Developing Water Indicator Templates: Specifications and Assessments

Statistical Committee of Rebuplic of Armenia

Nelli Baghdasaryan
Member of State Council of Statistics

Geneva
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ArmStatBank.am
Implemented UNECE Water Indicators

(C) Water resources

(C1) Renewable freshwater resources by indicators and years

(C2) Freshwater abstraction, by NACE and years

(C3) Water use, by NACE and years

(C4) Household water use per capita, by years

(C5) Public water supply, by purpose and years

(C6) Population connected to public water supply by indicators and years

(C7) Water losses, by years

(C10, C11) Water quality indicator, by observation points and years

Rivers:

Qasakh

Vorotan

Voghji

Meghri

Arpa

Debed

Hrazdan

Aghstev

Lake Sevan

(C11) Nutrients in underground freshwater, by water points, indicators and years

(C14) Population connected to wastewater treatment by indicators and years

(C15) Wastewater treatment facilities by indicators and years

(C16) Polluted waste water (without purification and insufficiently purified waste water), by years

Polluted waste water volume, by years

The content of hazardous substances in polluted waste water, by types of substances and years

Statistical Committee of Rebuplic of Armenia

DATA EXCHANGE AND INFORMATION FLOWS FOR WATER STATISTICS

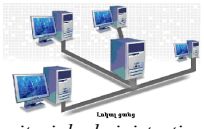
Ministry of Environment of RA

Cadastre Committee of RA

RA territorial administration and local self-government bodies

Ministry of Economy of RA

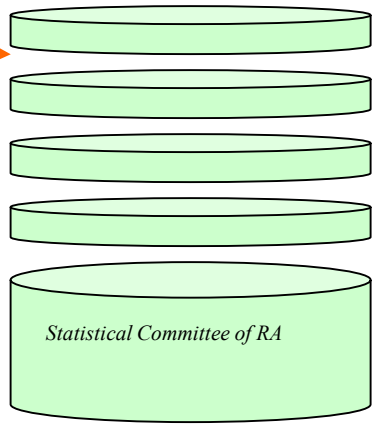
Ministry of Emergency Situations of RA



Ministry of territorial administration and infrastructures of RA

Ministry of health of RA

Environmental and Mining Inspectorate Body of RA

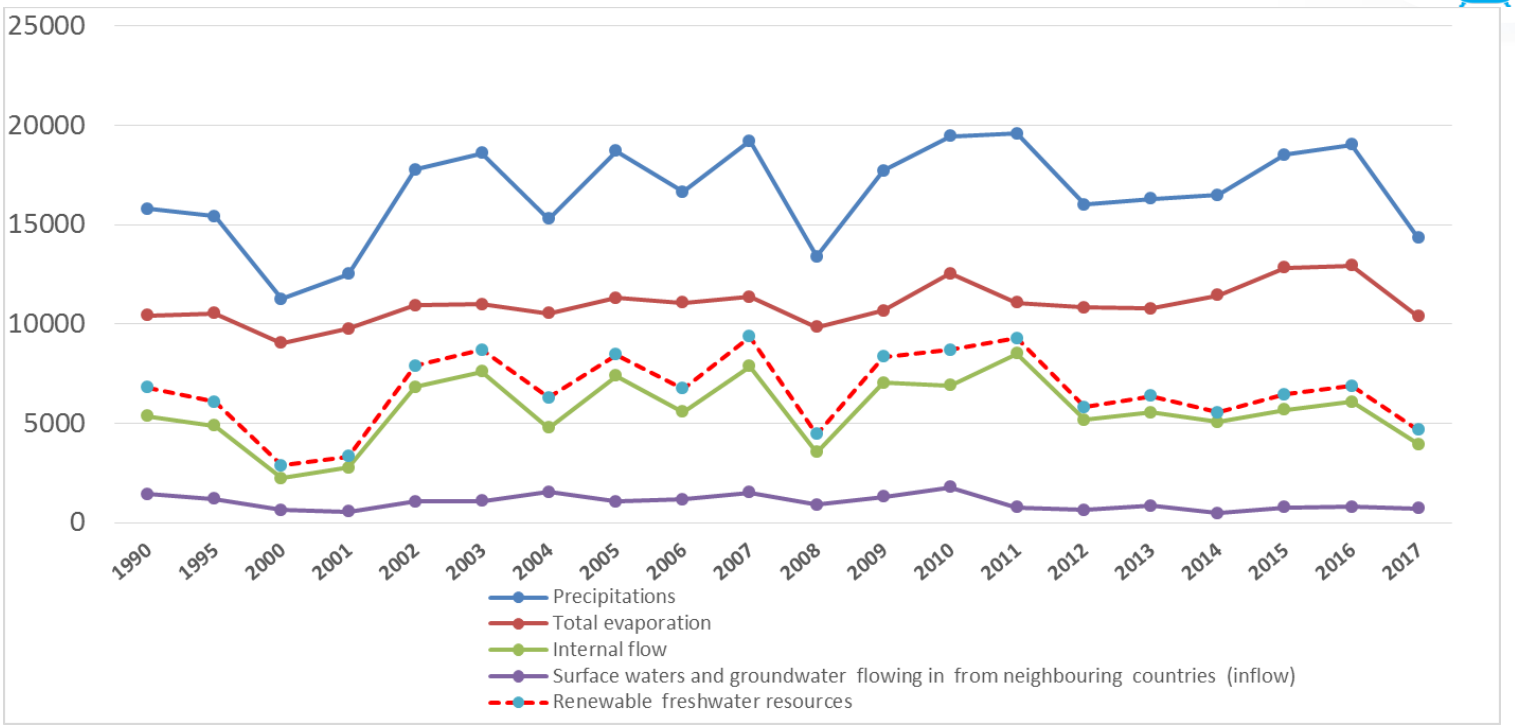


Statistical Committee of RA

National reports, books, brochures, other publications

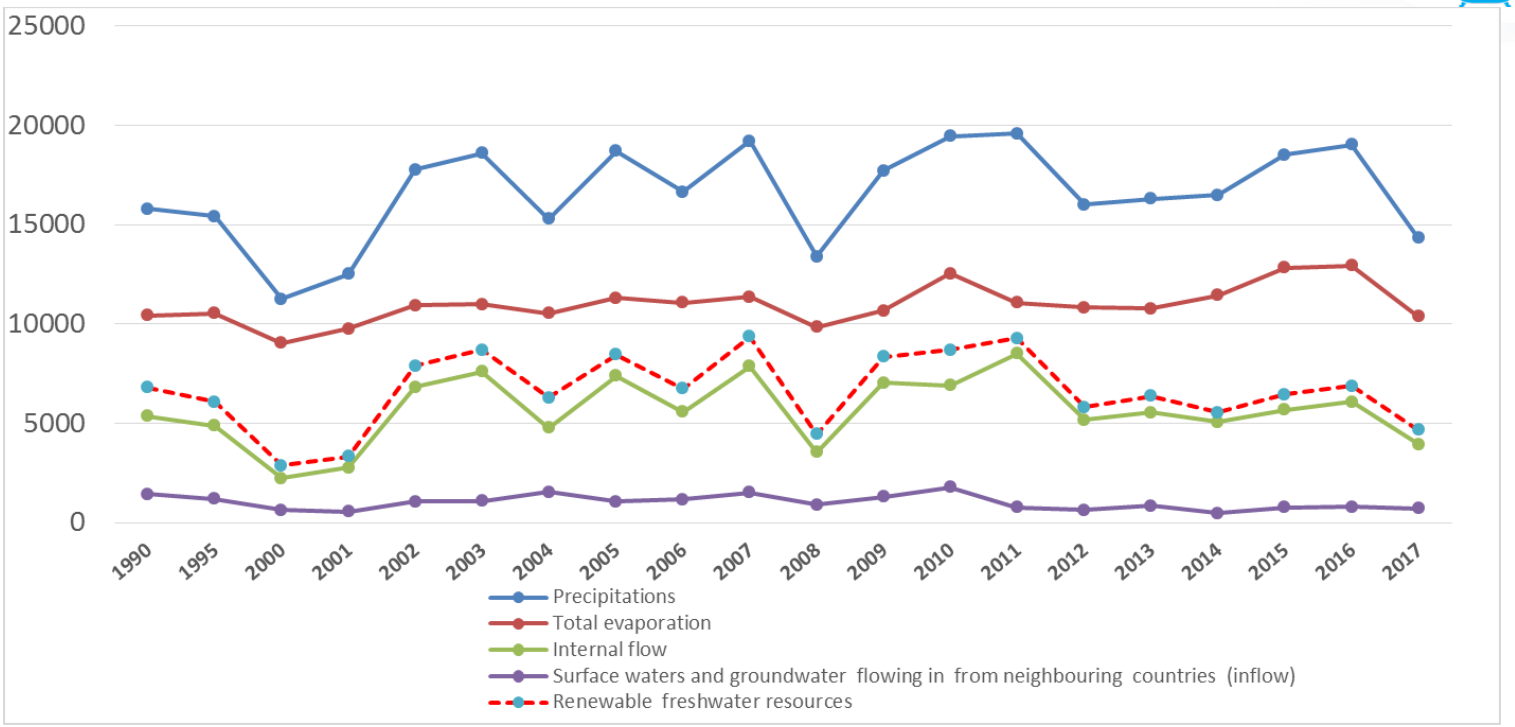
http://armstat.am/

Water indicator templates
Specification and Assessment
C-1.1 Renewable freshwater resources



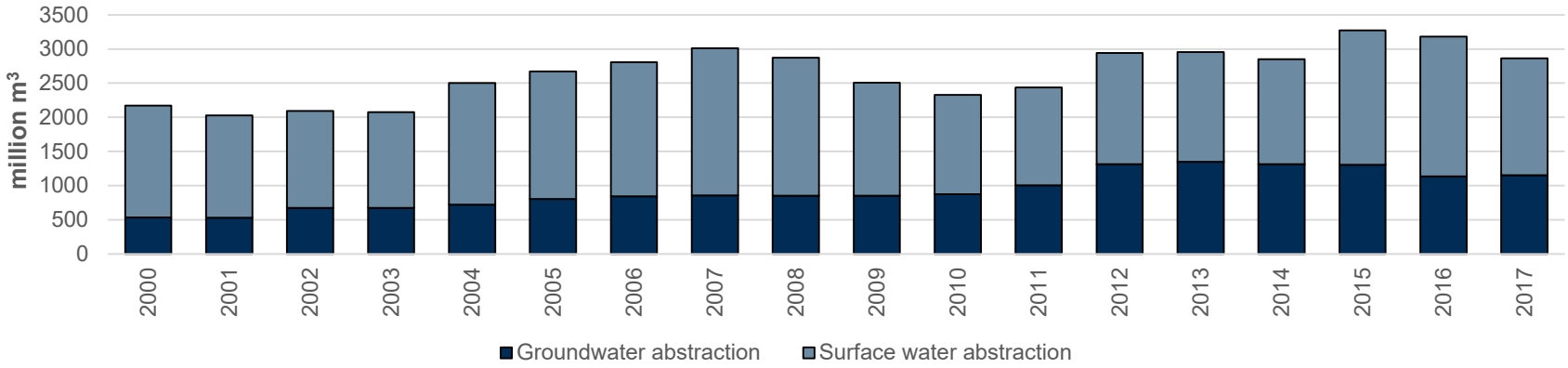
The total volume of river run-off and groundwater generated over the period of a year, in natural conditions, by precipitation into a territory plus inflow of surface and groundwater from neighboring countries.

Water indicator templates
Specification and Assessment
C-1.2 Internal flow



Total volume of river run-off and groundwater generated over the period of a year, in natural conditions, exclusively by precipitation into a country.

Water indicator templates
Specification and Assessment
C-2.1. Freshwater abstraction (surface and groundwater)



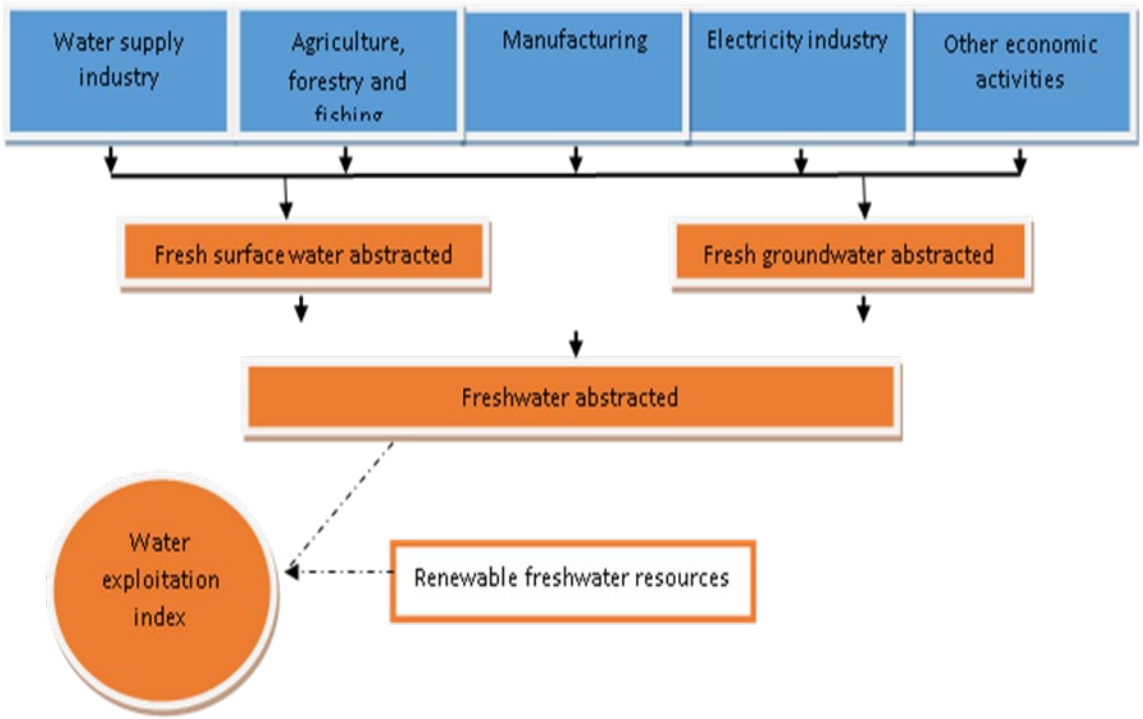
Key message

Armenia is not a water scarce country, however, is facing with severe water stress conditions with higher than 40% of annual water exploitation index (WEI 61.4% in 2017) due to high water demands for public water supply (61%) and agriculture (34%). Total water abstraction for both sectors accounted for 95% of annual total freshwater abstraction of the country in 2017.
Despite total population of the country has decreased around 7.5% between 2000-2017, annual freshwater abstraction has increased 65.3% for the same period.

Pressure of water abstraction is relatively much higher on surface water, meeting 59.7% of annual freshwater abstraction of the country (2017). However, pressure on groundwater resources have more than doubled since 2000 (from 533 mln. m^3 in 2000 to 1,154.5 mln. m^3 in 2017).

Water indicator templates
Specification and Assessment
C2.1. Freshwater abstraction (surface and groundwater)

Methodology for indicator calculation



Water indicator templates
Specification and Assessment
C-2.1 Freshwater abstracted

NEW

Water removed from any water source (surface water sources, such as rivers, lakes, reservoirs or rainwater; and groundwater sources) either permanently or temporarily. Includes abstraction by the water supply industry for distribution and direct abstraction by other activities for own use. The volume of water abstracted is broken down by main groups of economic activity of the abstractors (according to ISIC Rev.4) and households.

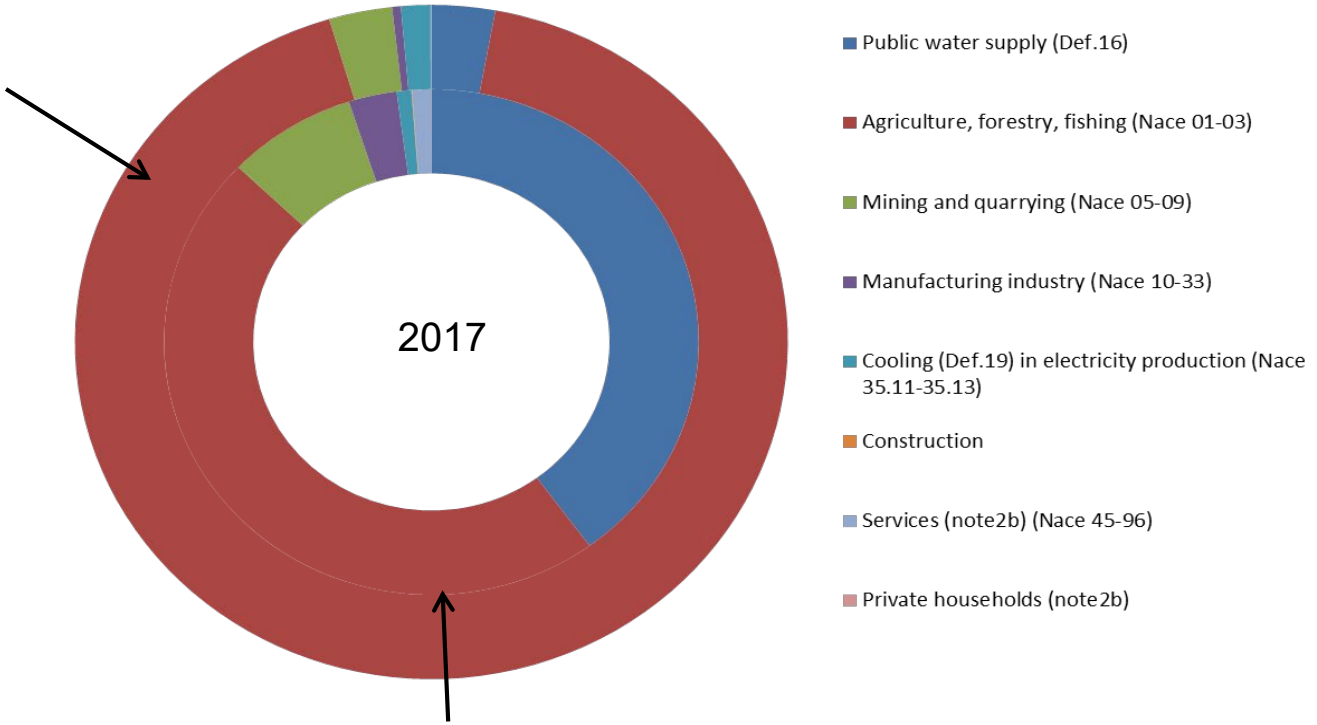
166 Fresh surface water abstracted: total
167 Fresh groundwater abstracted: total
170 by agriculture, forestry and fishing (ISIC 01-03)
177 by agriculture, forestry and fishing (ISIC 01-03): of which irrigation
178 by agriculture, forestry and fishing (ISIC 01-03): of which aquaculture
171 by manufacturing (ISIC 10-33)
172 by manufacturing (ISIC 10-33): of which industry cooling
175 by construction and other industrial activities
174 by production of electricity (cooling) (ISIC 35.11-35.13)
168 by water supply industry (ISIC 36)
176 by services (ISIC 45-96)
169 by households

SDG 6.4.1 CHANGE IN WATER USE EFFICIENCY OVER TIME (FAO)

This indicator is defined as the value added per water withdrawn, expressed in USD/m^3 over time of a given major sector (showing the trend in water use efficiency). Following ISIC 4 coding, sectors are defined as:
1. agriculture, forestry and fishing (ISIC A);
2. mining and quarrying, manufacturing, constructions and energy (ISIC B, C, D and F);
3. all the service sectors (ISIC 36-39 and ISIC 45-99), which includes:
   - water collection, treatment and supply industry (ISIC 36)

Water indicator templates
Specification and Assessment
C-2.1 Freshwater abstracted

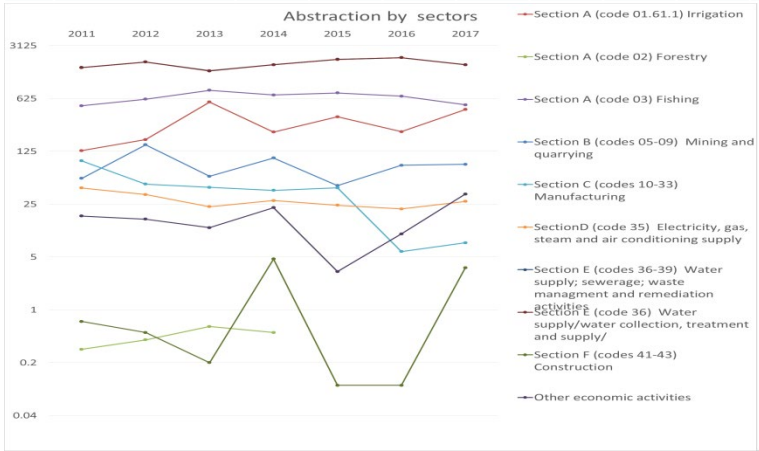
Total gross abstraction of fresh surface water

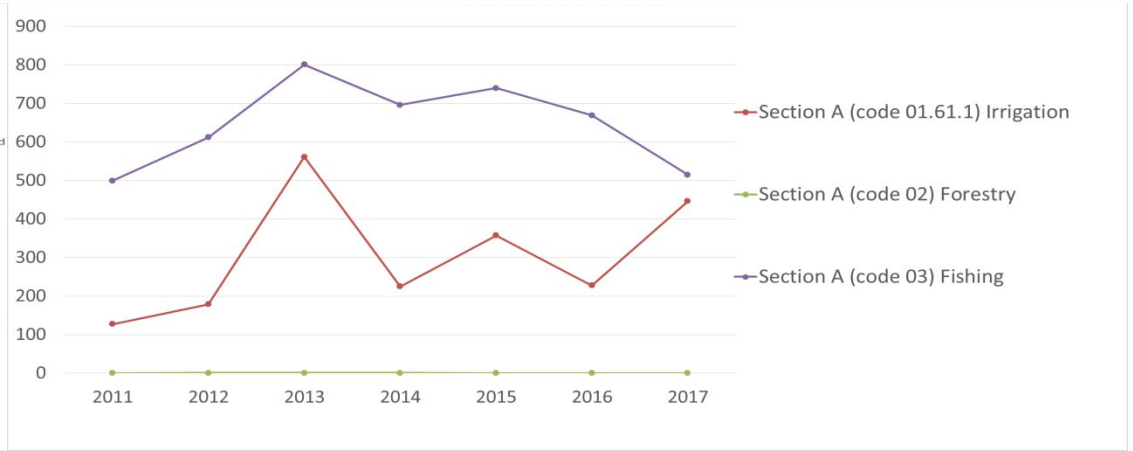


Total gross abstraction of fresh groundwater

Water indicator templates Specification and Assessment
C-2.1 Freshwater abstracted

		Unit	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
										Surface and groundwater abstracted												
1	Fresh surface water abstracted	million m^3	2616.6	1680	1638.2	1495.7	1417.5	1401.7	1780.7	1867.6	1963.9	2154.1	2021.5	1650.3	1450.6	1435.5	1626.8	1606.4	1538.3	1967.3	2045.6	1710.9
2	Fresh groundwater abstracted	million m^3	1325.4	851	533	530	675	674	722	803	843	858	852	854.4	875.8	1002.8	1314.4	1348.7	1312	1304.4	1136.3	1154.5
3										Freshwater abstracted												
4	Freshwater abstracted (Row 1 + row 2)	million m^3	3942	2531	2171.2	2025.7	2092.5	2075.7	2502.7	2670.6	2806.9	3012.1001	2873.5	2504.7001	2326.4	2438.3	2941.2	2955.1	2850.3	3271.7	3181.9	2865.4
5										of which abstracted by												
6	Water supply industry (ISIC 36)	million m^3	1022.0	555.0	603.0	569.0	552.2	585.5	589.8	595.9	594.2	608.8	618.0	597.3	559.6	516.8	535.7	525.2	500.2	496.3	479.8	572.2
7	Households	million m^3																				
8	Agriculture, forestry and fishing (ISIC 01-03)	million m^3	2259.0	1027.2	1378.3	1297.0	1339.2	1376.4	1795.0	1947.1	2041.6	2280.9	2110.6	1691.5	1602.4	1645.3	2108.5	2290.6	2143.0	2617.7	2582.8	2136.9
9	Manufacturing (ISIC 10-33)	million m^3	518.7	39.3	59.2	47.7	46.2	43.8	49.7	44.6	51.2	45.3	47.4	74.6	67.8	93.6	45.9	41.7	38	41.1	5.9	7.7
10	Electricity industry (ISIC 351)	million m^3	26.3	16.6	25.8	25.5	26.0	27.1	26.9	27.3	27.5	30.0	29.9	29.7	27.4	40.9	33.5	28.3	29.2	28.8	20.8	26.6
11	Other economic activities	million m^3	116.0	892.9	104.9	86.5	128.9	42.9	41.3	55.7	92.4	47.1	67.6	111.6	69.2	141.7	217.6	69.3	139.9	87.8	92.6	122
12										Water exploitation index (WEI)												
13	Renewable freshwater resources (=Table C-1, row 5)	million m^3	6810	6070	2873	3323	7893	8684	6302	8457	6734	9367	4439	8333	8681	9285	5822	6379	5532	6441	6882	4663
14	Water exploitation index (Row 4 / row 13)	%	57.9	41.7	75.6	61.0	26.5	23.9	39.7	31.6	41.7	32.2	64.7	30.1	26.8	26.3	50.5	46.3	51.5	50.8	46.2	61.4
	Water exploitation index (Row 4 / row 13) LTA = 7 769	%	50.7	32.6	24.1	22.2	22.3	25.4	32.2	35.7	36.4	38.8	37.0	31.7	27.4	31.4	37.9	38.0	36.8	42.1	41.0	36.9





Water indicator templates Specification and Assessment

C-2.3 Water exploitation index (WEI)

NEW

The indicator presents the annual total fresh water abstraction in a country as a percentage of its long-term annual average (LTAA) available water from renewable fresh water resources.

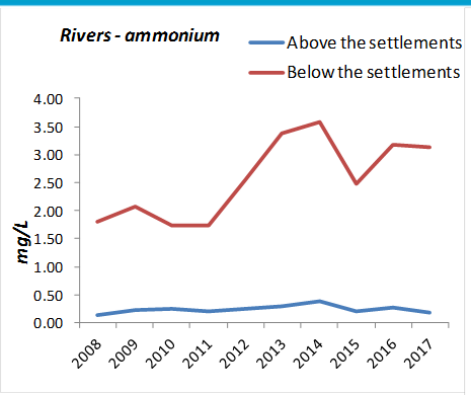
C-2.4 Level of Water Stress: freshwater withdrawal as a proportion of available freshwater resources (SDG 6.4.2)

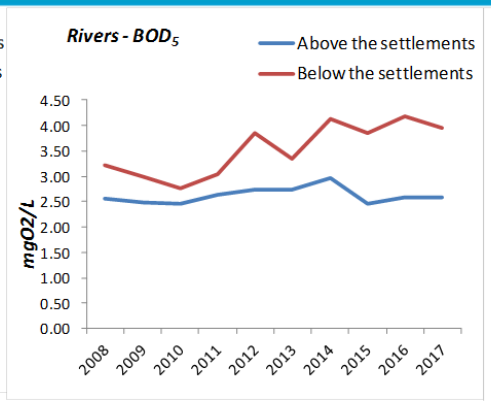
NEW

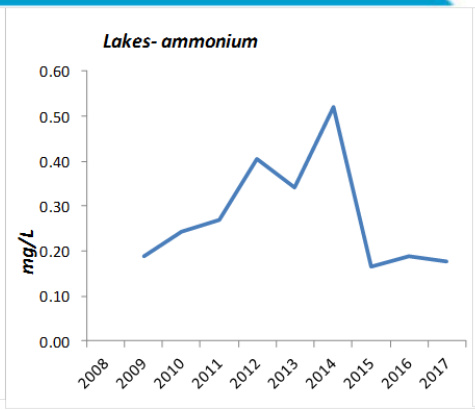
Ratio between total freshwater withdrawn by all major sectors and total renewable freshwater resources, after having taken into account environmental water requirements.

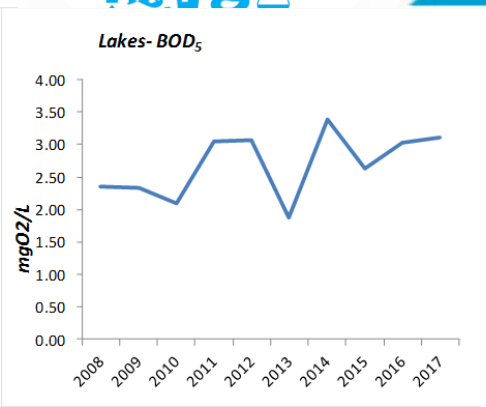
WATER STRESS		2015	2016	2017	2018	UNIT
Total freshwater withdrawal (surface + groundwater)	[1]	3.272	3.182	2.865	2.714	in 10^9 m^3
Total water withdrawal	[2]	3.272	3.182	2.865	2.714	in 10^9 m^3
Desalinated water produced	[3]	0	0	0	0	in 10^9 m^3
Direct use of treated municipal wastewater	[4]	0	0	0	0	in 10^9 m^3
Direct use of agricultural drainage water	[5]	0	0	0	0	in 10^9 m^3
Total renewable freshwater resources	[6]	**7.769**	**7.769**	**7.769**	**7.769**	in 10^9 m^3
Environmental flow requirements (volume)	[7]	**2.812**	**2.812**	**2.812**	**2.812**	in 10^9 m^3
Water Stress	[8]	**66.0**	**64.2**	**57.8**	**54.8**	%

Water indicator templates
Specification and Assessment
C10. BOD and concentration of ammonium in rivers and lakes









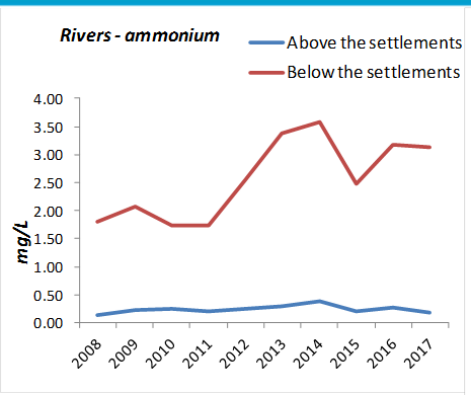
The data series are calculated as the average of annual mean concentrations for river stations in Armenia. The number of rivers included in the calculation of ammonium and BOD_5 concentrations is 21 and number of stations - 44 (21 stations are above settlements and 23 stations-below settlements).

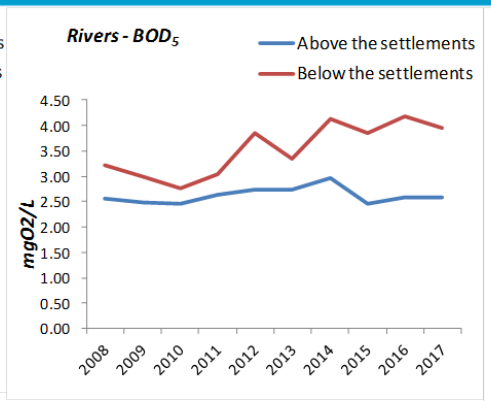
Key message

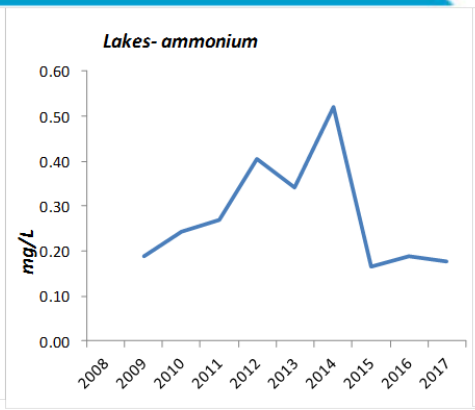
Biochemical oxygen demand (BOD) and ammonium are key indicators of organic pollution in water. BOD shows how much dissolved oxygen is needed for the decomposition of organic matter present in water. Concentrations of these parameters normally increase as a result of organic pollution caused by discharges from waste water treatment plants, industrial effluents and agricultural run-off. Severe organic pollution may lead to rapid de-oxygenation of river water, high concentration of ammonia and disappearance of fish and aquatic invertebrates.

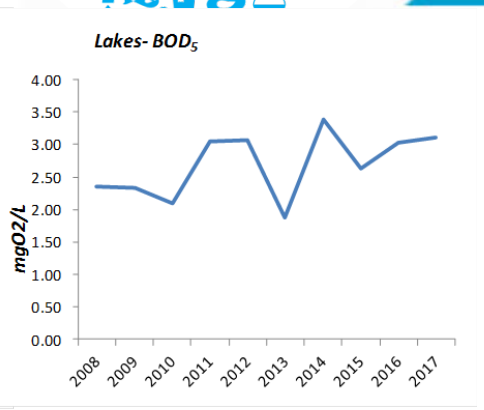
- Concentrations of biochemical oxygen demand (BOD) and total ammonium have increased in Armenian rivers in the period 2012 to 2017 due to the influence of not treated domestic wastewater of settlements and diffuse runoff from agriculture.
- Average concentrations of BOD_5 below and above settlements belong to the second class (good quality) assessed by Armenian water quality norms. Average concentrations of ammonium below settlements mainly belong to the fourth class (poor quality) or fifth class (bad quality), and before settlement - second class (good quality).

Water indicator templates
Specification and Assessment
C10. BOD and concentration of ammonium in rivers and lakes







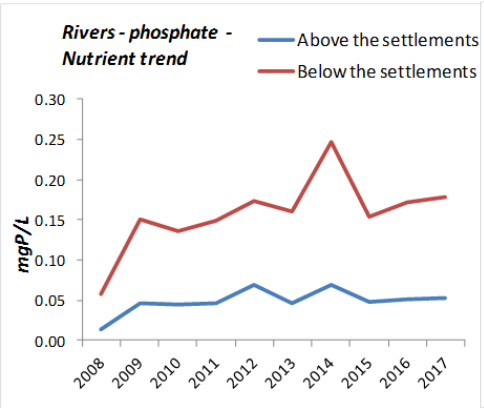


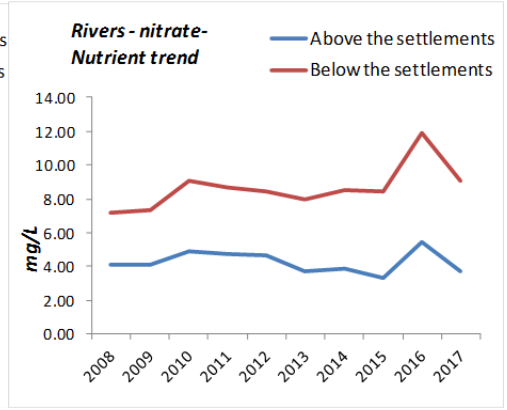
The data series are calculated as the average of annual mean concentrations for river stations in Armenia. The number of rivers included in the calculation of ammonium and BOD_5 concentrations is 21 and number of stations - 44 (21 stations are above settlements and 23 stations-below settlements).

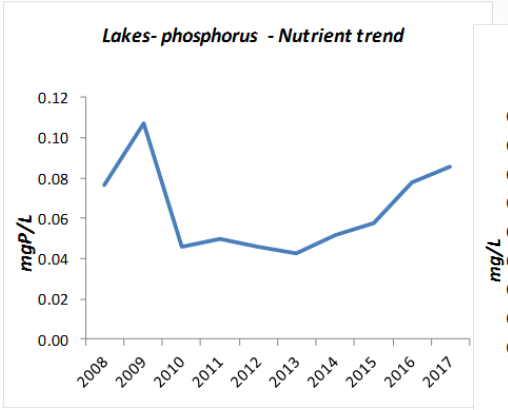
Key assessment

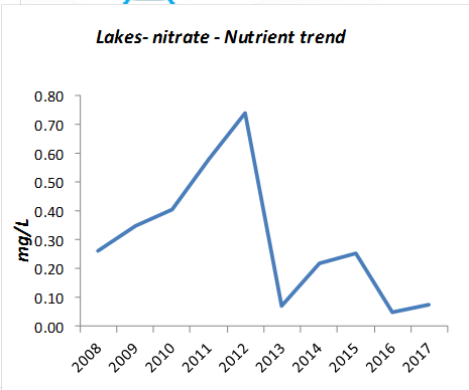
- Since 2012, average ammonium concentrations in Armenian rivers (after main settlements) have increased by 1 milligram per litter over the period 2008 to 2017.
- Average BOD5 concentration in Armenian rivers has increased slightly over the last decade.
- Average ammonium concentration in Armenian lakes (Lake Sevan) has sharply increased for the period 2008-2014 and then decreased three times.
- Average BOD5 concentration in Armenian lakes (Lake Sevan) has slightly increased for the period 2013-2017. Diffuse runoff from agricultural land and non treated domestic wastewater continues to be an important source of phosphorus for the Armenian lakes. Moreover, phosphorus stored in sediment can keep lake concentrations high and prevent improvement of water quality.
- The average concentrations of ammonium and BOD_5 were compared with the water quality norms for Armenian rivers. Average concentrations of ammonium below settlements mainly belong to the fourth class (poor quality) or fifth class (bad quality), and before settlement - second class (good quality).

Water indicator templates
Specification and Assessment
C11. Nutrients in freshwater









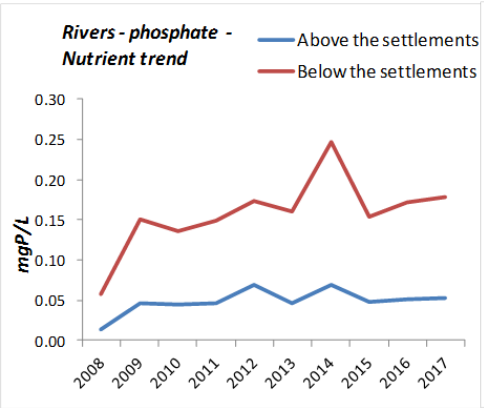
The data series are calculated as the average of annual mean concentrations for river stations in Armenia. The number of rivers included in the calculation of phosphate and nitrate concentrations is 21 and number of stations - 44 (21 stations are above settlements and 23 stations-below settlements).

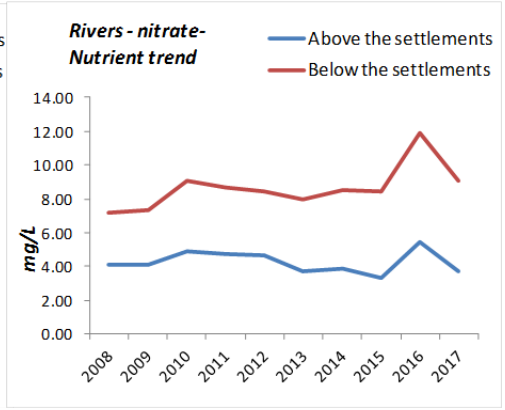
Key message

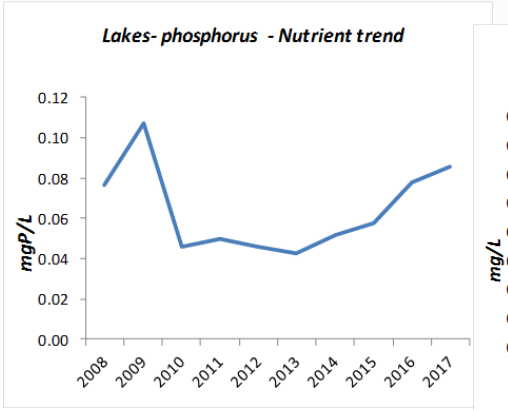
- Large inputs of nutrients to freshwater bodies from urban and agricultural point and non point sources can lead to ecological changes, eutrophication of water bodies and have negative impacts on the use of water from these water bodies for human consumption and other purposes.
- Since 2008, average nutrient concentrations (nitrate and phosphate) in Armenian rivers and lakes have increased over the last decade.
- Average nutrient concentrations have increased after the influence of not treated domestic wastewater of settlements and diffuse runoff from agriculture.
- Average concentrations of nitrate below and above settlements belong to the second class (good quality) assessed by Armenian water quality norms. Average concentrations of phosphate below settlements mainly belong to the third class (moderate quality) and before settlement - second class (good quality).

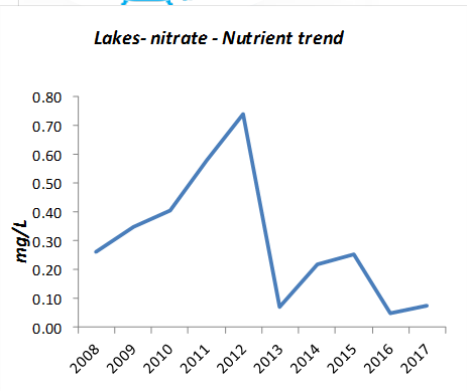
Water indicator templates Specification and Assessment

C11. Nutrients in freshwater









The data series are calculated as the average of annual mean concentrations for river stations in Armenia. The number of rivers included in the calculation of phosphate and nitrate concentrations is 21 and number of stations - 44 (21 stations are above settlements and 23 stations-below settlements).

Key assessment

- Since 2008, average phosphate concentrations in Armenian rivers have increased by 0.03 milligrams per litter of phosphate (mg P/l) over the period 2008 to 2017.
- Average nitrate concentration in Armenian rivers has increased slightly over the last decade.
- The average nitrate and phosphate concentrations in Armenian rivers after the influence of not treated domestic wastewater of settlements has increased by 3.3 times in case of phosphate and 2.1 times in case of nitrates.
- Average nitrate concentration in Armenian lakes (Lake Sevan) has sharply increased for the period 2008-2012 and then decreased.
- Average phosphorus concentration in Armenian lakes (Lake Sevan) has slightly increased for the period 2013-2017.Diffuse runoff from agricultural land and non treated domestic wastewater continues to be an important source of phosphorus for the Armenian lakes. Moreover, phosphorus stored in sediment can keep lake concentrations high and prevent improvement of water quality.
- The average concentrations of nitrate and phosphate were compared with the water quality norms for Armenian rivers. Average concentrations of nitrate below and above settlements belong to the second class (good quality). Average concentrations of phosphate below settlements mainly belong to the third class (moderate quality) and before settlement - second class (good quality).

WATER ACCOUNTS

Key indicators

		2015	2016	2017
K1	**Water consumption [mln. m³]**	1352.04	1309.72	1253.60
K2	Water consumption per GVA (gross value added) [m³ per 1000 drams]	0.30	0.29	0.25
K3	Water consumption per Production Output [m³ per 1000 drams]	0.19	0.18	0.16
K4	**Water use [mln. m³]**	5017.90	4735.62	4006.60
K5	Water use per GVA (gross value added) [m³ per 1000 drams]	1.11	1.04	0.80
K6	Water use per Production Output [m³ per 1000 drams]	0.71	0.66	0.51
K7	**Water consumption/ water use**	0.27	0.28	0.31
K8	Losses in distribution / total water use	0.15	0.15	0.21

THANK YOU FOR YOUR KIND ATTENTION

3 Government House, Republic ave.,
Yerevan 0010, Republic of Armenia
Phone: (+374 11) 524 618

E-mail: info@armstat.am
nelli@armstat.am

www.armstat.am
www.armstatbank.am