

Water quality data in Arequipa, Peru

Authors: L. Bowling, A. Moraes, K. Cherkauer, F. Daneshvar, J. Frankenberger, E. Bocardo, & J. Pinto



INTRODUCTION

Monitoring of water quality provides information to consumers regarding the mass per unit volume of potential contaminants of concern in river water. The results of water quality monitoring can detect human exposure to contaminants through drinking water, evaluate habitat needs, identify pollution sources, detect accidental releases and emerging issues, quantify trends in current water quality and manage regulations regarding total load.

MONITORING LOCATIONS AND AGENCIES

Monitoring of water quality in Peru is conducted by the Autoridad Nacional del Agua (ANA), as required by Water Resources Law No. 29338. Official monitoring of water quality in Arequipa started in 2011 and 20 sampling campaigns took place between 2011 and 2014. Currently, water quality sampling does not occur at fixed, uniform station locations, instead stratified sampling is conducted in different river basins.

This results in differences in the number of samples taken during a campaign (from 16 to 45), and differences in the number of parameters recorded (from 32 to 40).

According to Peruvian regulations, water quality analysis can only have legal validity if samples are analyzed by a laboratory accredited by the National Quality Institute (INACAL). ANA reports that all labs used were accredited at the time of sample collection, but it is known that some labs have since lost accreditation. Only the laboratory used in the 2014 reports is still accredited.

OBTAINING WQ DATA

The data are available in individual reports published by ANA, as listed in Table 1. These are available at <https://repositorio.ana.gob.pe/discover>. Additional sampling has taken place since 2014, but reports are not yet available.

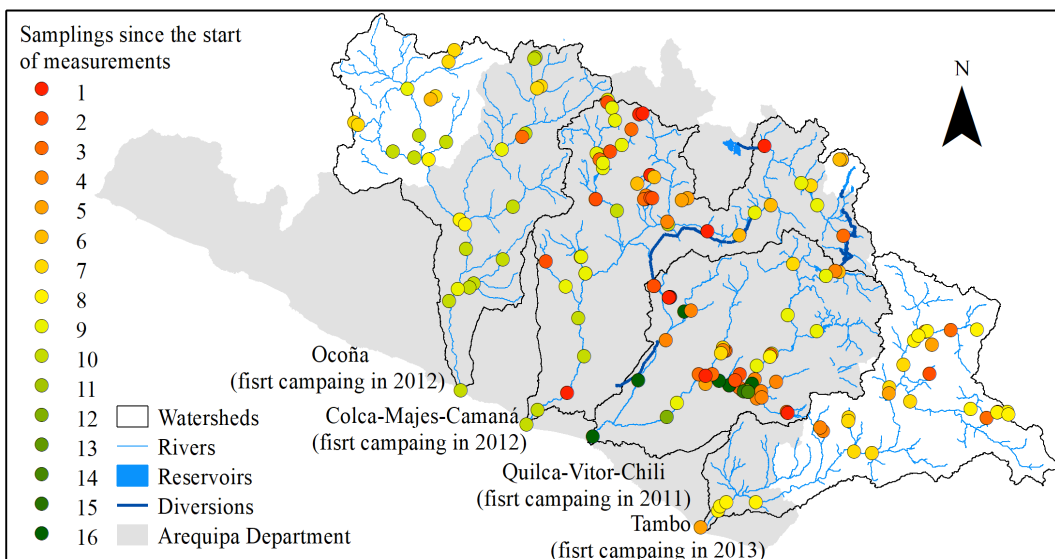


Figure 1. Spatial distribution of water quality measurements performed by the National Water Authority (ANA) from 2011 to 2014 in the four main watersheds in the Arequipa department. Points represent locations with at least one measurement in the respective year.

Adequacy: Water quality monitoring infrastructure is not currently sufficient to do anything other than provide exploratory data for development of a more permanent network and the data collected is not readily available to the consumers. Despite having several inconsistencies, results can be used for the development of a more permanent network. Repeated sampling, 2-3 times per year at fixed locations would improve the ability to detect new contamination sources and evaluate change over time. A platform to provide readily access and visualization of the data would facilitate interpretation and response to possible issues.

DISCUSSION OF WATER QUALITY INFORMATION

Samples have been collected from approximately 211 measurement locations across Arequipa focusing on the four major river basins that pass through the department (Figure 1). Sampling frequency is as little as once in four years, and at most four times per year (in the Quilca-Chili watershed in 2014). There is also variation in the timing of the sampling, with no consistency in the months when sampling is conducted within a watershed.

The low sampling frequency and inconsistent timing cannot represent the effect of seasonal hydrology on water quality. The network's spatial density is suitable for monitoring long-term change in water quality, however, to identify the source of specific human health hazards, a fixed water quality sampling network may need to be established in specific locations. Placement of fixed sites should factor in an improved ability to attribute contaminants to the correct source.

Table 1. Summary of water quality monitoring locations sampled by the National Water Authority (ANA) from 2011 to 2019 in the four major watersheds in the Arequipa Department.

Watershed	Sampling date		Measurement locations	Measured parameters	Report No.
	Year	Month			
Ocoña	2012	Nov-Dec	23	37	006-2013-ANA-AAA CO-SDGCRH/JLFZ/
	2013	Nov	24	35	006-2013-ANA-AAA CO-SDGCRH1
	2014	Apr	24	36	020-2015-ANA-AAA CO-ALA-OP/FGA
	2015	Sept	31	37	020-2017-ANA-AAA C-O-ALA.O-P
	2016	May	31	38	001-2017-ANA-AAA C-O-ALA.O-P
		Nov	31	39	010-2017-ANA-AAA.CO-ALA.O-P-AT/AGFT
	2017	Aug-Sep	31	36	005-2017-ANA-AAA.CO-ALA.O-P-AT/AGFT
	2018	Apr	31	47	012-2018-ANA-AAA.CO-ALA.O-P-AT/AGFT
		Apr	31	47	019-2019-ANA-AAA.CO-ALA.O-P-AT/AGFT
2019	Oct-Nov	28	49	043-2019-ANA-AAA.CO-ALA.O-P-AT/AGFT	
Colca-Majes-Camaná	2012	Oct	30	32	015-2012-ANA-SDGCRH/MPPC-JLFZ
	2013	Oct-Nov	38	37	011-2014-ANA-AAA I CO-SDGCRH/JLFZ
	2014	Mar	40	37	001-2015-ANA-AAA.CO-ALA.CM-AT /GFA
		Aug-Sep	23	37	003-2015-ANA-AAA.CO-ALA.CM-AT/GFA
	2016	Mar-Apr	32	50	007-2016-ANA-AAA.CO-ALA.CSCH-AA/FADM
		Nov	34	49	005-2016-AAA I C-O/SDGCRH
	2017	Sept	34	44	045-2017-ANA-AAA.CO-ALA.CSCH-AA/FADM
	2018	Apr	37	32	013-2018-ANA-AAA.CO-ALA.CM-AT/GFA
Quilca-Vitor-Chili	2011	Aug	24	37	002-2012-ANA
		Oct	24	37	108-2011-ANA-AAA I C-O
		Dec	24	37	001-2012-ANA
	2012	Mar	18	40	011-2012-ANA-PMGRH
	2013	Jan-Feb	33	36	001-2013-PMGRH-CUENCA CHILI
		Mar	33	36	08-2014-ANA-AAA.CO
	2014	Jan	27	40	001-2014-PMGRH-CUENCA CHILI
		Mar	17	37	003-2014-PMGRH-CUENCA CHILI
		May	17	37	005-2014-PMGRH-CUENCA CHILI
		Oct-Nov	16	38	004-2015-PMGRH-CUENCA QUILCA CHILI
	2015	Sept	17	45	046-2016-ANA-AAA.CO-ALA.CH/ECA-JCM
	2017	Sept	17	44	006-2018-ANA-AAA.CO-ALA.CH/JCCM
	2018	April	23	48	016-2018-ANA-AAA.CO-ALA.CSCH-AA/FADM
Tambo	2013	Oct	44	33	001-2014-ANA-AAA C-O/ALA T-AT-ALA MOQ/ECRH/VNCA-LVUC
	2014	Mar	44	34	002-2014-ANA-AAA C-0/ALA T-AT-ALA MOQ/ECRH/VNCA LVUC
		Jul	45	34	005-2015-ANA-AAA C-0/ALA T-AT-ALA MOQ/ECRH/VNCA LVUC
	2016	Apr	46	27	011-2016-ANA-AAA C-O/ALA T-AT-ALA MOQ/ECRH/VNCA-LVUC
		Oct-Nov	43	30	001-2017-ANA-AAA C-O/ALA T-AT/VNCA
	2017	Oct	43	33	260-2017-ANA-AAA C-O/ALA T-AT
	2018	Apr	45	33	004-2018-ANA-AAA C-O/ALA T-AT

CONTACT

For more information about the developers, this factsheet, and other tools developed by the SWM team of the Arequipa Nexus Institute, contact us at nexus-swm@purdue.edu.