Table S1 Available water supply for citrus planting in Anfusi Town

Number	Village	Planting area (hm^2)	Reservoirs water supply (10^6 m^3)	Weirs water supply (10^6 m^3)
1	Baiyangchong	364.27	0.03	0.11
2	Caijiazui	317.67	0.06	0.05
3	Fengshangang	180	0	0
4	Guantouzui	304.87	0.02	0.02
5	Hengxihe	271.8	0.01	0.05
6	Hujiafan	400	3.75	0.04
7	Hujiazui	208.33	1.30	0.08
8	Huoshankou	213.33	5.76	0.03
9	Jiangjiapo	180.4	0	0.02
10	Jinshihu	66.67	0	0.03
11	Liaojialin	280	0.02	0.10
12	Lingzhishan	153.33	0.03	0.06
13	Liujiachong	373.33	2.93	0.07
14	Qilichong	336.67	3.36	0.05
15	Qinjiabang	1032.47	0	0.07
16	Sanzangsi	300	0	0.05
17	Sangshuhe	333.33	0.02	0.06
18	Shangbaiping	336.47	0	0.12
19	Shuyuanba	120	0.01	0.10
20	Wujiamen	352.27	0	0.09
21	Xujiazui	730.29	0.02	0.04
22	Yangjiadian	224	0	0.07
23	Yeyawan	326	0.08	0.06
24	Zijingling	80	0.03	0.09
25	Zoujiachong	378.2	0.02	0.03

Table S2 Data sheet for net irrigation water requirements for citrus (2005–2023)

Year	ET_C(mm)	ET_0(mm)	P(mm)	P_e(mm)	IR(mm)
2005	732.20	1098.00	784.20	312.91	419.29
2006	727.86	1093.90	899.70	356.91	370.95
2007	676.82	1015.80	1128.50	403.53	273.29
2008	650.22	974.50	1175.20	407.32	242.90
2009	667.88	1003.90	1021.90	364.46	303.43
2010	684.81	1027.10	1155.50	424.15	260.65
2011	730.08	1095.10	905.80	311.05	419.03
2012	694.78	1044.80	1090.80	364.32	330.45
2013	771.76	1159.70	1006.10	340.21	431.54
2014	625.83	938.20	1018.30	396.51	229.32
2015	674.13	1013.30	1248.50	425.00	249.13
2016	705.27	1059.40	1182.90	421.69	283.58
2017	714.51	1071.40	1081.90	404.05	310.46
2018	748.64	1125.10	1066.00	388.46	360.18
2019	708.91	1065.60	779.20	324.05	384.86
2020	676.21	1014.40	1448.57	472.03	204.18
2021	699.60	1050.90	965.10	361.21	338.39
2022	694.78	1044.80	1090.80	364.32	330.45
2023	698.73	1052.60	964.65	361.21	337.52

Table S3 Water supply for citrus planting in Anfusi Town for the planning year

Number	Village	Reservoirs water supply (10^6 m^3)		Weirs water supply (10^6 m^3)	
		High flow year	Low flow year	High flow year	Low flow year
1	Baiyangchong	0.03	0.03	0.14	0.12
2	Caijiazui	0.07	0.06	0.07	0.06
3	Fengshangang	0	0	0	0
4	Guantouzui	0.05	0.05	0.03	0.03
5	Hengxihe	0.02	0.02	0.06	0.06

Number	Village	Reservoirs water supply (10^6 m^3)		Weirs water supply (10^6 m^3)	
		High flow year	Low flow year	High flow year	Low flow year
6	Hujiafan	4.02	3.85	0.05	0.04
7	Hujiazui	1.79	1.47	0.09	0.09
8	Huoshankou	6.69	6.21	0.07	0.06
9	Jiangjiapo	0	0	0.08	0.08
10	Jinshihu	0	0	0.03	0.02
11	Liaojialin	0.05	0.05	0.12	0.12
12	Lingzhishan	0.06	0.06	0.08	0.08
13	Liujiachong	3.45	3.10	0.08	0.07
14	Qilichong	3.84	3.62	0.08	0.07
15	Qinjiabang	0	0	0.17	0.11
16	Sanzangsi	0	0	0.07	0.05
17	Sangshuhe	0.02	0.02	0.06	0.05
18	Shangbaiping	0	0	0.12	0.11
19	Shuyuanba	0.02	0.01	0.12	0.10
20	Wujiamen	0	0	0.09	0.09
21	Xujiazui	0.03	0.02	0.06	0.06
22	Yangjiadian	0	0	0.07	0.07
23	Yeyawan	0.16	0.13	0.09	0.09
24	Zijingling	0.04	0.03	0.10	0.10
25	Zoujiachong	0.03	0.02	0.04	0.04

Table S4 Water distribution program for citrus cultivation in Anfusi Town for planning year

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
A	a	L/M/H	Caijiazui	0.59	0	0.59

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Hengxihe	0.50	0	0.50
			Hujiafan	0.74	0	0.74
			Liujiachong	0.69	0	0.69
			Qilichong	0.62	0	0.62
			Zoujiachong	0.70	0	0.70
			Caijiazui	0.25	[0.21,0.25]	[0,0.04]
			Hengxihe	0.21	[0.18,0.21]	[0,0.04]
			Hujiafan	0.31	[0.26,0.31]	[0,0.05]
		L	Liujiachong	0.29	[0.24,0.29]	[0,0.05]
			Qilichong	0.26	[0.22,0.26]	[0,0.04]
			Zoujiachong	0.30	[0.25,0.29]	[0,0.05]
	b		Caijiazui	0.25	[0,0.06]	[0.18,0.25]
			Hengxihe	0.21	[0,0.05]	[0.16,0.21]
			Hujiafan	0.31	[0,0.08]	[0.23,0.31]
		M	Liujiachong	0.29	[0,0.07]	[0.22,0.29]
			Qilichong	0.26	[0,0.07]	[0.20,0.26]
			Zoujiachong	0.30	[0,0.08]	[0.22,0.29]
		H	Caijiazui	0.25	0	0.25

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Hengxihe	0.21	0	0.21
			Hujiafan	0.31	0	0.31
			Liujiachong	0.29	0	0.29
			Qilichong	0.26	0	0.26
			Zoujiachong	0.30	0	0.30
			Caijiazui	0.25	0.25	0.00
			Hengxihe	0.21	0.21	0.00
			Hujiafan	0.31	0.31	0.00
	c	L/M/H	Liujiachong	0.29	0.29	0.00
			Qilichong	0.26	0.26	0.00
			Zoujiachong	0.30	0.30	0.00
			Guantouzui	0.28	0	0.28
			Huoshankou	0.20	0	0.20
			Jiangjiapo	0.17	0	0.17
B	a	L/M/H	Liaojialin	0.26	0	0.26
			Lingzhishan	0.14	0	0.14
			Qinjiabang	0.96	0	0.96
			Sanzangsi	0.28	0	0.28

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Xujiazui	0.68	0	0.68
			Yeyawan	0.30	0	0.30
			Guantouzui	0.52	[0,0.02]	[0.50,0.52]
			Huoshankou	0.36	[0,0.01]	[0.35,0.36]
			Jiangjiapo	0.31	[0,0.01]	[0.29,0.31]
			Liaojialin	0.48	[0,0.02]	[0.16,0.47]
		L	Lingzhishan	0.26	[0,0.01]	[0.25,0.26]
			Qinjiabang	1.75	[0,0.7]	[1.69,1.75]
			Sanzangsi	0.51	[0,0.02]	[0.49,0.51]
	b		Xujiazui	1.24	[0,0.05]	[1.19,1.24]
			Yeyawan	0.55	[0,0.02]	[0.53,0.55]
			Guantouzui	0.52	0	0.52
			Huoshankou	0.36	0	0.36
			Jiangjiapo	0.31	0	0.31
		M/H	Liaojialin	0.48	0	0.48
			Lingzhishan	0.26	0	0.26
			Qinjiabang	1.75	0	1.75
			Sanzangsi	0.51	0	0.51

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Xujiazui	1.24	0	1.24
			Yeyawan	0.55	0	0.55
			Guantouzui	0.24	0.24	0.00
			Huoshankou	0.17	0.17	0.00
			Jiangjiapo	0.14	0.14	0.00
			Liaojialin	0.22	0.22	0.00
	c	L/M/H	Lingzhishan	0.12	0.12	0.00
			Qinjiabang	0.81	0.81	0.00
			Sanzangsi	0.23	0.23	0.00
			Xujiazui	0.57	0.57	0.00
			Yeyawan	0.25	0.25	0.00
			Baiyangchong	0.34	[0,0.06]	[0.27,0.34]
			Fengshangang	0.17	[0,0.03]	[0.13,0.17]
			Hujiazui	0.19	[0,0.04]	[0.16,0.19]
C	a	L	Jinshihu	0.06	[0,0.01]	[0.05,0.06]
			Sangshuhe	0.31	[0,0.06]	[0.25,0.31]
			Shangbaiping	0.31	[0,0.06]	[0.25,0.31]
			Shuyuanba	0.11	[0,0.02]	[0.09,0.11]

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Wujiamen	0.33	[0,0.06]	[0.26,0.33]
			Yangjiadian	0.21	[0,0.04]	[0.17,0.21]
			Zijingling	0.07	[0,0.01]	[0.06,0.07]
			Baiyangchong	0.34	0	0.34
			Fengshangang	0.17	0	0.17
			Hujiazui	0.19	0	0.19
			Jinshihu	0.06	0	0.06
			Sangshuhe	0.31	0	0.31
		M/H	Shangbaiping	0.31	0	0.31
			Shuyuanba	0.11	0	0.11
			Wujiamen	0.33	0	0.33
			Yangjiadian	0.21	0	0.21
			Zijingling	0.07	0	0.07
			Baiyangchong	0.28	0.28	0.00
			Fengshangang	0.14	0.14	0.00
	b	L	Hujiazui	0.16	0.16	0.00
			Jinshihu	0.05	0.05	0.00
			Sangshuhe	0.26	0.26	0.00

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Shangbaiping	0.26	0.26	0.00
			Shuyuanba	0.09	0.09	0.00
			Wujiamen	0.28	0.28	0.00
			Yangjiadian	0.17	0.17	0.00
			Zijingling	0.06	0.06	0.00
			Baiyangchong	0.28	[0.25,0.28]	[0,0.03]
			Fengshangang	0.14	[0.12,0.14]	[0,0.02]
			Hujiazui	0.16	[0.14,0.16]	[0,0.02]
			Jinshihu	0.05	[0.04,0.05]	[0,0.01]
		M	Sangshuhe	0.26	[0.23,0.26]	[0,0.03]
			Shangbaiping	0.26	[0.23,0.26]	[0,0.03]
			Shuyuanba	0.09	[0.08,0.09]	[0,0.01]
			Wujiamen	0.28	[0.24,0.27]	[0,0.03]
			Yangjiadian	0.17	[0.15,0.17]	[0,0.02]
			Zijingling	0.06	[0.05,0.06]	[0,0.01]
			Baiyangchong	0.28	[0,0.12]	[0.16,0.28]
		H	Fengshangang	0.14	[0,0.06]	[0.08,0.14]
			Hujiazui	0.16	[0,0.07]	[0.09,0.16]

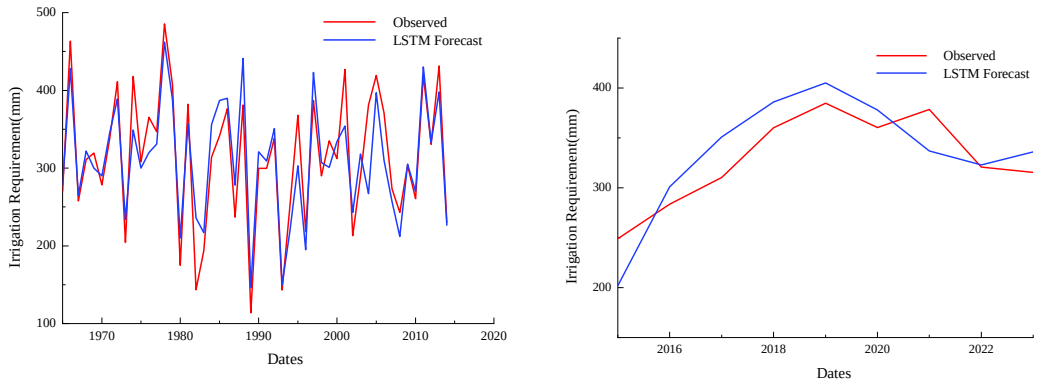
Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Jinshihu	0.05	[0,0.02]	[0.03,0.05]
			Sangshuhe	0.26	[0,0.11]	[0.15,0.26]
			Shangbaiping	0.26	[0,0.11]	[0.15,0.26]
			Shuyuanba	0.09	[0,0.04]	[0.05,0.09]
			Wujiamen	0.28	[0,0.12]	[0.16,0.27]
			Yangjiadian	0.17	[0,0.07]	[0.10,0.17]
			Zijingling	0.06	[0,0.03]	[0.04,0.06]
			Baiyangchong	0.57	[0.22,0.27]	[0.30,0.35]
			Fengshangang	0.28	[0.11,0.13]	[0.15,0.17]
			Hujiazui	0.33	[0.13,0.15]	[0.17,0.20]
			Jinshihu	0.10	[0.04,0.05]	[0.05,0.06]
			Sangshuhe	0.52	[0.20,0.25]	[0.27,0.31]
	c	L	Shangbaiping	0.53	[0.20,0.25]	[0.27,0.32]
			Shuyuanba	0.19	[0.07,0.09]	[0.10,0.11]
			Wujiamen	0.55	[0.21,0.26]	[0.29,0.34]
			Yangjiadian	0.35	[0.13,0.17]	[0.19,0.21]
			Zijingling	0.12	[0.05,0.06]	[0.06,0.08]
		M	Baiyangchong	0.57	[0.13,0.20]	[0.37,0.43]

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Fengshangang	0.28	[0.06,0.10]	[0.18,0.21]
			Hujiazui	0.33	[0.08,0.11]	[0.21,0.25]
			Jinshihu	0.10	[0.02,0.04]	[0.07,0.08]
			Sangshuhe	0.52	[0.12,0.18]	[0.34,0.40]
			Shangbaiping	0.53	[0.12,0.18]	[0.34,0.40]
			Shuyuanba	0.19	[0.04,0.06]	[0.12,0.14]
			Wujiamen	0.55	[0.13,0.19]	[0.36,0.42]
			Yangjiadian	0.35	[0.08,0.12]	[0.23,0.27]
			Zijingling	0.12	[0.03,0.04]	[0.08,0.09]
			Baiyangchong	0.57	[0.05,0.12]	[0.44,0.52]
			Fengshangang	0.28	[0.02,0.06]	[0.22,0.26]
			Hujiazui	0.33	[0.03,0.07]	[0.25,0.30]
			Jinshihu	0.10	[0.01,0.02]	[0.08,0.10]
		H	Sangshuhe	0.52	[0.04,0.11]	[0.41,0.48]
			Shangbaiping	0.53	[0.04,0.11]	[0.41,0.48]
			Shuyuanba	0.19	[0.01,0.04]	[0.15,0.17]
			Wujiamen	0.55	[0.04,0.12]	[0.43,0.50]
			Yangjiadian	0.35	[0.03,0.08]	[0.27,0.32]

Citrus planting areas	Water supply areas	Water inflow level	Village	Optimal water distribution target (10^6 m^3)	Water deficit (10^6 m^3)	Optimal water allocation (10^6 m^3)
			Zijingling	0.12	[0.01,0.03]	[0.10,0.11]

Table S5 Performance metrics of the LSTM model

Training set				Test set			
RMSE	R2	MAE	MBE	RMSE	R2	MAE	MBE
41.6133	0.7819	33.0536	1.4511	58.8234	0.5645	77.2678	0.5525



(a) Training set (b) Test set

Figure S1 The performance of the LSTM model

(a)Prediction was performed using the irrigation requirement data from the first 45 years as the training set of the LSTM model. The blue line depicts the predicted values from the LSTM model, while the red line shows the original observed values. (b) Prediction was performed using the remaining 7 years of irrigation requirement data as a test set for the LSTM model. The blue line depicts the predicted values from the LSTM model, while the red line shows the original observed values.