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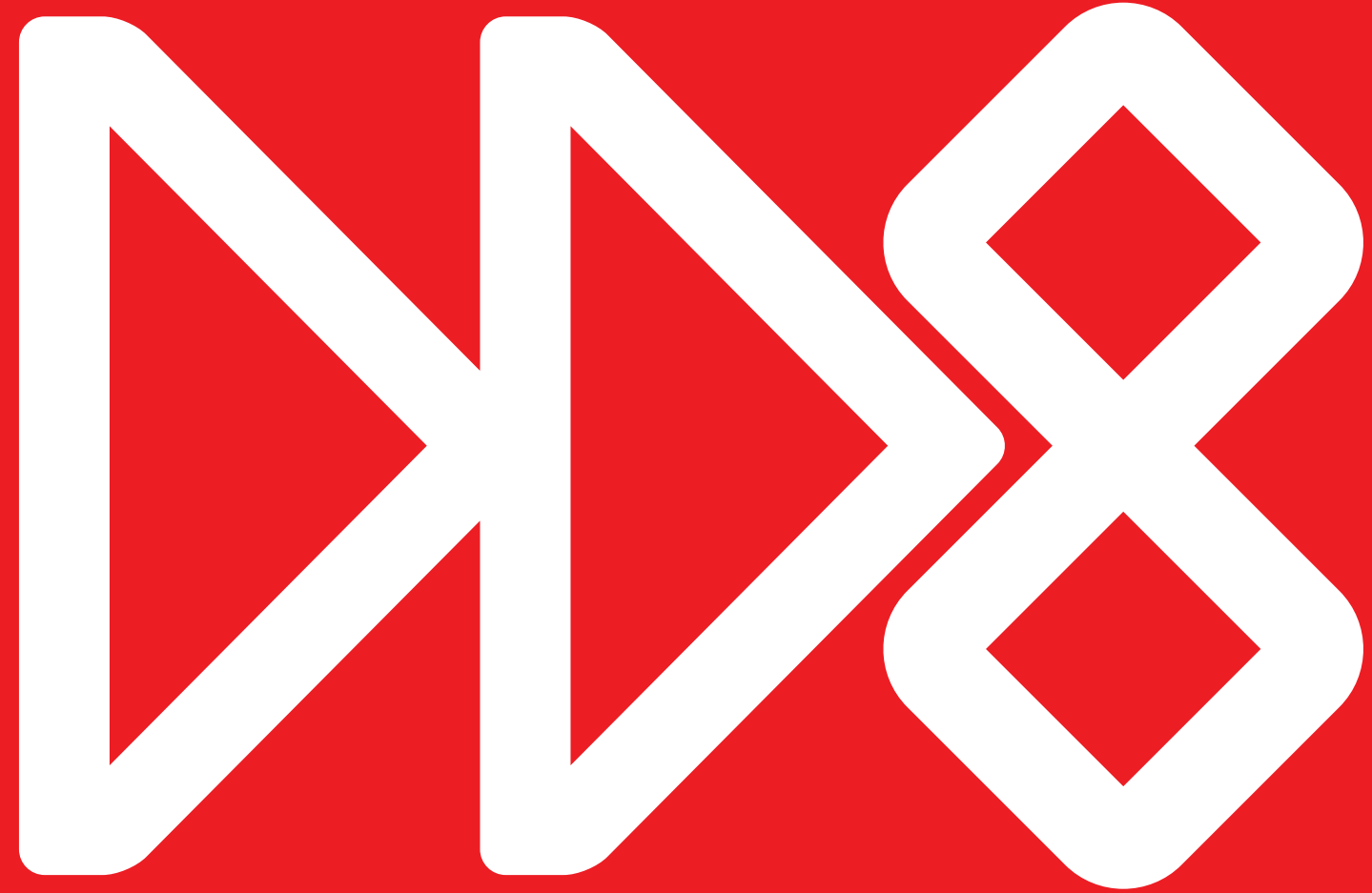
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THERE'S NO PLANET B

There are four main elements of life. They are earth, air, fire and water.

Throughout 2020 and now into 2021, our eco-consciousness has been heightened. Whether through a global health crisis, or a natural disaster — this past year we have never been more connected, apart.

As another year passes, we stop and reflect on the footprint we have left behind and what role we have played in this world.

From water usage, to wildfire, and air quality to soil health, we are watching the growing effects of our actions on our planet right before our eyes.

This quarter, we bring you *The Emerald Magazine's* EARTH issue. We dedicate each page to an element of life, and to heightening conscious consumption.

In *What Cannabis Teaches us About Water*, for example, we take an in-depth look at the water consumption needed to grow just one plant. We also examine the impact that “bad actors” have on the industry, and how some illegal growers not only pollute the land, but steal from waterways.

In *Earth on Fire*, we get a first hand look at the rippling effects of regional deforestation on the global climate. From the Amazon Rainforest to the redwoods of Northern California, wildfires are scorching communities, crops and businesses — leaving billions of dollars in damages in their wake. Above Cannabis, an industry-compliant brand in the Emerald Triangle, shares with *The Emerald Magazine* their experience battling the Mad River Fire Complex in 2018, and re-building as the threat of wildfire constantly looms.

And while water and fire are key to human existence, we'd only live mere minutes without air. In *Breathing Room*, writer Molly Cate takes us through simpler solutions to cleaning up our dirty air, from planting crops on rooftops to working with hempcrete to offset our carbon footprint. Through these small steps, we can walk together towards making a bigger difference.

The emerging cannabis market has the potential to be more conscious than others, and incorporate sustainable business practices at its inception. However, it can also turn into another wasteful industry. In *How Cannabis is Contributing to the Global Waste Crisis*, we examine the waste caused by cannabis product packaging, its environmental impact and what solutions we can work towards to combat the global plastics problem.

There is no Planet B. We must communally make the change we wish to see.

Sincerely,
Christina E. de Giovanni

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WHAT CANNABIS TEACHES US ABOUT WATER

“It is a crisis of managing water so badly that billions of people— and the environment—suffer badly.”

—World Water Council

WRITER | MELISSA HUTSELL

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AGRICULTURE IS THE biggest water user on the planet. More than 70% of the world’s freshwater supply is used to feed crops, according to the World Bank.

In the U.S., that number is closer to 80% or 90%—especially in Western states. That’s because California farmers grow a majority of the nation’s food. The state produces one-third of our vegetables, and two-thirds of the country’s fruit and nut supplies, according to the California Department of Food and Agriculture (CDFA).

A majority of the nation’s cannabis is also grown in the Golden State.

Drought is a major concern for all of the state’s farmers. But, cannabis cultivators often get a bad wrap when it comes to this precious resource.

A THIRSTY INDUSTRY, OR A SUSTAINABLE CROP?

That poor reputation is not entirely unwarranted.

For decades, some illegal growers polluted the land, and stole from local waterways. In the Emerald Triangle, an influx of these growers—colloquially known as bad actors—arrived in Northern California hillsides as part of the Green Rush.

While many of the region’s back-to-the-landers practiced sustainable values and a reverence for the land—the bad actors, “diverted water from the rivers to irrigate their crops,” reports the *New Yorker’s* Emily Witt. “They dumped pesticides into the watershed. They grew plants in national forests and state parks. They flattened mountaintops.”

But there are many legitimate growers with a history of practicing sustainable cultivation methods.

Legalization has brought forth extensive water regulations for the industry. The policies, which protect against diverting water or discharging waste, are said to be stricter than those placed on any other form of agriculture.

Ultimately, cannabis growers shouldn’t be the scapegoats for the state’s water crisis, writes Swami Chaitanya of Swami Select in *Marijuana Venture*.

In fact, many believe that focusing on the crop’s water consumption is misdirected.

For instance, the California Department of Fish and Wildlife (CDFW) suggests that one cannabis plant requires 6 gallons of water per day. Industry experts, however, find plants need 1-3 gallons per day in order to produce 1 pound of cured buds, depending on the climate it’s grown in.

That’s far lower than officials estimate. And far less water than other, large-scale crops, notes Chaitanya. “Each eighth [of cannabis] requires 1.875 gallons of water.” Whereas beef, he adds, “requires at least 1,500 gallons of water; Wine uses between 180-400 gallons per bottle; Almonds need [...] 100 gallons per can; broccoli takes about 5 gallons per head and avocados about 75 gallons per pound.”

HOW DOES CANNABIS USE WATER?

Like a fine cuppa coffee or a glass of wine, the water a product is made or grown with matters. Cannabis is no different.

“Water is one of the most important and overlooked parameters of a grow,” explains Dust, co-founder of Green House Seeds, and member of Strain Hunters, an international team of experts.

In most cases, “[water] will be one of the only vessels to transport the nutrients your plant needs to keep growing correctly its whole cycle,” he adds.

Water, by itself, will not define a good smoke or a good grow, says Dust. But, it is one of the most important aspects of cultivating good cannabis.

Unfortunately, most people do not realize how foundational having clean water is, he explains. No matter what medium you use—hydro, aero or soil, “the water will be in direct contact with one of the most sensitive parts of the plant; the root zone.”

Clean water helps safeguard plants against bacterial or fungicide problems. It also ensures that plants will not absorb unwanted chemicals, or heavy metals, Dust explains. That’s particularly important, considering many cannabis products are smoked, consumed, or absorbed by our bodies.

THROUGH THE LANDRACE LENS

Nearly 90% of the cannabis plant is made up of water, according to Royal Queen Seeds, a European breeding company. The plant uses it in a number of ways to live and grow.

According to *Maximum Yield*, Landrace strains have been selectively bred by humans adapted to their environments; and developed, “distinct genetic traits and characteristics unique to their respective homes.”

Altitude, temperature, latitude, and the amount of water in the climate plays a role in the development of these strains, says Dust.

For instance, higher humidity levels—i.e. the concentration of water in the air—usually favor a thinner bud structure with thinner leaflets.

Dust says that this is likely the plant’s natural response to fight against mold. Thinner buds and leaves, he explains, can help prevent water from getting stuck in the buds, and allows more airflow into the plant and its flowers.

Wet, or particularly humid environments can be optimal for the plant, explains Dust. “Having a significant amount of water in the environment would also usually mean having [lots of] biodiversity, and much more elements decomposing in the ground.”

“That’s perfect for the plant,” he says, because in dry, desert-like atmospheres, plants and animals have to struggle for survival.

“This would result in naturally having bigger plants in humid environments like the equator, against some shorter plants in dry conditions like in North Africa,” says Dust.

A CRISIS OF MANAGEMENT

Like the cannabis plant so vividly shows us, water matters—but, clean water matters most.

The world is currently facing a clean water crisis. Today, more than 1 billion people are living without access to clean water.

The issue is not about having too little water, reports the World Water Council. “It is a crisis of managing water so badly that billions of people—and the environment—suffer badly.”

One region where this is most apparent is the Middle East, where countries like Qatar and Israel are learning to squeeze more from every drop of water.

In 2013, Israel went from being one of the driest places on earth, to having a surplus of water, reports *Scientific American*, thanks to a national water conservation campaign, and a wave of desalination plants.

Desalination is the process of removing minerals and salts from substances—like water. In Israel, the Sorek Desalination Plant—one of the world’s largest desalination plants—pumps seawater from the Mediterranean, and transforms it into drinking water for more than 1.5 million people.

Israel’s desalination plants helped bring the country back from the brink of catastrophe. A decade ago, the country suffered one of its worst droughts.

During this time, “Israel’s largest source of freshwater, the Sea of Galilee, had dropped to within inches of the “black line” at which irreversible salt infiltration would flood the lake and ruin it forever,” according to *Scientific American*.

Now, the lake is starting to fill up, thanks to increased water supplies, which means farmers don’t have to pull as much from waterways. In fact, nearly 80% of Israel’s water now comes from these plants.

REUSE, REDUCE

The cannabis industry is also making efforts to be more water-wise. Some are more sustainable than others.

Rainwater catchment systems are among the most sustainable. Many outdoor growers in Northern California rely on rainwater, “which often naturally contains minerals at levels that can be beneficial to cannabis,” according to *MJBizDaily’s* special report, *Best Practices in Cannabis Cultivation*.

But indoor growers—especially in urban areas—have more hurdles when sourcing water.

“Straight-from-the-tap city water contains too many unknowns, including chlorine and other contaminants,” the report finds. They must rely on other methods to source clean water—like reverse osmosis filtration systems.

Hydroponic systems are among, “the most efficient and sustainable methods,” for indoor grows, according to *Cannabis and Tech Today*, which adds that these systems can, “reduce the need for pesticides and herbicides.”

Moreover, “hydroponically-grown plants grow faster and can reduce water consumption by up to 90% as opposed to traditional agricultural methods,” reports Powerhouse Hydroponics.

Using reclaimed, or grey water, is also a popular method used by indoor cannabis growers.

MedCare Farms, a craft cannabis co-operative headquartered in Riverside County, California, for example, uses recycled water to feed their plants.

That water is collected from condensation in A/C units, which is then put back into water tanks used to irrigate plants, explains Garin Heslop, founder of MedCare Farms. Other companies have slashed their water usage by more than half using similar methods.

Garden Remedies, a Massachusetts cannabis company, for example, also collects excess condensation from HVAC units, and re-routes the water back to plants, according to *Cannabis Business Times*. Roughly 85% of its water is recycled through this process.

A WATER-WISE NO BRAINER

Hemp is one commodity that’s reported to boost state-wide economies, and reduce water usage.

According to the University of Arizona’s Wet Project, which aims to promote responsible water usage, hemp garners more revenue per acre than crops like almonds, or alfalfa. In fact, some hemp farmers report making \$90,000 per acre for plants used for CBD oils. Alfalfa, on the other hand, earns approximately \$600 per acre, reports Water Deeply, a media project committed to covering the water crisis in America.

But, money isn’t the only incentive for farmers to grow hemp. The plant is known to grow well in different types of temperatures and soils. It requires little pesticides or fertilizer, and doesn’t deplete soil.

Plus, it grows quickly, and delivers a high yield—up to four fruitful harvests per year. Those yields can be used for anything from food, to fuel, to bioplastics, and clothing.

Whether or not hemp requires less water per acre to grow than other crops is not exactly clear. Hemp farmers in Colorado, for instance, are finding the crop needs more water than previously thought.

For instance, Brian Campbell, Colorado resident, tells *MJBizDaily* that he compared the growth of two hemp plants: one with regular irrigation, and the other in drought conditions. “The irrigated plants yielded a healthy average of 1,100 pounds of seed per acre, with some acres producing more than 2,000 pounds [...]” Campbell reports. “The nonirrigated hemp plants yielded an average of just 400 pounds of seed per acre.”

Geoff Whaling, chairman of the National Hemp Association, tells Water Deeply that, generally speaking, hemp needs a lot of water for the first three weeks of its life. “But, once it kind of passes its early development stage,” he adds, “it becomes one of the most drought-tolerant crops on the planet.”

A commonly cited study from the Stockholm Environment Institute compared the ecological footprint and water usage of hemp, cotton, and polyester.

The study found that when it comes to textiles, “hemp had a lower impact in terms of water, energy and the ecological footprint,” which measure CO2 emissions.

That’s, in part, because hemp is typically grown in regions where it’s sufficiently watered by rainfall. Cotton, however, is grown in dry regions, like Egypt and India, where there isn’t enough rainfall. Too supplement, water is pulled from already stressed water systems.

Where hemp really shines is as a low-maintenance crop. Overall, it requires less land, and less chemicals to grow. The crop can also be sustained almost entirely by rainfall, too. If it replaces larger crops, it could free up a lot of precious resources.

If there is anything the world crisis has taught us is that in order to increase freshwater supplies, the agricultural industry desperately needs better management practices. Cannabis growers have shown us that this is very much possible.



(ABOVE: LEFT AND RIGHT) ABOVE FARMS CANNABIS CROP AFTER THE 2015 MAD RIVER COMPLEX FIRE. PHOTO BY CARLY VANDAL

EARTH ON FIRE

WRITER | CLAIRE COVINO

PHOTOGRAPHER | CARLY VANDAL

IT WASN'T TOO long ago that a gender reveal party ended in over 10,000 acres of wildfire in California. It is perhaps the most perfect analogy for what's happening around us: heedless human behavior causes earth to go up in flames.

The New York Times reports that regions from Australia to the Arctic are ablaze at unprecedented rates — and while the causes vary, it's become an undeniable fact that the hot and dry conditions created by climate change are welcoming these fires with open arms.

There are three variables at play: humankind, climate change and fire. The grim reality is that neither the fires nor climate change would be happening if it weren't for us meddling humans.

According to NASA, scientists say that the climate has been gradually warming for the last several decades due to increased greenhouse gas emissions in the atmosphere produced by human activity. Greenhouse gases are naturally occurring in our atmosphere; they trap heat from the sun close to earth, making our planet livable as compared to our extraterrestrial neighbors. Human industrial activity such as the burning of fossil fuels emits more greenhouse gases — primarily carbon dioxide (CO₂) — into the atmosphere, effectively warming the planet like they're supposed to. But it's getting a little too warm. And now, the earth is on fire.

THE AMAZON RAINFOREST IS A MAJOR PLAYER

The Amazon Rainforest plays a huge role when it comes to climate change. It holds about 25% of the atmosphere's carbon, making it the world's largest carbon sink, according to the journal *Nature*.

It's vast plant life absorbs CO₂ from the atmosphere and turns it into oxygen through photosynthesis, giving it the nickname "earth's lungs." That title can be a bit misleading, however, because scientists generally don't view the Amazon as a net oxygen contributor, according to Encyclopedia Britannica. Plants produce about the same amount of oxygen by photosynthesis as they consume through respiration, which is the process by which they produce energy to grow. Therefore, it is a common misconception that a world with no Amazon would make us short on oxygen.

What a world with no Amazon would do, however, is accelerate climate change — and quickly.

While the rainforest may not be a significant oxygen producer, it's carbon absorption function is critical to the balance of our atmosphere. The process of photosynthesis allows it to absorb a large amount of CO₂. Because of this, it plays a vital role in slowing the effects of climate change.

The rainforest is also responsible for a large part of the water cycle in North and South America, according to Carnegie Europe, an international think tank. This means the rainfall in these regions is essentially recycled water from the Amazon. Without it, the land would begin to die and the climate in those areas would become increasingly hot and dry.

Thus, it's clear that the rainforest is a key part of our global habitat.

Yet despite its significance, the Amazon is a major target for deforestation. It expands over two million miles, which is about the size of the U.S.

Greenpeace, an international environmental organization, reports that over 18% of the rainforest has already been lost to deforestation. Over the past few decades, land clearing in the Amazon has become commonplace.

As stated by NASA earth observatory, the most efficient way to clear out the terrain is through slash-and-burn techniques, an age-old land clearing practice. The trees are first cut down and then the entire swath of land is burned. The combustion of all that plant and animal life releases tons of CO₂ into the atmosphere and transforms the terrain into a dry wasteland.

Due to deforestation efforts, plant and animal species in the rainforest are going extinct at exponential rates, according to Greenpeace. This poses harrowing threats to the food chain as well as the integrity of our global habitat.

As the Amazon disappears, so does the livability of this rock we call home.

CALIFORNIA IS NO STRANGER TO WILDFIRE SEASON

On the other side of the equator, California is experiencing record high wildfire numbers, which are only expected to climb, reports *The New York Times*.

In 2020 alone, over four million acres have been scorched by wildfire in the state. Out of the 20 largest fires in California's history, 11 of them have happened in the past decade, with only three of them occurring before 2000, according to the California Department of Forestry and Fire Protection.

While the Golden State isn't a stranger to "wildfire season," global warming is making matters much worse.

More specifically, it's the decline of the Amazon that's contributing to the increasing wildfires in California. Because the water cycle of the rainforest is attributed to much of the state's rainfall levels and resulting land moisture, the destruction of the Amazon has a direct effect on California's drying climate, according to Carnegie Europe. As we lose large parts of the rainforest, its capability to mitigate California's climate conditions in the face of global warming are becoming increasingly diminished. As a result, California's weather is the perfect cocktail for a fiery future.

CUTTING THE POWER

Whereas the fires in the Amazon are caused intentionally, the fires in California are not. Fingers get pointed to a variety of causes, but it's almost always from some form of human activity — aside from the occasional dry lightning strike which is the only natural fire catalyst, according to the National Fire Protection Association.

Pacific Gas and Electric (PG&E), a California utility company, has taken the blame for a large portion of the state's wildfires in recent years due to sparks from power lines, reported *Business Insider*.

The company has since declared bankruptcy. In June 2020, PG&E pleaded guilty to over 80 counts of manslaughter in the Camp Fire case, reported *The New York Times*, which destroyed the town of Paradise, California in 2018. It's now known as the deadliest fire the state has ever seen.

As a new precautionary measure, PG&E has executed planned outages when the weather conditions are the most optimal for wildfires — a decision their customers aren't thrilled about, to say the least. Beyond the inconveniences posed by the outages, they also cause significant repercussions for businesses that rely on a steady power supply.

An October 2019 outage in Northern California's Emerald Triangle, the largest cannabis-producing region in the U.S., was a detriment for many growers and dispensaries in the area, reported the *Eureka Times-Standard*. Operations that rely on grid power were severely impacted. At the time, PG&E cut power to more than 2.3 million people in response to extreme weather conditions, according to UC Berkeley. As a result, businesses closed. Large amounts of crops perished. Employees could not be paid. Customer traffic plummeted. For some, that meant thousands of dollars of lost revenue.

But for now, cutting the power seems to be PG&E's only defense. Other precautions taken by the state, such as controlled burns to get rid of dry brush and building fire-proof infrastructure, are debated on their effectiveness, according to the International Association of Fire and Rescue Services (CTIF). For the time being, it seems they're just applying a band aid.

The changing climate makes it almost impossible for California not to burn. In conjunction with the natural climate and the high population density, Californians are one stray spark away from starting the next wildfire.

There is an invincibility complex to humankind that puts an interesting twist on the situation — we simply cannot and will not be told no — even when the planet threatens to burn us alive.

DEVASTATION IS VAST

The devastation caused by wildfires is diverse and vast. Loss endures with every fire.

Above Farms, a cannabis farm in Humboldt County, California, lost 75% of its crop to the Mad River Complex Fire in 2015, just one year after they were founded, they told us here at *Emerald*. They have since been able to get back on their feet, but the experience is still a defining one for the company. As with most California cultivators, fire precautions have become part of Above Farms' daily routine. They clear the brush in the surrounding forests often to lower the flammability of the area.

For a brand that is so closely connected to nature, witnessing the destruction of the land on top of their own loss as a business was staggering. "It's not for the faint of heart to be out there," said Carly Vandal, Director of Marketing at Above Farms.

What's more, they play by the rules. They farm their crop organically, use environmentally friendly packaging and employ sustainable practices in their supply chain. Their story is symbolic of the urgency, reality and tenacity of this crisis. Not even a rule-abiding, tree-hugging cannabis farm is spared from the effects of climate change. It goes to show that whether we like it or not, we're all in this together. The common thread between these disasters is that they're all catalyzed by humans, and the repercussions of every unsustainable action are going to be felt by all of us.

LEADERSHIP IS QUESTIONABLE

Leadership around the world has not exactly left room for climate change to let up. President Jair Bolsonaro of Brazil — a country which is home to 60% of the Amazon — denies that the rainforest is burning at all, *Reuters* reported.

President Bolsonaro blames the media for spreading a false narrative about the fires, despite his own government releasing data on the spike in conflagrations. He's also encouraged mining and agriculture to boost the nation's economy, even though those activities are cited by the *BBC* for causing the most deforestation, both legal and illegal.

The Prime Minister of Australia, Scott Morrison, downplayed climate change during his country's own wildfire crisis and even escaped to Hawaii while his constituents battled the fires, reported the *Associated Press*. He preached about working on the economy during this time, rather than discussing climate change.

In the U.S., President Trump has also infamously denied the climate crisis and stood behind unsustainable and detrimental practices like mining and fracking. But then again, perhaps it isn't surprising that global economies are being valued above the health of our planet.

This hyper-acquisitive mindset is the reason for all the climate chaos in the first place. The idea that more is more — a core part of Americanna — is a huge contributor to that looming carbon footprint. Since the industrial revolution, the mantra has been go go go, 24 7 365. But our greenhouse gas allowance is almost up.

As reported by the National Oceanic and Atmospheric Administration (NOAA), the rate of CO₂ in the atmosphere has steadily increased since the 1960s. Today, the levels stand as much as 24% higher than before.

We're existing in a state of limbo, inching closer and closer to our eventual demise by mass amounts of natural disasters caused by climate change.

This is humankind's rendition of Icarus, and we're flying very close to the sun.

AND THE BLAME GOES TO...

It seems to be our natural tendency as humans to look for a scapegoat when crises occur. In California, PG&E has taken on a lot of responsibility for the fires. In the Amazon, many fault President Bolsonaro. But scapegoating doesn't necessarily lead to resolution.

The public focus may turn into a "whodunnit", but it's important to take a look at the full picture. Dishing out blame isn't productive in fixing the climate crisis because it directs energy to the past. The real problem lies in the security of our future.

The climate crisis is woven into the inner workings of our everyday lives; it's a direct by-product of the way we power society. Reversing climate change is going to require a pretty substantial upheaval of the powers that be. Big business and international governments will likely be the most crucial to making real change. Because everything is so intertwined, it's not going to be a quick or easy fix.

But if we want to extinguish the fires for good, we'll have to accept that our daily lives will look a little different. Us humans are big on efficiency, convenience, speed... but a climatically sound planet is not. Consumption and environmentalism aren't exactly compatible.

Either way, if we don't stop, we will eventually see the day that it's either going to be us or Mother Nature (spoiler alert: she wins).

"Climate change will have detrimental effects to our environment and personal health if we don't make changes now," says Danielle Weisse, a recent graduate of Western Connecticut State's ecology program.

Those effects are already being felt. Weisse added. "Data collected on temperatures and our atmospheric layers show that climate change is making consequential changes to our planet."

So, we return to the three core variables: humankind, climate change and fire. It's inherently cyclical. Soon, we'll no longer be able to have one without the other.

The fires in the Amazon Rainforest are representative of the persistent damage we've inflicted on the planet. The fires in California are representative of the future we're in for as a result. Both are proof that humankind is at the core of this crisis.

At the current rate, our future is looking rather apocalyptic. Fires will continue to ravage the planet, and there likely will come a day our earth becomes uninhabitable if we don't make a change now.

Assuming everyone wants to avert the impending doomsday at all costs, it's time we put on our big girl panties and get to work.

HOW CANNABIS IS CONTRIBUTING TO THE GLOBAL WASTE CRISIS

WHAT EXPERTS SAY WE CAN DO ABOUT IT

WRITER | ASHLEY LADERER

PHOTOGRAPHER | ELENA BERD

THE INDUSTRY HAS a plastics problem.

If you've bought cannabis products lately (from a dispensary or delivery service...not your local weed guy) you've likely experienced just how much packaging material is involved in the process—lots of plastic wrapped in more plastic.

After you open your goods, are you recycling the packaging you tore through? Is it actually recyclable? Our guess is that a majority is not. The single use plastic packaging becomes simply that—single use.

It's immediately thrown in the trash, contributing to the global waste crisis.

PLASTIC'S IMPACT ON THE PLANET

In case you missed it, single use plastic is...bad. According to Plastic Oceans, a nonprofit organization that raises awareness about plastic pollution, 300 million tons of plastic are produced every year. Fifty percent of that is designed for single use purposes.

Not all of this plastic is recycled, nor is it recycled properly. Each year, more than 8 million tons of plastic are dumped into the ocean. If it doesn't end up in our seas, it ends up in an already overflowing landfill where it can take about 1,000 years to decompose.

Some states are taking action toward reducing plastic waste. Single-use plastic bag bans for large retailers are in effect in California. Cities like Washington D.C., Seattle, Miami Beach, and more communities across the nation have banned plastic straws.

Bags and straws are not the only things contributing to plastic pollution and overflowing landfills, though.

Packaging accounts for 40% of overall plastic use, according to Plastic Oceans. Why is There So Much Plastic Packaging in the Cannabis Industry?

Use of plastics is just as much of a problem in the cannabis industry as any other. After all, the products have to be packaged in something. But another industry using more and more plastic packaging, without eco-friendly regulations in place, isn't exactly great for our planet. The cannabis industry has a long way to go when it comes to sustainability.

There are a few factors that contribute to the industry's packaging problem. The first are state laws and regulations, which force brands to use more packaging than may actually be necessary for things like childproofing cannabis products.

For example, according to the Washington State Legislature, "If there is more than one serving of marijuana-infused solid edible products in the package, each serving must be packaged individually in child resistant packaging."

Another factor is premiumization, or using packaging to make the product look high quality. With so many brands available, and so little shelf space, companies must make their product stand out. Premium packaging is one way to achieve this, writes Alex Collins, co-founder of Sapling, an industry marketing and branding company, in *Medium*.

The third factor is price.

Using packaging made from recycled materials or bioplastics like hemp can be more expensive than use of run of the mill plastics, which are relatively cheap. To give you an idea, a traditional plastic pre-roll tube costs around \$.07-.10, whereas hemp bioplastic or reclaimed plastic tubes made by sustainable packaging company Sana Packaging costs \$.24-.30 each.

The cost is unattainable for many cannabis companies—most of which are already trying to stay afloat while struggling to pay taxes, licensing fees, and more.

More states are legalizing; more brands are emerging; and more dispensaries are opening. And more weed means more packaging. Easier, legal access to cannabis is great for so many reasons—but what about the environmental cost?

MAKING MOVES TO CHANGE THE INDUSTRY

Ron Basak Smith, CEO and co-founder of Sana Packaging, has lofty goals for changing the cannabis industry. His company currently offers a small selection of tubes and containers made from 100% reclaimed ocean plastic, or hemp plastic. Hemp plastics are 100% plant-based and chemical-free. Reclaimed products are made in partnership with Ocean Works, a leader in the sustainable plastics space.

Sana launched their hemp products—the cannabis industry's first 100% plant-based hemp plastic packaging solution—in July 2018. Their reclaimed plastic packaging system, also a first of its kind in the industry, launched in March 2019.

"[Co-founder, James Eichner] and I were shopping in dispensaries for several years before this, and we just thought, 'this is not right, the amount of plastic in the packaging,'" Basak-Smith recalls. "I'm trying to just get high over here and have a good time, and I feel shitty about it every time. It's just not alright, and we shouldn't have to feel that way."

The concept for Sana Packaging came about while Basak-Smith and Eichner were working on their MBAs in Sustainability, Entrepreneurship, and Finance from the University of Colorado, Boulder.

Both entrepreneurs recognized that they were being inundated with single use plastic, and this was not sustainable for the long term in the slightest bit. They pitched their business idea in a university course that culminated in a "Sustainable Shark Tank" and were met with acclaim.

"We ended up winning," Basak-Smith recalls. They decided to pursue the business full-time, and Sana Packaging has plowed forward ever since—but not without its challenges.

"I think our understanding of hemp is at a pretty rudimentary stage, especially for creating consumable goods out of it [...] and having a proper supply chain. That's really what we're working towards," he adds.

"We have continuous issues," he explains. "Because it's so new, we take things really slow with the hemp products. We're not trying to promise the world to anyone, but [we know] that the future is bright if we stay focused with it."

It's not cheap to manufacture hemp packaging or reclaimed plastic packaging. Even just creating the molds for these new products is expensive.

Basak-Smith says both their hemp and reclaimed plastic products are two or three times more expensive than traditional packaging options.

"We want more people doing sustainable packaging. We want to see it normalized in the industry. We're showing that there's a willingness [for cannabis brands] to pay sometimes two [or] three times more for packaging," Basak-Smith says.

When the company first launched, people told him he was crazy for thinking anyone would pay that much for packaging. Now, Sana Packaging is proving those people wrong.

"I believe in the ethos of the cannabis industry and I believe there are people out there that care more about the environment than the bottom line," he says.

It's not just these companies that are willing to pay more to be sustainable—it's consumers too.

A 2019 survey conducted by CGS—a business applications, outsourcing and learning company—found that more than two-thirds of respondents consider sustainability when shopping for new products; and 47% of them said they would pay more for them.

Basak-Smith remains modest, but hopeful about Sana Packaging's impact.

"At this point, we do not see anything that we're doing as a silver bullet," he admits.

"There's a ton of improvement that's needed, but we're starting on the path of saying 'Hey, these are the processes that need to be put in place to use 100% reclaimed material or to use hemp byproduct material from the industry, and this is how you can make packaging out of it.'"

The company's next goal is to create a way to make new packaging out of reclaimed cannabis packaging in a "closed loop" system so it won't end up in a landfill.

The brand is already working with customers in dispensaries in Colorado towards this.

RECYCLING NON-RECYCLABLES AND MAKING A DIFFERENCE ON YOUR OWN

Tom Szaky, expert on all things recycling and founder of Terracycle, a social enterprise that aims to "eliminate the idea of waste," is also working toward a solution to the industry's plastics problem.

"Cannabis comes in containers that are hard to recycle or [are] non-recyclable, so we work with [cannabis brand] Tweed to do national collection of cannabis packaging," Szaky explains.

Together, they collect these specific types of packaging and upcycle it.

There are two ways Canadian consumers can contribute to the program. "We'll pick up the packaging from you, or you can drop off at many dispensaries across the country...and that number is growing," says Szaky.

"[The collected waste] is sent to one of our warehouses in Canada where we then store it until we have enough volume, usually about 20,000 to 40,000 kilos," he continues. "Then at that point in time, we've come up with different processes for how we separate the packaging forms into the various materials they're made from."

From there, he adds, "we recycle those materials into new plastics, metals, and other things that can be made into new products."

Sounds a lot better to us than ending up in a landfill, or worse—the ocean!

Sadly, a program of this scale cannot exist on a national level in the U.S. Szaky explains that in Canada, "it's federally legal, so it's possible to do it there. We will launch in the U.S. as soon as it's federally possible."

Nationwide legalization could have positive environmental impacts, something many people don't realize, Szaky says. While Americans don't have a pick-up recycling program yet, we are still able to make positive changes at an individual level. Szaky has actionable advice for those who want to be more conscious, eco-friendly consumers: write your lawmakers.

"[...] Lawmakers should champion for [federal legalization], not for the sake of more access to pot, but to allow for the packaging to be sustainable," he says. Get in contact with the cannabis brands you buy from that have excessive packaging and let them know how you feel about it via social media or otherwise. Also, be aware that you can vote with your dollar by supporting brands who are running their businesses in a way that aligns with your values.

"Vote for those products that come in the most environmentally friendly package forms," Szaky urges. "That sends a message to the industry that consumers care. The big problem right now is that the message the consumer is sending is that they want the fanciest, coolest, non-recyclable package—and that's the wrong message to be voting for."

It can be hard to know what packaging is sustainable and what isn't just by looking at it. Do your research, or ask your eco-conscious friends which brands are their favorites.

Ask your budtender about affiliated recycling programs, or if they can steer you in the right direction. Some brands may have their own program, like Dosist, which specialize in "disposable" vape pens. You can return an empty Dosist pen to the dispensary you got it from, if they participate.

HOW CANNABIS BRANDS CAN BE MORE SUSTAINABLE

Other than simply reducing packaging, Szaky has advice for cannabis brands that walk the walk and talk the talk when it comes to being more sustainable.

Szaky says the best way to do that is to "call up a local recycling center and say, 'I have this packaging—is this something that you would be excited seeing in your recycling stream, or not?'"

"That's something that is very key to think about as you design," he notes, "do the garbage companies that have to deal with this even want it, and would they be able to deal with it?"

Szaky recommends businesses ensure their packaging is recyclable. If a brand must use traditional virgin materials, he urges them to use one of these three materials: Clear glass, rigid clear PET, or rigid light colored HDPE. "Tell people that they should recycle on the packaging. Then think about making it from those materials, but recycled content," he says. "That's the secret sauce."

What it all comes down to is how much we value our environment, and how much ingenuity we can have, says Basak-Smith of Sana Packaging. "There has to be this ethos in the cannabis space around nature, the environment and its importance in our lives. Hopefully the industry can continue to practice what they preach."

BREATHING ROOM

CLEANING UP OUR DIRTY AIR

WRITER | MOLLY CATE

PHOTOGRAPHER | JOSEF KUBES

A BODY CAN LIVE several weeks without food; days without water; but mere minutes without air. What are we doing to this essential foundation for life?

GLOBAL REALITIES

The World Health Organization (WHO) estimates that 7 million people worldwide are killed by air pollution every year. Moreover, 90% of children under the age of 15—that's 1.8 billion kids—"breathe the air that is so polluted it puts their health and development at serious risk," adds the organization.

We hear a lot about carbon dioxide (CO₂). For sure, this greenhouse gas is a crucial threat to climate stability. But, there's much more to air pollution around the world than CO₂.

To understand air quality worldwide, the WHO tracks both ambient (outdoor) and household (indoor) pollution.

Household pollution comes from burning wood, and coal for heating and cooking. Millions around the world burn coal or wood indoors every day. Ambient pollution, on the other hand, is produced from a wide range of mostly industrial sources. Those include: carbon monoxide, nitrogen dioxide, nitrogen oxide, ground-level ozone, sulfur dioxide, hydrocarbons, and lead.

All are toxic; and they aggregate into droplets around carbon and dirt to form particulate matter (PM).

The Center for Disease Control and Prevention (CDC) explains that this matter is sorted into coarse and fine PM.

Coarse PM are particles larger than 10 micrograms (PM₁₀), while fine particles (PM_{2.5}) range from 2.5 to 10 micrograms in size.

It's the fine ones that do the most damage because they are so small, they can easily be absorbed into lung tissue.

THE WORLD'S MOST TOXIC CITIES

In 2019, *CBS News* listed the 50 worst cities in the world for ambient air pollution, most from a mix of vehicular and industrial sources.

China topped the list with a whopping 29 cities. India comes second with 15, and the dubious honor of having the top seven most polluted.

Pollution from oil production earned Al-Ahmadi, Kuwait, and Yanbu, Saudi Arabia a spot on the list, too.

The rest are a smattering in Bangladesh, Pakistan, and Uganda. Cameroon makes the list, thanks, in part, to massive deforestation, and fire, which has led to changing weather patterns.

Then there's Mongolia, home of the most toxic city in the world—at least for half the year.

The World Air Quality Index lists PM_{2.5} concentrations around the capital, Ulaanbaatar, from "very unhealthy" to "hazardous," depending on the season.

NPR reports that Mongolia is gaining wealth by exploiting its vast mineral deposits of coal, copper, and gold.

These industries, plus emissions from vehicles and the city's coal-fired power plants, contribute to poor air quality year-round, earning the "very unhealthy" rating. The problem is exacerbated in the winter months.

Ulaanbaatar is the "coldest capital city on earth," according to *NPR*. "Temperatures can drop to minus 20 degrees Fahrenheit at night." As a result, most of the city's 1.4 million people burn raw coal, a major source of black carbon, for heat.

While no city in the U.S. made it onto the list of top 50 most polluted, the National Institutes of Health (NIH) reports that national totals are headed in the wrong direction.

Back in 1979, the *American Journal of Epidemiology* found, "no evidence for negative health effects from particulate matter levels in the U.S."

Less than 30 years later, however, the Environmental Protection Agency (EPA) reported, "inhalation of fine particles is causally associated with premature death at concentrations near those experienced by most Americans on a daily basis." And cities, wherever they are in the world, are heat sinks. That's, in part, because buildings and roads concentrate and reflect enormous amounts of heat back into the atmosphere.

WORKING TOWARDS SOLUTIONS

Some countries are more actively pursuing solutions than others, with hopeful results, according to the WHO.

In just two years, the Air Pollution Mitigation Program in India has lowered household pollution by providing free liquefied petroleum gas (LPG) connections to 37 million poor women, supporting the switch to clean household energy.

Authorities in Hangzhou, China started the country's very first public bike-sharing scheme in 2008 with the intention of reducing traffic congestion. The program proved popular, and as a result, drastically improved the city's air quality.

"Hangzhou is a great example of how cities can introduce initiatives like bike sharing, to encourage people to get out of their cars and reduce air pollution," says Rob de Jong, Head of the United Nations Environment's (UNEP) Air Quality and Mobility Unit.

In 2013, China introduced their Air Pollution Action Plan to reduce PM_{2.5} levels. As a result, Beijing has drastically curbed the use of coal, closing its coal-fired power stations, and banning the burning of coal for heat.

That same year, Beijing was ranked by the WHO as the "40th worst city for PM_{2.5}."

Just five years later in 2018, it "ranked 187th place."

Mongolia is also taking measures to improve air quality. In March, the government banned raw coal, and put an alternative product on the market made from semi-coke, a byproduct of coal. The fuel-efficient briquettes burn longer and are cleaner. But they are more expensive, and the largely poor residents are reluctant to switch.





THE ROOFING RAINBOW

Some cities, mainly in wealthier countries, are introducing architectural solutions that lead the way toward a greener, cooler and more esthetically-pleasing future.

Green roofs go back to the Hanging Gardens of Babylon, constructed around 500 BCE. Now, green roofs are growing in popularity.

Toronto, Canada is riding this wave. In 2009, the city passed the Green Roofs By-law, which offers incentives for conversion.

Organizations like Green Roofs for Healthy Cities are also helping to lead the green roof movement. The organization does so through its online publication, *Living Architecture Monitor*, and by hosting regional events, including the annual Gry to Green Conference, and the national, multi-day CitiesAlive Conference.

It's not just roofs—but green spaces—that are becoming more prevalent. Take the High Line in New York City, which opened in 2009, for instance.

The High Line is a public park built on an old elevated rail line in Manhattan's West Side. This, "hybrid public space" brings together, "nature, art, and design." Sustainable practices incorporate: native, drought-tolerant, and low-maintenance plants; composting all garden waste on-site; and using rainwater.

In the podcast, *99 Percent Invisible*, Kurt Kohlstedt sheds light on the topic of green architecture, and the differences between an architect's renderings, and the finished structures.

Many times, buildings aren't as sustainable as intended, he explains. "The energy needed to hoist plantings onto large buildings and structural supports needed for the weight of piping and water significantly offset sustainability gains."

For example, China's Nanjing Green Towers, which is set to be Asia's first "vertical forest project," will feature over 3,000 trees, shrubs and vines. It's projected to "absorb 25 tons of CO₂ per year," says Kohlstedt. "This sounds impressive in the abstract, but it amounts to the output of around a half-dozen typical cars [or six homes per year]."

But green is not the only sustainable color—even for roofs.

How about red? Locales around the world, such as Prague and cities in Sweden, Croatia, and Portugal have preferred picturesque red roofs to boost civic pride and tourism. Researchers at California's Lawrence Berkeley National Laboratory recently discovered that these roofs boost sustainable benefits, too.

In a 2016 article from the Berkeley Lab, titled, *We're Not in Kansas Anymore: Fluorescent Ruby Red Roofs Stay as Cool as White*, Julie Chao writes that the lab's scientists have, "determined that certain dark pigments can stay just as cool as white by using fluorescence."

More specifically, the researchers found that, when exposed to sunlight, surfaces with ruby red paint stay as cool as white materials.

Upon further study, scientists discovered certain fluorescing blues can stay just as cool, even when mixed with other colors, including green, and black.

The results have opened the door to a rainbow of colors for roofs, and any other object subjected to prolonged sun exposure, "including vehicles, ships, storage tanks, and PVC piping," the lab finds.

FARMING WITH NATURE

One of the most exciting developments in farming avoids breaking up the ground almost entirely. That's important because much carbon and lots of dust are released into the air from traditional farming methods. The Sustainable Conservation organization notes, "conventional farming techniques cause significant soil disturbance, effectively increasing dust pollution and diesel emissions [...], a major source of air pollution."

Conservation tillage farming is low-impact farming. With this method, farmers avoid deeply turning the soil, and plant new crops right on top of the old stubble, according to the University of California Davis Agricultural Sustainability Institute (ASI).

Any naturally occurring plot of land contains a rich bio-diverse culture of plants, fungi, worms, insects, and bacteria that sustains its own health. All or most of that sustainability is destroyed season by season through conventional tilling techniques. That's why farmers end up "addicted" to using chemical fertilizers and pest control products.

Conservation tillage retains the biodiversity and the natural ability of the soil to care for itself.

This leads to all kinds of air quality benefits. For starters, it keeps precious topsoil on the ground instead of flying off in the wind, and into our lungs (recall the Dust-bowl of the 1930s). Plus, farmers spend less time driving big machines across their fields. That means burning less fuel, and in turn, decreasing CO₂ and greenhouse gas emissions, according to ASI research.

CANNABIS CONSIDERATIONS

How does cannabis fit into all this? We've heard the horror stories of irresponsible growers trashing public land, siphoning precious water, and dumping toxic waste. Even legitimate growers confront the fact that large-scale agriculture has a lousy carbon footprint.

As hemp becomes a common crop again, growers could lead the way to cleaner air by using and promoting sustainable conservation tillage. Better soil, human health and reduced erosion; what's not to like?

Directly related to air pollution, Fundación CANNA—a non-profit in Spain that conducts scientific research—promotes the use of hemp seed oil to offset lung damage from particulate matter. They claim, "omega 3 fatty acids [...] significantly lowered inflammation in the lungs [...] before or during exposure to PM particles."

Recall that the smaller PM particles settle in lung tissue, causing both physical damage from sharp-edged grit, and chemical damage from toxic compounds. Both of these processes lead to inflammation, and difficulty breathing as the lungs try to protect tissue from these ravages.

As the Fundación CANNA puts it, cannabis can help protect against pollution on multiple levels. "If we look at the sustainable point of view the choice is evident. [Hemp is] a sustainable crop that enriches the soils, sequesters carbon, and provides high quality omega 3 [fatty acids]."

Hemp agriculture can also take the lead in promoting the philosophy of using the whole plant.

The plant can be grown for its fiber and stalks, or its flowers and seeds. Overall, the whole hemp plant has more than 25,000 uses, and counting.

Clothing made from hemp is more than a cultural fashion statement; it has its environmental advantages too. That's because hempware provides consumers an alternative to fast fashion, one of the most toxic industries on earth. It requires less land, water and chemicals to produce than common textiles like cotton, for example.

According to a 2018 report from *The Guardian*, "[...] textile production produced more greenhouse gases than all international flights and maritime shipping combined."

Yup, time to pull out your hemp wear, folks. And encourage your friends to buy some too.

Other innovative uses of the whole plant are on the upswing. Take hemperete, for example.

Concrete is the world's first choice in building materials, both for good and for ill. It's highly durable, and can be made just about anywhere. But, "the world is running out of sand—and there's a black market for it now," reports *Business Insider*.

American Lime Technologies has a potential fix for this problem by championing the use of hemp in their concrete mix. They mix the inner woody core of the hemp plant, "with a lime-based binder." They suggest it actually cleans the air by simultaneously pulling CO₂ from the air and emitting oxygen.

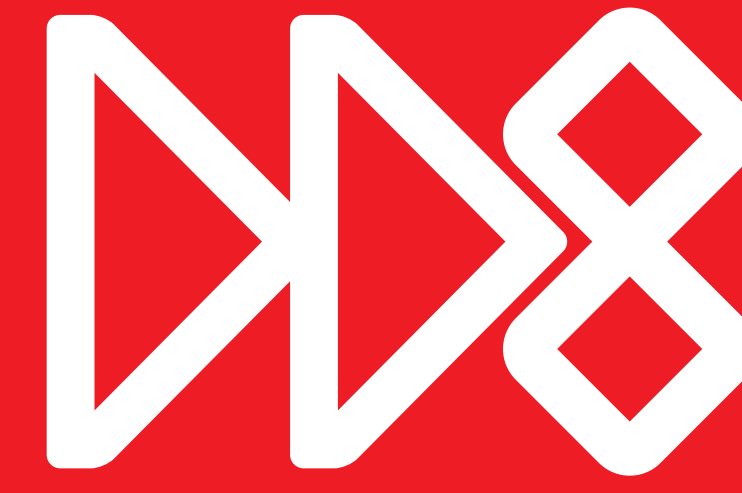
Hemp is currently being used to create solid, sustainable structures at lower costs than wood. One recent project from Cooperation Jackson, a community-based social change organization, is building homes as part of what the organization calls, "an eco-village full of hemp houses."

So, where do we go from here? People will always need fuel for cooking and heating. Right now, all around the earth, that means millions of people are sick and dying just trying to breathe.

Fixing such a big problem can seem overwhelming. Waiting on big governments to bail us out is not enough. Looks like everyone is needed. We can each find our own positive niche. Maybe you are excited about green roofs, or opting to bike instead of drive? Perhaps your business can make use of hemp-based products? Or, maybe you'll buy more hemp-based food or clothing options.

Certainly, cannabis users can remember their history of positive social change, and support ways that the beloved kind green can be part of the true green revolution.

What's yours to do?

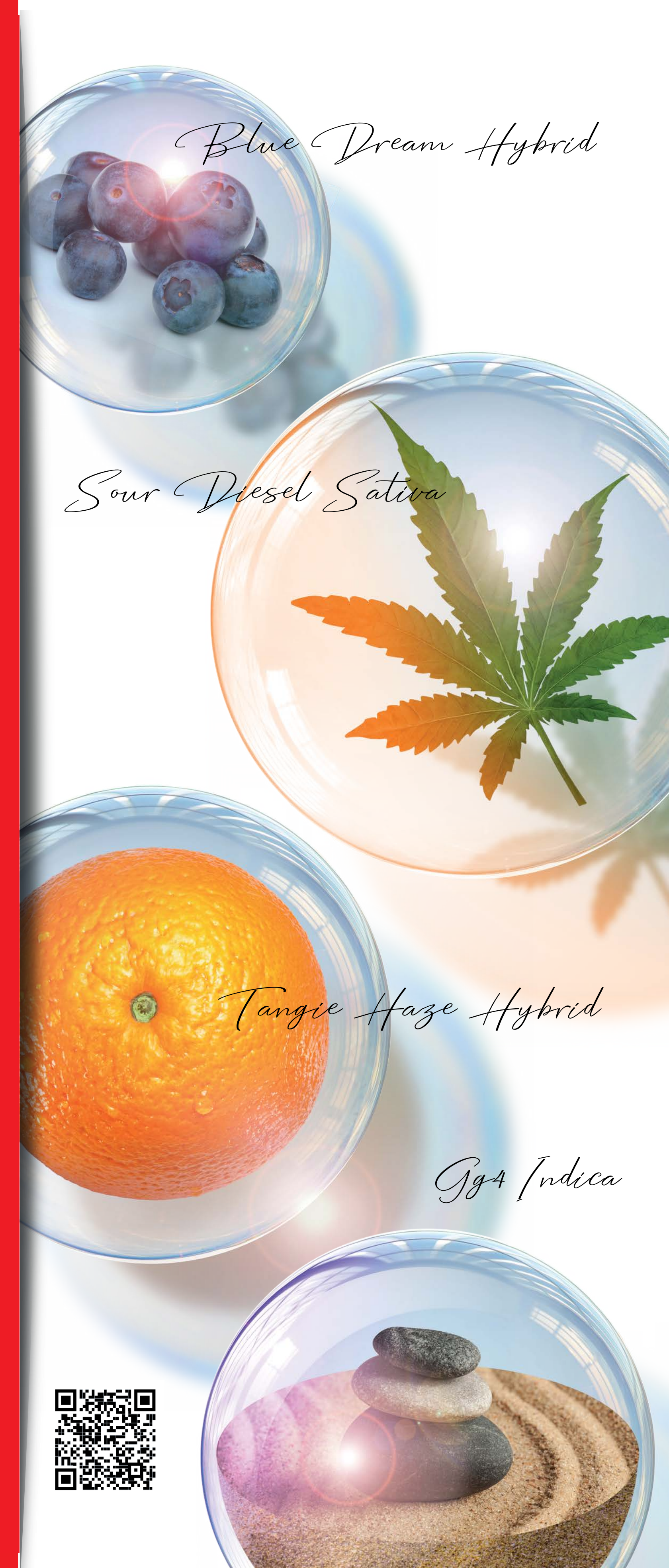


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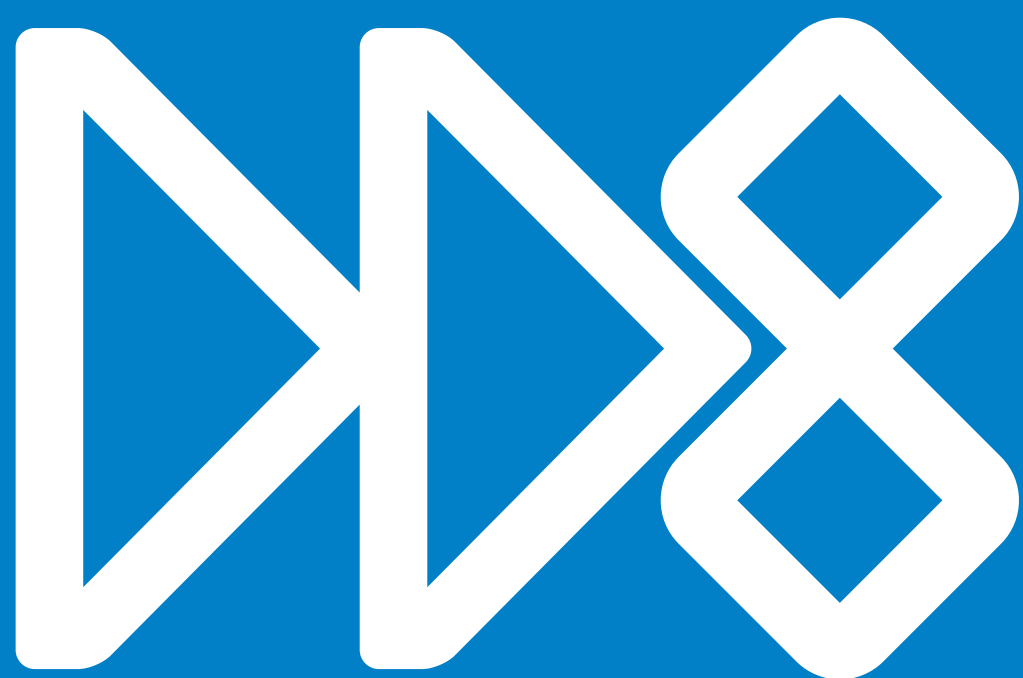
Blue Dream Hybrid

Sour Diesel Sativa

Tangie Haze Hybrid

Gg4 Indica





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