Interactions of artificial lakes with groundwater applying an integrated MODFLOW solution

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Table S1: Water balance of the whole model domain; the symbols follow Equation 1 of the main article; IN is the total water input; OUT is the total water output; each hydrologic year starts from 1st November of the previous year and ends 31st October of the year as listed; all values are in mm yr^{-1}.

Hydrologic year	IN			IN	OUT			OUT	ΔS	A_{LK} (km^2)	A_{LD} (km^2)
	P	Q_{in}	GHB$_{in}$		ET	Q_{out}	GHB$_{out}$				
2005	481.3	2750.4	67.6	3299.3	565.9	2713.0	12.4	3291.3	8.0	13.9	60.9
2006	552.5	3478.6	70.0	4101.1	576.9	3505.4	11.8	4093.1	8.0	13.1	61.7
2007	685.4	3472.8	68.2	4226.4	656.2	3470.0	13.0	4139.2	87.2	14.0	60.8
2008	614.2	2345.8	63.4	3023.4	561.8	2303.5	13.0	2878.3	145.1	13.0	61.8
Mean	*583.4*	*3011.4*	*67.3*	*3662.1*	*589.0*	*2997.5*	*12.6*	*3600.0*	*62.1*	*13.5*	*61.3*

where: P – precipitation rate, Q_{in} – stream inflows at the inlet of the modelled area, Q_{out} – stream outflows at the outlet of the modelled area, GHB$_{in}$ – lateral groundwater inflow into the modelled area across the GHB boundaries, GHB$_{out}$ – lateral groundwater outflow from the modelled area across the GHB boundaries, ET – total evapotranspiration consisting of land surface evapotranspiration (ET$_{LD}$) and lake evaporation (E_{LK}), and ΔS - total change of storage. A_{LK} and A_{LD} – lake area and land surface area.

Table S2: Water balance of the lake referenced to the variable lake area (see Table S1); the symbols follow Equation 4 of the main article, while IN is the total lake input and OUT is the total lake output; each hydrologic year starts from 1st November of the previous year and ends 31st October of the year as listed; all values are in mm yr^{-1}.

Hydrologic year	IN				IN	OUT			OUT	ΔS_{LK}
	P	Ro	Q_{LKin}	L_{LKin}		E_{LK}	Q_{LKout}	L_{LKout}		
2005	481.3	184.5	15167.5	25.8	15859.1	915.7	14631.8	149.6	15697.1	163.5
2006	552.5	185.1	20131.6	37.7	20906.9	939.4	19928.5	144.5	21012.4	-106.2
2007	685.4	262.3	18926.4	28.9	19903.0	906.6	18531.4	148.5	19586.5	317.1
2008	614.2	249.6	13885.4	47.2	14796.4	694.2	13234.6	94.4	14023.2	771.4
Mean	*583.4*	*220.4*	*17025.6*	*34.9*	*17864.2*	*863.9*	*16579.3*	*134.2*	*17577.4*	*286.8*

where: Ro – total surface runoff into the lake, Q_{LKin} – stream inflows (rivers and drains) at the inlet of the lake, Q_{LKout} – stream outflows at the outlet of the lake, L_{LKin} – seepage of groundwater into the lake, L_{LKout} – seepage from the lake into groundwater and ΔS_{LK} - is the lake storage change.

Table S3: Water balance of the surface and unsaturated zone referenced to the variable land area (see Table S1); the symbols follow Equation 6 of the main article; each hydrologic year starts from 1st November of the previous year and ends 31st October of the year as listed; all values are in mm yr^{-1}.

Hydrologic year	IN		IN	OUT				OUT	ΔS_{uz}
	P	Exf_{gw}		R_g	ET_{uz}	I	Ro		
2005	481.3	34.0	515.3	59.3	293.3	131.4	42.1	526.1	-10.8
2006	552.5	34.1	586.6	66.9	287.6	150.8	39.3	544.6	41.9
2007	685.4	45.8	731.2	120.7	337.2	187.1	60.4	705.4	25.8
2008	614.2	34.7	648.9	89.2	308.8	167.7	52.5	618.2	30.7
Mean	*583.4*	*37.1*	*620.5*	*84.0*	*306.7*	*159.3*	*48.6*	*598.6*	*21.9*

where: Exf_{gw} – groundwater exfiltration to land surface, R_g – gross recharge, ET_{uz} – unsaturated zone evapotranspiration, I - canopy interception and ΔS_{uz} - storage change of unsaturated zone.

Table S4: Water balance of the saturated zone referenced to the total modelled area; the symbols follow Equation 9 of the main article; each hydrologic year starts from 1st November of the previous year and ends 31st October of the year as listed; all values are in mm yr^{-1}.

Hydrologic year	IN				IN	OUT					OUT	ΔS_g
	GHB_{in}	Q_{GWin}	L_{LKout}	R_g		GHB_{out}	Q_{GWout}	L_{LKin}	ET_g	Exf_{gw}		
2005	67.6	9.3	27.8	48.3	153.0	12.4	59.3	4.8	50.0	27.7	154.2	-1.2
2006	70.0	10.0	25.3	55.2	160.5	11.8	55.5	6.6	49.8	28.1	151.8	8.7
2007	68.2	9.6	27.8	98.1	203.7	13.0	64.7	5.4	60.3	37.2	180.6	23.1
2008	63.4	9.3	16.4	73.7	162.8	13.0	60.1	8.2	47.5	28.7	157.5	5.3
Mean	*67.3*	*9.5*	*24.3*	*68.8*	*170.0*	*12.6*	*59.9*	*6.3*	*51.9*	*30.4*	*161.0*	*9.0*

where: Q_{GWin} – stream seepage to groundwater, Q_{GWout} – groundwater seepage to streams, R_g – gross recharge, ET_g – groundwater evapotranspiration and ΔS_g – storage change of saturated zone.