

Article

China's Agricultural Irrigation and Water Conservancy Projects: A Policy Synthesis and Discussion of Emerging issues

Lijuan Du^{1,2}, Li Xu^{3,*}, Yanping Li^{3,*}, Changshun Liu^{1,2}, Zhenhua Li³, Jefferson S. Wong³ and Bo Lei^{1,2}

¹ State Key Laboratory of Simulation and Regulation of Water Cycle in River Basin, A-1 Fuxing Road, Haidian District, 100038 Beijing, China; iwahr_dulj@foxmail.com (L.D.), liucs@iwhr.com (C.L.), bolei1228@hotmail.com (B.L.)

² China Institute of Water Resources and Hydropower Research (IWHR), A-1 Fuxing Road, Haidian District, 100038 Beijing, China

³ Global Institute for Water Security, University of Saskatchewan, 11 Innovation Blvd, Saskatoon, S7N 3H5, SK, Canada; zhenhua.li@usask.ca (Z.L.) jefferson.wong@usask.ca (J.S.W.)

* Correspondence: li.xu@usask.ca (L.X.); Yanping.Li@usask.ca (Y.L.); Tel.: +1-306-966-7226 (L.X.); +1-306-966-2793 (Y.L.)

Received: 31 October 2019; Accepted: 04 December 2019; Published: date

Supplementary Material

Table S1. Rural and urban population from 1950 to 2018 [1].

Year	Urban Population (Millions of People)	Rural Population (Millions of People)	Percentage of Urban Population (%)	Percentage of Rural Population (%)	Total Population (Millions of People)
1950	61.69	490.27	11.18	88.82	551.96
1951	66.32	496.68	11.78	88.22	563
1952	71.63	503.19	12.46	87.54	574.82
1953	78.26	509.7	13.31	86.69	587.96
1954	82.49	520.17	13.69	86.31	602.66
1955	82.85	531.8	13.48	86.52	614.65
1956	91.85	536.43	14.62	85.38	628.28
1957	99.49	547.04	15.39	84.61	646.53
1958	107.21	552.73	16.25	83.75	659.94
1959	123.71	548.36	18.41	81.59	672.07
1960	130.73	531.34	19.75	80.25	662.07
1961	127.07	531.52	19.29	80.71	658.59
1962	117.59	556.36	17.45	82.55	673.95
1963	116.46	575.26	16.84	83.16	691.72
1964	129.5	575.49	18.37	81.63	704.99
1965	130.45	594.93	17.98	82.02	725.38
1966	133.13	612.29	17.86	82.14	745.42
1967	135.48	628.2	17.74	82.26	763.68
1968	138.38	646.96	17.62	82.38	785.34
1969	141.17	665.54	17.50	82.50	806.71
1970	144.24	685.68	17.38	82.62	829.92
1971	147.11	705.18	17.26	82.74	852.29
1972	149.35	722.42	17.13	82.87	871.77
1973	153.45	738.66	17.20	82.80	892.11
1974	155.95	752.64	17.16	82.84	908.59
1975	160.3	763.9	17.34	82.66	924.2
1976	163.41	773.76	17.44	82.56	937.17
1977	166.69	783.05	17.55	82.45	949.74
1978	172.45	790.14	17.92	82.08	962.59
1979	184.95	790.47	18.96	81.04	975.42
1980	191.4	795.65	19.39	80.61	987.05
1981	201.71	799.01	20.16	79.84	1000.72
1982	214.8	801.74	21.13	78.87	1016.54
1983	222.74	807.34	21.62	78.38	1030.08
1984	240.17	803.4	23.01	76.99	1043.57
1985	250.94	807.57	23.71	76.29	1058.51
1986	263.66	811.41	24.52	75.48	1075.07
1987	276.74	816.26	25.32	74.68	1093
1988	286.61	823.65	25.81	74.19	1110.26
1989	295.4	831.64	26.21	73.79	1127.04
1990	301.95	841.38	26.41	73.59	1143.33
1991	312.03	846.2	26.94	73.06	1158.23
1992	321.75	849.96	27.46	72.54	1171.71
1993	331.73	853.44	27.99	72.01	1185.17
1994	341.69	856.81	28.51	71.49	1198.5
1995	351.74	859.47	29.04	70.96	1211.21
1996	373.04	850.85	30.48	69.52	1223.89
1997	394.49	841.77	31.91	68.09	1236.26
1998	416.08	831.53	33.35	66.65	1247.61
1999	437.48	820.38	34.78	65.22	1257.86
2000	459.06	808.37	36.22	63.78	1267.43
2001	480.64	795.63	37.66	62.34	1276.27
2002	502.12	782.41	39.09	60.91	1284.53

Year	Urban Population (Millions of People)	Rural Population (Millions of People)	Percentage of Urban Population (%)	Percentage of Rural Population (%)	Total Population (Millions of People)
2003	523.76	768.51	40.53	59.47	1292.27
2004	542.83	757.05	41.76	58.24	1299.88
2005	562.12	745.44	42.99	57.01	1307.56
2006	577.06	737.42	43.90	56.10	1314.48
2007	593.79	727.5	44.94	55.06	1321.29
2008	606.67	721.35	45.68	54.32	1328.02
2009	621.86	712.88	46.59	53.41	1334.74
2010	665.58	674.15	49.68	50.32	1339.73
2011	690.79	656.56	51.27	48.73	1347.35
2012	711.82	642.22	52.57	47.43	1354.04
2013	731.11	629.61	53.73	46.27	1360.72
2014	749.16	618.66	54.77	45.23	1367.82
2015	771.16	603.46	56.10	43.90	1374.62
2016	792.98	589.73	57.35	42.65	1382.71
2017	813.47	576.61	58.52	41.48	1390.08
2018	831.37	564.01	59.58	40.42	1395.38

Table S2. Numbers of local migrant workers and nonlocal migrant workers from 2010 to 2016 [2].

Year	Number of Migrant Workers (Millions of People)	Number of Nonlocal Migrant Workers (Millions of People)	Number of Local Migrant Workers (Millions of People)
2010	242.23	153.35	88.88
2011	252.78	158.63	94.15
2012	262.61	163.36	99.25
2013	268.94	166.1	102.84
2014	273.95	168.21	105.74
2015	277.47	168.84	108.63
2016	281.71	169.34	112.37
2017	286.52	171.85	114.67
2018	288.36	172.66	115.7

Table S3. Percentages of locals engaged in agriculture, locals engaged in non-agriculture, and nonlocals engaged in non-agriculture [3].

Age	Percentage of Local Engaged in Agriculture (%)	Percentage of Local Engaged in Non-agriculture (%)	Percentage of Nonlocal Engaged in Non-agriculture (%)
16–19	41.2	8.7	50.2
20–29	37.6	13.2	49.3
30–39	51.8	20.8	27.4
40–49	67.2	21.1	11.7
50–59	80.2	15.4	4.4

Table S4. Area of effective irrigated areas of farmland and crop yield from 1950 to 2017 [1,4].

Year	Effective Irrigated Area of Farmland (Millions of ha)	Crop Yield (Million Tons)
1949	15.93	113.18
1950	16.71	132.13
1951	18.54	143.69
1952	19.96	163.92
1953	22.25	166.83
1954	23.22	169.52
1955	24.61	183.94
1956		192.75
1957	27.34	195.05
1958	32.79	200.00
1959	35.01	170.00
1960	35.08	143.50
1961	32.08	147.50
1962	30.55	160.00
1963	30.06	170.00
1964	31.52	187.50
1965	33.06	194.53
1966		214.00
1967		217.82
1968		209.06
1969		210.97
1970	36.00	239.96
1971	36.44	250.14
1972	38.01	240.48
1973	39.22	264.94
1974	41.27	275.27
1975	43.28	284.52
1976	44.98	286.31
1977	44.99	282.73
1978	44.97	304.77
1979	45.00	332.12
1980	44.89	320.56
1981	44.57	325.02
1982	44.18	354.50
1983	44.64	387.28
1984	44.45	407.31
1985	44.04	379.11
1986	44.23	391.51
1987	44.40	404.73
1988	44.38	394.08
1989	44.92	407.55
1990	47.40	446.24
1991	47.82	435.29
1992	48.59	442.66
1993	48.73	456.49
1994	48.76	445.10
1995	49.28	466.62
1996	50.38	504.54
1997	51.24	494.17
1998	52.30	512.30
1999	53.16	508.39
2000	53.82	462.18
2001	54.25	452.64
2002	54.35	457.06
2003	54.01	430.70

Year	Effective Irrigated Area of Farmland (Millions of ha)	Crop Yield (Million Tons)
2004	56.25	469.47
2005	56.56	484.02
2006	57.08	498.04
2007	57.78	501.60
2008	58.47	528.71
2009	59.26	530.82
2010	60.35	546.48
2011	61.68	571.21
2012	62.49	589.57
2013	63.47	601.94
2014	64.54	607.03
2015	65.87	621.44
2016	67.14	616.24
2017	67.82	617.91
2018	68.27	657.89

Table S5. Area of saved irrigated area from 1998 to 2018 [4].

Year	Saving Irrigated Area (Millions of ha)
1998	15.27
1999	15.07
2000	16.40
2001	17.47
2002	18.60
2003	19.47
2004	20.33
2005	21.33
2006	22.40
2007	23.47
2008	24.47
2009	25.73
2010	27.33
2011	29.20
2012	31.20
2013	27.13
2014	29.00
2015	31.07
2016	32.85
2017	34.32
2018	35.33

Table S6. Revenue of the central government and local government from 1950 to 2018 [1].

Year	Revenue(Billions of CNY)			Percentage(%)	
	Country total	Central Government	Local Government	Central Government	Local Government
1950	6.22	6.22	0.00	100.00	0.00
1951	12.50	12.50	0.00	100.00	0.00
1952	17.39	17.39	0.00	100.00	0.00
1953	21.32	17.70	3.62	83.01	16.99
1954	24.52	18.77	5.75	76.57	23.43
1955	24.93	19.34	5.58	77.60	22.40
1956	28.02	22.21	5.81	79.27	20.73
1957	30.32	22.29	8.03	73.53	26.47
1958	37.96	30.53	7.44	80.41	19.59
1959	48.71	11.88	36.83	24.38	75.62
1960	57.23	14.28	42.95	24.95	75.05
1961	35.61	7.67	27.94	21.53	78.47
1962	31.36	9.31	22.05	29.68	70.32
1963	34.23	7.89	26.33	23.06	76.94
1964	39.95	10.08	29.87	25.23	74.77
1965	47.33	15.61	31.73	32.97	67.03
1966	55.87	19.65	36.22	35.17	64.83
1967	41.94	13.24	28.69	31.58	68.42
1968	36.13	10.71	25.41	29.65	70.35
1969	52.68	17.11	35.57	32.48	67.52
1970	66.29	18.30	48.00	27.60	72.40
1971	74.47	11.94	62.54	16.03	83.97
1972	76.66	10.58	66.08	13.80	86.20
1973	80.97	11.99	68.98	14.80	85.20
1974	78.31	13.48	64.84	17.21	82.79
1975	81.56	9.66	71.90	11.85	88.15
1976	77.66	9.89	67.77	12.74	87.26
1977	87.45	11.39	76.06	13.02	86.98
1978	113.23	17.58	95.65	15.52	84.48
1979	114.64	23.13	91.50	20.18	79.82
1980	115.99	28.45	87.55	24.52	75.48
1981	117.58	31.11	86.47	26.46	73.54
1982	121.23	34.68	86.55	28.61	71.39
1983	136.70	49.00	87.69	35.85	64.15
1984	164.29	66.55	97.74	40.51	59.49
1985	200.48	76.96	123.52	38.39	61.61
1986	212.20	77.84	134.36	36.68	63.32
1987	219.94	73.63	146.31	33.48	66.52
1988	235.72	77.48	158.25	32.87	67.13
1989	266.49	82.25	184.24	30.86	69.14
1990	293.71	99.24	194.47	33.79	66.21
1991	314.95	93.83	221.12	29.79	70.21
1992	348.34	97.95	250.39	28.12	71.88
1993	434.90	95.75	339.14	22.02	77.98
1994	521.81	290.65	231.16	55.70	44.30
1995	624.22	325.66	298.56	52.17	47.83
1996	740.80	366.11	374.69	49.42	50.58
1997	865.11	422.69	442.42	48.86	51.14
1998	987.60	530.92	498.40	53.76	46.24
1999	1144.41	588.60	559.49	51.43	48.57
2000	1339.52	698.92	640.61	52.18	47.82
2001	1638.60	842.29	780.33	51.40	48.60
2002	1890.36	1064.59	851.50	56.32	43.68
2003	2171.53	1194.05	985.00	54.99	45.01

Year	Revenue(Billions of CNY)			Percentage(%)	
	Country total	Central Government	Local Government	Central Government	Local Government
2004	2639.65	1381.92	1189.34	52.35	47.65
2005	3164.93	1621.51	1510.08	51.23	48.77
2006	3876.02	1927.20	1830.36	49.72	50.28
2007	5132.18	2442.11	2357.26	47.58	52.42
2008	6133.04	3362.69	2770.34	54.83	45.17
2009	6851.83	3591.57	3260.26	52.42	47.58
2010	8310.15	4248.85	4061.30	51.13	48.87
2011	10,387.44	5132.73	5254.71	49.41	50.59
2012	11,721.00	5613.30	6107.70	47.89	52.11
2013	12,920.96	6019.85	6901.12	46.59	53.41
2014	14,037.00	6449.35	7587.66	45.95	54.05
2015	15,226.92	6926.72	8300.20	45.49	54.51
2016	15,960.50	7236.56	8723.94	45.34	54.66
2017	17,256.70	8111.90	9144.80	47.01	52.99
2018	18,335.20	8544.70	9790.50	46.60	53.40

Table S7. Per capita wage income and per capita agricultural income from 1985 to 2018 [1].

Year	Per capita wage income (CNY)	Per capita agricultural income (CNY)	The proportion of per capita wage income to net income (%)	The proportion of per capita agricultural income to net income (%)
1985	72.15	191.46	18.15	48.15
1990	138.8	330.11	20.22	48.10
1995	353.7	775.12	22.42	49.13
1997	514.55	943.01	24.62	45.12
1998	573.58	927.25	26.53	42.89
1999	630.26	882.09	28.51	39.91
2000	702.3	833.93	31.17	37.01
2001	771.9	863.62	32.62	36.50
2002	840.22	866.67	33.94	35.01
2003	918.38	885.71	35.02	33.78
2004	998.46	1056.5	34.00	35.98
2005	1174.53	1097.71	36.08	33.72
2006	1374.8	1159.56	38.33	32.33
2007	1596.22	1303.76	38.55	31.49
2008	1853.73	1426.96	38.94	29.97
2009	2061.25	1497.93	40.00	29.07
2010	2431.05	1723.49	41.07	29.12
2011	2963.43	1896.67	42.47	27.18
2012	3447.46	2155.374	43.55	27.23
2013	3652.5	2313.852	38.73	24.54
2014	4152.2	2584.814	39.59	24.64
2015	4600.3	2747.196	40.28	24.05
2016	5021.8	2892.193	40.62	23.39
2017	5498.4	3050.616	40.93	22.71
2018	5996	3638.071	41.02	24.89

Reference

1. National Bureau of Statistics of PRC. *China Statistical Yearbook 1980–2018*; China Statistics Press: Beijing, China, 1981–2019.
2. National Bureau of Statistics of PRC. 2010–2018 Survey Report of Migrant Workers. Available online: http://www.stats.gov.cn/tjsj/zxfb/201704/t20170428_1489334.html (accessed on 9 November 2019).
3. National Bureau of Statistics of PRC. Report on Number, Structure and Characteristics of the New Generation of Migrant Workers. Available online: http://www.stats.gov.cn/zjtc/zfx/fxbg/201103/t20110310_16148.html (accessed on 9 November 2019).
4. Ministry of Water Resources of PRC. *China Water Statistical Yearbook 1980–2018*; China Waterpower Press: Beijing, China, 1981–2019.



© 2019 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).