Comprehensive Risk Management Strategies for Addressing Water Scarcity and Climate Change Impacts

M. Ganzer, M. Minoves, A. Rubirola and M. Paraira

7th november 2023

Aigües de Barcelona

AMSTERDAM INTERNATIONAL WATER WEEK

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- Global climate change context and current drought situation in Barcelona
- Brief history of Water Safety Plans (WSP) and Barcelona's DWTP experience in WSP implementation
- Challenges of Sanitation Safety Plans (SSP) and Barcelona's WWTP experience in SPP implementation
- WSP + SSP = Global Risk Management
- Indirect Potable Reuse (IPR): Barcelona case study
- Risk Management through Climate Resilient – WSP
- Conclusions

GLOBAL WATER SCARCITY & CLIMATE CHANGE

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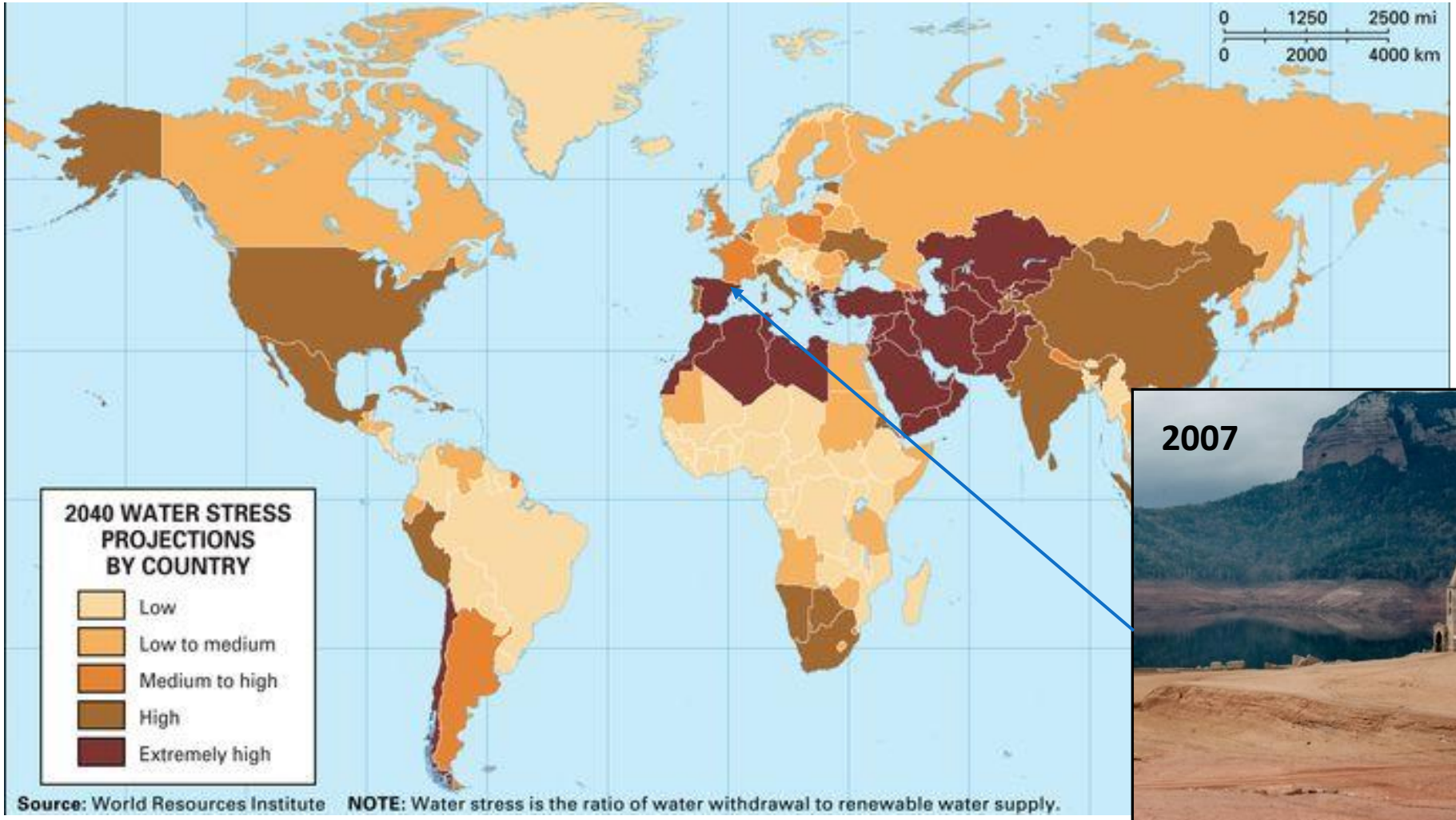

CURRENT SITUATION BARCELONA 2023

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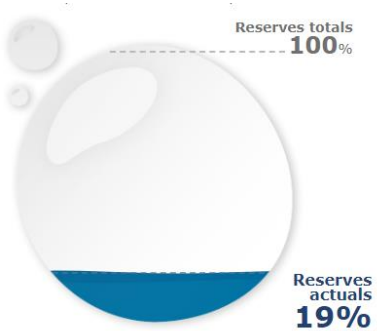

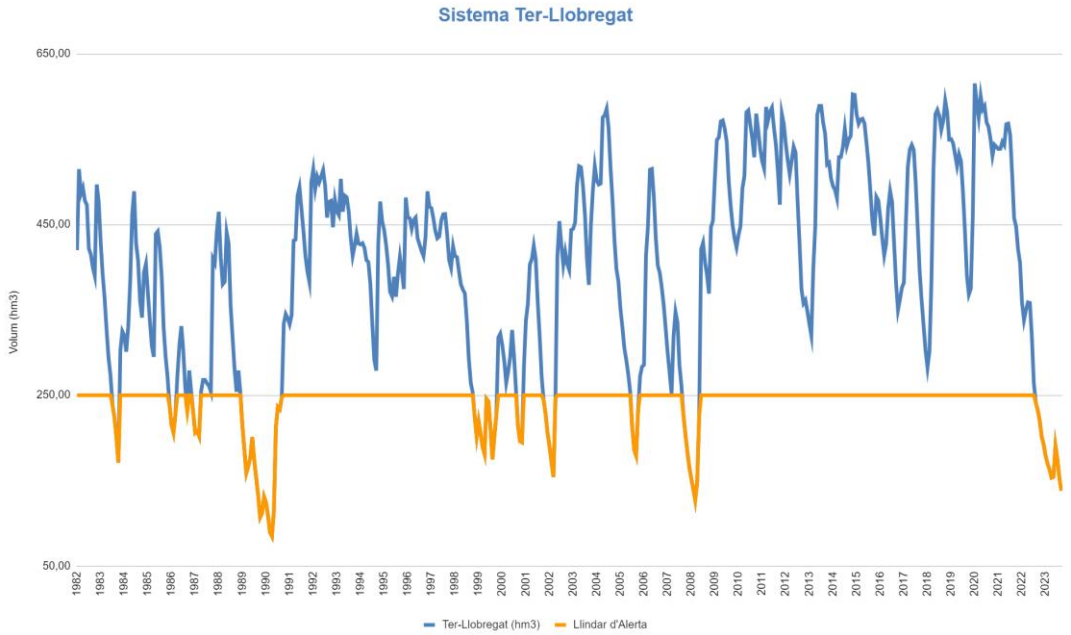

HOW CAN WE DEAL WITH IT?

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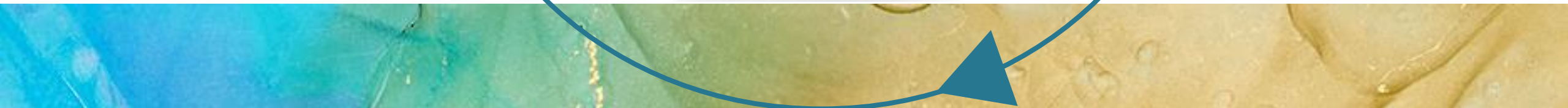
Water Quality

1 What can happen?

2 Who and how to act?

3 How do we ensure the risk has been properly managed?



BRIEF HISTORY OF WATER SAFETY PLANS (WSP)

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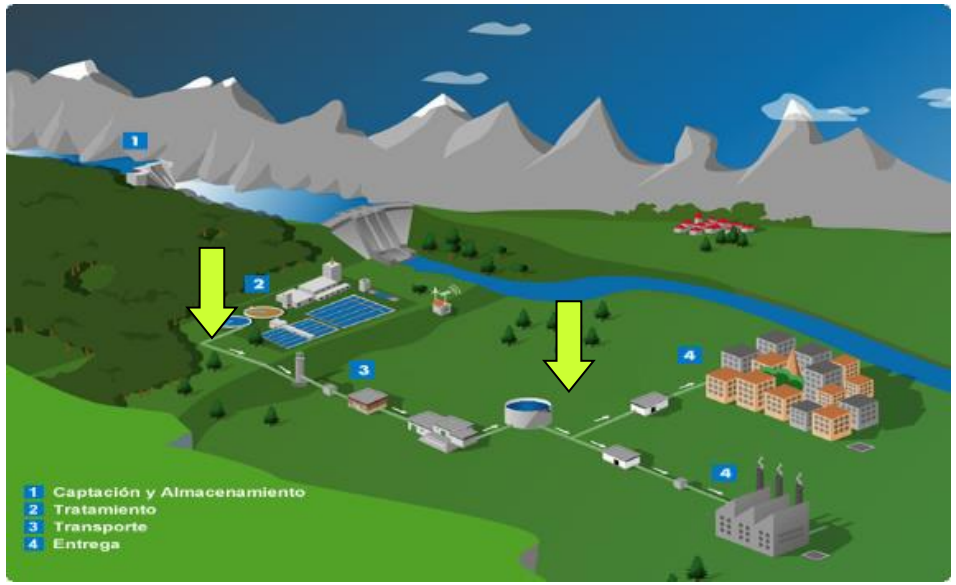
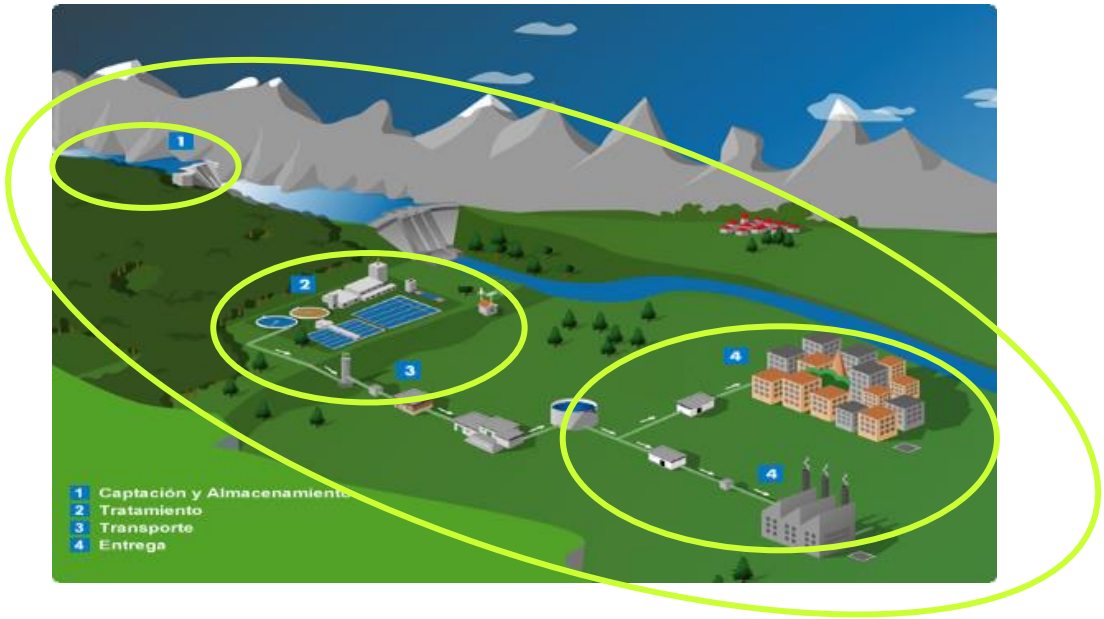


Main inconvenient:
It was
retrospective



Water Safety Plans (WSP)

Preventive management

WSP IMPLEMENTED IN 2010 IN BARCELONA'S DRINKING WATER TREATMENT PLANT

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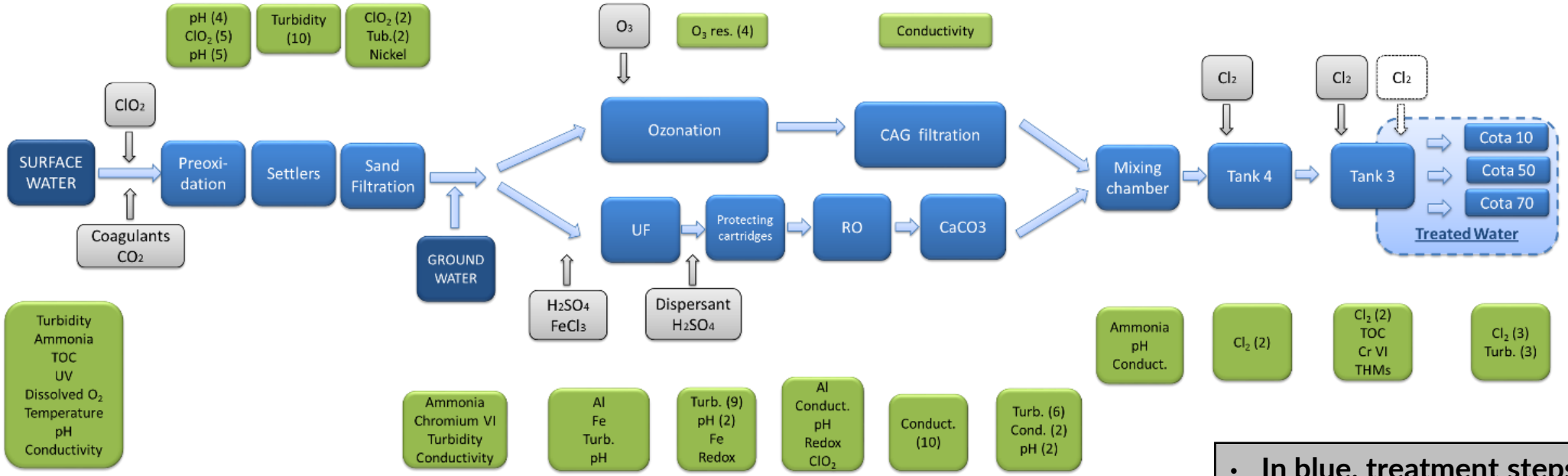
***Sant Joan Despí DWTP* is a very complex waterworks, and a risk-based management approach has been very useful to improve water quality**



Production capacity: 5 m^3/s

- In blue, treatment steps
- In green, on-line analysers

WSP - SANT JOAN DESPÍ DWTP

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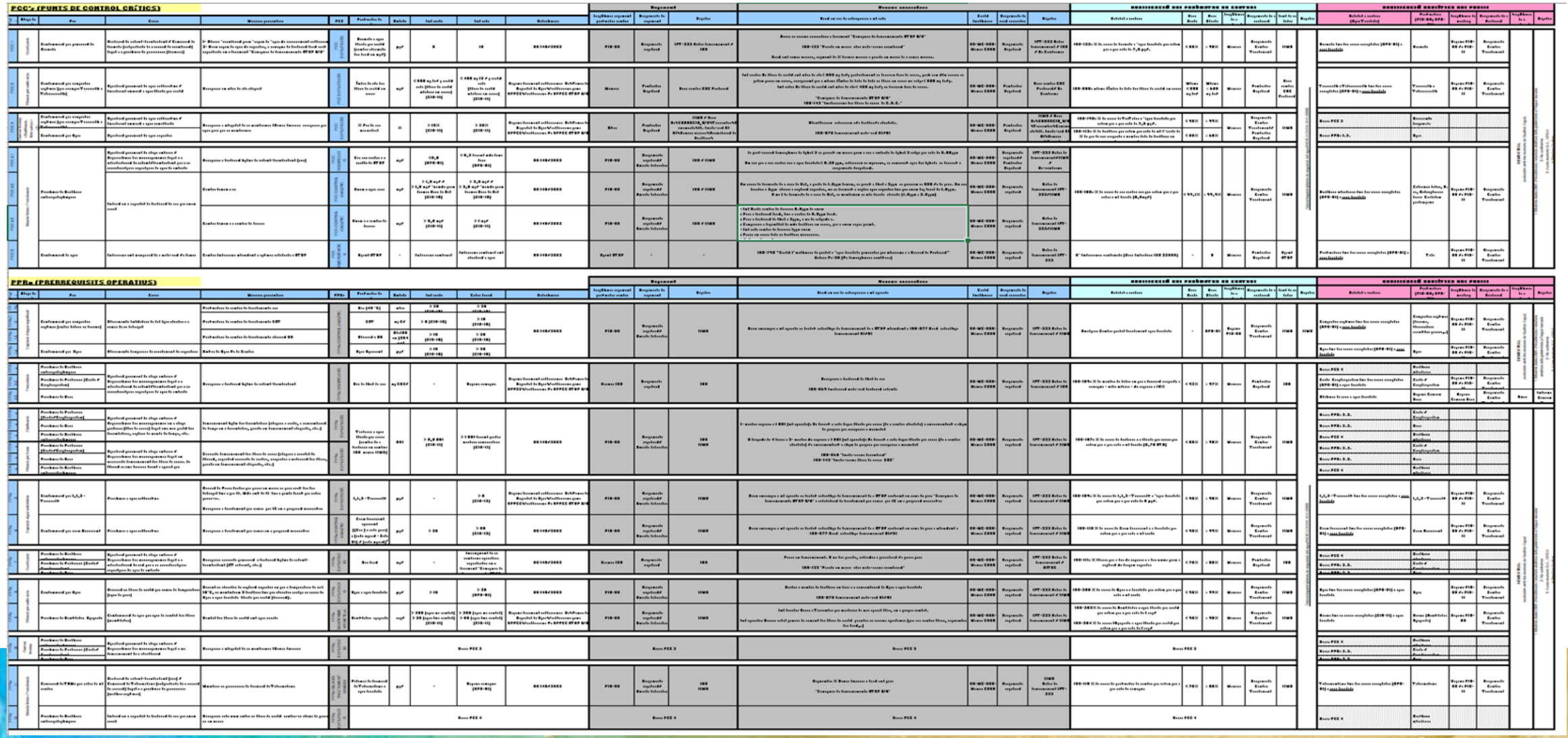
What can happen? When must act? Who has to act? How? Verification



BENEFITS WSP/ ISO 22.000: IMPROVEMENT IN NON-COMPLIANCES/INCIDENTS AND HEALTH OUTCOMES

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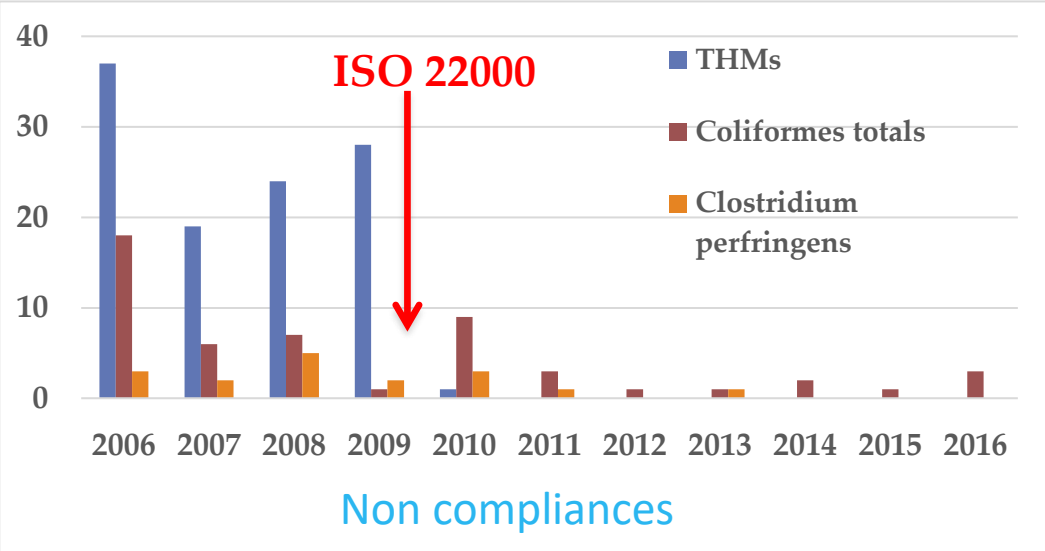
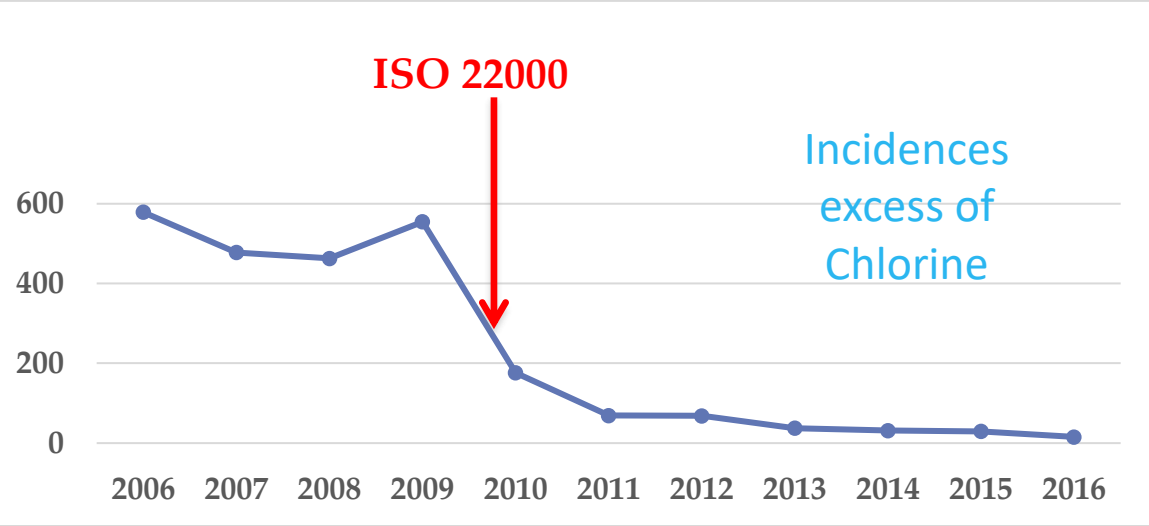


Non compliances



Incidences excess of Chlorine

International Journal of Hygiene and Environmental Health 220 (2017) 513–530

Contents lists available at ScienceDirect

International Journal of Hygiene and Environmental Health

journal homepage: www.elsevier.com/locate/ijheh

Water quality, compliance, and health outcomes among utilities implementing Water Safety Plans in France and Spain

Karen E. Setty[a,*], Georgia L. Kayser[a,b], Michael Bowling[c], Jerome Enault[d], Jean-Francois Loret[d], Claudia Puigdomenech Serra[e], Jordi Martin Alonso[f], Arnau Pla Mateu[e], Jamie Bartram[a]

[a] The University of North Carolina, Chapel Hill, Department of Environmental Sciences and Engineering, 170 Rosenau Hall, CB #7400, Chapel Hill, NC, USA
[b] The University of California, San Diego, Department of Family Medicine and Public Health, 9500 Gilman Dr, 0628, La Jolla, CA 92093-0628, USA
[c] The University of North Carolina, Chapel Hill, Department of Health Behavior, 302 Rosenau Hall, CB #7440, Chapel Hill, NC, USA
[d] Suez, Centre International de Recherche sur l'Eau et l'Environnement (CIRSEE), 38 rue du President Wilson, 78230 Le Pecq, France
[e] Suez, Centre Tecnològic de l'Aigua (CETAQUA), Carretera d'Esplugues, 75, 08940 Cornellà de Llobregat, Barcelona, Spain
[f] Aigües de Barcelona, Carrer General Batet 1-7, 08028, Barcelona, Spain

ARTICLE INFO ABSTRACT

Are we able to transfer these improvements to reclaimed wastewater?

COMPARISON BETWEEN SANITATION SAFETY PLAN (SSP) AND WATER SAFETY PLAN (WSP)

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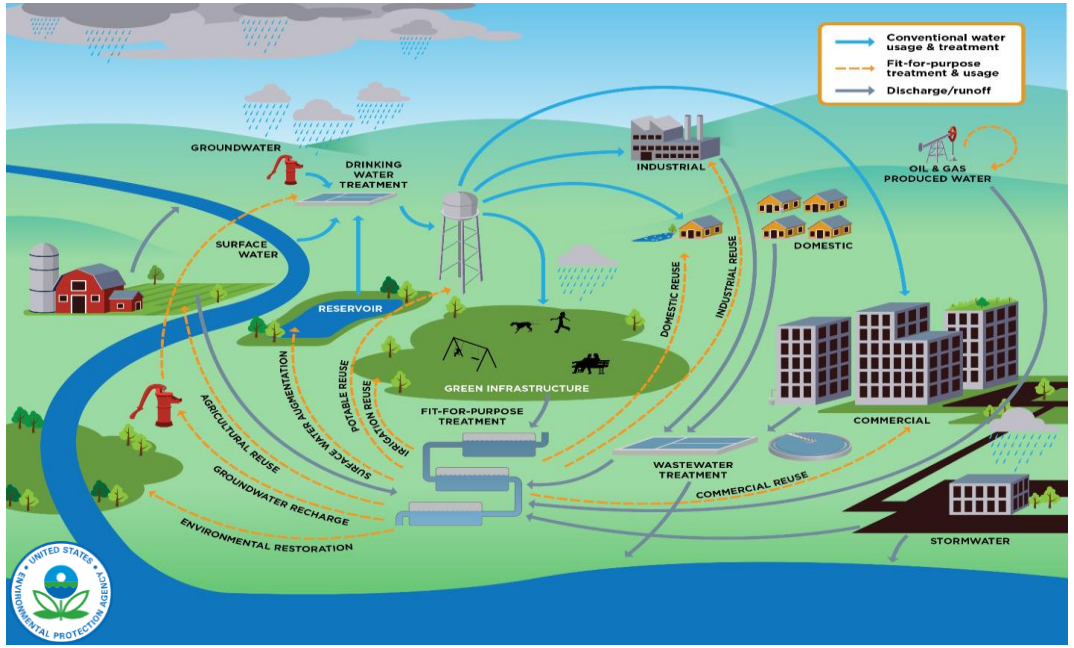

Comparison of Sanitation Safety Planning with Water Safety Planning

Many readers will be familiar with Water Safety Plans (WSPs). Like WSPs, SSP is based on the Stockholm framework for preventive risk assessment and management and uses the methods and procedures of hazard analysis and critical control point (HACCP).

WSPs provide a systematic approach towards assessing, managing and monitoring risks from catchments to drinking-water consumers. Similarly SSP applies the approach from sanitation waste generation (e.g. the toilet) to the waste's final use and/or disposal. For example, in the case of reuse/recycled waste streams in agriculture which produce a food product, SSP goes from "toilet to farm to table", or for waste streams which are released to the environment, from "toilet to environment".

There are, however, critical differences in the two approaches. SSP typically operates in a less defined regulator environment, has multiple objectives, has more stakeholders and addresses risks to multiple exposure groups.

	Sanitation Safety Planning	Water Safety Planning
Similarities	Derived from WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater	Derived from the WHO Guidelines for Drinking-water Quality
	Uses risk management, HACCP, Stockholm Framework (see Note)	Uses risk management, HACCP, Stockholm Framework
	Core components: (1) system assessment; (2) monitoring; (3) management	Core components: (1) system assessment; (2) monitoring; (3) management
	Follows the sanitation chain	Follows the drinking-water supply chain
Differences	Considers multiple exposure groups for microbiological, physical and chemical hazards	Considers single exposure group (drinking-water consumer) for microbiological, physical, chemical and radiation hazards
	Expands from waste generation to its uses and discharges into the environment	Contracts from catchments and converges to the drinking-water delivery point
	Usually no clear regulatory framework – roles and responsibilities are shared over different sectors and levels	Usually operates in a clear regulatory framework
	Objectives – reduce negative health impacts of use of wastewater, excreta or greywater while maximizing the benefits of their use	Objectives — to consistently ensure the safety and acceptability of a drinking-water supply and to reduce the risk of drinking-water contamination
	Implementing agency – varies depending on objectives, skills and resources	Implementing agency – water utility or a community association for small supplies

Note: The Stockholm Framework creates a harmonized framework for the development of guidelines and standards, in terms of water-related microbiological hazards. It provides the conceptual framework of the 2006 WHO Guidelines. In its simplest form, its key elements are: assessment of public health and of risks; health targets; risk management based on informed environmental exposure and acceptable risk (see 2006 WHO Guidelines Vol. 1, 36 for more details).

Need to develop specific SSP for each use

No clear regulatory framework

LEGAL CONTEXT AND METHODOLOGY

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- **Regulation EU:** risk management approach, limited to agriculture irrigation
- **Spanish decree:** Multiple uses, but no risk management requirement

Regulation EU *2020/741*

Table 1 – Classes of reclaimed water quality and permitted agricultural use and irrigation method

Minimum reclaimed water quality class	Crop category (*)	Irrigation method
A	All food crops consumed raw where the edible part is in direct contact with reclaimed water and root crops consumed raw	All irrigation methods
B	Food crops consumed raw where the edible part is produced above ground and is not in direct contact with reclaimed water, processed food crops and non-food crops including crops used to feed milk- or meat-producing animals	All irrigation methods
C	Food crops consumed raw where the edible part is produced above ground and is not in direct contact with reclaimed water, processed food crops and non-food crops including crops used to feed milk- or meat-producing animals	Drip irrigation (**) or other irrigation method that avoids direct contact with the edible part of the crop
D	Industrial, energy and seeded crops	All irrigation methods (***)

Real Decreto 1620/2007

USO	Calidad	Nematodos intestinales	*Escherichia coli*	SS	Turbidez	Nt y Pt	Otros Contaminantes	Otros Criterios
1.- USO URBANO	1.1 y 1.2	Quincenal	2 veces semana	Semanal	2 veces semana	---	El Organismo de cuenca valorará la frecuencia de análisis sobre la base de la autorización de vertido y del tratamiento de regeneración.	Mensual
2.- USO AGRARIO	2.1	Quincenal	Semanal	Semanal	Semanal	---		Mensual
	2.2	Quincenal	Semanal	Semanal	---	---		Quincenal
	2.3	Quincenal	Semanal	Semanal	---	---		----
3.- USO INDUSTRIAL	3.1	---	Semanal	Semanal	Semanal	---		Mensual
	3.2	Semanal	3 veces semana	Diaria	Diaria	---		*Legionella spp.* 3 veces semana
4.- USO RECREATIVO	4.1	Quincenal	2 veces semana	Semanal	2 veces semana	---		---
	4.2	---	Semanal	Semanal	----	Mensual		----
5.- USO AMBIENTAL	5.1	---	2 veces semana	Semanal	---	Semanal		----
	5.2	Semanal	3 veces semana	Diaria	Diaria	Semanal		Semanal
	5.3	---	---	Semanal	---	---		----
	5.4							Frecuencia igual al uso más similar

Potable reuse +
risk management approach?

REGULATION (EU) 2020/741 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 May 2020 on minimum requirements for water reuse.

WHAT HAVE WE RELIED ON TO DEVELOP THE SSP?

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Based on international reference documents such as the WHO Guidelines

Aigües de Barcelona has created its own SSP Management Manual and Procedures

1 OBJECTE

Definir la metodologia a seguir per identificar els perills significatius i avaluar els riscos associats a les activitats i processos sobre els que es faci una gestió de l'aigua regenerada.

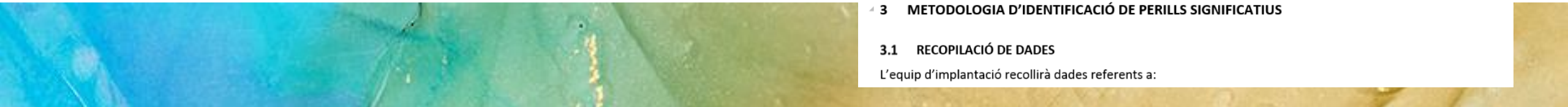
2 ABAST

Les aigües regenerades produïdes a les EDAR d'Aigües de Barcelona gestionades segons criteris **GRSAR**.

3 METODOLOGIA D'IDENTIFICACIÓ DE PERILLS SIGNIFICATIUS

3.1 RECOPILACIÓ DE DADES

L'equip d'implantació recollirà dades referents a:



SANITATION SAFETY PLAN (SPP) EL PRAT WWTP

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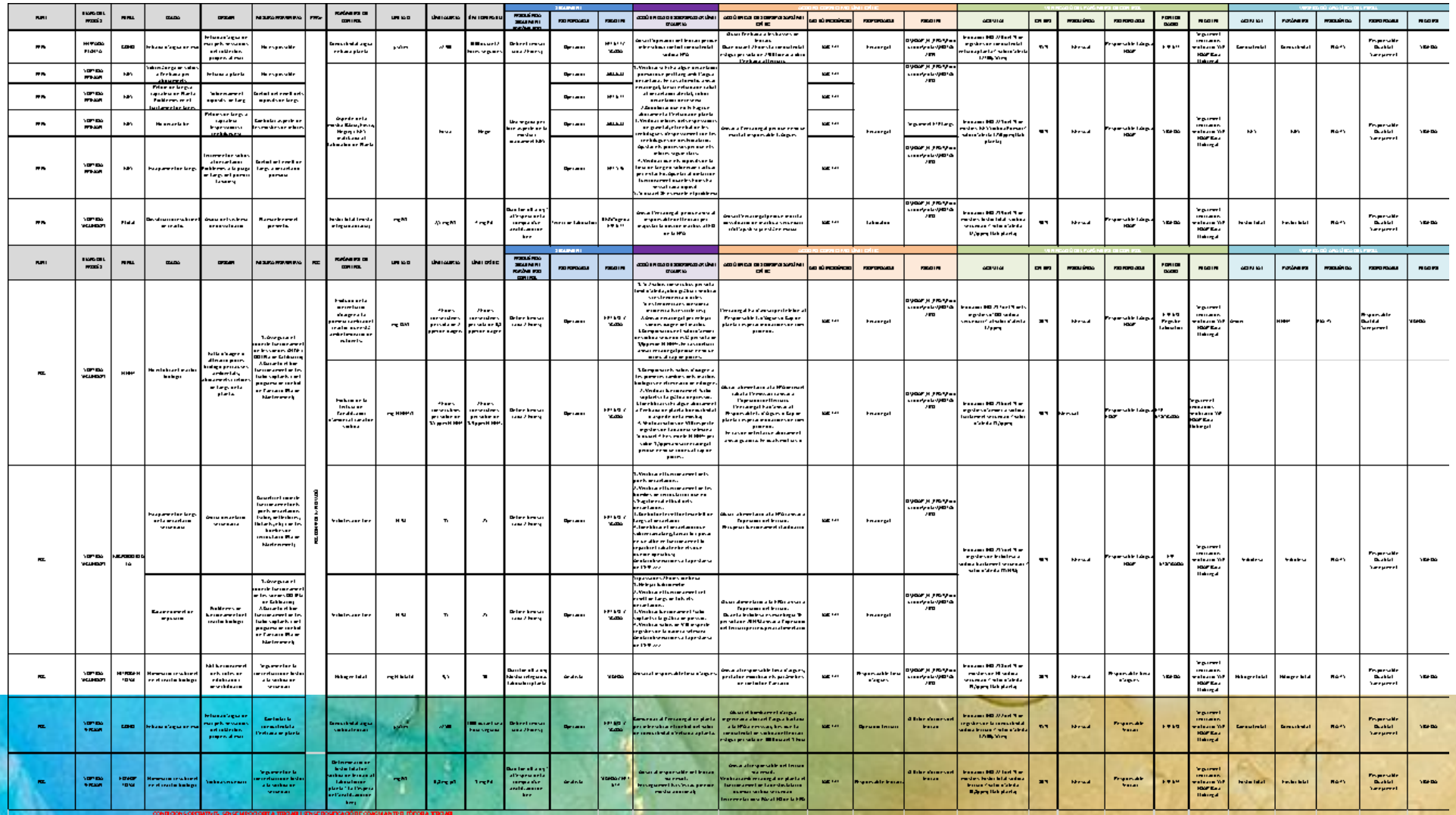
Aigües de Barcelona

What can happen? Who must act? How? verification



AIGÜES DE BARCELONA: SCOPE OF ACTIVITY WSP AND SSP IMPLEMENTATION

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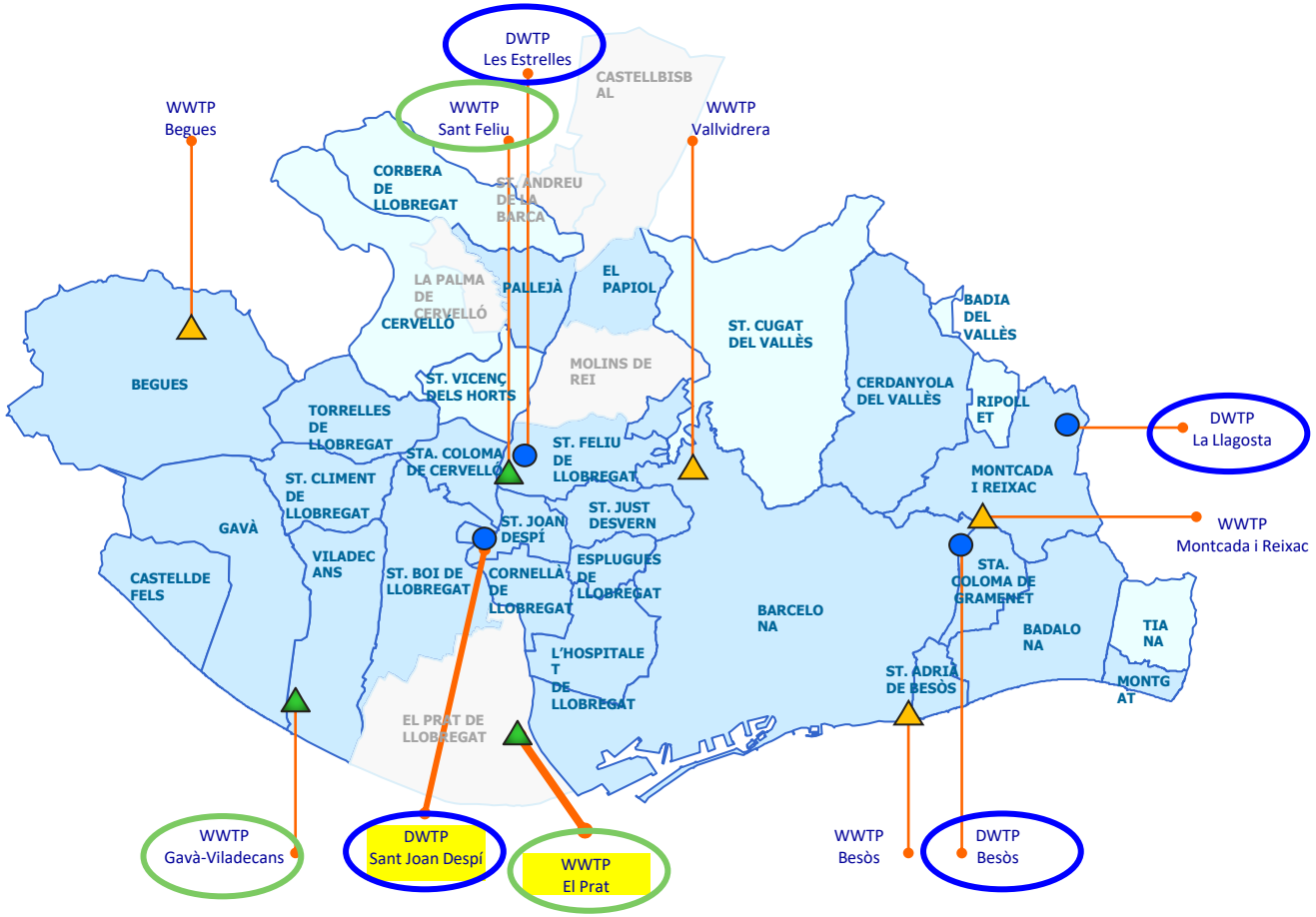

Drinking Water Treatment Plant

Waste Water Treatment Plant

Reclamation facility

WSP

SSP

DRINKING WATER: AIGÜES DE BARCELONA management | GROUP AGBAR management | OTHER COMPANIES

INDIRECT POTABLE REUSE: BARCELONA CASE STUDY

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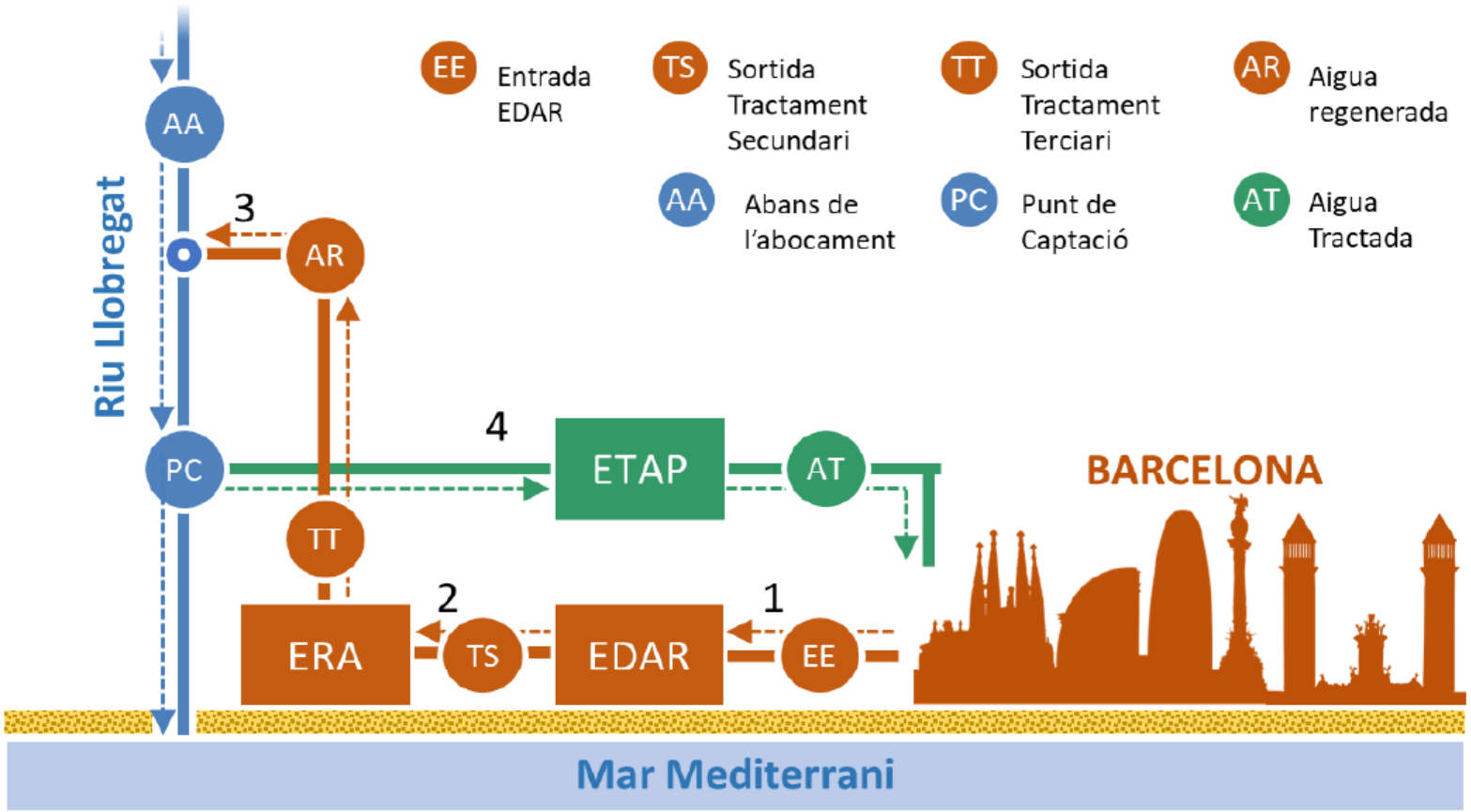
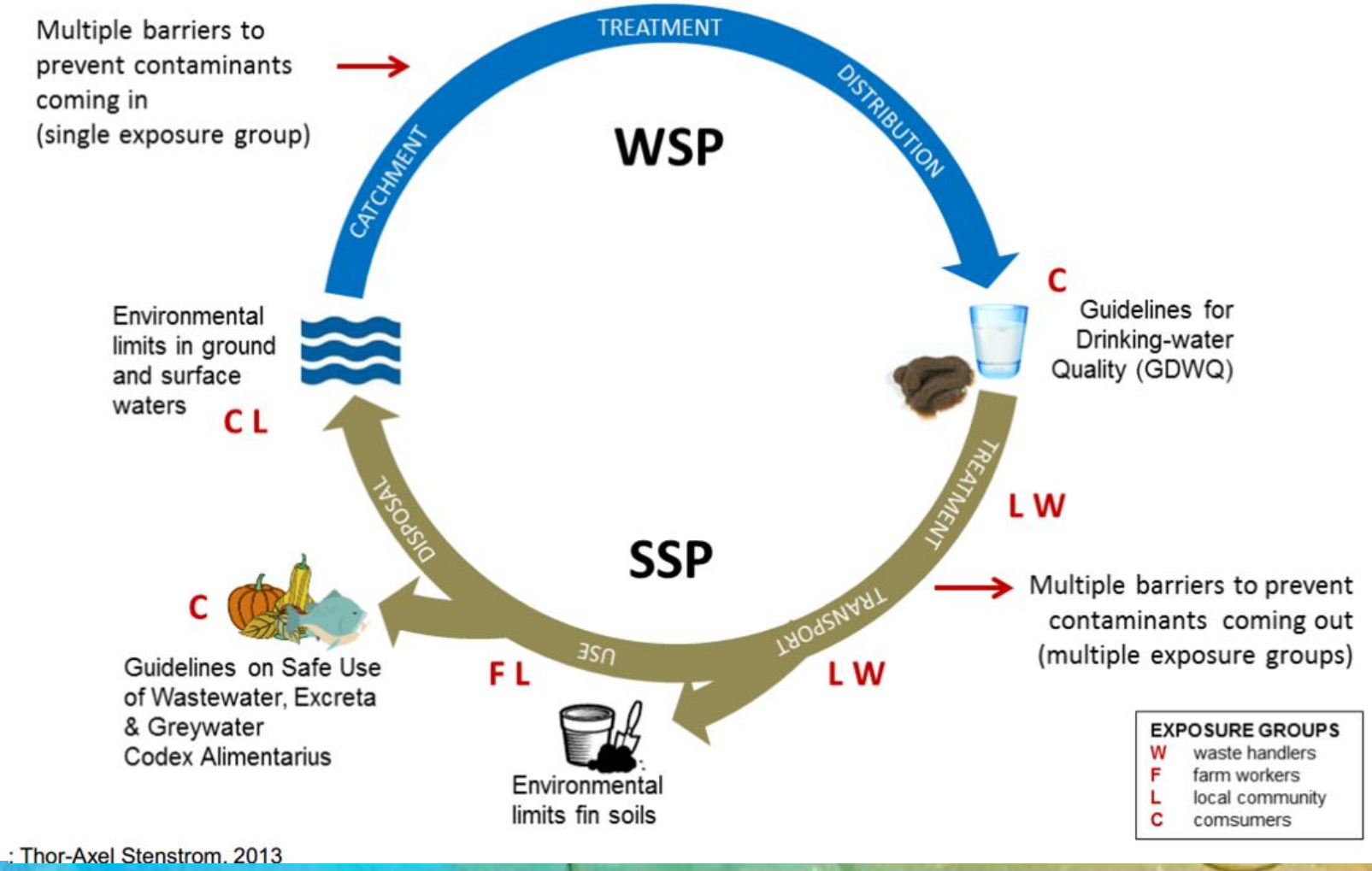


Agència Catalana de l'Aigua

Aigües de Barcelona
La gestió responsable

WSP + SSP = GLOBAL RISK MANAGEMENT



: Thor-Axel Stenstrom, 2013

✓ Benefits:

- Common Approach: Health Risk applied to **Source, Drinking and Reclaimed Water.**
- **Involvement** of all users: operators, customers, administrations.
- Control of critical processes / **barriers and control points** / continuously ensured safety / verification.
- **Immediate action** in case of deviation from the requirements.
- **Generates user confidence** in reused water.

INDIRECT POTABLE REUSE: SAMPLING POINTS

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INDIRECT POTABLE REUSE: MONITORING PLAN

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Family	Parameter	Sampling points				Responsible
		AA	AR	PC	AT	
Biological parameters	Algae	M	M*	M	—	Aigües de Barcelona
	Microcystins	—	—	S	M	Aigües de Barcelona
	Microbiological par.	—	—	S	S(1)	Aigües de Barcelona
	Chlorophylla	M	M*	D	—	Aigües de Barcelona
Physicochemical parameters	Ammonium	M	S	online	—	Aigües de Barcelona
	TOC	M	M	online	online	Aigües de Barcelona
	Phosphorus	M	S	S	S	Aigües de Barcelona
	Nitrates & nitrites	M	S	S	D	Aigües de Barcelona
	Conductivity	M	S	online	online	Aigües de Barcelona
	pH	—	—	online	online	Aigües de Barcelona
	O_2 dissolved	—	—	online	-	Aigües de Barcelona
Organoleptics	Odor	—	—	D	D	Aigües de Barcelona
	Geosmin	—	—	M	M	Aigües de Barcelona
Disinfection by-products	Trihalomethanes (THMs)	—	—	—	online	Aigües de Barcelona
	Haloacetic acids	—	—	—	Q	Aigües de Barcelona
	Chlorite and Chlorate	M	M	S	D	Aigües de Barcelona
	NDMA	M	M	M	M	ACA
Micropollutant	Metals	M	M	S	S	Aigües de Barcelona
	Detergents	M*	M*	M*	—	Aigües de Barcelona
	Dioxanes	M	S	S	S	Aigües de Barcelona
	Pesticides LC	M	M	S	M	Aigües de Barcelona
	Pesticides GC	—	—	Q	M	Aigües de Barcelona
	Target Orbitrap	M	M	M	M	Aigües de Barcelona
	VOCs	—	—	S	S	Aigües de Barcelona
	PFAS	M	M	Q	Q	Aigües de Barcelona
	PAHs	—	—	M	M	Aigües de Barcelona
	Bisphenol A	—	—	M	M	Aigües de Barcelona
	Glyphosate and AMPA	2M	2M	2M	2M	ACA

Agència Catalana de l'Aigua

Aigües de Barcelona
La gestió responsable

INDIRECT POTABLE REUSE: POLLUTANTS DETECTED

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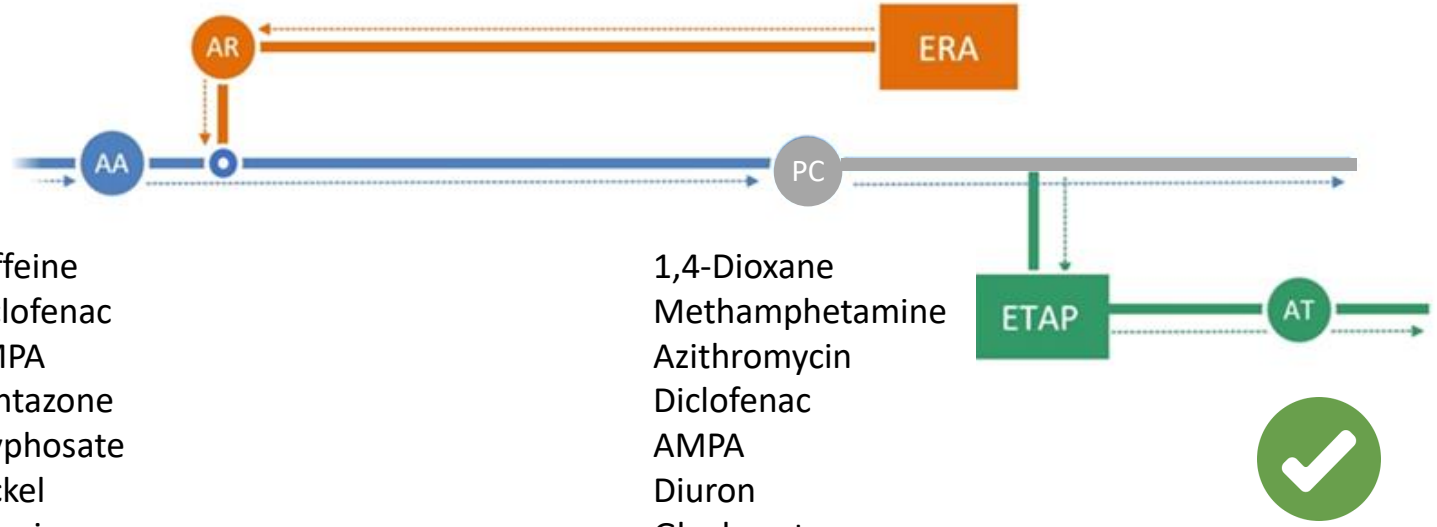
1,4-Dioxane
EDDP
NDMA
Methamphetamine
Azithromycin
Diclofenac
Diuron

AMPA
Glyphosate
Imidacloprid
2,4-Dichlorophenoxyacetic acid
Aluminum



Caffeine
Diclofenac
AMPA
Bentazone
Glyphosate
Nickel
Aluminum

1,4-Dioxane
Methamphetamine
Azithromycin
Diclofenac
AMPA
Diuron
Glyphosate
Aluminum
Nickel
Lead

INDIRECT POTABLE REUSE: DWTP THE KEY TO SUCCESS

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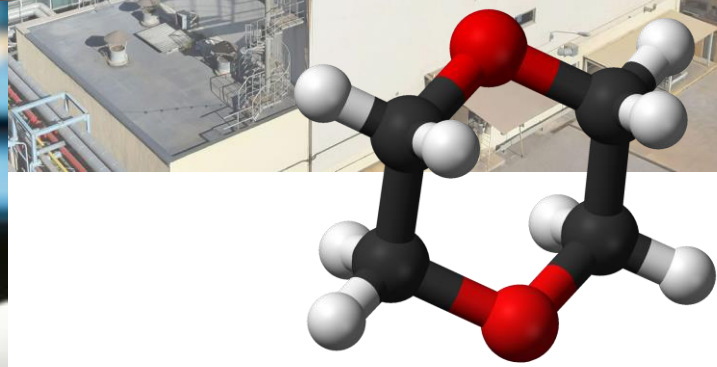
DWTP Sant Joan Despí

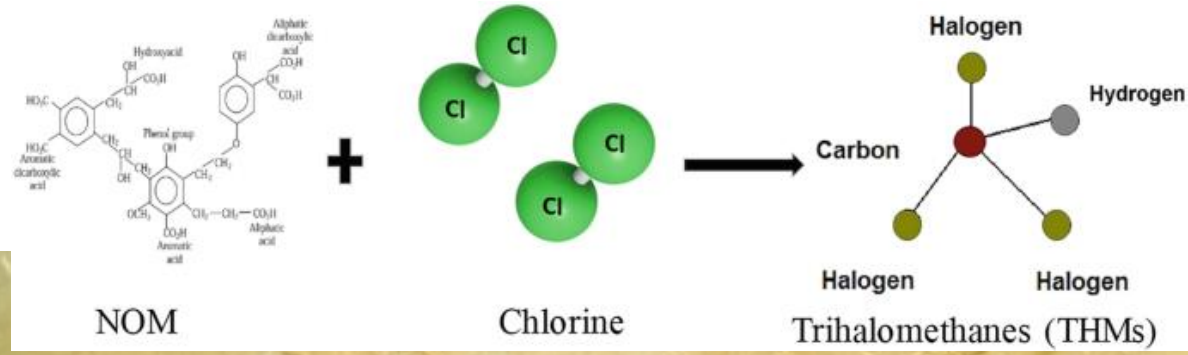
- ✓ Technologically very advanced
- ✓ Risk management based on ISO 22,000 /WSP standard
- ✓ Removal of micropollutants and microbiological parameters
- ✓ No parameter with concentrations higher than *guide or parametric values* in treated water

However, we have other problems…

NEW THREATS:

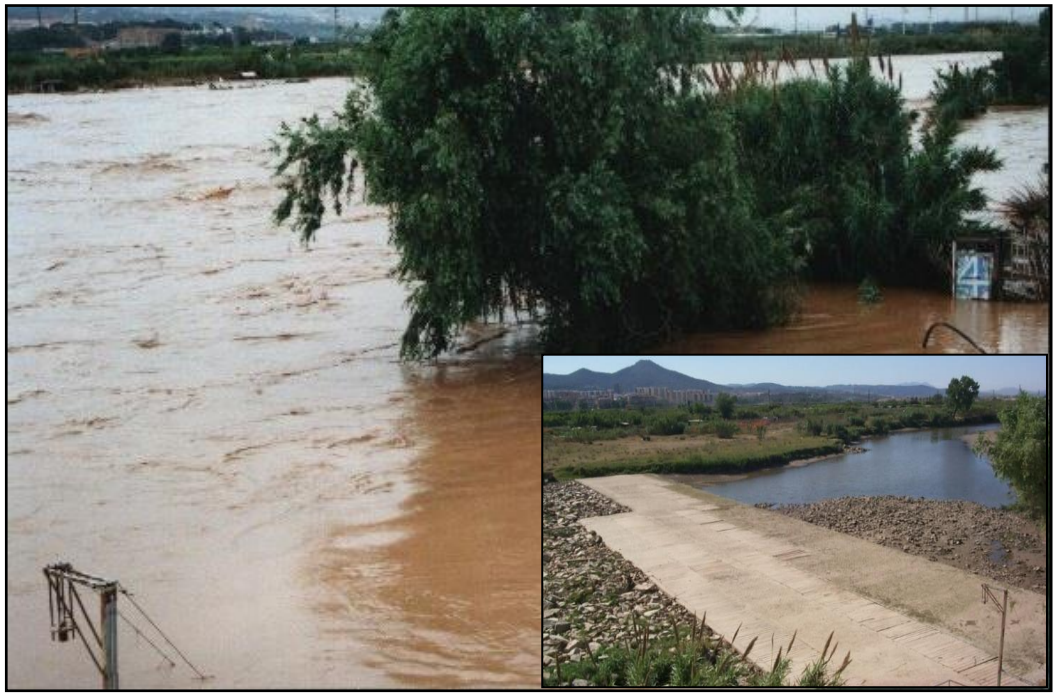
Algae
Increase in Trihalomethane (THMs)
1,4-dioxane
Organoleptics





Climate Resilient-Water Safety Plan (CR-WSP)

Global approach to risk assessment and management that includes all stages of water supply, from catchment to consumer, **incorporating climate change impacts**.



STANDARDISATION OF LIMITS AND SEVERITY INDEXES

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Aigües de Barcelona has developed a table with > 450 parameters: Severity index based on national and international references (RD 3/2023, WHO, IARC, EPA, ACA, etc...)

GRUPS	
GRUPO 1 -->	Agentes cancerígenos para el hombre y los animales
GRUPO 2A -->	e cancerígenos para el hombre, prueba de cancerogénesis para los animales
GRUPO 2B -->	r cancerígenos para el hombre, suficiente cancerogénesis para los animales
GRUPO 3 -->	o clasificables en cuanto a su cancerogenicidad para el hombre.

COLORS GRAVETAT		
	1	Perill no significatiu sobre la salut de la població
	3	Perill amb impacte menor en la salut de la població
	5	Perill amb impacte considerable en la salut de la població
	10	Perill amb impacte major en la salut de la població
	-	

https://ntdb.sps.gov/tdb/contaminant?id=11020
https://apps.who.int/iris/rest/bitstreams/1136016/retrieve
https://www.iarc.who.int/
https://aca.gencat.cat/web/.content/10_ACA/J_Publicacions/07-estudis-informes/35-proves-restitucio-ERA-Prat-Llobregat.pdf

			Tipus substància		Comentari OMS		Comentari PUBCHEM	GRAVETAT	Justificació gravet	RD 3/2023		UNITA		OMS		
Perill (paràmetre)	Anglès	nº CAS	Real Decreto 817/2015	Categoria	Salut humana	Medi ambient				Ho contempla?	VP		anexo	Ho contempla?	VP	Unitats
E.coli	*Escherichia coli*			Bacteris	Salut humana	Medi ambient		10	RD	x	0 UFC o NMP/100 ml		Annex I; part A; Tab. 1	x		
Enterococs	*Enterococci*			Bacteris	Salut humana			10	RD	x	0 UFC o NMP/100 ml		Annex I; part A; Tab. 1	x		
Clostridium perfringens	*Clostridium perfringens*			Bacteris	Salut humana			10	RD	x	0 UFC/100 ml		Annex I; part A; Tab. 1	x		
Legionella spp.	*Legionella spp.*			Bacteris	Salut humana			10	RD	x	100 UFC/l		Annex I; part A; Tab. 1			
Acenaftè	Acenaphthene	83-32-9	-	Hidrocarbur aromàtic policíclic			Hidrocarbur aromàtic policíclic	5	ACA N1							
Acenaftilè	Acenaphthalene	208-96-8	-	Hidrocarbur aromàtic policíclic			Hidrocarbur aromàtic policíclic	5	ACA N2							
Acetamiprid	Acetamiprid	135410-20-7	-	Insecticida neonicotinoide			Insecticida neonicotinoide	5	RD	X	0,1	µg/L	Annex I; part B; Tab. 2			
Acetaminofen	Acetaminophen	103-90-2	-	Analgèsic			Paracetamol, analgèsic	3	IARC, ACA							
4-Acetilaminoantipirina	4-Aminoantipyrine	83-15-8	-	Metabolit de fàrmac				3	ACA N2							
Àcids haloacètics	Haloacetic acid		-	Subproductes de desinfecció				5	RD	x	60	µg/L	Annex I; part B; Tab. 2			
Àcid Acetilsalicílico (ASA metabòlic)	Acetylsalicylic acid	50-78-2	-	Aspirina				3	ACA N2							
Àcid Bromocloroacètic (BCAA)	Bromochloroacetic acid (BCAA)	68238-35-7	-	Producte desinfecció, (HAAS)			Producte de desinfecció	5	RD	x	60	µg/l	Annex I; part B; Tab. 2			
Àcid bromodicloroacètic (BDCAA)	Bromodichloroacetic acid (BDCAA)	71133-14-7	-	HAAS				5	RD	x	60	µg/l	Annex I; part B; Tab. 3			
Àcid clorodibromoacètic (CDBAA)	Dibromochloroacetic acid	5278-95-5	-	HAAS				5	RD	x	60	µg/l	Annex I; part B; Tab. 4			
Àcid diatrizoic	Àcid diatrizoic	117-96-4	-	Uso en radiografía de diagnóstico				3	ACA N2							
Àcid dibromoacètic (DBAA)	Dibromoaceticacid	631-64-1	-	HAAS				5	RD	x	60	µg/l	Annex I; part B; Tab. 4			
Àcid dicloroacètic (DCAA)	Dichloroacetic acid	79-43-6	-	Subproducte desinfecció, HAAS			Subproductes de desinfecció	5	RD	x	60	µg/l	Annex I; part B; Tab. 5	x	50	µg/L
Àcid monocloroacètic (MCAA)	Monochloroacetic acid (MCAA)	79-11-8	-	Herbicida , HAAS			Herbicida	5	RD	x	60	µg/l	Annex I; part B; Tab. 6			
Àcid monobromoacètic (MBAA)	Monobromoacetic acid (MBAA)	79-08-3	-	Subproducte desinfecció, HAAS			Subproductes de desinfecció	5	RD	x	60	µg/l	Annex I; part B; Tab. 7			
Àcid Salicílic (ASA metabòlit)	Salicylic acid	69-72-7	-	Agent antiinflamatori			Agent antiinflamatori	5	ACA N1							
Ácido sulfónico fluorotelómero 4:2	4:2 fluorotelomer sulfonic acid (4:2FTS)	757124-72-4	-													
Ácido sulfónico fluorotelómero 6:2	6:2 fluorotelomer sulfonic acid (6:2FTS)	27619-97-2	-													
Ácido sulfónico fluorotelómero 8:2	8:2 fluorotelomer sulfonic acid (8:2FTS)	39108-34-4	-													
Àcid tribromoacètic (TBAA)	Tribromoacetic acid (TBAA)	75-96-7	-	HAAS				5	RD	x	60	µg/l	Annex I; part B; Tab. 7			
Àcid tricloroacètic (TCAA)	Trichloroacetic acid (TCAA)	76-03-9	-	Compost organoclorat, HAAS			Compost organoclorat	5	RD	x	60	µg/l	Annex I; part B; Tab. 7			
Àcid valproic	Valproic acid	99-66-1	-	Anticonvulsivant			Anticonvulsivant	3	ACA N2							
Aclonifen	Aclonifen	74070-46-5	Prioritaris	Herbicida				5	RD	x	0,1	µg/l	Annex I; part B; Tab. 2			
Acrilamida	acrylamide	79-06-1	-	Coagulant tractament aigua	Salut humana			10	IARC	x	0,1	µg/l	Annex I; part B; Tab. 2	x	0,5	µg/L
Alaclor	alachlor	15972-60-8	Prioritaris	Herbicida	Salut humana			5	RD	x	0,03	µg/l	Annex I; part B; Tab. 2	x	20	µg/L
17 α-etinil estradiol (EE2)	17 alpha-ethinyl estradiol (EE2)	57-63-6	-	Estrògen				5	ACA N1							
α-Endosulfan	Alpha-Endosulfan	115-29-7	-	Insecticida	Salut humana			5	RD	x	0,03	µg/l	Annex I; part B; Tab. 2			
α - Hexaclorociclohexà (HCH)	α-Hexachlorocyclohexane	58-89-9	-	Plaguicida organoclorat	Salut humana			5	IARC, RD	x	0,03	µg/l	Annex I; part B; Tab. 2	x	2	µg/L
Aldicarb	Aldicarb	116-06-3	-	Plaguicida sistèmic	Salut humana			5	RD	x	0,1	µg/l	Annex I; part B; Tab. 2	x	10	µg/L
Aldicarb-sulfòxido	Aldicarb-sulfóxid	1646-88-4	-	Plaguicida sistèmic	Salut humana			5	RD	x	0,1	µg/l	Annex I; part B; Tab. 2	x	10	µg/L
Aldrin	aldrin	309-00-2	-	Plaguicidas clorados	Salut humana			10	IARC	x	0,03	µg/l	Annex I; part B; Tab. 2	x	0,03	µg/L
1-Algues verdes																
2-Algues blaves	algae		-													
Alumini	aluminium	7429-90-5	-	Metall	Salut humana			3	RD	x	0,2	mg/L	Annex I; part C; Tab. 3	x	0,9	mg/L
Ametrina	ametryn	834-12-8	-	Herbicida			Herbicida	5	RD	x	0,03	µg/l	Annex I; part B; Tab. 2			
Amfetamina	amphetamine	300-62-9	-	Droga il·lícita				1	ACA N3							
Amoni			-					3	RD	x	0,5	mg/l	Annex I; part C; Tab. 3			
Amoxicil·lina	amoxicillin	26787-78-0	-	Antibiòtic				3	ACA N2							
Antimoni	antimony	7440-36-0	-	Fundició metalls	Salut humana			5	RD	x	10	µg/L	Annex I; part B; Tab. 2	x	20	µg/L
Antipirina o Fenazona	antipyrine or phenazone	60-80-0	-	Analgèsic			Analgèsic	3	ACA N2							
Antracè	Anthracene	120-12-7	Perillosa Prioritaris	Producte combustió				5	ACA N1							
Atrazina	Antrazine	1912-24-9	Prioritaris	Herbicida			Herbicida	5	RD	x	0,03	µg/l	Annex I; part B; Tab. 2			
Antrazinadecisopropil-2-OH	anthrazine decisopropil	645-92-1	-	Metabolit de herbicida				5	RD	x	0,1	µg/l	Annex I; part B; Tab. 2			
Argent	Silver	7440-22-4	-	Metall	Salut humana			3	PubChem							
Arsènic	arsenic	7440-38-2	-	Metall	Salut humana			10	IARC	x	10	µg/l	Annex I; part B; Tab. 2	x	10	µg/l
Atenolol	atenolol	29122-68-7	-	Tractament hipertensió			Tractament hipertensió	3	ACA N2							
Azitromicina	Azithromycin	83905-01-5	-	antibacteriano				5	RD	x	100	ng/L	anexo IV			
Azoxystrobina	Azoxystrobin	131860-33-8	-	Fungicida				5	RD		0,1					
Δ9-Tetrahidrocannabinol (THC)		1972-08-3	-	Isomer THC				3	ACA N2							

RISK MANAGEMENT through CLIMATE RESILIENT - WSP

AMSTERDAM INTERNATIONAL WATER WEEK

1 What can happen?

2 Who and how to act?

3 How do we know that the risk has been properly managed?

New CR-WSP measures incorporated into SJD DWTP WSP (2023)

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Hazard	Cause	New preventive measure	New control measure	Limit	Corrective action
Microbiological	Presence of algae (diatoms) due to a higher concentration of nutrients, longer residence time, temperature, etc. in the surface water of the river, increased on one hand by drought (less resource) and on the other hand the contribution of regenerated water, cause a malfunction of the pretreatment	$KMnO_4$ dosage	Analysis of chlorophyll once a day in the river	Chlorophyll > 25 µg/L	ClO_2 dose increase Using $KMnO_4$ Coagulant and pH adjustment
1,4-dioxane	Regenerated water: From industry, compost that is not eliminated in the WWTP / RWTP	Monitoring. Minimization of industrial discharge/s.	1,4-dioxane analysis twice a week in reclaimed water	1,4-dioxane in reclaimed water> 200 µg/L	Shutdown / reduction of regenerated water impulsion
THMs	Increase of THM formation precursors in river + regenerated water (organic matter, bromides, temperature)	Dilution of treated water ETAP SJD with Gavà IV well, minimization of residence time, TRS systems.	*THM - Potential Formation* at the DWTP and online monitoring at the Sant Climent reservoir	PF-THMs > 45 µg/L Online analyzer > 80 µg/L	Maximization TRS network, contribution of wells in the Castelldefels-Gavà area, dilution of desalination water or decrease in surface water supply SJD DWTP
Organoleptic	Presence of salts and odorous organic compounds	Reverse Osmosis Coal renewal (GAC)	Odour control in the groundwater resource	Odour (45ºC) treated water	Stop groundwater or surface resource, and/or increase reverse Osmosis

WATER REUSE IN BARCELONA'S METROPOLITAN AREA MANAGED BY SANITATION SAFETY PLANS (SPP)

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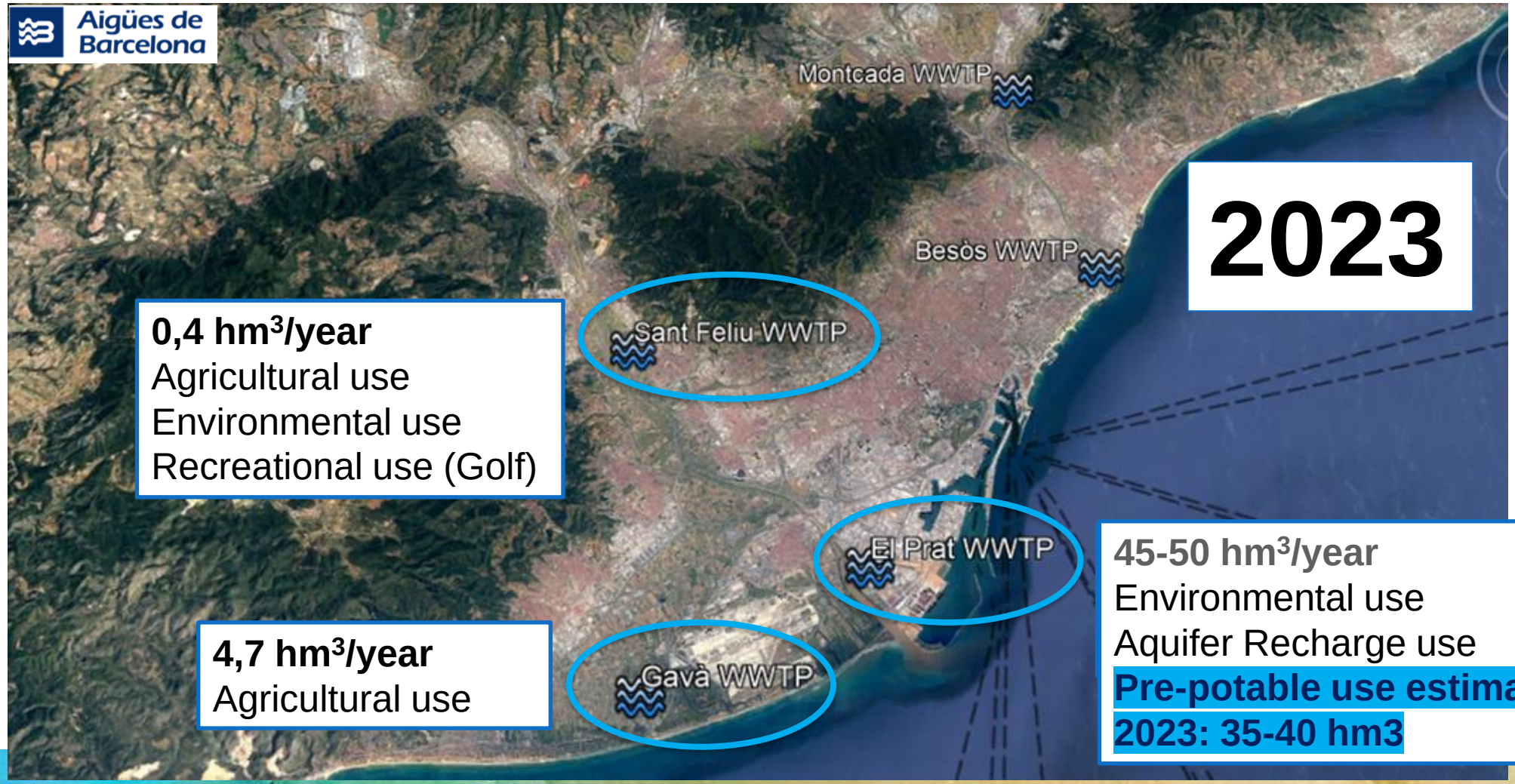

WHAT ABOUT CLIMATE RESILIENT PLANS FOR RECLAIMED WATER FOR AGRICULTURAL USE?

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NEXT STEP:

Climate Resilient Sanitation Safety Plan (CR – SSP)

Climate-related events in reclaimed water system - Gavà Case Study

Event = Climate event + system effects + impact on reclaimed water safety for people/crops/environment.

MAGO
Mediterranean wAter management solutions for a sustainable aGriculture

PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

CONCLUSIONS

- **Reclaimed** water for a **diversity of uses** has become necessary to deal with the scarcity of water and the **threats of climate change**.
- WSP and SSP allow comprehensive risk management for indirect potable reuse (IPR).
- Reclaimed water for **IPR** in Barcelona has become a **success story**, thanks to
    - the coordination of all the agents involved,
    - the implementation of health risk management systems (SSP+WSP),
    - the high performance of SJD DW plant treatment SJD
    - the extensive control measures established to guarantee the safety of drinking water.
- In the current scenario of drought and facing the new threats of the climate crisis, adapting WSPs with climate resilience is one of **the challenges of the present. Climate Resilient-WSPs** are a very useful tool. Once again, the participation of all the agents involved will be important.

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THANK YOU!

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Rijksdienst voor Ondernemend Nederland

TOPSECTOR WATER & MARITIEM

Marta Ganzer Martí
Aigües de Barcelona
marta.ganzer@aiguesdebarcelona.cat