

Study finds room for improvement in South Korea's polluted river basin

July 12 2018, by Cristina Rojas



A new Portland State University study shows that even though water quality has improved in South Korea's Han River basin since the 1990s, there are still higher-than-acceptable levels of pollutants in some of the more urbanized regions in and around the capital Seoul. Credit: Heejun Chang

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quality has improved in South Korea's Han River basin since the 1990s, there are still higher-than-acceptable levels of pollutants in some of the more urbanized regions in and around the capital Seoul.

The study by Heejun Chang, a geography professor in PSU's College of Liberal Arts and Sciences, and Janardan Mainali, a Ph.D. student in geography, was published online in the *Journal of Hydrology* in June. It was supported by a grant from the National Science Foundation.

The study used spatial data from the early 1990s through 2016 to examine seasonal [water](#)-quality trends in the Han River basin, the largest and most populous river basin in South Korea. The river had become synonymous with pollution as factories, farms and city sewer systems poured waste into its waters. But ahead of the 1988 Seoul Olympics, the government launched efforts to begin cleaning it up.

The study examined the relationship between water quality—as measured by total nitrogen (TN), total phosphorus (TP), chemical oxygen demand (COD) and suspended soil particles—and topography, population density, soils, and land cover such as changes from forest or agricultural use to urban land.

The study showed that the water quality generally improved within the Seoul metropolitan area but declined in rural areas from the early 1990s to 2016.

Some of the urbanized regions still had higher-than-acceptable concentrations of nitrogen, phosphorus and COD. Even though wastewater treatment plants were built, the study suggests that the population growth in suburban areas may have outpaced the proper treatment of wastewater as well as increasing runoff or "non-point source" pollution.

Among the findings:

- In the major urban areas, the decreasing trends seen in TN, TP and COD levels over time can be attributed, in part, to the government's installation of new wastewater treatment plants, better watershed management practices and stream restoration practices
- Most of the trends were explained by some combination of forest or agricultural land cover, changes in land use, the percentage of area covered by water and slope variations, suggesting that land management could be an effective strategy for improving water quality
- Having vegetation and protected areas along streams was shown to help improve water quality

Chang, who also serves as a faculty fellow at PSU's Institute for Sustainable Solutions, said that governments and agencies need to be proactive in ensuring water quality is a priority, particularly in suburban and developing [rural areas](#), by imposing more stringent regulations, implementing best management practices and creating natural buffers.

"Nature-based solutions have shown to improve water [quality](#) in the long run," he said.

More information: Janardan Mainali et al, Landscape and anthropogenic factors affecting spatial patterns of water quality trends in a large river basin, South Korea, *Journal of Hydrology* (2018). [DOI: 10.1016/j.jhydrol.2018.06.074](#)

Provided by Portland State University

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