environment & Water), Municipal Enterprises for Water Supply and Sewerage, Decentralized Administrations, The General Secretariat of Civil Protection
Italy	Legislative decree n. 1/2018	President of the Council - Department of Civil Protection, Regional Civil Protection Services (centri funzionali), Ministry of Infrastructure and Transport
Montenegro	National Strategy for Emergency Situations, National and municipal plans for protection and rescue, The Strategy for Disaster Risk Reduction with Dynamic Plan of Activities for implementation of the Strategy for the period 2018-2023, Law on Hydrometeorological Affairs	Directorate for Emergency Situations, The Protection and Rescue Service (municipial level), The Institute of Hydrometeorology and Seismology of MNE

Serbia	Disaster Risk reduction & Emergency Situation Management Law (OG Republic of Serbia No.87/2018) Act on Seismological Survey Activites ((OG Republic of Serbia No.71/1994) Decree on content and approach for disaster risk reduction (DRR) plan development (OG Republic of Serbia No.21/2020) National and municipal plans for DRR, National Strategy for protection and rescue in emergency situations WSS WSPs or similar for risk reduction plans due to hazards	Ministry of Interior – Sector for Emergency Situations
Slovenia	Uradni list RS, št. 51/06 – 97/10 in 21/18 – ZNOrg	Administration of the Republic of Slovenia for Civil Protection and Disaster Relief

At the end of the law overview, we are also providing the table with the law regarding the Financing of the Water utilities which well defined in all countries (Table 2.10).

Table 2.10: National legislation regarding financing of the water utilities in MUHA project countries.

Country	Financing of Water Utilities
Croatia	Act on the Water Intended for Human Consumption (OG No. 56/13, 64/15, 104/17, 115/18, 16/20), The Water Management Financing Act (OG No. 153/10, 90/11), Regulation on the calculation and collection of water fees (OG No. 79/10, 76/11, 19/12, 151/13 and 83/15), Regulation on fees for water management (OG No. 82/10, 108/13)
Greece	Ministry of Interior / "Philodimos II Program“ / Antonis Tritsis / Public Investment Program, The Ministry of Environment & Energy, Municipal Enterprises for Water Supply and Sewerage and Municipalities Own Funds, Regional Development Plans
Italy	Legislative decree n. 152/2006, law decree n. 201/2011/law n. 214/2011, decree of the President of the Council of Ministers 20/07/2012, law decree n. 133/2014/law n. 164/2014, law n. 221/2015, law n. 205/2017
Montenegro	Official Gazette of Montenegro, No 55/16, 74/16,2/18 and 66/19
Serbia	Act on Ministries of Republic of Serbia (OG RS 128/2020) Local municipalities financing Act (OG RS 95/2018, 86/2019, 126/2020) Water tariff
Slovenia	Official gazette RS, n. 87/12, 109/12, 76/17 in 78/19, Uradni list RS, št. 32/93, 30/98 – ZZLPPO, 127/06 – ZJZP, 38/10 – ZUKN in 57/11 – ORZGJS40

2.2 Tools supporting the water safety procedure implementation

Although different tools are used in different MUHA project countries, most include some kind of monitoring, GIS support system and database (Table 2.11).

Table 2.11: Tools supporting the water safety procedures implementation in six MUHA project countries.

Country	Tools	Link/Reference/Source
Croatia	- Reginal database for water quality system for Istrian part of Croatia - Reports on safety of water for human consumption (in Croatian) - Centralized data on water quality and monitoring for the whole country - Hrvatske vode Geoportal - Ecological map of the City of Zagreb - ARKOD system	- ePortal - Hrvatski zavod za javno zdravstvo (HZJZ) - Hrvatske vode - Geoportal - EKO KARTA - ARKOD system
Greece	- Regional databases - Ecological maps - Monitoring plans - Databases developed by local institutes and universities	- River Basin Management Plans for 14 Greek RBD include some data
Italy	- Guideline for risk assessment and management within the drinking water chain according to Water Safety Plans	- Lucentini et al., 2014b
Montenegro	- Drought Impact Archive - Drought vulnerability map - Drought monitoring using SPI maps	- Drought Management Centre for Southeast Europe, Institute of hydrometeorology and seismology of MNE
Serbia	- Surface water hydrological monitoring network - Groundwater hydrological monitoring network - early warning and maps - Monitoring network - the Rulebook on sanitary (hygienic) admissible drinking water quality standards - SCADA - DWSS internal monitoring and reporting of the departures from the required standards - Analyses of the already recorded hazards - Operational and maintenance DWSS procedures and plans - DWSS internal and external reporting on detected pipe breaks other parts of the DWSS failure - DRR Management plans development at the municipality level or when it is necessary at the DWSS - Sector for Emergency situations Operational centre 112 - Network of seismological stations	- Republic of Serbia hydrometeorological Services – RHMZ - Serbian Agency for Environmental protection - Seismological Survey of the Republic of Serbia
Slovenia	- Information system for monitoring mandatory municipal public utility services for environmental protection (IJSVO) - Internal control of drinking water - Monitoring of drinking water - SCADA - Tango (central smart city dashboard) - Remote monitoring - Dynamic hydraulic model	- National Institution on Publich Health (NIJZ)

	- At-line MB (microbial) analyser - HACCP operational meetings - Education on tools and workshops - GIS software - System operational databases - User notification system - National monitoring on end-of-pipe control. Detailed description can be found in the document MUHA DT.1.1.4 chapter 3.2.2 - Monitoring, observation and control system (SMOK) - Collective cadastre of economic public infrastructure (ZKGJI) - Atlas okolja - Atlas voda - SPIN - -Overview of active interventions	- National laboratory of health, environment, and food (NLZOH) - Ministry of the environmental and spatial planning, The surveying and mapping authority of the Republic of Slovenia - Ministry of defence, Administration of the RS for civil protection and disaster relief

2.3 Risks, bottlenecks, challenges

For successful implementation of improved water safety procedures risks, difficulties and challenges faced by water utilities must be identified. For reference point we used the summarized benefits and difficulties in European water utilities by Tsoukalas and Tsitsifli (2018) since utilities in MUHA partner countries have similar challenges (Table 2.12).

Table 2.12: Benefits and difficulties that emerge in the implementation of WSPs in European water utilities as summarized by Tsoukalas and Tsitsifli (2018).

Benefits	Difficulties	References
Better analysis of observed deviations	Absence of legislation Inappropriate monitoring system	Viera, 2007
Increase of compliance with legislation Decrease of diarrheal incidents Improvement of drinking water quality	Lack of financial resources Limited staff experience	Gunnarsdottir et al., 2012
Better monitoring in water source Better control of microbial contamination Systematic collection and processing of physicochemical and microbiological data Increase of production efficiency Improvement of employees' performance		Mayr et al., 2012
Extreme weather risk assessment		Curk et al., 2006
Effective risk assessment associated with compounds that are not controlled by routine monitoring Increase of consumer confidence		Lucentini et al., 2016
Increase of consumer awareness Finding of financial resources Development of drinking water safety management strategies	High residual concentration of hazardous substances Inappropriate design of landfills Inadequate sewerage network	Samwel et al., 2010
Effective risk assessment Avoid of serious failure Increase of reliability Facilitation of communication		WHO, UN et Economic Commission for Europe, 2011
Improvement of drinking water quality Efficient treatment of drinking water Increase of compliance with legislation Decrease of diarrheal incidents		Setty et al., 2017
Increase of water utilities reputation Increase of consumer confidence Decrease of customers' complaints Identification of unknown hazards	Limited access to chemical materials approved for contact with water	Loret et al., 2016

Benefits	Difficulties	References
Improve of drinking water quality Better response in emergencies Increase of employee awareness Improve of record keeping procedures	Difficulties in assessing all possible hazards Limited staff time Lack of financial resources Lack of supporting activities Lack of adequate equipment	

The study of Tsoukalas and Tsitsifli (2018) concluded that it is quite difficult to define the critical success factors due to the different conditions met in water utilities among different countries and among regions in the same country. There are many possible causes as, for example, the production capacity, the employees' skills and experience, the corporate culture, the kind of water supply (groundwater, surface water and sea water), the distribution system, the legislation.

Main technical risk concerning utilities in MUHA partner project is the age of the water supply network and facilities along with inadequate internal installation, large lengths of networks and small connection to the peripheral parts. In Slovenia for example, distribution system is often oversized due to safety requirements, which can lead to overheating of water and stagnation in the system. Costs for upgrading an outdated infrastructure present a substantial challenge especially for smaller water utilities.

Utilities with water sources in karstic area have problems with complexity of karst aquifers and theirs low self-cleaning abilities, which leads to more complex water treatment and higher risk of pollution. Karstic water sources and surface water sources have higher risk of microbiological pollution as well.

The development and implementation of efficient WSP requires multidisciplinary and multi--stakeholder approach for which skilled and experienced professionals are essential. Although most MUHA partner countries have knowledge needed, smaller utilities often do not have financial and human resources for such implementation.

A structured approach for implementation of WSP is needed. However, many MUHA project countries have considerable variety of utility governance model. Insufficient and outdated or new and complex policies and regulations are often inconsistent, which further complicates the development of guidelines and efficient implementation of the WSPs. In addition, in some countries implementation of procedures related to water safety in not a priority at the national or local level.

A qualitative SWOT analysis highlights the main strengths, weaknesses, opportunities, and threats in the process of implementation of the WSPs identified by MUHA partner countries (Table 2.13). Not all are applicable in all the countries and some have additional strengths, weaknesses, opportunities and threats. For those, please refer to D.T1.1.1 for a country of interest.

Table 2.13: SWOT analysis of implementation of the WSPs.

▪ **STRENGTHS** - Defined water protection zones (CRO, MNE, SI) - Qualified staff with necessary modern knowledge (CRO, IT, MNE, SRB) - Sufficient technical resources (facilities, equipment, software) (CRO, IT, MNE) - Legal framework supporting WSPs (GR, SRB, SI) - Need for WSPs is acknowledged by water utility manages as well as general public (GR, SRB) - Some guidelines and procedures already exist (SRB, SI)	▪ **WEAKNESSES** - Lack of necessary funds for qualified staff and implementation of WSPs, especially in smaller WSS (IT, MNE, SRB, SI) - Lack of experienced and qualified staff in smaller WSS (CRO, GR, IT, MNE, SRB, SI) - Difficulties with coordination between key stakeholders and sectors (CRO, GR, IT, SRB) - Aged infrastructure with high losses rate and low efficiency (GR, IT, MNE, SRB, SI) - No legal biding enforcing implementation of WSPs in some countries or insufficient policies (MNE, SRB, SI) - Lack of shared information databases and good practices (CRO, GR, SRB)
▪ **OPPORTUNITIES** - Improved water supply safety along with resilience to hazards and climate change (CRO, IT, MNE, SRB, SI) - Access to EU projects and funds (CRO, GR, IT, MNE) - Transboundary cooperation with external experts available (CRO, GR) - Improved sectoral and institutional cooperation (GR, SRB)	▪ **THREATS** - Climate change (CRO, GR, IT, MNE, SI) - Hazardous events (CRO, IT, MNE) - Water pollution (agriculture, terrorism …) (CRO, GR, SRB) - Groundwater depletion and future uncertainties with respect to water availability (CRO, SI) - Financial crisis (GR, IT, MNE, SRB, SI) - Unexpected conditions (e.g. global pandemic) (GR) - Lack of political will to harmonize legislation with EU and to implement it in practice (CRO, MNE, SRB)

3 Specific hazards/risks addressed by the water safety procedures

In most MUHA project countries, main risk addressed by water safety procedures is related to the quality of water (which is in a big scale inherited from HACCP procedures). That includes quality at the water source as well as the efficiency of water treatment and storage and safe conditions within the distribution systems.

Common hazards addressed by water safety procedures are

- Pollution: microbiological, chemical (accidental pollution, pesticide spraying, septic tank leaks, etc.) and physical (turbidity, sand, silt, leaves, corrosion, etc.), radiological
- Pipe breaks
- Facility/equipment failure
- Technological accident

Protection of water sources is regulated with drinking water protection zones/water protection sanitary zones. For more information see Table 2.2 and Table 2.4 or D.T1.1.1 of a specific country.

Protection zones are also most common measure against accidental pollution. Some countries have defined procedures that should take place in case of an accidental pollution, such as informing the central state administration body responsible (see Table 2.2). Measures taken after the accidental pollution include: determining the causes, type and extend of water pollution, utilization of the secondary water source if exists, additional water process, additional monitoring if the pollution is detected, disconnection of the wells and distribution system , continuous monitoring (7/24).

Measures addressing floods are commonly defined on national level for general purposes and are not specifically targeting water safety procedures of the drinking water supply system. Nevertheless, from those general measures the utilities can predict the importance of flood risks and procedures within the specific locations of each water supply system. General measures at the national scale include flood risk maps, early warning systems, prevention measures (proper infrastructure and clean rainwater network). In case of flood, Civil Protection authorities are mobilized. For more specific measures in given country see D.T1.1.1 for that country.

In case of droughts, water use restrictions are put in place in regard to quantity and purpose. If available, alternative water sources are activated. Some Countries (Montenegro and Slovenia) have national drought monitoring systems (e.g. Drought Watch). However, determining and monitoring the water availability is not common practice among utilities.

Regarding earthquake most countries have legislation addressing the safety of the infrastructure at the national level. However, only few water utilities have water safety plans which include measures addressing earthquake.

4 Conclusions

This overview shows that all MUHA project countries have legislation concerning drinking water protection and water safety plan. Most also have policies addressing drought and flood management as well as earthquake mitigation management in relation with WSS management. However, policies lack in incentive and clear framework for development and implementation of WSPs. In some countries, water utilities are obliged to have WSPs, although it is not clear what those WSPs should include.

Consequently, water utilities have or are trying to develop and implement WSPs on their own and are more or less successful. Since financial cost of implementation is significant, smaller WSS often cannot afford an experienced and qualified staff. Implementation of WSPs also require multi-sectoral approach and good communication between key stakeholders. Moreover, insufficient exchange of good practices and information makes the implementation even harder.

WSS recognise the need for holistical WSPs, which includes not only the pollution as is the standard in most cases, but other natural hazards as well, especially those related to the climate change like droughts and floods. Although some WSPs include measures related to droughts and floods, this measures frequently exclude monitoring and preparedness activities. In addition, flood management in mostly on national level and measures often do not apply well to specific locations. Measures addressing earthquakes are mostly neglected as well.

Aim of this document is to present common point between MUHA project countries (Croatia, Greece, Italy, Montenegro, Serbia and Slovenia) and understanding the weaknesses and challenges that WSS face while implementing WSPs, as well as seeking the opportunities and strengths that will help with the development of multi-hazard framework for water related risks management. As shown by this overview, a harmonized and accessible approach to implementation of water safety plans which include accidental pollution, drought and flood management and earthquake related risks is needed.

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MUHA Workpackage T1, Activity T1.1 Reports:

- D.T1.1.1 Reports on National consultations on water supply safety mechanisms – Croatia
- D.T1.1.1 Reports on National consultations on water supply safety mechanisms - Greece
- D.T1.1.1 Reports on National consultations on water supply safety mechanisms - Italy
- D.T1.1.1 Reports on National consultations on water supply safety mechanisms - Montenegro
- D.T1.1.1 Reports on National consultations on water supply safety mechanisms - Serbia
- D.T1.1.1 Reports on National consultations on water supply safety mechanisms - Slovenia

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