We Are in a Drought, but Fields of Plastic are Not the Solution

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Marin County is in a drought. Individuals and public entities should be, and are, looking for ways to reduce water consumption. This has led several municipalities and school districts across the county to consider installing artificial turf as a way to reduce water consumption and water costs.

A large artificial turf field is being proposed for Pickleweed Park in San Rafael.¹ That project would convert about 210,000 square feet of natural grass into plastic turf. Mill Valley is also considering converting multiple fields ²into plastic. An additional artificial turf project under consideration³ is in Corte Madera Town Park. Several of these proposed artificial turf fields are located within feet of Bay tidal waterways and wildlife habitats.

Replacing fields of natural grass and soil with plastic, rubber and crushed rock comes with considerable ecological and climatological downsides. We are in a drought, no question, but we are also in an extreme heat emergency. As Governor Gavin Newsom pointed out last month in his *Extreme Heat Action Plan*, "Extreme heat driven by climate change endangers the lives and livelihoods of Californians in every corner of our state and threatens our vital natural systems." Adding non-natural surfaces to our community increases heat reflection into our atmosphere and creates a heat-island effect which is disruptive to the surrounding flora and fauna. Heat islands can have the effect of "Throwing off the timing of this cycle can have cascading effects on urban ecosystems that may be harmful to birds, butterflies and other wildlife in search of food and habitat. The study shows that urban parks can provide them "cool island" refuges, with natural conditions to which they are better accustomed."⁴

Governor Newsom's plan emphasizes "nature-based solutions" over synthetic ones: "Nature-based solutions deliver multiple benefits, including addressing extreme heat by cooling communities... and regulating temperature of...surfaces during extreme heat events. This track includes actions to promote nature-based solutions to reduce extreme heat risks."⁵

How much heat does a synthetic turf field add to the atmosphere? Studies have shown that the surface temperature of artificial turf runs between 35 to 60 degrees hotter than natural grass on full-sun days.^{6,7} One study conducted at Brigham Young University found that "The surface temperature of the synthetic turf was 37° F higher than asphalt and 86.5° F hotter than natural turf."⁸ Penn State University's Center for Sports Surface Research conducted studies comparing surface temperatures of synthetic turfs composed of various fiber and infill colors/materials and found that the maximum surface temperatures during hot, sunny conditions averaged from 140° F to 170° F.⁹

In the 2002 study at Brigham Young University, temperatures were recorded for the BYU practice fields in June. Average air temperature was 81.42°F. Surface area temperatures were taken between 7 a.m. and 7 p.m. The average surface temperature of the artificial turf fields was over 117° with a high of 157°. The natural turf, in contrast, had an average surface temperature of 78.19° and a high of 88.5°.¹⁰

The artificial turf industry's primary answer to cooling fields is to spray them with water which diminishes the water-saving argument.¹¹ Even Marin Water's own guidance_highlights the issues and lack of water savings.¹² Even if artificial turf does save some water, it is a terrible trade-off with a net-negative impact to the environment. Artificial turf increases the risk of MRSA¹³ and Staph infections in users of the product. This can only be combated with frequent cleaning with water and anti-biotic and antifungal chemicals which leach into the groundwater, into the waterway, and leads to another problem for insects, wildlife and the local environment.

It is also important to point out that installing an artificial surface bakes the underlying native soil to a point where it creates an ecological dead-zone beneath the plastic, rubber and rock. Unlike grass and soil, plastic does not sequester carbon. This further increases global warming and destroys the habitat for microorganisms, insects and wildlife up and down the food chain.

The impact of winter weather extremes will also be exacerbated by synthetic fields. These nonnatural fields greatly reduce the ability for a flood zone to hold and then slowly infiltrate stormwater. This increases stormwater runoff and can cause flooding, toxic runoff and sewage overflow in adjacent habitat areas.¹⁴ Many of these proposed synthetic fields in Marin County are located in natural flood zones. There is also a chemical concern associated with artificial turf. Synthetic turf blades, backing, shock pads and even plant-based infill have shown a 100% positive test rate for total fluorine, the gold standard for testing products for the presence of PFAS, a family of 12,039 "forever" chemicals (US EPA). These chemicals leach into soil, waterways and oceans. They cross human placentas, enter human breast milk, bioaccumulate in humans, wild and aquatic life.¹⁵ PFAS in synthetic turf is in the California Department of Toxic Substance Control (DTSC) current work plan. If these artificial turf fields are installed directly adjacent to Bay watersheds, the impact to fish, shellfish, ducks, egrets, otters, herons, other animals and humans that inhabit the immediate area, and the downstream waterways, could be severe.

Artificial turf blades also break down in extreme heat and UV light over time. Combined with frequent use and agitation, this creates micro-plastic particles that make their way into the waterways and subsequently into the bay ecosystem. "The plastic blades in the carpets begin to degrade the moment they are laid. The grinding action during play, UV radiation and environmental exposure causing breakdown, forming microplastics. Each field loses 0.5 to 8.0% of its blades annually, contributing 200 to 3200 pounds of plastic waste to our environment."¹⁶

A 2006 Chinese study states, "Marine microplastics will affect many aspects of the marine fish and marine food chain. The microplastics can have a toxic effect on fish and other aquatic life, including reducing food intake, delaying growth, causing oxidative damage and abnormal behavior. In addition, nano-scale microplastics will penetrate the biological barrier and accumulate in tissues...and may further affect life at the molecular level."¹⁷

Lastly, artificial turf fields need to be replaced roughly every 8 years.¹⁸ Each square foot of artificial turf is roughly 1/2 pound of plastic. The average sized artificial turf field is about 80,000 square feet. That is 40,000 lbs. of plastic going to landfill every 8 years for each field.¹⁹ That is equivalent to adding over 760,000 plastic bottles to landfill each year for each artificial turf field.²⁰ At a time where we are trying to teach our kids that we need to prioritize environmental health over convenience, our school districts and local municipalities should not be supporting artificial turf fields.

It is reasonable for the school districts, towns and cities to be pursuing solutions that limit water use and extend playing seasons for their athletic fields. The appropriate solution, however, does not lie in covering more of our community in plastic. Rather, we should be pursuing natural, heat & drought resistant grass²¹ over soil and sand bases with proper drainage. San Anselmo recently rejected artificial turf as a solution for their renovation of Memorial Park. We hope other municipalities and school districts within Marin County will follow their lead and find a sustainable, nature-based field solution that will help protect the local wildlife, the community and the planet.

¹ https://www.marinij.com/2022/02/24/san-rafael-seeks-grant-for-pickleweed-park-upgrade/

² https://www.marinij.com/2021/12/05/mill-valley-considers-artificial-turf-for-sports-fields/

³ https://www.townofcortemadera.org/DocumentCenter/View/6829/2021-Town-of-Corte-Madera-Presentation-Council-11221

⁴ https://news.wisc.edu/spring-comes-sooner-to-urban-heat-islands-with-potential-consequences-for-wildlife/

⁵ https://www.gov.ca.gov/2022/04/28/california-releases-extreme-heat-action-plan-to-protect-communities-fromrising-temperatures/

⁶ https://ftw.usatoday.com/2015/08/its-so-hot-in-texas-turf-is-melting-cleats

⁷ https://www.nytimes.com/2007/08/13/nyregion/13citywide.html

⁸ https://www.nrpa.org/parks-recreation-magazine/2019/may/synthetic-sports-fields-and-the-heat-island-effect/

⁹ https://www.nrpa.org/parks-recreation-magazine/2019/may/synthetic-sports-fields-and-the-heat-island-effect/

¹⁰ https://aces.nmsu.edu/programs/turf/documents/brigham-young-study.pdf

¹¹ https://turffactorydirect.com/2020/05/29/how-to-keep-turf-cool/

¹² https://www.marinwater.org/sites/default/files/2021-11/LYL%20-%20Does_Artificial_Turf_Qualify%2011-9-20.pdf

¹³ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7222665/

¹⁴ http://www.pugetsoundstormwater.com/2021/04/new-study-shows-artifical-turf.html

¹⁵ https://pfas-1.itrcweb.org/7-human-and-ecological-health-effects-of-select-pfas/

¹⁶ https://aesm.assembly.ca.gov/sites/aesm.assembly.ca.gov/files/letter%20from%20public%20synthetic%20turf%2C %20microplastics%2C%20Dianne%20Woelke.pdf

¹⁷ https://iopscience.iop.org/article/10.1088/1755-1315/631/1/012006/pdf

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¹⁸ https:// https:// themotzgroup.com/resources/blogs/how-long-will-my-synthetic-turf-field-last-how-can-i-extend-its-life/

¹⁹ https://www.theatlantic.com/science/archive/2019/12/artificial-turf-fields-are-piling-no-recycling-fix/603874/

²⁰ https://www.wastecare.com/usefulinfo/PET-Plastic-Water-Soda-Bottles-Bale-Weights.htm

²¹ https://hydroseedingsocal.com/drought-tolerant-turf-options-california/