

# Effects of pharmaceuticals on the environment

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The term, chemicals of emerging concern, has newly been brought to the public's attention because of the recent research which has shown that pharmaceuticals in the planets waterways and soil isn't natural whether done on purpose or accidentally. The research spans over the last 100 years due to the lack of technology, resources, and because honestly, we've haven't had these types of chemicals in our medicines and/or personal hygiene items until the past 100 years. Before that time individuals relied solely on natural remedies or just plain ole good luck. The following review of literature confirms that the impact on the Earth's environment continues to be affected because of the lack of regulations on pharmaceuticals and consequently will continue to contaminate our waterways, our animals, and our lands.

**EFFECTIVIVENESS OF WASTE WATER TREATMENT WORKS (WWTW) WHEN IT COMES TO PHARAMACETICALS** The first challenge was finding reliable sources that pertain to the issue at hand. Thanks to UMUC vast library and this class' learning resources, tons of articles were discovered. First, such source was the article written by a few researchers who took on the huge task of testing the recycled waters from wastewater treatment facility in the Gauteng Providence in South African. After the facility treated the water, the water would then be released downstream and would eventually end up in a major dam that would hydrate approximately six percent of the surrounding communities (Archer, Petrie, Kasprzyk, and Wolfaardt, 2017). Under the most sanitary conditions the researched took samples for five days straight and then shipped those samples to a university in the United Kingdom (University of Bath). The outcome of the water samples came back with a total of 19

different varieties of Pharmaceuticals and Personal Care Products (PPCP) ranging from human waste to illegal drugs to metabolites which are necessary to sustain life (Archer, Petrie, Kasprzyk, and Wolfaardt, 2017). A similar study was explored by Katharina Kern in 2011, Kern who is a molecular biologist in Germany, was able to discovered that only five percent of the pharmaceuticals that humans take gets used by our bodies, while the rest of the 95% of medicine we digest gets pushed out of our bodies and eventually makes its way out of our body and into our sewer systems and eventually to a water treatment facility to get treated and recycled (Kern, 2011). As a matter of fact, Kern mentions in her research paper called “ The Urban Waste Water Treatment Directive”, which identifies that the waste water treatment facilities treat water on a minimum requirement basis, however it fails to include any elimination requirements of active pharmaceutical substances, specific pharmaceutical emission limit values, or any specific purification levels regarding pharmaceutical substances acceptable when purifying waste water (Kern, 2011).

PHARAMACETICALS IN OUR NATURAL WATER WAYS. The next research article takes place in South Korea where scientist Kim, Lee, and Oh investigated the effects of pharmaceuticals in both the coastal sea waters of the South Korean peninsula and the more untouched and unmolested waters of fish farms. Under the most sanitary conditions to avoid cross contamination scientist took samples from both bodies of waters to test for pharmaceuticals. The results of the study from the sea water found all kinds of pharmaceuticals ranging from inflammatory drugs to anti-seizure drugs to antidepressants, the group of scientist even found stimulant caffeine in the

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sea water samples (Kim, Lee, and Oh, 2017). The results from the samples taken in fish farms were also found to contain trace amounts of pharmaceuticals but nowhere near the numbers previously found in the coastal sea waters (Kim, Lee, and Oh, 2017). Another reason why the pharmaceutical levels were so high in the coastal sea waters was because the water was being released from a waste water treatment works and eventually made its way out to sea (Kim, Lee, and Oh, 2017). The last research article examines a place where water isn't readily available and every drop counts in order to sustain life. This place is the country of Oman. For this study a team of scientist decided to use radishes as the main test subject for their experiment. They would test both the radishes and the soil which would be watered by water which was recently treated from a waste water facility, the test was used to find out if the water would pass the pharmaceuticals along to both the radishes and the soil (Raya, Mushtaque, Ahmed, and Choudri, 2018). The results from study found trace amounts of pharmaceuticals not only in the radishes, but also in the radishes roots, and in the soil. Of all the medications that were being tested amoxicillin, which is a form of penicillin antibiotic used to fight of all kinds of infections, was the one found with the most spiked levels (Raya, Mushtaque, Ahmed, and Choudri, 2018). About ten percent of the population is allergic to penicillin, but there have been no reports at this time of individuals reported to have been hospitalized from eating or drinking products treated by waste water products.

## **Conclusion**

In conclusion, this article isn't meant to frighten the reader but rather to educate and bring awareness to the audience about the importance of regulating the ways in which waste water is treated and disposed of, along with bringing to light have some pharmaceuticals actually harming our environment. The reason why everybody does not take the same medication as one another, is simply because different problems and needs require different treatments, yet the waters are testing positive for potentially harmful pharmaceuticals. Some of these same pharmaceuticals which are typically regulated in distribution by the Food and Drug Administration (FDA). Change has to come sooner than later because all this water that is supposed to be getting treated is not regulated as much as one would think. Affirmative action is due now before it's too late and the Earth's natural drinking water is completely tainted by pharmaceuticals leaving no more good, clean, and natural drinking water for humans and animals to consume.