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## Ask a Scientist: Would the rising seas affect the grand canyon or such places in any way?

Abby Barnes, PhD student in biological psychology with edits from Brooke Dulka, PhD student in biological psychology

Jul 18, 2017



Courtesy of The University of Tennessee, Knoxville.

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You've probably heard of the Seven Wonders of the World - a list of the historical structures that exemplify humans' ability to imagine and create amazing things. But did you know there are Seven *Natural* Wonders of the World as well? That list was made in 2008, when a committee of over 30 experts from all over the world joined together for one mission: to identify, protect and promote the most spectacular parts of nature. The Grand Canyon made it through the extremely selective process this committee used, along with the Aurora Borealis, the Harbor of Rio de Janeiro, the

Great Barrier Reef, Mount Everest, Paricutin, and Victoria Falls. These sites are considered to be amazingly unique, visually impressive, culturally important and – most importantly – are completely natural; they have not been created by human activity.

Many of these natural wonders have a common thread. Have you spotted it? It's water! The Grand Canyon, for example, has been carved over millions of years by the Colorado River. The Harbor of Rio de Janeiro is formed from the coast of Brazil wrapping almost entirely around a small portion of the Atlantic Ocean. The Great Barrier Reef is obviously dependent on a portion of the Pacific Ocean called the Coral Sea, and Victoria Falls is the largest (by width and height) waterfall in the world.

Another list, finished in 2011 and selected by a worldwide popular vote, is named the New Seven Wonders of Nature. This list includes the Amazon Rainforest and River, Halong Bay, Jeju Island, Iguazú / Iguazu Falls, Puerto Princesa Subterranean River, Komodo Island, and Table Mountain. Six out of seven of these sites are related to water by river, bay, or sea. It seems that water has an amazing ability to create beauty and wonder... but, around the globe, water levels are changing. The ice caps at our poles - which hold almost 6 *quintillion* (that's 18 zeros) gallons of water - are melting as Earth's average temperature increases. This has caused sea levels to rise eight to 10 inches since 1880, and studies suggest that this trend is accelerating. With the threat of rising sea levels, it's natural (and somewhat terrifying) to wonder: Will the natural wonders of the world someday be drowned by the very thing that helped create them?

There are a lot of current estimates of how much the sea level will rise within the next couple centuries. These estimates range from just a couple inches to as much as 30 feet, but it really depends on what source you look at. This can make researching the effects of rising sea levels really difficult. For the purposes of this article, we've tried to pick a reasonable estimate of sea levels rise - 10 feet or 3 meters. This number is at the upper end what are claimed to be "conservative" estimates of sea level rise over the next century.

To answer your question directly, the Grand Canyon would not likely be affected by those sea levels. Actually, the sea would have a hard time affecting the Grand Canyon at any level - it's way too far inland and high above sea level. However, there are quite a few natural wonders that *are* at risk! The Harbor of Rio de Janeiro, for example, will likely suffer losses of landmarks such as beautiful overlooks and beaches – although it will also get much bigger, keeping its title of "Largest Bay in the World" secure. The limestone islands of Vietnam's Ha Long Bay, and the incredible diversity of life they host, are at a high risk of being drowned; just as Indonesia's Komodo Island, the natural habitat of the Komodo Dragon, might shrink under rising water. In the Philippines, access to the

underground rivers of Puerto Princesa will likely disappear underwater as well. Last, but definitely not least, the Great Barrier Reef relies on a specific range of water depth to survive. If the ocean depth increases too much, the reef will be drowned and deteriorated.

It's important to mention that sea level rise is not a solitary process. It's just one consequence of global warming! It is possible that other consequences, such as large shifts in weather patterns like rainfall, could impact these natural wonders also. Additionally, a lot more land than just natural wonders will be lost to rising sea levels. Currently, the retreating coastlines are expected to force about 200 million people to relocate. Also, because humans have relied on sea trade for most of our history, most big cities are along coastlines. This means that a lot of our biggest cities are at risk of going underwater! If sea levels rise even 10 feet, large parts of New York City, Philadelphia, New Orleans, Sacramento, Venice, Amsterdam, Copenhagen, Osaka, and even some parts of London, Tokyo, and Shanghai will be submerged.

You might be wondering... could the impact of people on the global climate be enough to cause such drastic changes to our planet? Well, that's a question for another day! But, with all of these estimates and uncertainties, we can only really be sure of one thing – the gain from ignoring sea levels and climate change is not worth what we could lose.

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*Abby Barnes is a PhD student in biological psychology and can be reached at [abarne17@vols.utk.edu](mailto:abarne17@vols.utk.edu), and Brooke Dulka is a PhD student in biological psychology and can be reached at [bdulka@vols.utk.edu](mailto:bdulka@vols.utk.edu).*