

Supplementary material

Table 1. Hydrological and economic variables related to the SEEA-Water analysis

Variable	Data source	Institution	Scale ^a
Abstraction	SIMPA, Own calculations	CHG, MAGRAMA	Basin
Use	PHC, Survey water services, Own calculations	CHG, MAGRAMA, INE	Basin
Returns	Own calculations based on IPH	CHG, MAGRAMA	Basin
Consumption	Own calculations based on CHG	CHG, MAGRAMA, INE	Basin
Intermediate consumption	Regional I/O Tables	IECA	Regional
Gross Value Added	Regional Accounts	INE	Regional
Gross fixed capital formation	Regional Accounts, WB investment series	INE, WB	Regional, National
Closing stocks of fixed assets	Water tariff, Government budget (2004-2008)	MAGRAMA	Basin
Self-supply costs: Groundwater	Ministry of Agriculture, Food and Environment report	MAGRAMA	Basin
Self-supply costs: Surface water	Water tariff	MAGRAMA	Basin
Self-sanitation costs	Survey water services	INE	Regional
Government account table	Government budget (2004-2008), WB investment series	MAGRAMA, WB	Regional, National
Specific transfers	Government budget (2004-2008), WB investment series	MAGRAMA, WB	Regional, National
Agricultural production by branch	National Accounts	INE	National
Evaporation rate from reservoirs	MAGRAMA/CEDEX	MAGRAMA/CEDEX	Basin
Agricultural surface evolution	CHG	CHG	Basin
Volume in reservoirs	CHG	CHG	Basin
Rainfall	SIMPA/REDIAM	CHG/AEMET	Basin
Infiltration	SIMPA	CHG	Basin
Potencial Evaporation (ETP)	SIMPA	CHG	Basin
Evapotranspiration (ETR)	SIMPA	CHG	Basin
Groundwater runoff	SIMPA	CHG	Basin
Irrigation efficiency by units	CHG	CHG	Basin
Irrigation use (water doses)	CHG	CHG	Basin

Surface runoff	SIMPA	CHG	Basin
Temperature	SIMPA	CHG	Basin
Gauging stations	SAIH/Gauge monitoring network	CHG/CEDEX	Basin
Groundwater resources, aquifer characterization	CHG/IGME	CHG/IGME	Basin
Volume of dam/regulation capacity	CHG	CHG	Basin
River flow	SAIH	CHG	Basin
Aquifer level (piezometric)	Piezometric monitoring network	MAGRAMA/IGME	Basin

SYMPA Integrated System Modeling Process Precipitation Contribution, *CHG* Guadalquivir River Basin Authority, *MAGRAMA* Ministry of Agriculture, Food and Environment *PHC* Guadalquivir Hydrological Plan, *IPH* Water Planning Instruction, *INE* National Statistics Institute, *IECA* Andalusian Statistics Institute, *WB* World Bank, *CEDEX* Centre for Hydrographic Studies, *REDIAM* Environmental Information Network of Andalusia, *AEMET* Spanish Meteorological Agency, *SAIH* Automatic Hydrological Information System, *IGME* Spanish Geological and Miner Institute.

^a Adjusted to basin limits

System of Environmental-Economic Accounting for Water: Guadalquivir river basin 2012

Table S1.1 Standard physical supply and use table for water.

A. Physical use table (millions of cubic metres per year)

GRB		Industries								Households	Rest of the world	TOTAL	
		Agriculture	Industry	Energy	W-Supply		W-Sanitation	Services	Total				
					1-3	5-33/41-43							35
From the environment	1- Total abstraction (= 1.a + 1.b = 1.i + 1.ii)	19.702	36	0	63	12.712		171	0	32.683	0		32.683
	1.a Abstraction for own use	19.702	36	0					0	19.738	0		19.738
	1.b Abstraction for distribution			0	63	12.712			0	12.774	0		12.774
	1.i. From inland water resources	19.702	36	0	63	12.712		0	0	32.512	0		32.512
	1.i.1 Surface water	312	24	0		12.712				13.048			13.048
	1.i.2 Groundwater	805	12	0	63						0		879
	1.i.3 Soil water	18.584		0					0	18.584	0		18.584
	1.ii Collection of precipitation			0				171	0	171	0		171
	1.iii Abstractin from the sea			0					0	0	0		0
Within the economy	2. Use of water received from other economic units	2.028	32	10.139	425	17	2.012	284	63	15.000	261	17	15.277
	2.a Reused water	17		0					0	17	0	0	17
	2.b Wastewater to sewerage			0				284	0	284	0	0	284
	2.c Others			0					0	0	0	0	0
3. Total use of water (=1+2)		21.730	68	10.139	488	12.729	2.012	455	63	47.683	261	17	47.961
3.1 Total use Blue water(=1-1.i.3+2)		3.145	68	10.139	488	12.729	2.012	455	63	29.099	261	17	29.376

B. Physical supply table (millions of cubic metres per year)

GRB		Industries									Households	Rest of the world	TOTAL
		Agriculture	Industry	Energy	W-Supply		W-Sanitation	Services	Total				
		1-3	5-33/41-43	35	36	CHG	WUA	37	38,39/45-99				
Within the economy	4. Supply of water to other economic units		25		355	12.630	2.012	17	50	15.089	208	60	15.358
	4.a Reused water							17	0	17	0	0	17
	4.b Wastewater to sewerage		25						50	76	208	0	284
	4.c Others								0	0		0	0
To the environment	5. Total returns (5a + 5b)	150	16	10.108	132	99		439	0	10.944	0		10.944
	5.a. To inland water resources	87	16	10.108	132	99		439	0	10.881	0		10.881
	5.a.1 Surface water	87	16	10.108				439		10.649			10.649
	5.a.2 Groundwater	0	0		132	99		0	0		0	231	
	5.a.3 Soil water	0	0		0			0	0	0	0	0	
	5.b . To other (sea)	64	0	0	0			0	0	64	0		64
	6. Total supply of water (4+5)	150	41	10.108	488	12.729	2.012	455	50	26.033	208	60	26.302
7. Total consumption water (3-6)		21.580	27	31	0	0	0	0	13	21.650	52	0	21.702
7.1 Total consumption blue water (3.1-6)		2.995	27	31	0	0	0	0	13	3.065	52	0	3.117

Note: Dark grey cells indicate zero entries by definition.

Table S1.2 Emission accounts tables

A1. Gross and net emissions table (hm³)

GRB	Industries									Households Total	Rest of the world	TOTAL
	Agriculture	Industry	Energy	W-Supply		W-Sanitation	Services	Total				
Pollutant	1-3	5-33/41-43	35	36	CHG	WUA	37	38,39/45-99	Total			
1. Gross emissions (=1.a+1.b)	150	41	10.108	132	99	0		50	10.581	208		10.790
1.a. Direct emissions to water (=1.a.1 + 1.a.2 = 1.a.i + 1.a.ii)	150	16	10.108	132	99	0		0	10.505	0		10.505
1.a.1. Without treatment	150		10.108	132	99				10.489			10.489
1.a.2. After on-site treatment		16							16			16
1.a.i. To inland water resources	87		10.108	132	99				10.426			10.426
1.a.ii. To the sea	64								64			64
1.b. To sewerage (ISIC 37)		25					171	50	247	208		455
2. Reallocation of emissions by ISIC division 37		25					171	50	247	208		455
3. Net emissions (=1.a+2)	150	41	10.108	132	99	0	171	50	10.752	208		10.961

A2. Gross and net emissions table (DBO5 t/year)

GRB	Industries									Households Total	Rest of the world	TOTAL
	Agriculture	Industry	Energy	W-Supply		W-Sanitation	Services	Total				
Pollutant	1-3	5-33/41-43	35	36	CHG	WUA	37	38,39/45-99	Total			
1. Gross emissions (=1.a+1.b)	0	5.985	0	0	0	0	40.274	11.875	58.134	49.046		107.180
1.a. Direct emissions to water (=1.a.1 + 1.a.2 = 1.a.i + 1.a.ii)	0	0	0	0	0	0	0	0	0	0		0
1.a.1. Without treatment									0			0
1.a.2. After on-site treatment									0			0
1.a.i. To inland water resources									0			0
1.a.ii. To the sea									0			0
1.b. To sewerage (ISIC 37)		5.985					40.274	11.875	58.134	49.046		107.180
2. Reallocation of emissions by ISIC division 37		5.985					40.274	11.875	58.134	49.046		107.180
3. Net emissions (=1.a+2)	0	5.985	0	0	0	0	40.274	11.875	58.134	49.046		107.180

B. Emissions by ISIC division 37 table (DBO5 t/year)

GRB	
Pollutant	ISIC division 37
4. Emissions into water (=4.a. + 4.b.)	6.061
4.a. After treatment	6.061
Into water resources	6.061
Into the sea	0
4.b. Without treatment	0
Into water resources	0
Into the sea	0

Table S2.2 Matrix of flows of water within the economy (millions of cubic meters per year)

GRB		User											
		Industries								Households	Rest of the world	TOTAL	
		Agriculture	Industry	Energy	W-Supply		W-Sanitation	Services	Total				
Supplier		1-3	5-33/41-43	35	36	CHG	WUA	37	38,39/45-99	Total			
Industries	1-3							25		0			0
	5-33/41-43									25			25
	35									0			0
	36	32	10.139	425		2.012		63	95	261	60	355	
	CHG								12.575			12.636	
	WUA								2.012			2.012	2.012
	37	17							17			17	
	38,39/45-99							50		50			50
Total	2.028	32	10.139	425	0	2.012	76	63	14.775	261	60	15.095	
Households								208		208			208
Rest of the world						17				17			17
Total Use of water received from other economic units		2.028	32	10.139	425	17	2.012	284	63	15.000	261	60	15.320

Table S1.3 Hybrid supply and use tables

A. Hybrid supply table (physical and monetary units)

	Industries								Imports	Taxes less subsidies on products	Trade and transport margins	Total supply at purchaser's price	
GRB	Agriculture	Industry	Energy	W-Supply			W-Sanitation	Services					Total output at basic prices
	1-3	5-33/41-43	35	36	CHG	WUA	37	38,39/45-99					
1. Total output and supply (mill €)	4.860	40.777	2.383	721	129	121	596	82.974	132.561	29.826	6.766	169.154	
1.a. Natural water (CPC 1800)	0	0	0	567	129	121	0	817	0	0	0	817	
1.b. Sewerage services (CPC941)	0	0	0	88	0	0	547	0	635	0	0	635	
2. Total supply of water (hm3)	150	41	10.108	488	12.729	2.012	455	50	26.033	60		26.094	
2.a. Supply of water to other economic units	0	25	0	355	12.630	2.012	17	50	15.089	60		15.149	
2.a.1. Wastewater to sewerage	0	25	0	0	0	0	0	50	76	0		76	
2.b. Total returns	150	16	10.108	132	99	0	439	0	10.944			10.944	
3. Total (gross) emissions (DBO5 t/year)	0	5.985	0	0	0	0	40.274	11.875	58.134			58.134	

Note: Dark grey cells indicate zero entries by definition.

B. Hybrid use table (physical and monetary units)

GRB	Intermediate consumption of industries (by ISIC category)								Actual Final Consumption					Capital Formation	Exports	Total uses at purchaser's price	
	Industries								Households			Government	Total				
	Agriculture	Industry	Energy	W-Supply		W-Sanitation	Services	Total industry	Final consumption expenditures	Social transfers in kind of Government and non-profit institutions serving households	Total						
				1-3	5-33/41-43												35
1. Total intermediate consumption and use (mill €)	1.900	29.197	1.596	432	129	121	292	34.393	68.059	39.591	12.502	52.093	5.445	57.538	20.418	23.140	169.154
1.a. Natural water (CPC 1800)	85	0	0	70	129	121	0	0	404	253		253		253			657
1.b. Sewerage services (CPC941)	0	0	0	31	0	0	63	0	93	115		115		115			208
2. Total use of water (hm3)	21.730	68	10.139	488	12.729	2.012	455	63	47.683			47.683		47.683		17	47.700
2.a.Total abstraction	19.702	36	0	63	12.712	0	171	0	32.683			32.683		32.683			32.683
2.a.1. Abstraction for own use	19.702	36	0	0	0	0	0	0	19.738			19.738		19.738			19.738
2.b. Use of water received from other economic units	2.028	32	10.139	425	17	2.012	284	63	15.000			15.000		15.000		17	15.017
2.1 Total use Blue water	3.145	68	10.139	488	12.729	2.012	455	63	29.099			29.099		29.099		17	29.116

Note: Dark grey cells indicate zero entries by definition.

Table S1.4 Hybrid account table for supply and use of water (physical and monetary units)

GRB	Industries									Rest of the world	Taxes less subsidies on products, trade and transport margins	Actual final consumption		Capital formation	Total
	Agriculture	Industry	Energy	W-Supply			W-Sanitation	Services	Total Industry			Households	Government		
	1-3	5-33/41-43	35	36	CHG	WUA	37	38,39/45-99							
1. Total output and supply (mill €)	4.860	40.777	2.383	721	129	121	596	82.974	132.561	29.826	6.766				169.154
1.a. Natural water (CPC 1800)				567	129	121			817						817
1.b. Sewerage services (CPC941)				88			547		635						635
2. Total intermediate consupmion and use (mill €)	1.900	29.197	1.596	432	129	121	292	34.393	68.059	23.140		52.093	5.445	20.418	169.154
2.a. Natural water (CPC 1800)	85			70	129	121			404			253			657
2.b. Sewerage services (CPC941)				31			63		93			115			208
3. Total value added (gross) (=1-2) (mill €)	2.961	11.581	787	290	0	0	304	48.581	64.503	6.686					71.189
4. Gross fixed capital formation (mill €)	288	1.190	420	26	43	18	17	11.892	13.894						13.894
4.a. For water supply				26	43	18			87						87
4.b. For water sanitation							17		17						17
5. Closing stocks of fixed assets for water supply (mill €)				850	1.055	875			2.780						2.780
6. Closing stocks of fixed assets for sanitation (mill €)							334		334						334
7. Total use of water (hm3)	21.730	68	10.139	488	12.729	2.012	455	63	47.683	17		261			47.961
7.a. Total abstraction	19.702	36	0	63	12.712	0	171	0	32.683			0			32.683
7.a.1. Abstraction for own use	19.702	36	0	0	0	0	0	0	19.738			0			19.738
7.b. Use of water received from other economic units	2.028	32	10.139	425	17	2.012	284	63	15.000	17		261			15.277
7.1 Total use Blue water	3.145	68	10.139	488	12.729	2.012	455	63	47.683	17		261			29.376
8. Total supply of water (hm3)	150	41	10.108	488	12.729	2.012	455	50	26.033	60		208			26.302
8.a. Supply of water to other economic units	0	25	0	355	12.630	2.012	17	50	15.089	60		208			15.358
8.a.1. Wastewater to sewerage	0	25	0	0	0	0	0	50	76	0		208			284
8.b. Total returns	150	16	10.108	132	99	0	439	0	10.944			0			10.944
9. Total (gross) emissions (DBO5 t/year)	0	5.985	0	0	0	0	40.274	11.875	58.134			49.046			107.180

Note: Dark grey cells indicate zero entries by definition.

Table S1.5 Hybrid account table for water supply and sewerage for own use (physical and monetary units)

		Industries								Households	Total Industry	
GRB (2012)		Agriculture	Industry	Energy	W-Supply		W-Sanitation	Services	Total			
		1-3	5-33/41-43	35	36	CHG	WUA	37				38,39/45-99
Water supply for own use	1. Cost of production (=1.a + 1.b) (mill €)	232	3	0	0	0	0	0	0	235	0	235
	1.a. Total intermediate consumption	232	3							235		235
	1.b. Total value added (gross)									0		0
	1.b.1. Compensation of employees											
	1.b.2. Other taxes less subsidies on production											
	1.b.3. Consumption of fixed capital											
	2. Gross fixed capital formation (mill €)	0								0		0
	3. Stock and fixed assets (mill €)	0								0		0
	4. Abstraccion for own use (blue water) (hm³)	1.117	36	0	0	0	0	0	0	19.738	0	19.738
Sewerage for own use	1. Cost of production (=1.a + 1.b) (mill €)	0	7	0	0	0	0	0	0	7	0	7
	1.a. Total intermediate consumption		7							7		7
	1.b. Total value added (gross)											
	1.b.1. Compensation of employees											
	1.b.2. Other taxes less subsidies on production											
	1.b.3. Consumption of fixed capital											
	2. Gross fixed capital formation (mill €)											
	3. Stock and fixed assets (mill €)											
	4. Return of treated water (hm³)		16							16		16
Blue (self) water												

Table S1.6 Government account table for water-related collective consumption services.

GRB (2004)	Government (ISIC division 84) (by Clasification of the Functions of the Government category)			
	05.2 Wastewater management	05.3 (part) Soil and groundwater protection	05.6 Environmental protection not elsewhere clasified	06.3 Water supply
1. Cost of production (=1.a + 1.b) (mill €)	12	16	3	55
1.a. Total intermediate consumption	12	16	3	55
1.b. Total value added (gross)				
1.b.1. Compensation of employees				
1.b.2. Consumption of fixed capital				

Table S1.7 Account table for supply and use of water (monetary units)

A. For wastewater management (mill €)

	Users/beneficiaries					
GRB (2012)	Producers		Final consumers		Rest of the world	Total
	Specialized producers (ISIC division 37)	Other producers	Households	Government		
1. Use of wastewater services (CPC 941 and CPC91123)		7	115	12		134
1.a. Final consumption			115	12		127
1.b. Intermediate consumption		7				7
1.c. Capital formation	n/r	n/a				n/a
2. Gross capital formation	17	0				17
3. Use of connected and adapted products	0	0	0			0
4. Specific transfers	1	0	0	0	0	1
5. Total domestic uses (=1+2+3+4)	18	7	115	12	0	152
6. Financed by the rest of the world	0	0	0	0	0	0
7. National expenditures (= 5-6)	18	7	115	12	0	152

Note: Dark grey cells indicate zero entries by definition.

B. For water management and exploitation (mill €)

	Users/beneficiaries					
GRB (2012)	Producers		Final consumers		Rest of the world	Total
	Specialized producers (ISIC division 36, CHG, WUA)	Other producers	Households	Government		
1. Use of water management services		235	253	55		542
1.a. Final consumption			253	55		307
1.b. Intermediate consumption		235				235
1.c. Capital formation	n/r	n/a				n/a
2. Gross capital formation	87	0				87
3. Use of connected and adapted products	0	0	0			0
4. Specific transfers	1	0	0	0	0	1
5. Total domestic uses (=1+2+3+4)	88	235	253	55	0	630
6. Financed by the rest of the world	0	0	0	0	0	0
7. National expenditures (= 5-6)	88	235	253	55	0	630

Note: Dark grey cells indicate zero entries by definition.

Abbreviations: n/r = not recorded to avoid double counting; n/a = not applicable in the case of wastewater management.

Table S1.8 Financing account tables A.

For wastewater management (mill €)

GRB (2012)	Users/beneficiaries					
	Producers		Final consumers		Rest of the world	Total
	Specialized producers (ISIC division	Other producers	Households	Government		
1. General Government	1	0	0	12	0	13
2. Non-profit institutions serving households	0		0		0	0
3. Corporations	17	7	0	0	0	24
3.a. Specialized producers	17	0	0	0	0	17
3.b. Other producers	0	7	0	0	0	7
4. Households	0	0	115	0	0	115
5. National expenditures	18	7	115	12	0	152
6. Rest of the world	0	0	0	0	0	0
7. Domestic uses	18	7	115	12	0	152

Note: Dark grey cells indicate zero entries by definition.

B. For water management and exploitation (mill €)

GRB (2008*, GL)	Users/beneficiaries					
	Producers		Final consumers		Rest of the world	Total
	Specialized producers (ISIC division 36, CHG, WUA)	Other producers	Households	Government		
1. General Government	1	0	0	55	0	56
2. Non-profit institutions serving households	0		0		0	
3. Corporations	87	235	0	0	0	322
3.a. Specialized producers	87	0	0	0	0	87
3.b. Other producers	0	235	0	0	0	235
4. Households	0	0	253	0	0	253
5. National expenditures	88	235	253	55	0	630
6. Rest of the world	0	0	0	0	0	0
7. Domestic uses	88	235	253	55	0	630

Note: Dark grey cells indicate zero entries by definition.

Table S1.9 Asset account table (hm³)

GRB		Element							
		Variable	1311 Reservoir	1312 Lakes	1313 Rivers	1314 Snow, ice, gla	132 Groundwater	133 Soil	Total
Opening Stock	1 Initial state	StateInitial	6.083,33		71,85		1.303,45	410,58	7.869,21
	2 Returns		0,00		400,02		231,24	0,00	631,26
Increase in Stock		ReturnHydropower							0,00
		ReturnIrrigation			86,69				86,69
		ReturnIndustry			54,44				54,44
		ReturnRefrigeration							0,00
		ReturnUrbanSupply			258,89		231,24		490,13
	3 Precipitation	Precipitation	107,25		59,25	39,44		19.576,84	19.782,78
	4a Upstream input		16,78		0,00		0,00	0,00	16,78
		From Reservoirs Ur	10,85						10,85
		FromReservoirs Irri	5,93						
		FromRivers							0,00
		FromGW							0,00
	4b Other resources input		1.207,00		1.951,10		679,47	1.122,54	4.960,12
		FromArtificialReservoirs			180,24			0,00	180,24
		FromRivers	1.173,00				0,00	312,11	1.485,11
		FromSnow/Ice	34,00					5,44	39,44
		FromGW			1.327,63			804,99	2.132,62
		FromSoilWater			443,23		679,47		1.122,70
Decrease in Stock	5 Abstractions		2.570,62	0,00	336,58	0,00	879,43	0,00	-3.786,63
		AbsHydropower							0,00
		AbsIrrigation			312,11		804,99		-1.117,10
		AbsRainFedAgr							0,00
		AbsIndustry			24,47		11,79		-36,26
		AbsRefrigeration	30,00			0,00			-30,00
		AbsUrbanSupply	2.540,62				62,65		-2.603,27
	6 Evapotranspiration	Evapotranspiration	317,32		132,50			17.465,97	-17.915,80
	7a Output Downstream		60,16	0,00	0,00	0,00	0,00	0,00	-60,16
		To Reservoirs	60,16			0,00			-60,16
		ToRivers							0,00
		ToGW							0,00
	7b Output To the Sea	ToSeaTotal			760,94		185,78		-946,71
		From Urban discharge			162,43				-162,43
		From Irrigation discharge					63,50		-63,50
		Natural discharge			760,94		122,28		-883,22
	7c Output other resources		180,24	0,00	1.173,00	39,44	1.327,63	1.209,39	-3.929,71
		ToArtificialReservoirs			1.173,00	34,00		0,00	-1.207,00
		ToRivers	180,24				1.327,63	529,92	-2.037,79
		ToGW						679,47	-679,47
		ToSoil				5,44			-5,44
	8 Other Losses		OtherLosses				732,46		-732,46
Final state		Total	4.286,02	0,00	79,21	0,00	-911,13	2.434,59	5.888,68

Table S2.5 Supplementary information to the asset accounts

Matrix of flows between water resources (hm3)

	GRB	Variable	Element						Total
			1311 Reservoir	1312 Lakes	1313 Rivers	1314 Snow, ice, gla	132 Groundwater	133 Soil	
Water asset categories	EA.1311	FromArtificialReservoirs	0,00	0,00	180,24		0,00	0,00	180,24
	EA.1313	FromRivers	1.173,00	0,00	0,00		0,00	312,11	1.485,11
	EA.1314	FromRivers	34,00					5,44	39,44
	EA.132	FromGW	0,00	0,00	1.327,63		0,00	804,99	2.132,62
	EA.133	FromSoilWater	0,00	0,00	443,23		679,47	0,00	1.122,70
Inflow from other resources			1.207,00	0,00	1.951,10		679,47	1.122,54	4.960,12