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POPULATION THREATS TO AMERICA'S RIVERS, ESTUARIES, AND LAKES

Their Health and Future in the Face of Ever-Rising Population Numbers

An NPG Forum Paper
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A look at a map that displays the full array of our nation's major rivers makes very clear that they serve as "America's lifelines." From the smallest to the mightiest, they start in out-of-the-way corners of the land as small streams, gather volume, and rush past both small communities and large cities to play a monumental role in the life of each and every American. Across the country, we access the fresh water of our nation's rivers and bays for drinking, raising crops, producing energy, recreation, and other purposes…the list is almost endless.

The United States has over 250,000 rivers that course over 3,500,000 miles.[1] The present challenges to our country's once pristine waterways have been building from the earliest times America was settled by Europeans. Today, as most Americans are aware, the quality and abundance of fresh water supplied by our rivers is constantly under threat. Throughout the late part of the 20th century, Americans finally awoke to the huge environmental crises overtaking our nation's waters. Thanks to a massive interest in addressing that problem, the overall health of many rivers is much better. Here at the beginning of the 21st century, many long-standing problems remain to be rectified and the issue of climate change and its impact on rivers and other large bodies of water often takes center stage in discussions related to how we prepare for the future.

Yet, the one major subject that vitally needs to be addressed and acted upon in relation to how our rivers and lakes will survive, is population growth. In short, U.S. population is expected to grow to almost 450 million people – up from its current level of 328 million – by 2060. How will our rivers, estuaries, and lakes fare?

This NPG Forum paper is designed to offer an overview of the present status of a few key river systems. It will also present insights into the status of the Great Lakes as well as the two major U.S. estuaries that are under massive assault by ever-increasing population: the Chesapeake Bay and San Francisco Bay. Any effort to comment on all of the nation's major waterways would take volumes. This paper can only provide a glimpse of what our nation and people face in working to protect our waters, restore them, and ensure that they will be there to provide all the needs of America's population well into the future.

THE CLEAN WATER ACT

The chief government agency that oversees America's rivers, estuaries and lakes is the Environmental Protection Agency (EPA). One of the greatest accomplishments of the EPA since its founding in 1970 was when Congress finally passed the Clean Water Act of 1972. *Wikipedia* defines The Clean Water Act (CWA) as "the primary federal law in the United States governing water pollution. Its objective is to restore and maintain the chemical, physical, and biological integrity of the nation's waters by preventing point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. It is one of the United States' first and most influential modern environmental laws… Major changes have subsequently been introduced via amendatory legislation including the Clean Water Act of 1977 and the Water Quality Act of 1987."[2]

However, the EPA is not alone in shaping the future of the nation's waters. Ever-intrusive tentacles of government on the federal, state, and local levels are constantly at work to help or hamper the health of our streams, rivers, bays, and lakes. In many areas you will find overlaps in authority from powerful federal forces such as the Army Corps of Engineers, Department of the Interior, Coast Guard, and a multitude of commissions and other agencies dictating policy. The actions of these groups – often working in concert with energetic and highly respected non-profit organizations – help frame positive decision-making.

As these groups work to keep our waters clean, it is crucial that they concurrently fight back against the all too prevalent "growth at any cost" philosophy which, in the long term, will only exacerbate the modern-day problems of today's waterways. In short, the negative impact of population growth in further damaging our rivers, bays, and lakes is not on their radar.

Today's 'ignore population growth decision making' will surely come back to haunt leaders and residents of many U.S. cities in the future. Without question, a river under stress by too many people will fail to provide the clean, vibrant, sustainable ecosystem that will be central to a decent quality of life. Essentially, while the Clean Water Act radically changed for the better how we met the wrongheaded policy-making of the past, too many of today's leaders are willfully failing to heed—and avert—the threatening challenges ahead.

For many Americans alive today, the alarm over the deteriorating state of our nation's waterways went off in 1969, when a *Time Magazine* article focused on the Cuyahoga River in Cleveland, Ohio and dubbed it the river that "oozes rather than flows" after the river literally caught fire due to floating debris and oil.[3] That article, which helped kindle a widespread national recognition of our nation's decaying environment, prompted Americans to open their eyes to how we were ignoring our fundamental duty to protect our natural resources and ignited environmental passions that soon led to the first Earth Day in April 1970.

The early days of the environmental movement created national celebrities such as folk singer Pete Seeger, who sailed his small scoop *Clearwater* up and down New York's horridly polluted Hudson River. In the late 1960s and 1970s, Seeger stopped into large and small ports along the way and rallied an army of activists to clean up that valuable waterway from Albany to New York Harbor. Seeger's community activism was duplicated countless thousands of times in future decades in cities and towns across America as individuals took bold actions to fight for the future of the rivers and waters they held dear.

THE CONNECTICUT RIVER

One of those rivers was the Connecticut River, the central waterway of the New England states that was once described as "the best landscaped sewer."[4] Site of some of America's earliest settlements that reached farther into the land than others along the eastern coast, the waters of the Connecticut River, and countless dams built along it, powered many of our nation's first industrial factories.

At 406 miles, the Connecticut River is the longest river in New England and its extensive watershed extends into 4 states (VT, NH, MA, and CT) and includes 2.4 million residents in more than 400 communities. It is widely celebrated as a major recreational area for New England residents due to its overall wild and scenic nature. For all of its importance to the area, it is worth noting that the river is not regularly traversed by large ships. The American Rivers organization highlights that uniqueness and attributes it to the fact that "Due to the heavy silt loads carried by the river that obstruct ship navigation." The group also notes that the Connecticut is one of the few major rivers in the United States without a major city at its mouth. Its larger cities, Hartford and Springfield – lie 45 and 69 miles upriver, respectively.[5]

Today, the website Connecticut River notes that the river has made "significant improvements over recent decades" but is still plagued by problems aggravated by high nitrogen levels, bacteria from sewer overflows, and storm water management. It makes clear that these problems will be capital intensive to remedy and the area is challenged in finding the funds to make the necessary changes. Also, while New England is not one of fast-growing areas in the U.S., that does not mean it is not growing at all. While 89 percent of the watershed is undeveloped, its lands and resources are under constant threat of development. Without strategic, community-initiated conservation, the resources that sustain community identity, ecological integrity, and the land's economic viability will be lost. Indeed, figures show … affordability and accessibility give the Connecticut River Valley a high potential for economic development and rapid growth. Lands developed for commercial or residential purposes increased by 31% from 1982 to 1997. It is projected that with current trends, 323,000 acres within the watershed will be converted from rural to exurban by 2020.[6]

In most watersheds across the nation, an activist citizens' group stands as a key watchdog overseeing activities that impact the river. In New England, the *Connecticut River Conservancy* stands as one of the major advocacy groups. They make clear that they are very vigilant when it comes to monitoring increasing population growth and potential development in stating: "…CRC is constantly reviewing all types of permits, licenses, and development proposals for industries, businesses, cities and governments, large and small. Sources of negative impacts on rivers and community water don't always occur at the water's edge. They are often subtle, cumulative results of developments, large and small, built on ill-advised floodplain plots or sited haphazardly in upland settings that erode habitat and water quality in the drainages below. We maintain a wide vantage looking for things that can cause our resources harm. This work is often detailed, technical, and arcane, but it makes a difference."[7]

THE CAPE FEAR RIVER BASIN

Much farther south from New England, the Cape Fear River Basin includes another major river system that vividly presents the realities and challenges of the 21st century. Essentially, the Cape Fear has a huge problem that has been building for decades and is definitely not going to disappear any time in the near future. The basin covers more than 9,000 square miles in North Carolina; 35 percent of its streams are threatened, and 18 percent are impaired by pollutants caused by land use.[8]

With about 27 percent of the state's population and dozens of municipalities situated within its boundaries – including Greensboro, Burlington, Chapel Hill, Sanford, Fayetteville, Dunn, Clinton, Warsaw, Burgaw, and Wilmington – the **Cape Fear River Basin** is one of the most industrialized regions in North Carolina.[9]

According to the Cape Fear River Watch, "There are more factory farms in the Cape Fear River Basin than any other place on planet Earth." They base that shocking statement on the fact that the area is home to scores of Concentrated Animal Feeding Operations (CAFOs) – also known as factory farms – where over 5 million hogs, over 16 million turkeys, and 300 million chickens are produced annually. The citizen-led oversight group states, "The pollution discharge from both swine and poultry CAFOs is enormous. These discharges contain nutrients, such as nitrogen and phosphorus, heavy metals such as copper, toxic gases including methane, hydrogen-sulfide and ammonia and deadly bacteria and viruses such as MRSA and salmonella."[10]

These feeding operations are not stand-alone contaminators. The Cape Fear River Basin also falls victim to activities from growing urban centers and timber harvesting and a newly emerging potential cause for alarm—the possible contamination of drinking water by a Chemours facility near Fayetteville. In an article focusing on the health of the Cape Fear River Basin in April 2017, Sciencing.org stated: "These varied land uses contribute to the pollution problems within the basin. Each source alone might not have much of an effect. But the combined effects of all the region's land uses results in extensive loss of quality habitat…The resulting pollution is responsible for cloudy silt-laden waters, population explosions of algae, dangerously low oxygen levels, less diversity of wildlife and fish kill."[11]

Located in a state that ranks among the fastest-growing in the country, the potential for any quick turnaround for the Cape Fear River Basin's problems seems quite dubious. Indeed, rising population levels across America that will drive demand for more timber, more hogs, and more turkeys and chickens will potentially only exacerbate this watershed's present problems.

MISSISSIPPI RIVER

It was well into the 19th century when changing patterns in U.S. population growth pushed millions of people further inland to settle in middle America along the Mississippi River. The Mississippi stands as the second longest river in the U.S. It has a watershed of 1.2 million square miles that includes all or part of 31 states and 2 Canadian provinces and a flood plain that is home to a huge, diverse number of fish, birds, mammals and amphibians.[12]

The Nature Conservancy describes this huge ecosystem that serves America's heartland by stating, "The river plays a vital role in the well-being of human communities who depend on it for water, food, jobs and recreation. It provides drinking water to 18 million people, links agricultural producers to markets around the world and provides hunters, anglers, boaters and other outdoor enthusiasts with exceptional recreational opportunities." Concurrently, the Conservancy highlights the threats to the river by noting, "The Mississippi has been extensively modified during the last century by locks, dams and levees. In most places, the river no longer inundates its floodplains during high water periods, contributing to a decline in the abundance and diversity of plant and animal life. With fewer flooded wetlands to filter the river's flows, increased run-off of excess nutrients and sediment has reduced water quality."[13]

The saga of the Mississippi can be told in thousands of stories emitting from the communities that line this large river. And while the population of the Mississippi River Basin is growing at what might be considered a moderate rate, it is in adding up these stories that we gain a glimpse of what's to come. In a 2013 article in Minnesota's *Star Tribune*, titled "Minnesota's Threatened Rivers," Josephine Marcotty presented a well-researched take on the many challenges presented by agriculture interests and the loss of local forests but also focused on a local rise in population levels that will translate into even more problems in the future. She wrote:

The population around Minnesota's lake country is growing rapidly, and is expected to accelerate as baby boomers retire. The population of Crow Wing County has risen 15 percent since 2000—faster than the state as a whole—and is projected to grow another 13 percent in the next two decades. And that doesn't include the seasonal vacationers who clog the roads every summer weekend, driving the expansion of Highway 371.

'This is just a darn nice place to live', said Rod Osterloh, who's been working as a real estate agent in the Brainerd area for 30 years. 'There's high-quality water, fishing, hunting, lots of recreation and proximity to the Twin Cities.' As a result, he added, 'There's traffic all the time.'

At the same time, grandparents are dividing their lake home properties to help pay taxes or hand them down to their kids and grandkids, said Jeff Forester, executive director of the Minnesota Lakes & Rivers Advocates. 'It's the largest intergenerational transfer of forested land in history,' he said, 'And you can't put it back together.' Taken together, these trends mean more roofs, lawns, docks, driveways and boats—all of which can drive water pollution."[14]

A common thread that runs through almost every story about protecting our nation's rivers includes the core needs to limit agricultural runoff, fight industrial pollution, protect habitats and the ever-growing impacts of both human respect for—and disrespect for—our rivers. There is hardly a community in America that is touched by a river, lake or bay that does not annually rally its citizens to join in a "clean-up" project.

Along the many miles of the Mississippi, Chad Pregracke has been labeled a "CNN hero" for leading the year-round fight to collect millions of pounds of debris, from tires to trash bags. Confronted with the fact that more than 50 U.S. cities look to the Mississippi for their drinking water, Pregracke started

fighting the pollution war alone but soon expanded to build the non-profit *Living Lands and Waters* organization. He is credited with creating "building the only "industrial strength" not-for-profit river cleanup operation like it in the world."

Through hard work and an intense commitment to the future of America's rivers, he has brought together a strong, united team of over 100,000 volunteers. With five barges, three towboats, a crane, excavator, six workboats and coordinating up to 25 work vessels, mainly in the area surrounding the Mississippi, Chad's operation has removed more than 10 million pounds of garbage from rivers.[15]

The stories of the Connecticut, Cape Fear and Mississippi offer only a glimpse of three key water systems. Yet, they underscore how fragile our rivers have become as well as the monumental – and costly – task of keeping them healthy as they are beset upon by many factors linked directly to population growth. It should be noted here that each year, American Rivers issues its list of America's Most Endangered Rivers, a report of "rivers at a crossroads." They list rivers where key decisions in the coming months will determine the rivers' fates. "Rivers are chosen for the list based on the following criteria: 1) The magnitude of the threat, 2) The significance of the river to people and nature, 3) A critical decision-point in the coming year." The rivers that made the list in 2018 include: Big Sunflower River (MS) threatened by Army Corp of Engineer draining critical wetlands; Rivers of Bristol Bay (AK) threats to the salmon industry by world's biggest open pit mine; Boundary Waters (MN) threatened by mining that would pollute pristine waters; Lower Rio Grande River (TX) threatened by potential border wall; South Fork of the Salmon River (ID) threatened by mining; Mississippi River Gorge (MN) threatened by obsolete locks and dams; and the Colville River (AK) threatened by oil and gas development that imperils clean water and habitat for polar bears, wolves and caribou.[16]

THE CHESAPEAKE BAY AND SAN FRANCISCO BAY

Two of our nation's largest estuaries share a multitude of similar problems, most triggered by the fact that their ecosystems are being overrun by population growth.

Chesapeake Bay: Few Americans look at the Chesapeake Bay on a map and grasp the extensive reach that spreads into six states. This is the largest estuary in the U.S. with a watershed that covers 64,000 square miles scattered over MD, VA, NY, PA, WV and DC. This same watershed area is currently home to more than 18 million people and continues to count many fast-growing counties. Perhaps more important, it is also home to an estimated 3,000 species of plants and animals.

The five largest rivers that flow into the bay are the Susquehanna, Potomac, Rappahannock, York and James. In all, more than 100,000 streams, creeks and rivers serve as pipelines that feed the bay its water.

The fight for the future of the Chesapeake is led by one of the most vocal and effective non-profit groups in America, the Chesapeake Bay Foundation (CBF), which has 250,000 members who are very vocal and active. CBF has been using its clout for decades to spur EPA activism in protecting its vulnerable waters and working with surrounding states to make sure they are all on target via cooperative planning and providing critical state funds to meet the goal of a clean, healthy, and viable bay.

However, meeting that goal has been a long, arduous and very costly struggle. That effort is compounded by the fact that the leaders in at least four of the states – MD, VA, DC and PA – often fail to deliver on many of the major changes necessary to bring forth environmental progress.

Writing an opinion piece on the Chesapeake in *The Washington Post* in May 2018, Tom Pelton, Director of the Environmental Integrity Project, succinctly summed up the problems by stating: "State officials in Maryland and Virginia have boasted about how much progress their states have made in reducing pollution in the bay. But we've repeatedly tried the state-led approach in cleaning up the Chesapeake Bay, and it repeatedly failed. So, let's not go there again… Three state-led bay cleanup agreements, signed by governors in 1983, 1987 and 2000, produced some ups and downs for the bay, but no overall improvement in the estuary's health between 1986 and 2010, according to water-quality monitoring analyzed by the University of Maryland Center for Environmental Health. The bay's health rating was an anemic 48 out of 100 in 1986 and 47 in 2010…

…With billions spent and the best scientific minds at work, why was there no real progress? Because the state cleanup agreements were built on lofty language but contained none of the regulations — the teeth — that would have been needed to achieve bay restoration goals. For example, even though all the states pledged to reduce farm runoff pollution, not one took the basic step of requiring farmers to fence their cattle out of streams because this would have been unpopular with the farm lobby, which holds a political hammerlock on state government...After these state-led cleanup agreements failed, the Obama administration switched gears in 2010. President Barack Obama's EPA imposed a new federally led system of numeric pollution limits for each of the bay region states, and for the first time threatened financial penalties for states that did not meet their goals. The new system worked. With federal oversight over the bay, indicators of bay health surged upward between 2011 and 2017, with improved water clarity, fewer algal blooms, and a flourishing of grasses to the greatest extent since monitoring began in the 1980s."[17]

That is definitely positive news for the oysters, crabs, wildlife, wetlands, forests and humans that count on a healthy Chesapeake. Yet can it continue?

Environmentalists greatly fear that under the Trump administration, the EPA will scale back its commitment to and funding for a clean bay. In addition, there are powerful political forces at work in the area's state capitals, especially Richmond, Annapolis and Harrisburg. Lobbyists for major entities that are consistently called on to carry much of the burden of the bay cleanup—such as energy companies, farmers, chicken producers, developers, etc. don't hesitate to use their clout to fight legislation or go to court to spurn enforcement of EPA rules. Up against these well-financed groups, those working for more "smart growth" policies have a serious uphill fight.

San Francisco Bay: Unlike its counterpart in the east, San Francisco Bay and its watershed is confined to just one state. The non-profit Bay Institute is one of the larger area organizations that fights for the future of San Francisco Bay and they make clear the formidable challenge they face in describing the area. They note: "The greater Bay ecosystem covers nearly 40% of California's land area. It encompasses the inland delta of the Sacramento and San Joaquin Rivers and the Central Valley streams, the Suisun Marsh, the San Francisco Bay itself, and the coastal waters of the Gulf of the Farallones. Nearly half of the surface water in California starts as rain or snow that falls in this area, and on average over half of that water is diverted for use on farms, in homes, and in factories. The remaining water flows downstream through the largest inland delta, the largest blackwater marsh, and the largest estuary on the American west coast."[18]

Without question, the San Francisco Bay is a diverse ecosystem that supports countless plants, fish, wildlife and other creatures. Many Americans are perhaps most familiar with the endangered Delta Smelts, the fate of which usually pops into the headlines when California is facing its ever-recurring droughts when huge arguments—and court cases—take center stage regarding balancing the future of this fish with plans to better control the dispersal of fresh water in the area.

Another major organization that works hard to shape a positive future for this region – now home to nearly 10 million people – is the Water Education Foundation that offers an overview of the area's history, highlighting the fact that, "Since the 1850s, roughly 40 percent of San Francisco Bay has been filled in and more than 80 percent of the original tidal wetlands converted to other uses." The Foundation enumerates past and present challenges to the bay as: urban and industrial pollution; agricultural runoff from the Central Valley; freshwater diversions from the Delta; man-made changes to natural waterways and shorelines; loss of habitat, particularly wetlands; introduction of non-native species such as the Asian clam; and intensified land use and development.[19]

As both the Chesapeake and San Francisco Bays become more rapidly urbanized, efforts to protect and improve the health of both of these invaluable estuaries are being led by a large number of federal, state and local governments – with the U.S. Environmental Protection Agency at the forefront. The good news is that federal and state efforts to preserve both of these major estuaries are complemented by politically powerful private environmental organizations that educate area citizens regarding the individual role they can play to foster a more positive, all-around sustainable environment that will serve nature and humanity well into the future.

THE GREAT LAKES

The five Great Lakes of North America – Superior, Huron, Michigan, Erie and Ontario – have the distinction of being the world's largest freshwater ecosystem. It's drainage basin includes parts of eight U.S. states and two Canadian provinces. In total, the lakes cover an area of about 94,000 square miles and have a watershed that extends over 201,000 square miles. They contain over 5,500 cubic miles of freshwater – 18% of the world's available supply. The need to do all things possible to protect their health, must stand as a premier national goal.[20]

As with both the Chesapeake and San Francisco Bays, the fate of the Great Lakes will be shaped by present and future decision-making by a consortium of federal, state and local governments, national and local non-profit organizations, key business and agricultural groups, and others.

One of the greatest threats to the Great Lakes is the agricultural runoff from large farms which feeds the growth of algae blooms. Lake Erie is hardest hit by this problem. The Alliance for the Great Lakes makes clear that, "Lake Erie algae blooms are an annual threat to the health and drinking water of more than 11 million people. This is unacceptable." The blooms make water toxic to fish, wildlife and people and the Alliance is one of many major groups working hard to eliminate them. They note, "Unfortunately, very few rules are in place to limit runoff pollution from big farms."[21] The issue made national headlines in 2014 after algae growth created a short-term water crisis in the city of Toldeo, Ohio which borders the lake. In an article addressing the rush to tackle the algae problem, a 2018 article in *The Wall Street Journal* stated, "Stopping the blooms is taking on more urgency. In March, the Environmental Protection Agency announced a plan to meet a goal of cutting phosphorus entering Lake Erie by 40% through voluntary efforts by 2025." While farmers don't hesitate to use their political clout regarding this issue, they do seem to be on board to working to eventually fix it. The *Journal* quoted Joe Cornely, a spokesman for the Ohio Farm Bureau Federation, as saying: "We recognize that more needs to be done. Our approach is, as soon as we figure out something that we know is going to work, let's take that step."[22]

The good news for the Great Lakes is that despite their widespread geographical reach there is a strong bi-partisan unity among the U.S. Senators and Members of the House of Representatives who work hard to speak with one voice. Operating under the umbrella of the non-profit Northeast-Midwest Institute, the Senate and House Great Lakes Task

Force works to guide federal policy-making in relation to the lakes. With major concerns in the first year of the Trump administration that funds for key Environmental Protection Agency programs were going to be substantially cut back, the Task Force stood united in pushing for a continuation of the annual $300 million provided to the Great Lakes Restoration Initiative in recent years.

The critical need to keep investing large amounts of federal funds in protecting the Great Lakes was underscored by Cameron Davis, the former Federal Interdependent Great Lakes Restoration Coordinator who oversaw the work of 11 federal departments dealing with Great Lakes issues. Davis recently told *Great Lakes Now:* "One thing that the Bush and Obama administrations both supported was strong interagency coordination. It reduces duplication of effort, leverages departments' authorities, and saves taxpayers money. All to help protect drinking water, cut toxic pollution and keep invasive species out, like Asian carp…For the Great Lakes to be restored and protected, it's not enough to have just a Great Lakes budget. The EPA has to be restored and protected."[23]

Due to their status as boundary lakes between two different countries, another major government entity that has a powerful say over the Great Lakes is The International Joint Commission which came into being in 1909. In particular, the Commission rules upon applications for approval of projects affecting boundary or transboundary waters and may regulate the operation of these projects; it assists the two countries in the protection of the transboundary environment, including the implementation of the Great Lakes Water Quality Agreement and the improvement of transboundary air quality; and it alerts the governments to emerging issues along the boundary that may give rise to bilateral disputes.

In his recent paper, *Freshwater Ecosystems and Human Populations: Great Lakes Case Study,* David Rankin, the Director of Programs for the Great Lakes Protection Fund, stated: "The integrity of a freshwater ecosystem such as the Great Lakes is dependent upon the condition of its physical, chemical and biological components. Human populations can have both direct and indirect impacts on these components through resource consumption; residential, commercial, agricultural and silvicultural development; and the production and disposal of waste products."[24]

In addressing the challenge to restore the Great Lakes Ecosystem Health, Rankin notes: "The overarching challenge facing the Great Lakes ecosystem is to create governance systems that support recovery…Government programs and private initiatives have slowed, and in some cases eliminated, near-field pollution. Government programs have successfully kept the fishery on life support. But these are reactions to threats, not actions to restore the ecosystem. Reactive government programs ossify. They are suited to 'rifle shot' responses to clear and temporary problems."[25] He goes on to make clear that "restoration governance" must guide policies in the future. Those policies should include restoring natural flows, halting biological pollution, and promoting clean development.

WESTERN WATER AND THE COLORADO RIVER

While the earlier pages of this paper addressed a few individual rivers and their myriad challenges related to agriculture, industry and other problems, it is important to note here that the Colorado River shares many of these difficulties. Yet the major story of the Colorado is not so much the environmental trials it must confront today but its short and long-term future that will very much be decided by population growth and politics.

In an extensive paper titled *Water and Population in the American West*, Professor Denise D. Fort of the New Mexico School of Law presented the realities of this issue as it pertains to one of the fastest-growing areas in the U.S. She notes: "The amount of water available for human use is determined by the hydrological cycle. While there is a relationship between population growth and stresses on water supplies, the relationship is not linear. Increased human populations typically result in reallocation of current resources rather than the development of new water sources. Water supplies in the American West are particularly limited and, with newcomers lured by bright skies and new economic centers, population growth in the region has outstripped the rest of the country in recent years." In her focus on population, Fort states: "The population of the West grew by 32% during the last twenty-five years, compared to 19% in the country as a whole."[26]

As a river that serves the water needs of more than 30 million people spread over seven states (California, Arizona, Nevada, Wyoming, Utah, Colorado and New Mexico), the Colorado River is very much under population stress. That stress is exacerbated by the fact that many of these states rank among the nation's fastest-growing. The use of the river's water is governed by the Colorado River Compact agreed to by those seven states in 1922. According to *Wikipedia*, "The Colorado River is managed and operated under numerous compacts, federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as 'The Law of the River.'"[27]

That "law" could be put to a real test very soon. In a May 2018 article, *Ecowatch* reported that "After years of unrelenting drought, federal forecasters reported there are better-than-even odds that the nation's largest reservoir will decline into shortage conditions by 2020, forcing Arizona, Nevada and Mexico to reduce their Colorado River water use." The article went on to note that if a 'federal shortage declaration' is issued regarding the water levels in Lake Mead that is fed by the Colorado, Arizona's annual allocation of Colorado River water would be cut by 11 percent and Nevada's by 4 percent.[28] Those are frightening words for those two states which have seen their populations grow by 14.96%

and 16.55% respectively from 2006 to 2016. Further drops could prompt cuts for other states. Such projections put even greater pressure on all the area states to implement drought contingency plans.

In early 2018, Colorado State University hosted the first ever *Water in the West Symposium* that brought together engineers, lawyers, farmers, ranchers, and government leaders to help expedite the opportunities for all of these groups to work together.

In reporting on that gathering, Environmental Incentives noted: "Though every state is facing their own unique crises, Colorado is a compelling study. Eighteen states and Mexico rely on water that falls in Colorado." It went on to report:

"The Colorado Water Conservation Board estimates we will need $20 billion in funding over the next 30 years to 1) bridge the widening gap in water supply and demand in the state, and 2) create a future that promotes sustainable growth while conserving our highly-valued natural resources…The next 30 years will also bring new challenges as demand from the urban population increases, outdated infrastructure deteriorates and must be modernized, and climate change exacerbates and increases stressors on the water system. Business as usual, simply, is not an option. If collaboration is the key – and certainly no one entity can do it alone – how do we create opportunities for many interested entities to work together? How can we leverage existing funding to provide real solutions to such a complex situation?"[29]

Clearly, the future of the Colorado River and other waters in our nation's western states depends on how quickly and deliberately the decision-makers in those states answer these two very important questions.

CONCLUSION

In March 2013, Tom Horton wrote an NPG Forum Paper that focused on the environmental threats of a potential 1.7 million more people in the next decade encroaching on the Chesapeake Bay. He especially highlighted the problem of getting a multitude of groups working together to bring forth improvements while ignoring future population growth – one of the greatest factors contributing to ever-threatening environmental degradation. He noted: "The blind spot is the American allegiance – some would say addiction – to perpetual economic growth, and to encouraging an ever-expanding population of human consumers to support it."[30]

In looking at our nation's rivers, estuaries and lakes today we see that we have made great progress from the early days when a portion of Ohio's Cuyahoga River went up in flames. That success can be attributed to many people over the past 50 years—including elected leaders who have passed laws and set long-overdue responsible environmental policies, aggressive and vocal environmentalists who continue to force positive change, and countless millions Americans who understand that each of them can and must play a personal role in making sure we leave our children and grandchildren a livable future—especially one where they can enjoy the rich bounties of all of America's waterways.

It is definitely a plus to be able to say that as a nation we are well on the way toward reversing the harm humans have inflicted on our waters, estuaries and bays. Yet making great progress toward that goal is simply not possible as long as the "growth at any cost" crowd that dominates political and corporate decision-making in America continues to yield too much power. Only if we make it our national aim to rein-in this group and replace their "full-speed ahead on population growth' dictates will we be safe.

Simply put: We must stop ignoring the fact that more people will bring more problems.

USA Today recently reported that when President Lyndon B. Johnson signed legislation 50 years ago that created the Wild and Scenic designation for rivers that met certain criteria, he stated: "An unspoiled river is a very rare thing in this nation today. Their flow and vitality have been harnessed by dams and too often they have been turned into open sewers by communities and by industries. It makes us all very fearful that all rivers will go this way unless somebody acts now to try to balance our river development."[31] Today, after five decades, 40 states are home to these designated rivers and they make up 12,000 miles of protected waters. That number represents only one-quarter of 1% of U.S. rivers. With the looming threat of tens of millions of additional people populating our nation in the near future, there is little question that we still have a long way to go to create a greater, more sustainable population balance between the American people and our nation's waters.

In all, it's crucial to remember that as population growth presents huge challenges to America's economic, social and environmental future, the health of our rivers, estuaries and lakes must continue to be a top national priority. A "sick" waterway can have huge negative repercussions on every state, city, community and farm it touches. And as long as our nation's leaders fail to realistically confront overpopulation head-on, we can only make minimum progress at best in the fight to restore our rivers to their greatness.

In her 2016 NPG Forum Paper *Overpopulation: The Ultimate Exploiter*, Dr. Karen I. Shragg stated: "Overpopulation diminishes our resources, landscapes, water supply, and the ability of our climate to regulate itself."[32] The reality is that America will never meet the goal of restoring our rivers, estuaries and lakes to their greatness unless we get our nation's leaders to realistically confront overpopulation head-on and bring forth common sense, problem-solving solutions that will slow, halt and reverse our nation's population growth.

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