

Supplementary material
Table S1-Subsystems, indicators and data source

Subsystems	Indicators	Data source
Natural water subsystem	Average annual rainfall	Hunan Water Resources Bulletin (http://slt.hunan.gov.cn/slt/xxgk/tjgb/index.html)
	Water resource per capita	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Total water resource	Hunan Water Resources Bulletin (http://slt.hunan.gov.cn/slt/xxgk/tjgb/index.html)
Water Conservancy Facilities Subsystem	Water conservancy construction investment in agriculture and forestry	China Water Resources Statistics Yearbook (http://www.stats.gov.cn/tjsj/ndsj/)
	Number of reservoir	China Water Resources Statistics Yearbook (http://www.stats.gov.cn/tjsj/ndsj/)
	Reservoir storage capacity	Hunan Water Resources Bulletin (http://slt.hunan.gov.cn/slt/xxgk/tjgb/index.html)
	Length of embankments	China Water Resources Statistics Yearbook (http://www.stats.gov.cn/tjsj/ndsj/)
	Effective irrigated area of farmland	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Water consumption (GDP)	Hunan Water Resources Bulletin (http://slt.hunan.gov.cn/slt/xxgk/tjgb/index.html)
	Industrial added value water	Hunan Water Resources Bulletin (http://slt.hunan.gov.cn/slt/xxgk/tjgb/index.html)
Water resource development and utilization subsystem	Water consumption per unit of grain yield	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Comprehensive water consumption per capita	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Total water supply	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Water utilization rate	Hunan Ecological Environment Status Bulletin (http://sthjt.hunan.gov.cn/sthjt/xxgk/zdly/hjjc/hjtj/index.html)
	Green coverage area	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Sewage discharge	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Sewage treatment rate	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
Ecological Environment subsystem	Water quality compliance rate	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Food production	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Per capita disposable income	Hunan Statistical Yearbook (http://tjj.hunan.gov.cn/hntj/tjsj/tjnj/index.html)
	Gross regional product	Statistical Bulletin of National Economic and Social Development of Hunan Province (http://www.hunan.gov.cn/hnszf/zfsj/tjgb/202003/t20)

200319_11815838.html)

Regional fiscal revenue

Statistical Bulletin of National Economic and Social
Development of Hunan Province
(http://www.hunan.gov.cn/hnszf/zfsj/tjgb/202003/t20200319_11815838.html)

Table S2-Order parameter index

Order parameter index	2000	2003	2006	2009	2012	2015	2018	2019	Mean	SD
Average annual rainfall	0.473	0.160	0.413	0.252	0.725	0.662	0.299	0.571	0.444	0.188
Water resources per capita	0.490	0.377	0.518	0.136	0.615	0.552	0.055	0.623	0.421	0.202
Total water resources	0.454	0.376	0.527	0.163	0.624	0.599	0.102	0.680	0.441	0.200
Investment in agriculture, forestry and water conservancy	0.012	0.093	0.325	0.194	0.392	0.715	0.909	0.990	0.454	0.349
Reservoir seat number	0.719	0.729	0.739	0.740	0.958	0.961	0.962	0.939	0.843	0.112
Year-end storage capacity	0.646	0.650	0.689	0.691	0.988	0.072	0.195	0.290	0.528	0.289
Length of embankments	0.003	0.026	0.031	0.053	0.068	0.926	0.974	0.987	0.383	0.449
Effective irrigated area of farmland	0.056	0.054	0.085	0.163	0.759	0.820	0.932	0.946	0.477	0.392
Water for ten thousand yuan OF GDP	0.069	0.207	0.521	0.775	0.916	0.964	0.979	0.999	0.678	0.346
Ten thousand yuan of industrial added value water	0.463	0.233	0.547	0.746	0.908	0.960	0.999	0.980	0.729	0.267
Water per unit of grain yield	0.186	0.038	0.717	0.812	0.979	0.895	0.759	0.752	0.642	0.318
Comprehensive water consumption per capita	0.165	0.449	0.511	0.703	0.594	0.631	0.691	0.826	0.571	0.189
The total water supply	0.220	0.135	0.415	0.400	0.432	0.707	0.858	0.687	0.482	0.234
Water utilization ratio	0.242	0.361	0.275	0.652	0.203	0.276	0.724	0.268	0.375	0.186
Green coverage area	0.606	0.061	0.055	0.274	0.423	0.607	0.943	0.982	0.494	0.335
Sewage discharge	0.381	0.997	0.443	0.521	0.461	0.388	0.134	0.013	0.417	0.273
Sewage treatment rate	0.105	0.086	0.176	0.478	0.771	0.909	0.976	0.986	0.561	0.372
Water quality standard rate of water functional area	0.632	0.811	0.876	0.578	0.744	0.051	0.797	0.921	0.676	0.260
Food production	0.505	0.037	0.842	0.890	0.864	0.954	0.641	0.602	0.667	0.280
Per capita disposable income	0.002	0.037	0.107	0.238	0.444	0.629	0.892	0.989	0.417	0.361
Gross regional product	0.154	0.204	0.290	0.624	0.545	0.722	0.916	0.990	0.556	0.297
Regional revenue	0.001	0.028	0.072	0.408	0.554	0.826	0.933	0.990	0.476	0.386

Table S3. Xiangjiang River Basin WCS system coordinated governance index information

<i>i</i>	Subsystem	<i>j</i> Order parameter index	Upper and lower limits	Information entropy value	entropy coefficient	property
<i>i</i> ₁	Natural water subsystem	<i>j</i> ₁ mean annual precipitation/ <i>mm</i>	[999.40,1 892.80]	0.955	0.269	Positive direction
		<i>j</i> ₂ per capita water resources/(<i>m</i> ³ /人)	[1 375.26,3 244.89]	0.936	0.383	Positive direction
		<i>j</i> ₃ total water resources/ <i>a hundred million m</i> ³	[70.23,167.66]	0.942	0.348	Positive direction
		<i>j</i> ₄ Investment in agriculture, forestry and water conservancy/ten thousand yuan	[16 832.81,669 461.67]	0.900	0.165	Positive direction
<i>i</i> ₂	water conservancy facilities subsystem	<i>j</i> ₅ Reservoir seat number/individual entries	[837,1 129]	0.967	0.053	Positive direction
		<i>j</i> ₆ Year-end storage capacity/ten thousand <i>m</i> ³	[37 620.00,191 458.97]	0.930	0.114	Positive direction
		<i>j</i> ₇ Length of embankments/ <i>km</i>	[409.74,1 650.25]	0.744	0.420	Positive direction
		<i>j</i> ₈ Effective irrigated area of farmland/ten thousand <i>hm</i> ²	[200.17,244.71]	0.850	0.247	Positive direction
<i>i</i> ₃	Water resources development and utilization subsystem	<i>j</i> ₉ ten thousand-yuan GDP water utilization/ <i>m</i> ³	[87.30,818.94]	0.942	0.218	Negative direction
		<i>j</i> ₁₀ Ten thousand yuan of industrial added value water/ <i>m</i> ³	[59.38,473.02]	0.963	0.140	Negative direction
		<i>j</i> ₁₁ Ten thousand yuan of industrial added value water (<i>m</i> ³ / <i>t</i>)	[587.91,877.14]	0.946	0.204	Negative direction
		<i>j</i> ₁₂ per capita water use / <i>m</i> ³	[529.43,589.17]	0.973	0.102	Negative direction
		<i>j</i> ₁₃ total supply of water/hundred million <i>m</i> ³	[27.41,29.47]	0.975	0.095	Positive direction
		<i>j</i> ₁₄ utilization rate of water resources /%	[20.81,46.65]	0.936	0.242	Positive direction
		<i>j</i> ₁₅ Green coverage area/ <i>hm</i> ²	[3 268.18,7 477.37]	0.896	0.390	Positive direction
		<i>j</i> ₁₆ quantity of waste water effluent/ten thousand <i>m</i> ³	[5 896.52,25 203.54]	0.963	0.140	Negative direction
<i>i</i> ₄	Ecological environment subsystem	<i>j</i> ₁₇ treatment rate of domestic sewage/%	[29.22,98.55]	0.897	0.384	Positive direction
		<i>j</i> ₁₈ Water quality standard	[83.43,97.60]	0.977	0.085	Positive direction

	rate of water functional area/%				
	j_{19} grain output/t	[2 075 842.40,2 642 947.46]	0.967	0.085	Positive direction
i_5 Socio-economic subsystem	j_{20} per capita disposable income/yuan	[4 466.60,32 969.26]	0.863	0.360	Positive direction
	j_{21} gross regional domestic product/ten thousand yuan	[1 198.53,22 936 432.56]	0.936	0.167	Positive direction
	j_{22} Regional revenue/ten thousand yuan	[144 191.19,2 882 472.67]	0.852	0.388	Positive direction