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CONTACT US

subscribers@chemwatch.
net
tel +61 3 9572 4700
fax +61 3 9572 4777

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

*** While Chemwatch has taken all efforts to ensure the accuracy of information in this publication, it is not intended to be comprehensive or to render advice. Websites rendered are subject to change.**

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ASIA PACIFIC

COVID19 Alcohol-based hand sanitiser connect: meeting urgent product demand

2020-05-13

Accord's new COVID-19 Alcohol-Based Hand Sanitiser Connect is an efficient solution developed in collaboration with the federal Department of Industry, Science, Energy and Resources, Consumer Health Products Australia and the Australian Distillers Association to assist the considerable supply and demand needs relating to alcohol-based hand sanitiser products during this unprecedented COVID-19 pandemic. This initiative endeavours to match suppliers of alcohol-based hand sanitiser product with hand sanitiser product requests received. When Accord receives a request in relation to hand sanitiser from any source, we will circulate this to our database of hand sanitiser manufacturers/suppliers with information on: • the nature of the request • name and relevant contact details • any other available specifics that may be useful in identifying a company that can assist e.g. size of pack preferred, volume/number of packs being sought, type of sanitiser required (e.g. hospital, aged care, food handling, janitorial, child care, other industrial use), geographical location if relevant etc. It will then be up to recipients to follow up on the request directly when/if they are able to assist and to make any further arrangements to fulfil requests. This process does not confer any preference to any particular businesses nor products, nor offer any guarantees of product supply nor quality. For more information contact shollands@accord.asn.au

Accord Australasia Limited, 13 May 2020

<https://accord.asn.au/22> October 2019

Maya to extend free health services to RMG workers

2020-05-12

Bangladesh Garment Manufacturers and Exporters Association (BGMEA) and Maya have signed an agreement on Tuesday to provide free services as part of efforts to help prevent and limit the spread of COVID-19 among readymade garment workers.

BGMEA President Rubana Huq and Founder and CEO of Maya Ivy Huq Russel inked the collaborative agreement on behalf of their respective

This initiative endeavours to match suppliers of alcohol-based hand sanitiser product with hand sanitiser product requests received.

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organisations, with a view to addressing general medical and mental health-related issues of the workers.

Maya is a platform where users can ask any question anonymously to Maya's licensed doctors and mental health counsellors, related to medical, health and wellbeing, psychological, social, lifestyle and fitness via app and web.

The services to be provided by Maya to BGMEA are the following:

Maya App: The users will be able to ask unlimited questions about physical and mental health concerns and get answers from certified doctors and mental health specialists.

They will be provided with digital prescriptions on their phone, when needed, which can be used to order medicines at Maya or be used to buy drugs at pharmacies.

Besides, factory workers will be prioritised in receiving answers to their queries as their goal is to answer their queries within an hour.

Toll-Free Hotline: Factory workers can directly call its doctors and counselors through a dedicated hotline established only for RMG workers. The hotline will not charge the workers as the full cost will be borne by Maya.

Toll-free SMS: Factory workers who do not have smartphones can send questions through SMS to its doctors and counsellors and receive their answers through SMS. The factory workers will not be charged for any SMS as Maya will bear the full cost.

Video Calling: Once launched, factory workers can make video calls with doctors and counsellors, which will provide a feeling of assurance and relief to factory workers who are in constant risk during the COVID-19 crises. Maya can work with factories to provide access for workers without smartphones.

Customised Dashboard: Maya will provide customised dashboards for BGMEA and factories, which will provide real-time data on factory workers.

Monthly Reports: Monthly reports will provide insights and analysis of worker consultations from all platforms.

Costs related to Maya's services offered to BGMEA, including Maya App, Toll-free hotline, Toll-free SMS, Customised Dashboard and Monthly

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Reports, will be borne by Maya. Neither BGMEA nor RMG workers will be required to pay for any of the services during the agreed timeline.

United News of Bangladesh, 12 May 2020

<https://unb.com.bd/category/Bangladesh/maya-to-extend-free-health-services-to-rmg-workers/51501>

AMERICA

EPA makes it easier for consumers to find safe, effective disinfectant products to use against the Novel Coronavirus

2020-05-12

WASHINGTON (May 12, 2020) — Today, the U.S. Environmental Protection Agency (EPA) released its List N Tool, a new web-based application (app) that allows smart phone users and others to quickly identify disinfectant products that meet EPA's criteria for use against SARS-CoV-2, the virus that causes COVID-19. The agency also announced new actions to ensure that new disinfectant products that are safe and effective to use against SARS-CoV-2 can be added to EPA's List N: Disinfectants for Use Against SARS-CoV-2 as quickly as possible.

"In support of President Trump's plan to reopen America, EPA is working to ensure that all Americans can easily access the best information on surface disinfectants as we work together to fight the spread of the novel coronavirus," **said EPA Administrator Andrew Wheeler.** "This new app will help put important information in the hands of businesses, governments, and American consumers when they are making decisions about how best to clean and disinfect buildings."

For more than two months, EPA has provided the public with List N, a list of more than 400 surface disinfectant products that meet the agency's criteria for use against SARS-CoV-2. This week, the agency transformed the data from the List N webpage into a browser-based web app that allows users to rapidly identify the disinfectant products best suited for their needs. Users can search by use site (e.g., home, business, health care, etc.), surface type (e.g., hard, non-porous surfaces like countertops; porous surfaces like fabrics), contact time (i.e., the time the product needs to be visibly wet), EPA registration number, active ingredient, or product name.

"This new app will help put important information in the hands of businesses, governments, and American consumers when they are making decisions about how best to clean and disinfect buildings."

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EPA is also continuing its efforts to ensure that List N is updated as quickly as possible with new disinfectant products that are safe and effective to use against SARS-CoV-2. Building on the agency's previously [announced expedited review](#) for EPA-registered disinfectants that do not require review of new efficacy data, today, the agency announced an expedited review process for other products that would like to qualify for EPA's List N. These other products include currently registered products that require a data review and applications for new disinfectant products.

[EPA's Expedited Review of Pesticide Registration Improvement Act \(PRIA\) Submissions for Products Eligible for Inclusion on List N: Submission Information for Registrants](#) also contains important information to submitters on how to submit a product for expedited review. This does not replace the review process of all other submitted antimicrobial products.

EPA may also consider expedited review of new active ingredients or new uses for currently registered active ingredients (including higher application rates, new application methods such as fogging and electrostatic sprayers, or use sites such as porous surfaces).

When using an EPA-registered disinfectant, follow the label directions for safe, effective use. Make sure to follow the contact time, which is the amount of time the surface should be visibly wet [Read our infographic on how to use these products](#).

US EPA, 12 May 2020

<https://www.epa.gov/newsreleases/epa-makes-it-easier-consumers-find-safe-effective-disinfectant-products-use-against>

GAO's priority open recommendations for the Environmental Protection Agency as of April 2020

2020-05-05

Each year, we make more than 1,000 recommendations to help improve the federal government. We alert department heads to the recommendations where they can save the most money, address issues on our [High Risk List](#), or significantly improve government operations.

This report outlines our [21 priority open recommendations](#) for the Environmental Protection Agency as of April 2020.

For example, we recommended that EPA work with technical assistance providers to help water treatment utilities prepare for potential climate change effects.

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Since our previous letter in April 2019, EPA implemented 3 of our priority recommendations.

What GAO Found

In April 2019, GAO identified 17 priority recommendations for the Environmental Protection Agency (EPA). Since then, EPA has implemented three of those recommendations by, among other things, taking actions to assess established timeframes for each step in the Integrated Risk Information System (IRIS) process and publish current information about chemicals being assessed.

In April 2020, GAO identified seven additional priority recommendations for EPA, bringing the total number to 21. These recommendations involve the following areas:

- Assessing and controlling toxic chemicals.
- Reducing pollution in the nation's waters.
- Ensuring cybersecurity at EPA.
- Addressing data, funding, and cybersecurity issues for drinking water and wastewater infrastructure.
- Managing climate change risks.

EPA's continued attention to these issues could lead to significant improvements in government operations.

Why GAO Did This Study

Priority open recommendations are the GAO recommendations that warrant priority attention from heads of key departments or agencies because their implementation could save large amounts of money; improve congressional and/or executive branch decision-making on major issues; eliminate mismanagement, fraud, and abuse; or ensure that programs comply with laws and funds are legally spent, among other benefits. Since 2015 GAO has sent letters to selected agencies to highlight the importance of implementing such recommendations.

For more information, contact Mark Gaffigan at (202) 512-3841 or gaffiganm@gao.gov.

us GAO, 5 May 2020

<https://www.gao.gov/products/GAO-20-287PR>

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Water utilities continue battle against lead in their systems

2020-05-13

Public awareness about the dangers of lead in drinking water grew exponentially after the Flint, Mich., water crisis.

In 2016, news broke that people were getting sick, losing their hair and breaking out in rashes as a result of high concentrations of lead in Flint's water. Criminal and civil lawsuits were filed, a slew of congressional hearings were held, and a \$97-million lead service line replacement program was quickly put in place for the city.

During that same year, a USA Today study found that at least 2,000 water systems across the country contained lead concentrations above permissible limits. To replace all lead lines in the U.S. was forecast to cost up to \$30 billion, according to a 2016 American Water Works Association (AWWA) study.

Among other issues, it became clear that the Lead and Copper Rule, a 1991 regulation meant to protect the public from lead contamination, had not been properly enforced or followed in many communities, and that modifications were necessary. The public trust was shattered, says Marc Edwards, an engineering professor at Virginia Tech University who has been an outspoken critic of the U.S. Environmental Protection Agency and some water utilities for lax enforcement of the rule.

The public has "justifiably" lost faith in the government and water utilities, says Edwards, who was ENR's Award of Excellence winner in 2017 for his efforts to fight for safe water in Flint (ENR 4/17-24/17 p. 30). "My concern is we shouldn't have a [regulation] that is routinely broken, as was the case with the Lead and Copper Rule." A revised Lead and Copper Rule is set to be finalized this summer, though it doesn't resolve all the concerns Edwards and others have.

Other things have been changing as well. Several cities, including Pittsburgh, Philadelphia, Denver, Newark and Trenton, N.J., and Lansing and Grand Rapids, Mich., have implemented ambitious proactive programs to address lead in water systems.

But others are lagging. "Some seem to only want to bury their heads in the sand," says Erik Olson, senior strategic director for health and food at the Natural Resources Defense Council. "We see some cities moving forward, [but] some only when facing lawsuits." His group has successfully

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collaborated with public health and labor groups to file lawsuits in several cities, including Flint, Newark and Pittsburgh, to speed lead service line replacements or advocate for other program improvements.

New Orleans

In New Orleans, potential violations of the existing Lead and Copper Rule were highlighted in a 2017 report from the city's former Inspector General Ed Quatrevaux. It was never publicly released, but was reported by BuzzFeed in late 2019.

The report found the city did not collect the required 50% of samples from high-risk homes with lead pipes or copper pipes with lead solder. As a result, the sampling may have missed homes with high lead concentrations, and many New Orleans residents "may have been drinking significantly lead-contaminated water for years without knowing it due to faulty testing" says Olson. He did his own analysis of the IG report, and agrees with Quatrevaux's findings that some sampling was likely done incorrectly.

Adrienne Katner, an assistant professor of environmental safety and health at Louisiana State University, who has spearheaded research into elevated water lead levels in New Orleans and surrounding areas, says the fact that the IG's report was never released highlights a lack of transparency and enforcement of the Lead and Copper Rule.

Richard Rainey, a spokesman for the Sewerage and Water Board of New Orleans, told ENR the city complied with state and federal requirements, and that the water in New Orleans is "safe to drink." The Louisiana Dept. of Health has consistently certified the water testing results were below the EPA's action level for copper and lead, he says. And because the current IG does not agree with the findings and recommendations of Quatrevaux's report, he adds, the report was never released.

Long Overdue Revision

The Lead and Copper Rule was last modified in 2007. Environmentalists say the revised rule, proposed October 2019, will weaken public health protections. But water utilities are gearing up for some stringent new requirements. The proposed rule requires all water systems to develop a public inventory of lead service lines within three years. All service lines of unknown composition would be assumed to be lead and therefore require replacement.

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The proposal would also create a new “trigger level” of 10 parts per billion (ppb) of lead, at which point a water system would have to identify ways to reduce lead levels. Methods might include reevaluating current treatment or conducting a corrosion control study.

The proposed rule, however, does not change the 15 ppb of lead action level. Once lead is found at that concentration, a utility must implement additional water sampling and quality monitoring, corrosion control, public education and complete lead service line replacements.

Sandy Kutzing, an environmental engineer and principal at CDM Smith who has worked on lead programs in both Newark and Trenton, says the new 10-ppb trigger level will likely spur more water sampling requirements for utilities.

The proposed rule also would lengthen the time period for lead line replacements. Under the existing rule, water systems with lead above 15 ppb must replace 7% of their lead service lines each year for as long as they exceed 15 ppb. The new rule lowers the amount to 3% each year, extending the time utilities have to replace all lead service lines by 20 years.

NRDC’s Olson says the trigger level complicates the rule. He adds that cities do not need 33 years to replace lead service lines. Flint is expected to complete its \$97-million lead service line replacement program in less than five, and Newark is well beyond the halfway point of an aggressive 30-month, \$120-million lead service line replacement program.

Steve Via, director of federal relations at AWWA, which represents water utilities, agrees the new rule could create confusion. The regulation’s language is unclear, he says, and as a result, regional regulators could focus on the “letter of the rule” rather than whether utilities are actually moving forward in good faith with lead service line and corrosion control programs. “It creates a bunch of administrative details that could impede the overall goals.”

Moreover, Via says the requirement to treat all “unknown” service lines as lead service lines could be counterproductive. There are ways to determine which areas are most likely to have lead lines, based on when the homes were built and where lead has been found in other areas.

ENR, 13 May 2020

<https://www.enr.com/articles/49372-water-utilities-continue-battle-against-lead-in-their-systems>

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Coronavirus is stalling air quality, pollution rules, even in eco-minded California

2020-05-13

As experts warn that exposure to pollution can increase the risk of dying from COVID-19, an array of powerful industries is pressuring California regulators to delay or roll back air quality and climate regulations due to the coronavirus outbreak.

The trucking industry wants to stall new emissions-reduction rules. Oil companies want looser enforcement of existing regulations. Port and shipping interests are pushing to delay rules on ocean vessels as they become Southern California’s largest source of smog-forming pollution.

Will Barrett, clean air advocacy director for the American Lung Assn. in California, said the lobbying effort is a “brazen attempt to use the COVID pandemic as a justification for long-held policy complaints about clean air programs in California” and accused industry of using the crisis “as cover to roll back or delay programs that will save lives.”

The breadth of requests presents a conundrum for regulators who, even in eco-minded California, have been open about the need to grant some measure of relief from environmental requirements in response to the pandemic. While officials say their commitment to fighting climate change and air pollution remains unshaken, they are nonetheless postponing compliance deadlines and delaying pollution-reduction rules.

Los Angeles Times, 13 May 2020

<https://www.latimes.com/california/story/2020-05-13/coronavirus-air-quality-climate-regulation>

EUROPE

CTPA Emergency Response. For exchange of hand hygiene and PPE manufacturing/supply needs during the COVID-19 public health emergency

2020-05-12

In this time of a national and global health emergency, the purpose of the CTPA Emergency Response Exchange (CERE) is to maximise the domestic production and supply of essential hand hygiene products, including hand sanitisers and gels, handwashes and soaps. We understand that

The trucking industry wants to stall new emissions-reduction rules.

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hand cream is also in short supply and is being used to help protect hands during this time of increased washing. In addition, it will investigate the possible supply of Personal Protection Equipment (PPE) to the National Health Service (NHS), local authorities and other relevant care providers.

For the purposes of this Exchange, these hand hygiene products include hand sanitisers and gels, handwashes and soaps and could be cosmetics or biocides.

CERE performs the following roles:

Matches the needs of manufacturing facilities with the ingredients and/or packaging etc needed to make these items.

Matches companies which have a surplus of necessary supplies with the NHS supply chain.

Instructions

CERE is a simple three-step process.

STEP 1 – Getting your contact information and needs into CERE

After reading all the steps, please complete and submit it to CERE through the E-form

STEP 2 – Getting your contact information and needs matched with relevant companies

Our CERE team will then:

Match suppliers with manufacturers and inform the manufacturer of potential suppliers and their contact details. This can be suppliers of ingredients or componentry such as packaging.

Match manufacturers with suppliers and inform the suppliers about manufacturers who are looking to buy supplies, along with the contact details.

Understand which companies have goods or PPE to supply or donate to the NHS and facilitate this.

STEP 3 – Making Contact

Companies which have completed Step 2 can then contact the matched companies and make arrangements. CTPA will not be involved with any of these Business-to-Business or Business-to-NHS/carer.

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For any technical difficulties, please contact info@ctpa.org.uk, with the email subject as "CERE Technical Help".

In order to go through with the submission, we will ask you to agree to the following:

TERMS OF USE:

By submitting this form, you are consenting to your contact details and information provided being stored, examined and shared with other users of the Exchange to facilitate matching manufacturers, suppliers and the NHS to assess shortages of manufacturing ingredients, components, as well as any other purpose related to the current COVID-19 health emergency.

CTPA will be co-operating with UK Government. Any information shared will be collated and pseudonymised.

CTPA takes your personal privacy very seriously and will ensure that your personal details are used and safeguarded as appropriate under the General Data Protection Regulation (GDPR) for the purpose of the Emergency Response Exchange project only. CTPA will not share your personal data with any other third parties.

CTPA reserves the right to terminate the Emergency Response Exchange with due notice to all participants once the public health emergency has been resolved or the supply chain has stabilised.

All CTPA activity will be conducted in line with the CTPA Competition Guidelines.

See CTPA Privacy Statement.

Important Notice to Manufacturers of Hand Hygiene Products

It is essential that all hand hygiene products produced fully comply with the relevant legislation depending on whether they are legally classified as cosmetics, biocides or medicines. Please see CTPA's advice page "Placing Hand Gels or Sanitisers on the UK Market – What You Need to Know" for further information. CTPA members can also find detailed information at the Reference Zone page in the members-only website. The Health and Safety Executive (HSE) information on manufacture and supply of biocidal hand sanitiser during the COVID-19 outbreak may also be of use.

The CTPA Emergency Response Exchange is a service provided and funded by CTPA. This platform is intended as a temporary relief measure aimed

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at resolving urgent shortages in the supply chain of products required for the protection of individuals during the current COVID-19 public health emergency. The platform is open to all participants and will be actively connecting companies with relevant matching submissions. The scope of the exchange is limited to the manufacturing and supply of hand hygiene products, PPE and/or products identified as necessary for public protection or required by the NHS and relevant care providers.

With our thanks to Cosmetics Alliance Canada for the kind permission to use its exchange as a model.

www.ctpa.org.uk, 12 May 2020

<https://www.ctpa.org.uk/cere>

Tyre pollution: lowering car emissions with new EU tyre labels

2020-05-12

More fuel-efficient tyres mean lower emissions. New EU tyre labels will help you choose based on fuel efficiency, wet grip and noise level.

The EU has committed to cut its greenhouse gas emissions by at least 40% below 1990 levels by 2030 under the Paris Agreement. Road transport is responsible for about 22% of the EU's greenhouse gas emissions and transport is the only sector where emissions remain higher than in 1990. In order to reach climate neutrality by 2050, the EU wants to cut emissions from transport 60% by 2050, compared with the 1990 level.

Tyres account for between 20% and 30% of a vehicle's fuel consumption, which means that choosing more fuel-efficient tyres can help to reduce transport emissions. In order to help consumers make informed decisions, the EU is introducing a new labelling scheme for tyres introducing a new labelling scheme for tyres.

New labels to help consumers

The labels will include information on fuel efficiency and wet grip, on a scale from A to G (similar to the energy labelling used for household appliances), as well as information about their external noise level, expressed in decibels.

Information on snow and ice grip can be added in the future, as well as information on mileage and abrasion (responsible for microplastic pollution) when a testing method becomes available.

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Labels must be clearly visible to consumers, be on display in all situations where tyres are sold, including online, and should provide a QR code for easy scan.

Benefits of new EU labelling of tyres

New tyre labels will allow EU consumers to choose more fuel-efficient tyres, which can lead to great savings for them in terms of spending as well as lower emissions. Road safety is improved through better wet grip while information on noise levels help lower noise pollution caused by cars.

Next steps

The European Parliament approved the new labelling scheme on 13 May. The new rules will enter into force on 1 May 2021.

European Parliament, 12 May 2020

<https://www.europarl.europa.eu/news/en/headlines/society/20200423STO77731/tyre-pollution-lowering-car-emissions-with-new-eu-tyre-labels>

New rules to promote water reuse in farming

2020-05-12

Population growth, urbanisation and tourism have all contributed to the water shortages and droughts that are increasingly affecting many areas of Europe, especially the Mediterranean region. Water sources are under stress and the situation is expected to get worse because of climate change. According to an estimate, by 2030 half of Europe's river basins could be affected by water scarcity.

In order to secure Europe's freshwater supplies for the years to come, MEPs approved new rules for the reuse of wastewater on 13 May.

In order to ensure safety of the crops, the new rules introduce minimum requirements for water quality, require frequent monitoring and oblige wastewater treatment plants to draw up risk management plans. Member state authorities would issue permits for the treatment plants and check for compliance of rules.

According to an estimate, by 2030 half of Europe's river basins could be affected by water scarcity.

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Uniform EU level rules would level the playing field for operators of reclamation plants and farmers and prevent obstacles to the free movement of agricultural products.

European Parliament, 12 May 2020

<https://www.europarl.europa.eu/news/en/headlines/society/20190206STO25114/new-rules-to-promote-water-reuse-in-farming>

INTERNATIONAL

Lagos issues occupational health, safety guidelines for formal, informal sectors

2020-05-13

The Lagos State government has issued new occupational health and safety sectorial guidelines following the continued spread of the COVID-19 pandemic as part of measures to reaffirm its commitment to the safety of lives of its citizenry.

The Director-General, Lagos State Safety Commission, Mr. Lanre Mojola, yesterday said the additional Occupational Health & Safety Sectorial (OSH) guidelines on easing of the lockdown of businesses in Lagos cover several sectors such as manufacturing, construction, retail outlets and shopping malls, eateries and restaurants, food packaging businesses, financial institutions as well as the informal sector, such as artisans.

According to him, Lagos State Safety Commission was established to develop and formulate policies and strategies that will build a sustainable safety culture within the state and he urged Lagosians to adhere to these safety guidelines.

The Commissioner for Special Duties, Tayo Bamgose-Martins, also emphasized the need for business operators to adhere strictly to safety guidelines adding that apart from frequent washing of hands with soap and alcohol-based sanitizer, meetings should begin with a safety moment and ensure the mandatory use of face mask. He urged all and sundry

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to cooperate with the government in adhering to safety guidelines to combat the pandemic.

The Guardian, 13 May 2020

<https://guardian.ng/news/lagos-issues-occupational-health-safety-guidelines-for-formal-informal-sectors/>

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REACH Update

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Grouping of chemicals speeds up regulatory action

2020-05-13

To speed up identifying and managing the risks of hazardous chemicals, ECHA is screening structurally similar substances in groups. Last year, the Agency together with national authorities reviewed around 220 high-volume substances of which 56 % needed more hazard data.

Helsinki, 13 May 2020 – ECHA's second report on the Integrated Regulatory Strategy gives an overview on the progress in addressing substances of concern and in the "mapping of the chemical universe". It includes recommendations to authorities and industry on managing chemicals' risks.

In 2019, ECHA moved from a substance-by-substance approach to addressing structurally similar chemicals in groups. The aim is to speed up the identification of hazardous substances and get their risks controlled more quickly.

Together with Member States, the Agency reviewed around 220 substances registered above 100 tonnes per year and allocated them to different pools of the chemical universe for regulatory action. For 56 % of them, more data was needed to clarify the need for further risk management. For 22 % of the substances, no further action was proposed and 7 % were considered as high priority for EU regulatory risk management.

The number of substances registered above 100 tonnes and not yet assigned to a pool in the chemical universe has reduced to around 2 400. The grouping approach also enabled ECHA to scrutinise more than 300 low-production volume substances in 2019.

"The progress we have made with the Integrated Regulatory Strategy is a step towards better protecting Europe's citizens. To gain the most impact, we have focused the work on high-volume substances, and we aim for more clarity on all chemicals registered above 100 tonnes by the end of 2020. Grouping similar substances helps to speed up and make regulatory actions more consistent. It also helps national authorities step up their efforts to manage chemical risks under REACH and other pieces of legislation," says Jack de Bruijn, ECHA's Director of Prioritisation and Integration.

Last year, the Agency together with national authorities reviewed around 220 high-volume substances of which 56 % needed more hazard data.

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Mapping the chemical universe and assigning substances for further action is a key part of the Integrated Regulatory Strategy. The aim is to have full clarity for all registered substances by 2027.

Report's recommendations

ECHA's Integrated Regulatory Strategy report covers an overview of the pre-regulatory steps (screening of groups by ECHA or Member States, expert group assessment and regulatory management option analysis), the evaluation processes and the regulatory risk management activities under REACH and CLP.

It gives the following recommendations:

- Screening groups of substances, data generation and assessment should be further optimised to ensure substances are progressed to regulatory risk management without delay.
- Harmonised classification and labelling should become a priority, as it has a direct impact on company-level risk management, and is often the step before restriction, authorisation or other measures under other pieces of legislation are taken.
- The priority and appropriateness of previously identified, but still pending, follow-up actions should be reviewed and those substances which need further regulatory risk management should be progressed without delay.
- The compliance of registration information needs to be improved, in particular, for substances with a high potential for exposure and currently lacking appropriate hazard data.
- Compliance of dossiers, their systematic review and updates of registrations based on new information, remains industry's responsibility. ECHA welcomes the initiative of industry associations to develop review programmes to help registrants review chemical safety data.
- Further enhance cooperation and coordination between authorities.

Background: chemical universe

Overall, the chemical universe of over 21 000 registered substances (both high-volume and low volume substances) includes approximately:

- 330 substances have regulatory risk management under consideration;
- 1 550 substances are under data generation;

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- 390 substances that already have regulatory risk management ongoing; and
- 700 substances where currently no further actions have been proposed after authority reviews.

ECHA, 13 May 2020

https://echa.europa.eu/documents/10162/27467748/irs_annual_report_2019_en.pdf/bd23e8cb-a55a-24af-4be3-7a29828ebb09?utm_source=echa-weekly&utm_medium=email&utm_campaign=weekly&utm_content=20200513&cldee=Y2lhcmEudGhydXNoQGNvZW1pY2Fsd2F0Y2guY29t&recipientid

Why a group restriction of bisphenols is long overdue

2020-05-12

Two years ago, in spring 2018, CHEM Trust published the report “*From BPA to BPZ: a toxic soup?*”. It examined how industry is being allowed to replace the well-known hormone disrupting chemical bisphenol A (BPA), with very similar chemicals that may also be harmful, for example bisphenol S (BPS). The report argued that in order **to avoid regrettable substitution** of one problem chemical with another, **restrictions on groups of chemicals** need to be taken.

Following the publication of the report CHEM Trust sent letters to the European Chemicals Agency (ECHA), the European Food Safety Authority (EFSA) and the European Commission’s Health Commissioner, calling for accelerated regulatory action on the bisphenols group of chemicals. While all responses acknowledged the issue, no specific commitments to address the problem were made.

2 years on – where are we now?

In January 2020 an EU-wide ban of BPA in thermal paper entered into force. This ban was intended to motivate the industry to use alternatives to BPA in thermal paper products. **CHEM Trust feared that only banning BPA would lead to regrettable substitution of BPA with BPS or similar bisphenols.** Unfortunately, **it seems this was justified.** At the end of 2018 ECHA published a survey showing that from 2016 to 2017 the use of BPA in thermal paper increased 7% whereas the use of BPS increased 98%.

The replacement of BPA with other bisphenols seems to be taking place in other areas, too. Human biomonitoring studies have recently found a trend towards a **decrease in human exposure to BPA** and **increased exposure to other bisphenols**, including BPS.

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So, it seems that the EU’s decision to phase out BPA, without also restricting the use of alternative bisphenols, has led to a likely increase in exposure to other bisphenols, including those where there is evidence that they may be harmful to human health, such as BPS.

Health impacts of the other bisphenols

This trend of regrettable substitution is very concerning. A new report published by the German Environment Agency (UBA) in February 2020 shows that nearly all of the tested alternatives to BPA may also have endocrine disrupting properties.

This UBA study looked for existing data on the endocrine disrupting potential of 44 BPA alternatives, including several bisphenols. They found that for 15 of the substances the potential to be endocrine disruptor was already described, whereas no data were available for 23 of the substances. All substances were then tested in various commercially available *in-vitro* test systems for endocrine activity. **The researchers concluded that 33 of the BPA alternatives may have endocrine disrupting properties** and that only one of the substances could be recommended as a substitute for BPA.

A recent review that included 20 potential BPA-alternatives, which are reported to be used in consumer products, confirmed a significant lack of data and also indications of endocrine disrupting properties for some of the bisphenol alternatives to BPA.

Are the other bisphenols being regulated?

- The Belgian authorities have recently submitted a proposal for the EU to classify **BPS** as a ‘presumed human reproductive toxicant’ (Rep. Cat. 1B; CHEM Trust provided supportive comments), based on new testing provided by industry as part of a substance evaluation under EU chemicals law REACH. A final decision on the EU classification is expected in autumn 2020.
- At the time of writing the “*Toxic Soup*” report none of the companies selling BPS suggested it may be a reprotoxicant. Only recently industry changed the self-classification of BPS as ‘Suspected human reproductive toxicant (Rep. Cat. 2), although this seems to have had been long warranted based on test results from 2000.
- The French Agency for Food, Environmental and Occupational Health & Safety, Anses, concluded in October 2019 that **bisphenol B (BPB)** is an endocrine disruptor based on a systematic literature review and assessment according to the EU Guidance document on the criteria for

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- endocrine disrupting biocides and pesticides. Anses has announced that it will submit a proposal for BPB to be identified as a Substance of Very High Concern under REACH by August 2020.
- The Swedish Institute of Environmental Medicine published their conclusion in July 2019 that **bisphenol AF** showed endocrine disrupting properties when assessed according to the EU criteria and the ECHA/EFSA guidance.
- In parallel, EFSA is working on a re-evaluation of BPA, and EFSA has discussed the outcome of the new testing for reproductive effects of **BPS** which is part of the substance evaluation with the Belgian authorities. However, no joint EU action on the group of bisphenols seems to have been taken. EFSA has recently finalised their own assessment of the result of these studies and concluded that they do not affect the authorisation or the specific migration limit for use of BPS in plastic food contact materials. However, EFSA also states that the agency is fully aware that other toxicological studies have been published since BPS authorisation.

The evidence to date illustrates **that further bans for BPA and its bisphenol alternatives are needed**, as they are still used in everyday consumer products, such as food contact materials and are ubiquitous in the general public, as human biomonitoring studies show.

ECHA has announced that they **plan to address and regulate chemicals in groups** to a much greater extent. CHEM Trust welcomes this announcement by ECHA and wants to see restriction of the bisphenols used as alternatives to BPA given the highest priority for this approach.

Dr Michael Warhurst, Executive Director of CHEM Trust said:

“Over the last two years new scientific findings continue to back up our 2018 Toxic Soup report which concluded that bisphenol alternatives to BPA also have similar impacts on human health and should be phased out. We need rapid action to restrict the bisphenols as a group, as the evidence shows that BPA is being replaced, in consumer products, with other problematic bisphenols. The European Commission must urgently request that EU chemicals agency ECHA prepares a group restriction on bisphenols.”

Some of the research published recently on bisphenols

New studies are being published all the time which highlight the harmful effects of other bisphenols:

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- A new study, looking for 15 different bisphenols including **BPA** and **BPS** plus other alternatives to BPA in biological samples from pregnant women in South China, showed that babies are exposed to unexpectedly high levels of these substances in the womb. BPA, BPS, **BPAF** and **BPE** and the derivative **BPSIP** were frequently detected in the samples (Pan et al., 2020).
- In addition to **BPA**, **BPS** and **BPF**-exposures have also been associated with body mass outcomes in children (6-19 years). A recent study using US NHANES biomonitoring data showed that those with highest levels of BPS and BPF in the urine were more likely to be obese compared to children with lower levels. Although this study has some limitations, it suggests that BPS and BPF are correlated with obesity in children (Jacobson et al., 2019). In another paper also using NHANES data, BPA and BPF-exposures were also associated with obesity in children and particularly in boys (Liu et al., 2019).
- BPS** has slower skin uptake than BPA but research has found that when BPS is taken up in the body, it persists much longer and at much higher concentrations than BPA due to slower metabolism. This suggests that replacing BPA with BPS may lead to increased internal exposure to this endocrine disruptor (Liu & Martin, 2019; Gayraud et al., 2019).
- A new study with pregnant mice showed that exposure to low doses of **BPA**, **BPS** and **BPF** in foetal life significantly increased blood pressure in the offspring, suggesting that even low-dose exposure to these chemicals during pregnancy may affect blood pressure later in life (Al Mansi et al., 2020).
- An experimental study showed instant effects on mice heart function, with more potent effects for **BPS** and in females, when treating with BPA and BPS in amounts that mimicked typical human levels (Ferguson et al., 2019).
- A recent paper suggests that current analytical methods to detect exposure to BPA (and other bisphenols) are likely to be underestimating the real human exposure (Gerona et al., 2019). This suggestion is currently under debate and is disputed by other scientists.

Chemtrust, 12 May 2020

https://chemtrust.org/bisphenol_group/

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Janet's Corner

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Chemistry Lab

2020-05-22



<https://www.pinterest.com.au/pin/570760952777087066/>

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Hazard Alert

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Hydroquinone

2020-05-22

Hydroquinone is a granular white solid organic compound. Its chemical formula is $C_6H_4(OH)_2$, and it is industrially produced by two main methods. It also occurs naturally in multiple places, including in the defense mechanism of a bombardier beetle. It can also be found in the poodle-dog bush, and as an active toxin in the felt-ringed agaricus mushroom. The compound was found to be carcinogenic in rats—when taken orally—however there has been no research into the carcinogenic effects of hydroquinone on humans.

USES [2,3,6]

Hydroquinone has multiple uses across the beauty, photography and oil industries. It is used as a depigmentor in topical skin products to reduce hyperpigmentation, such as liver spots, freckles, "age spots", and melasma. It works by blocking melanocytes, which produce melanin, which makes you the colour that you are. In photography, it is used in the development of darkroom photographs, as a developer and reducer. It is also found in oils, foods and greases as an antioxidant.

ROUTES OF EXPOSURE [4]

- Hydroquinone is banned in Japan, Australia and across the European Union due to the negative medical effects from the use of hydroquinone-containing products.
- In the U.S., hydroquinone is sold at two different strengths: 2% over-the-counter, and 4% with a prescription and restricted application.

HEALTH EFFECTS

Hydroquinone poisoning affects a range of systems including the integumentary, hormonal and gastrointestinal systems.

Acute Effects [5]

Severity of symptoms depend on the level and type of exposure.

- Ingestion of hydroquinone in higher doses can cause tinnitus, dizziness, headaches, vomiting, dyspnea, cyanosis, delirium.
- Ingesting large amounts of the compound can cause edema of the internal organs, convulsions and collapse.

Hydroquinone is a granular white solid organic compound.

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Chronic Effects [5,6,]

Hydroquinone is toxic to multiple body systems. Long-term effects from the exposure to hydroquinone dust can include impaired vision. It has also been found that long-term use of hydroquinone topical creams has led to ochronosis—which can result in the discolouration of the skin to a blueish-black colour. In rodents, it was found that hydroquinone—when applied dermally—increased the incidence of skin tumours.

SAFETY

First Aid Measures [7]

- Inhalation: Move the victim to a fresh air source and monitor their breathing. Call a doctor if symptoms persist.
- Skin contact: If there is skin or hair contact, remove the victim's clothing, and wash exposed skin with mild soap and water. Continue with a warm water rinse. Clean contaminated clothing before re-wearing. If rash or skin irritation occurs, consult a doctor.
- Eye contact: Rinse eyes with water carefully for a few minutes. Remove contact lenses if present and easy to do so. Continue rinsing. If irritation persists, contact a doctor.
- Ingestion: If swallowed, DO NOT induce vomiting. Rinse mouth with water and contact a medical professional.

Exposure Controls/Personal Protection [7]

- Engineering controls: Safety showers and emergency eyewash fountains should be accessible in the immediate area of the potential exposure. Ensure there is adequate ventilation, and whenever possible, material should be handled in a laboratory.
- Personal protection: Safety glasses and protective gloves should be worn. Do not eat, drink or smoke when using hydroquinone.

REGULATION [2]

United States:

The Occupational Safety and Health Administration has set an 8-hour time weighted average (TWA) concentration for hydroquinone of 2mg/m³.

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Australia [8]

Safe Work Australia: Safe Work Australia has set an 8-hour time TWA for hydroquinone of 2mg/m³.

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India's push to relax environmental assessment rules amid pandemic draws criticism

2020-05-07

Environmentalists in India are criticizing government moves to continue to approve major industrial projects, and to relax the nation's environmental assessment rules, even as the COVID-19 pandemic has complicated public oversight and canceled potential field reviews.

"They are carrying on as if there is no health emergency, hosting meetings and taking decisions including on big ticket projects," said Kanchi Kohli, an environmental governance expert with the Centre for Policy Research. "Public engagement, ground verification—these options are all foreclosed at this time."

India has been in strict lockdown since 26 March to curb the pandemic. But it's been business as usual at the Ministry of Environment, Forest, and Climate Change. Panels there have been meeting over video conference to approve a slew of mining, infrastructure, and industrial projects, many of them in forest areas. In the past month, the ministry has signed off on a new coal mine in an elephant reserve, preliminary drilling inside a wildlife sanctuary that is home to endangered lion-tailed macaques and great Indian hornbills, and a contentious project to remake New Delhi's Parliament district. And it is considering two other controversial projects: a large hydropower project in the Dibang Valley, a biodiversity hot spot in northeastern India; and a uranium mine in a tiger reserve in central India.

The ministry is also moving ahead with a rewrite of some of India's environmental rules. On 23 March, it issued a new draft policy on assessing the environmental impacts of large projects. Among other changes, the draft proposes reducing the time allowed for public comment on assessments, and allowing more projects to avoid the public comment process entirely. Critics of the proposal say proposed changes could normalize approval of projects that went ahead without environmental clearance.

The ministry initially gave the public 60 days to comment on the proposal, but several groups asked it to pause the process given the pandemic. The environment ministry has extended the deadline for comments to 30 June.

Analysts note that the government's push to approve industrial projects even during the pandemic is consistent with Prime Minister Narendra Modi's pro-business stance. For example, an analysis by the Legal Initiative for Forest and Environment shows that from January to June

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2019, a key panel overseeing wildlife sanctuaries and parks approved 63 of 70 development proposals, resulting in reduced protections for 216 hectares of land. The panel has just one independent scientist, Kohli notes. "Considered decision-making with diverse points of view has been wilting over the past few years," she says. "The focus is on approval rather than scrutiny or discussion."

Conservationists and scientists fear that pro-development views will prevail as the ministry considers the Dibang Valley hydropower project. It envisions building a 3097-megawatt dam in an area known for supporting 300 species of birds and 75 species of mammals. Members of the Idu-Mishmi tribe, who live in the area, oppose the project. Scientists who have done research in the region have panned an existing environmental assessment commissioned by the government, and asked it to conduct a broader assessment of how the dam, together with others planned for region, might affect the environment. And they are urging the government to give the local community a greater say in managing the forest. "We implore you to choose this option," one group of scientists wrote to a forest advisory committee last month, so that "India can once again lead the world as a true ecological champion in this time of unprecedented social and ecological crisis."

sciencemag.org, 7 May 2020

<https://www.sciencemag.org>

What happens if a "Big One" strikes during the pandemic?

2020-05-09

On April 12 and 13, dozens of tornadoes tore through several southern states. Homes were obliterated, hundreds of thousands of people lost power, and 36 lost their life. Many sped to shelters as twisters mangled the land behind them. But one family was turned away at the door of a tornado shelter in Crossville, Alabama, because the hopeful entrants didn't have enough face masks for every family member.

This is just one possible consequence of a deeply uncomfortable scenario: if, during the coronavirus pandemic, America is rocked by a large-scale geological or extreme-weather disaster, one that causes mass casualties and widespread infrastructural devastation. Any such disaster would be horrific enough in isolation, but one striking the United States today, now home to a third of the world's confirmed COVID-19 cases, would place

And the odds of a disaster not happening during that time are low.

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a nightmarish gantlet of novel obstacles between first responders and saving the lives of the afflicted.

For many, the mere notion of coterminous catastrophes is unconscionable. [Brian Terbush](#), the earthquake/volcano program coordinator at Washington State's Emergency Management Division, says there is always a thread of fatalism among some members of the public when it comes to earthquakes, eruptions, tsunamis, and the like. People sometimes ask: "Why should we prepare for one if it'll kill us anyway?" Now Terbush is hearing something different: "Aren't we going through enough right now?"

The pandemic is already undeniably traumatic, enough to make people unwilling to consider that the situation could, in fact, worsen. But geoscientists and emergency managers don't have that choice. They have to ruminate on the unthinkable, because that's the only way they can prepare themselves, and the public, to navigate a confluence of calamities.

Short of a medical miracle, the coronavirus scourge will persist in America into the foreseeable future. And the odds of a disaster *not* happening during that time are low. How will the country, whose attention remains glued to the pandemic, handle a synchronous act of destruction?

Hurricanes and wildfires, weather phenomena often associated with disasters, are seasonal and, therefore, inevitable. [Daniel Swain](#), a climate scientist at UCLA, explains that both become possible in May, before usually becoming most frequent and potent from late summer through early fall. This year, meteorologists are forecasting a greater than average number of major Atlantic hurricanes—unwelcome in normal times, but especially so this year. If states are wildly successful in implementing their infection-prevention measures, Swain says, their respective COVID-19 peaks may be pushed back to late summer. In other words, right when hurricanes and wildfires may be running rampant.

Geological hazards, however, are more temporally random. America has 161 active volcanoes, about one-tenth of the Earth's total. Although none near major population centers is exhibiting worrying signs of unrest, there is a nonzero chance that a destructive eruption could occur during the pandemic.

At least volcanoes tend to noticeably act up prior to a potential outburst, says [Sara McBride](#), a disaster researcher at the U.S. Geological Survey. "Earthquakes can be real bastards," McBride told me. They happen with

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essentially no known warning, making them "the most impolite of geohazards."

Major temblors are also an inevitability on many of America's faults. The probability of a magnitude-6.7 quake in the Los Angeles area within the next 30 years is 60 percent. In the San Francisco Bay Area, that risks to 72 percent. "We know that a big earthquake"—a proverbial Big One—"could happen any day," says [Ken Hudnut](#), an earthquake geophysicist with the USGS. "It could happen during COVID-19."

Hundreds of preexisting plans deal with individual disaster scenarios. The problem is that these plans don't account for a pandemic happening at the same time. It may be overused, but "unprecedented is the word," says [Becky DePodwin](#), a meteorologist and emergency-preparedness specialist at AccuWeather. "There's no playbook for this."

Right now, emergency managers are laser-focused on the pandemic response. "Our normal systems right now are pretty much running at their full capacity," Terbush says. In pre-pandemic times, states could ask one another to lend a hand if one was overwhelmed by a disaster. But today, the coronavirus has all 50 of them in individual viselike grips. In some respects, it's every state for itself.

During major hurricanes and wildfires, millions of people may need to be evacuated in just a few days, Swain says. This is always a logistical quagmire, but the pandemic may create a situation in which people crowding into evacuation shelters could inadvertently cause spikes in COVID-19 cases. As those April tornadoes demonstrated, not everyone may be permitted inside in the event of a disaster. And even if all are welcome, it isn't clear if shelters will always be able to accommodate everyone and keep them six feet apart.

Those caught up in disasters may also fail to heed lifesaving advice, says the volcanologist [Jess Phoenix](#). She worries that the stream of pandemic misinformation coming from the White House will make some lose confidence in other organs of government, including genuinely qualified emergency managers. If another disaster occurs, people may simply tune out the advice and warnings of experts.

Fleeing from ruination is not simply a matter of movement, either. It is largely enabled by privilege. In the past seven weeks, more than 33 million Americans have applied for unemployment. If they lack rainy-day funds, they may not be able to afford their own evacuations, says [Samantha Montano](#), a disasterologist at the University of Nebraska at Omaha. Many

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will be reliant on a robust response from nonprofits and state actors, but that may not transpire as both are inextricably tied down combatting the pandemic.

Vulnerable and marginalized people are, after all, disproportionately suffering right now. A mass-casualty incident would only make matters worse for these communities, while putting America's health-care system, already buckling under the weight of the coronavirus, under even more strain. Some of the experts I spoke with worry that the wider public, inundated by a fire hose of seemingly unending grim news, may be running low on empathy for those caught up in yet another disaster aside from the agonizingly prolonged pandemic.

First responders, for their part, are used to throwing themselves into dangerous situations, but will now be haunted by the additional specter of COVID-19. Wildfires are fought by migratory teams of firefighters and support staff, who are set up in tent cities in remote places—close-quarter environments that have historically been ravaged by contagions, Swain says. COVID-19, a vicious disease that renders many bed-bound for weeks, would undoubtedly impede their ability to snuff out infernos.

"Not that there is ever a good time for a disaster, but this is a particularly bad one," Terbush says.

As gut-wrenching as an overlapping disaster would be, there are reasons to be hopeful.

America's capability to remotely monitor the environment for catastrophic harbingers, and to alert the public if any are spotted, remains unchanged—for now. The USGS and its university partners made sure their staff could work from home long before the country's situation precipitously deteriorated, says Michael Poland, the scientist in charge at the USGS's Yellowstone Volcano Observatory. If a monitoring station goes down, someone goes out in the field to fix it, physically distancing and wearing an N95 mask when needed.

Emergency staff are also on a war footing, ready to respond at a moment's notice should another disaster occur. "Our risk portfolio is dominated by no-notice catastrophic events," from earthquakes to landslides, says Kevin McGowan, the director of the Los Angeles County Office of Emergency Management. Winding up emergency systems to deal with such sudden events normally takes time, but the pandemic means that more than 80 of L.A. County's 88 cities have already activated their emergency-operations centers.

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Scientists and emergency managers are also well practiced in the art of improvisation. They often conduct tabletop exercises that simulate disaster scenarios unfolding in individual cities or across multiple states, from violent eruptions to cataclysmic temblors. Those running the exercises often throw in wild cards—resources suddenly becoming unavailable or key staff going missing—to see how the participants handle them.

Such flexible thinking will prove invaluable during the current pandemic. "Things are not going to go according to the script you set for them," Poland says. "That comes with the territory."

The coronavirus itself is also beginning to feature in these trial runs. On April 1, a USGS-led tabletop exercise simulated a magnitude 7.5 temblor on the southern San Andreas Fault during the pandemic. Hudnut, who participated in the exercise, explains that it helped scientists and emergency managers work through previously unconsidered problems. Both ground-based staff and helicopters are used to check sites for damages, but in this case, helicopters featuring physically distanced occupants may take precedence in order to limit person-to-person contact.

This is not without risk: Helicopters can crash, and pilots wearing helmets and N95 masks must ensure that their visors don't fog up. But it's a start, and trial runs like these mean that the hundreds of preexisting disaster plans in place all over the country are being updated on the spot.

Tens of thousands of people are working around the clock on these problems, pushing through the psychological burnout. Many are joining forces. McBride is a co-lead of a newly formed international group of geoscientists, anthropologists, historians, social scientists, and others specifically designed to explore the impacts of disasters during the pandemic, with a particular focus on vulnerable groups and those who shield them from tragedy.

The White House's misinformation and the federal government's leadership vacuum are persistent problems, but several states are forming regional pacts to circumvent this and lend one another a helping hand.

The coronavirus will be difficult to avoid for the foreseeable future. But should another disaster take place, the more immediate threat to life—an incoming hurricane or tsunami, for example—will be dealt with first, Terbush says, pandemic be damned.

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In the meantime, this entrenchment of disaster watchers will remain sapped of strength without the participation of the public itself. Distressing though it may be, everyone I spoke with said that millions of Americans have to accept that a second disaster may greet them—and prepare accordingly.

That means having several weeks of supplies ready: nonperishable food, plenty of water (and water filters), medicine, and sanitary and hygiene products. Be as self-sufficient as you can afford to be. Make sure you have a workable evacuation plan for your family (and your pets) written down; a digital copy may disappear along with your electricity supply. Read your state's disaster survival guides, available online. Check in with your local shelters to make sure they are operational. Identify trustworthy sources of information and stay informed, especially through radio channels, as they may be the only way to find out what's happening after a disaster knocks out TV stations and the internet.

America may very well make it through the pandemic without another nightmare falling from the skies or rising from below. But not considering the alternative would be negligent, and evading the worst outcomes will take everyone's active participation. "If there were ever a time for people to take preparedness seriously," McGowan says, "now is that time."

theatlantic.com, 9 May 2020

<https://www.theatlantic.com>

Meat-free future? Coronavirus exposes America's fragile food system

2020-05-10

Americans are nearing a future where the nation's beloved steak dinners, cheeseburgers and barbecue are under threat, if the world's second largest meat processor is to be believed.

Tyson Foods warned "the food supply chain is breaking" last week and said meat shortages were on the way to the US because the coronavirus pandemic was forcing it and other big companies to close several meat processing plants as their workforces became infected.

But for some critical observers, the crisis in America's huge industrial meat production sector came as no real surprise. Will Harris, a cattleman at White Oak Pastures in southern Georgia, said he always knew a "trainwreck" would hit the factory farming industry.

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Harris knows intimately how fragile factory farms and their supply chains can be, because for two decades, he raised cattle for the industrial beef production system.

"For the past 70 years, big multinational corporations have moved our food system further and further down the road of focusing only on efficiency, only on taking costs out of production," Harris said. "And in doing that they created a very fragile food system where a lot of things can go wrong."

But Harris said there is an alternative: his style of farming.

Harris moved towards sustainability in the 1990s because of concerns about the environment and animal welfare. White Oak Pastures, which has \$20m in annual sales to Tyson's \$42bn, has not sent panicked missives warning about meat shortages and is not being forced to kill its animals, as farmers who rely on corporate processing plants are.

Instead, online sales have jumped fivefold; it has hired 16 more full-time employees; and any slowdown in processing will simply mean cows have more time to munch and meander in the grass.

"We're not bulletproof. I could have a lot of people get this sickness and have to close the plant. I hope not, but it could happen," Harris said. "But we are doing all we can to prevent it, not just because of the economics of closing the plant but because we don't want our people sick."

In a country where people consume on average more meat each day than the government recommends, the Covid-19 outbreak is far from catalysing a meat-free America.

Instead, it's exposing how fragile big meat's supply chain is and making a case for smaller, more resilient models.

"This virus is a warning shot, and it provides us with an opportunity to change our food system in ways that are less susceptible to disruption," said Bob Martin, food system policy director at the Johns Hopkins Center for a Livable Future.

Issues with factory farming are well-documented. Slaughterhouses are one of the most dangerous workplaces in the country; employers often exploit a mostly immigrant workforce; increasing line speeds threaten food and worker safety; and meat consumption is a huge drain on the environment.

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The alternatives, meanwhile, appear to be thriving in the wake of the outbreak.

White Oak is among the independent farms and butchers seeing a growth in business because of the outbreak. At Marksby Farm in Kentucky, individuals and grocery stores were seeking more of its grass-fed, antibiotic-free beef. Restaurants have been selling their supply direct to consumers, and other small farmers have turned to social media to do keep up with demand.

There is plenty of meat

The problem Tyson warned of is not actually a meat shortage, but a shortage of slaughter capacity.

Workers at industrial slaughterhouses, who are overwhelmingly immigrants and people of color, are among the most vulnerable to Covid-19 because of their working conditions. At least 20 workers have died and more than 5,000 have been infected, forcing some slaughterhouses to shut.

For operations like Tyson's – which had capacity to process 45.6 million heads of beef, pork and poultry a week in 2019 – one plant closure can cause a glut of millions of chickens or thousands of hogs at one farm. Industrial farms don't have the space or resources to keep these animals alive, and millions are expected to be euthanized in the coming weeks.

Industrialization forced US farmers to be more dependent on slaughterhouses belonging to just four multinational corporations. In 1967, there were 10,000 state and federal inspected slaughter facilities across the country. Today, there are 2,700.

A lobby which represents cattle farmers and ranchers, R-Calf USA, wrote to the White House urging it to consider restructuring the beef industry so there are more plants owned by more people. "This high level of physical and geographical concentration of America's vital beef supply chain is intuitively and inherently contrary to America's food security interests, as now unequivocally demonstrated by Covid-19," the letter said.

Despite Tyson's warnings about meat shortages, executives painted a much rosier picture of their financial situation in an earnings call this week.

The value of Tyson shares has fallen, but executives said the export business remains strong and they were recovering from a drop in sales to food service with a sharp increase in retail sales.

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Tyson's chief executive, Noel White, said on the call: "We're well-positioned to operate during this period and to take advantage of increasing demand during the recovery."

These statements are meant to assure investors, but they also highlight that the burden is falling on workers and the farmers they purchase from, not the people in the corner office.

Hungry for change

Experts said for a radical shift to take place, grassroots activists have to unite to overcome the immense economic and political power of the meat industry.

The same day Tyson ran a full-page ad warning of a possible meat shortage, the Trump administration put the power to close or open a plant in the hands of the federal government, not local authorities. In an executive order, the administration also shielded companies from lawsuits by employees who contract Covid-19.

Although Republicans and Democrats are susceptible to meat industry lobbying, breaking up big meat became a popular position in the Democratic presidential race.

Bernie Sanders and Elizabeth Warren promised to strengthen laws to limit monopoly power in agriculture. Joe Biden has pledged to expand labor protections for agricultural workers and to reinstate safety protections rolled back by Trump.

"This is an opportunity for meat-eaters to join together with sustainable producers of meat, and with meat and dairy industry workers, to all unite together and say we want a better system," said Nina Ichikawa, executive director for the Berkeley Food Institute, which seeks to expand access to healthy, affordable food.

Ichikawa said: "Covid-19 is making this more possible because we all have this collective fear of Covid-19, and we have collective vulnerability, so all our eyes are turning to meatpacking."

[theguardian.com](https://www.theguardian.com), 10 May 2020

<https://www.theguardian.com>

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Compound found in medicinal fungus can “rapidly” reset the body clock

2020-05-07

In the future, people getting ready for a flight — and fearing impending jet lag — might fit an assortment of additions into their carry on: masks, gloves, and maybe a medicinal mushroom hailed for delivering animalistic sex drive.

That’s because a new study suggests that a synthetic form of cordycepin, a compound found in a medicinal fungus with a reputation for keeping bedroom doors closed, may help ease the pain of jet lag.

Cordycepin is the active ingredient in a fungus called *C. militaris*. This fungus gets its sexy reputation because it’s similar to a rare fungus called *C. sinensis*, which is found protruding from the corpse of dead caterpillars high in the Tibetan Himalayas. The difference is that *C. militaris* is much cheaper, and in turn, much easier to get. (*C. sinensis* has memorably been described as “Himalayan Viagra” and sells for about \$35,000 per pound in China.)

In this study, a synthetic form of cordycepin was evaluated to see if it could be curative for something else: jet lag.

The results were positive: In mice, scientists found that synthetic cordycepin drastically helped the animals adjust to time change. Normally when mice are exposed to an 8 hour time change — imagine flying from New York to Abu Dhabi — it would take them 10 days to adjust. The mice on cordycepin took only four days.

Erquan Zhang, the study’s senior author and an assistant investigator at The National Institute of Sciences Beijing, tells *Inverse* that these results suggest that **CORDYCEPIN CAN HELP RESET OUR CIRCADIAN RHYTHM**. That’s the cycle of hormone release that governs our sleep and wake cycles as well as other processes. It’s also known as the biological clock and the body clock.

“We want to let people know that drastic and quick changes for our body clock are possible,” Zhang says.

The study was published Wednesday in *Science Translational Medicine*.

THE BODY CLOCK— The biological clock has little to do with the time on an actual clock. It’s a cycle of hormone release in the body that is sensitive to light, that’s relative to our genes – there are «morning larks» who

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naturally awake early and «night owls» who find they’re most active late at night.

When those schedules get out of whack, people can develop serious health conditions — an effect especially seen in night shift workers. Working against your biological clock can also affect your quality of life: It can make exercise feel harder or affect mental health.

The average American lives about 75 minutes out of sync with their biological clock, a 2018 *Cell* paper estimated. This phenomenon is called social jetlag. It refers to a misalignment between your social time and your biological time, as opposed to the jetlag you’d get from flying to a new time zone.

WHY A FUNGUS CAN BENEFIT THE BODY CLOCK — This study examined whether a synthetic form of cordycepin could eventually fine-tune our body clocks and help us manage social jetlag and travel jetlag alike.

The team performed a series of experiments on cells and in mice. When they dosed mice with either 15mg/kg or 45 mg/kg of the synthetic cordycepin, the mice were able to more easily adjust when they were forced to live in a “time zone” 8 hours earlier than what they were used to, as compared to mice who did not receive the compound.

That same pattern held when the mice were put in a time zone 8 hours behind their own (imagine flying from New York to Baker Island, an uninhabited island about halfway between Hawaii and Australia).

“In both cases, our drug administration shortened the adaptation time to at least one half,” says Zhang.

HOW IS THIS POSSIBLE? — The team found the synthetic cordycepin can bind to an enzyme called RUVBL2, and influence transcription of clock genes. These are genes when are turned “on” and “off” as the body goes through our 24-hour cycles.

RUVBL2, importantly, was abundant in areas of the mouse brain like the suprachiasmatic nucleus of the hypothalamus. This is the light-sensitive area of the brain that is the master controller of our circadian rhythm.

Cordycepin binds to RUVBL2, which creates a cascade of changes. First, a crucial protein is forced to leave chromatin, a structure that condenses DNA into packages (like a .zip does for images). Once that protein leaves,

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other genes related to the circadian rhythm, called E-box genes, are transcribed freely.

Cordycepin can be thought of as a key that “unlocks” the ability to transcribe those genes. Once that happens, a new oscillation (or a cycle of 24 hours) begins. The clock is reset.

Overall, Zhang theorizes that this “magic drug can change the clock phase up to 12 hours.”

“A timed regulation of our internal body clock is possible.”

Because this study was conducted on mice, more work needs to be done to gain an understanding of how this happens in people. But those who might benefit most, Zhang says, are shift workers and travelers who are “dire need” of a manner to control their body clocks.

[inverse.com](https://www.inverse.com), 7 May 2020

<https://www.inverse.com>

Some comb jellies survive the winter by eating their young

2020-05-07

You wouldn't want this creature as a parent. An invasive species of jellyfishlike animal in the Baltic Sea may survive harsh winters by consuming large numbers of its larvae, new research suggests.

Mnemiopsis leidyi—commonly known as the sea walnut (above), because of its shape—is native to the western North Atlantic Ocean. But it has proliferated in European waters in recent decades, likely after hitching rides in the ballast waters of cargo ships. In the western parts of the Baltic Sea, the species' end-of-the-summer population booms ravage the base of the marine food web, including fish eggs, fish larvae, and small crustaceans. But the creatures need lots of food to bulk up for winter—and the largest source of sustenance at that point is their own offspring.

Field studies in a fjord near Denmark, including analyses of freshly caught comb jellies, found adults that had indeed consumed larvae of their species. And lab studies back up that finding, researchers report today in *Communications Biology*.

Cannibalism may help solve the mystery of why these creatures produce so many larvae in late summer even though they'd be unlikely to

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survive the upcoming winter. The team estimates that consuming large numbers of larvae at the end of the Baltic summer provides adults with an estimated 2 to 3 weeks of nourishment. That, in turn, leaves the adults with adequate reserves to survive 80 days at winter water temperatures without consuming any prey at all.

The details of the scheme's energy balance aren't yet fully understood, the researchers admit. Yes, it takes a lot of energy for adults to produce larvae that won't survive the winter, they note. But on the upside, those larvae are, in essence, gathering food for the adults by consuming prey further down the food web.

[sciencemag.org](https://www.sciencemag.org), 7 May 2020

<https://www.sciencemag.org>

'Them plants are killing us': Inside a cross-border battle against cancer and pollution

2020-05-07

SAULT STE. MARIE, Mich. — A January storm has covered the bungalows here in sparkling snow. Men wearing gloves and hats pulled over their ears steer snow-blowers in and out of driveways, launching powder into the air.

This small city in Michigan's Upper Peninsula is where the state kisses Ontario. An international bridge connects them across the St. Marys River that flows between Lake Superior and Lake Huron. The river marks the international border between the U.S. and Canada.

Photographer Christopher Katsarov Luna drives slowly. I turn around in the passenger seat to watch Torry Ruddell in the back, her brown hair falling as she hunches over hand-drawn maps of the area. Many houses are colored red, indicating that at least one person there has or had cancer.

“Down there my great-grandparents lived,” Ruddell, 44, points.

“It's got a red circle,” I notice.

“Yeah, my great grandmother, my grandmother, my great aunt and all of my aunts had breast cancer,” she says in a matter-of-fact tone. “My great grandfather had skin cancer.” Her mother also survived uterine and cervical cancer.

We keep driving. “Those people right here, their son had brain cancer,” she says. “He passed away when we were young, still in high school.”

Many things can increase one's risk of developing cancer — genetics, smoking, exposure to the sun or radon gas — but there's no doubt in her mind what's making people sick.

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There are other serious illnesses on the map, too, including heart and autoimmune diseases and deformities. But the homes in red are what we focus on.

Many things can increase one's risk of developing cancer — genetics, smoking, exposure to the sun or radon gas — but there's no doubt in her mind what's making people sick.

Ruddell grew up across the street from the Northwestern Leather Company tannery that once stood in this area. From 1900 until it closed in 1958, it dumped toxic chemicals on site. Testing in the late 1970s by Sault Ste. Marie State College and the Michigan Department of Natural Resources found especially high levels of hexavalent chromium in the soil and groundwater.

Hexavalent chromium, or chromium-6, is a chemical made infamous by the film *Erin Brockovich*, which tells the true story of how Pacific Gas & Electric contaminated drinking water with chromium-6 in the town of Hinkley, Calif., causing people to develop cancer. The International Agency for Research on Cancer has classified it as carcinogenic to humans, and studies have shown that workers exposed to chromium-6 have a higher instance of lung cancer. Even at low levels, chromium-6 can cause dermatitis and skin ulcers.

The Michigan tannery site was remediated in 2007, but data obtained by non-profit organization the Environmental Working Group shows the area still has unhealthy amounts of chromium-6 in its drinking water.

As a kid, Ruddell played on the former tannery site, wading in the mud up to her neck. She picked and ate berries that caused rashes doctors couldn't explain. There were no signs or fencing warning people to stay away.

Today, a six-foot chain-link fence surrounds the site. On the other side of the fence, there's a sign covered in snow. I climb over and brush away the snow. It warns against digging wells for drinking water: "Buried tannery waste located on site."

But the tannery isn't the only source of pollution here. There's a scent in the Michigan air that's familiar to people on both sides of the river. It smells like burning tires and rotten eggs.

I ask Ruddell where it's coming from. "That'd be from across the water there," she says.

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On the other side of the river, a brown steel plant with tall chimneys sticks out against the white landscape. Algoma Steel, the second-largest steel plant in Canada, has stood there since 1902. It belches fumes every day of the year, including Christmas, and has a special exemption from the Ontario Ministry of the Environment, Conservation and Parks allowing it to emit benzene and benzo(a)pyrene, both cancer-causing pollutants, well above provincial health standards.

It's too late to do anything about the legacy pollution from the tannery or the steel plant, but Ruddell is part of a growing movement of people in the U.S. and Canada organizing against what they perceive as a new threat.

I remember Ruddell's words when I first called in December: "Them plants are killing us, and they want to put another one in there."

The Ring of Fire

For nearly a decade, companies and governments have eyed northern Ontario's Ring of Fire, a circular mining concession named after the Johnny Cash song, as a promise of economic prosperity. Canadian mining company Noront Resources owns the vast majority of the mining rights in the chromite-rich region, which spans 5,000 square kilometers (2,000 square miles) of the James Bay Lowlands, one of the largest wetlands in the world.

Mining experts have their doubts about how much the Ring of Fire is actually worth, and a lack of roads in the region has hampered development for years. But a recent commitment from the Ontario government to build roads has reinvigorated Noront's plans to mine chromite and process it in a plant the company hopes to build in Sault Ste. Marie, Ont., nicknamed the Sault (pronounced «the Soo»).

Last year Noront entered into a 99-year lease with Algoma Steel to use a brownfield site (a site with a history of pollution) next to the steel plant to build a new ferrochrome production facility — the first of its kind in North America.

Chromite is a mineral used to make stainless steel. First it is converted into ferrochrome through a high-temperature smelting process that can produce chromium-6.

The facility would sit on the banks of the St. Marys River, which connects two massive freshwater lakes and crucial fisheries. It would also be near people's homes, leading locals to consider selling their houses.

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One man told me his family has lived in the area since 1840, and if the plant is built, he's moving to Panama.

First Nations leaders came forward to say they weren't consulted. More than 50 doctors signed an open letter opposing the facility and a Facebook group called "No Ferrochrome Plant" sprung up, attracting 4,600 members.

Cancer rates in the Sault are already high — the area has the highest age-standardized rate of cancer in Ontario and the highest provincial rates of lung and prostate cancer. Smoking is more common in the region but doesn't fully account for the rates. The city's P6C postal code also has double the national rate of a rare cancer, acute myeloid leukemia. A [2019 study](#) found «disease clusters» of the leukemia in four industrial border cities, including the Sault, suggesting pollution from industry as a possible cause.

The facility will export stainless steel to the American market, but Noront says the plant will bring work predominantly to locals, creating 300 to 500 full-time and 1,500 indirect jobs.

The potential economic boost is welcome news to many locals who remember the years of instability and uncertainty when Algoma Steel, the city's main employer, went bankrupt and was bought by another company in 2007.

The ferrochrome facility will not increase cancer risk in the Sault, Noront president and CEO Alan Coutts insisted in an email. He says the ferrochrome smelting process the company is planning will be nothing like the Erin Brockovich story.

As a by-product of smelting, "the ferrochrome facility may produce trace amounts of chromium-6, which will be captured on the site and destroyed," Coutts says. Noront wants to use closed-arc furnaces, which the company says generate the smallest amounts of the toxic chemical in the industry.

"If we can't build a plant that is safe for the employees, the citizens and the environment, we won't build it," Coutts says. Yet suspicions are growing around the long-term viability of Noront and the company's ability to successfully finance its Ring of Fire and ferrochrome plant aspirations — expected to cost in the tens of billions. As [The Globe and Mail reported](#) in October, Noront is in «dire financial shape,» holding US\$47.8 million in

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debt and, because of overhyped projections of accessible mineral value in the Ring of Fire, has had trouble attracting investors.

But those abstracted challenges for Noront have done little to alleviate the concern growing on the ground in the Sault.

Before the ferrochrome announcement, many residents were resigned to the fact that they live in an industrial city with high cancer rates.

Now, the possibility of another industrial plant has awoken the fight in them.

'At what cost?'

With 2,800 employees, the Algoma Steel plant is the largest employer in the Sault, providing the best paying and most stable jobs in the city. It's the sole source of income for many families and a point of pride for residents. Prime Minister Justin Trudeau underscored the plant's national importance when he visited workers during his May 2019 re-election campaign.

Algoma churns out steel used in manufacturing, construction, mining and more. Some of it ends up in military vehicles. "That's a big-dollar contract for us," says Andrew, a steelworker, who asked that his real name not be used for fear of losing his job.

Speaking over the phone, Andrew says he is grateful for his work. It provides for his family, and his benefits helped pay for his daughter's leukemia treatment before she passed.

She was in grade eight when she began complaining of pain in her ankle. The doctors in Ottawa did everything they could to keep her alive, Andrew says. She lived just long enough to graduate high school.

"One day she's graduating grade eight. The next day she's fighting for her life."

Andrew has worked in industrial plants in Sault Ste. Marie and nearby Sudbury and it pains him to wonder if living near the plants contributed to her cancer.

"I just don't want to see more children dying of cancer for the greed of these corporations," he says.

To make steel, iron ore is smelted in blast furnaces where high temperatures, created by coking coal, remove impurities and add carbon.

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In the process, coking coal is heated to more than 1,000 C (about 1800 F) in ovens until it forms into hard, grey rocks, known as coke.

The smelting process emits coke oven gas and sulphur, Andrew explains. It smells like rotten eggs. "It's a putrid smell."

Work at the plant can be dangerous and Andrew says recent events have made him question whether or not the company can keep him and other workers safe.

On February 26, a team of Algoma Steel workers were tasked with clearing coke oven sludge from a pipe by flushing it with water, according to Mike Da Prat, president of United Steelworkers Local 2251. Suddenly the hose of the vacuum truck they were using burst, spraying liquid everywhere and exposing workers to hydrogen cyanide. Three workers were rushed to hospital.

"A person got covered in it, and some other people [inhaled] fumes from it," Da Prat says.

Hydrogen cyanide, a colourless and extremely poisonous gas with a smell of bitter almonds, is produced in coke ovens like those used at Algoma Steel. Hydrogen cyanide is so deadly that it's used as a chemical weapon and for death row executions.

Da Prat says this wasn't the only incident: in February, two contract workers inhaled hydrogen cyanide while cleaning a tank. They, too, ended up in hospital.

In other recent incidents, blood work revealed workers had low red blood cell counts, a telltale sign of benzene exposure, Da Prat says.

"We've got job safe practices and workplace procedure," Da Prat says. "What happened is, through sloppy management, they've been lax, [the practices and procedures] haven't been adhered to, they haven't enforced them." He says workers can't sue Algoma; they have to file a claim through the Workplace Safety and Insurance Board (WSIB).

"It'll be nothing unless you've got severe injuries." The loss of a kidney and part of a bladder was worth \$3,300 in a 2008 compensation claim, he says.

Algoma Steel spokesperson Brenda Stenta says the workers who ended up in hospital were all released. In response to the incidents, the company introduced new safety rules requiring workers to wear more personal protective equipment. The company is investigating the events alongside the steelworker unions and the Ontario Ministry of Labour, Training and

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Skills Development. Stenta says worker safety is the company's top priority and it will act on the findings of the investigation.

When Andrew heard his co-workers had been exposed to hydrogen cyanide, he felt frustrated and upset. "It's like we are the guinea pigs for companies' profits," he says.

Andrew first awoke to the dangers of industry when he worked at a plant in Sudbury. The air inside was thick with dust and smoke. In the decade since he left Sudbury and moved back to the Sault, at least 10 people he worked with in Sudbury have passed away. The youngest was 39. "Most of it was cancer," he says.

The conditions are similar at the Algoma Steel plant, but he doesn't have much choice. "I know I'm putting my health on the line working there every day to provide for my family, but there's nothing much out there in the city, 'cause it's a steel town, eh."

"Everybody knows the steel plant's dirty, but it's what built the city," he continues. "If the steel plant did shut, this city would become a ghost town."

Losing his daughter and friends has made Andrew think hard about the ferrochrome facility.

"It's insane for the city to allow a smelter that will employ 300 people, maybe more, for the profit of the mining industry, where they're not even looking at the health and safety of the population."

A study of a ferrochrome plant in Finland found that the plant's emissions contaminated wild berries with chromium-6 and other heavy metals. Concentrations were higher within three kilometers (about 1.8 miles) of the facility. While no one lives within a 2.5 kilometer radius of the Finland plant, people do live across the street from the proposed site of Noront's facility.

Some Sault residents were under the impression the facility will be modeled after the Finland plant but Coutts says that's not the case. Noront's chief development officer Stephen Flewelling has said, because of its unique design, the facility will be the first ferrochrome plant of its kind in the world.

Coutts says the design by Canadian engineering firm Hatch will use direct current electric arc smelting and preheat the ore. According to Noront, the process will recover more chromite so it can end up in the ferrochrome

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rather than in the leftover waste products known as slag. He says direct current results in better control and capture of chromium-6.

Coutts says the facility will also have “excellent dust control and capture,” which will allow dust from the furnace to be recycled.

Chromium-6 forms in the presence of heat and oxygen, Noront says, so the facility will smelt the ore in a non-oxygenating environment.

But Coutts says the design won't be finalized until three to five years from now, raising the question of how the company can already be so sure of its safety.

Andrew says unemployed young people desperate for work might see the facility as a benefit to the city.

“It's creating jobs,” he says. “But at what cost?”

Cancer claims

Tammy Francis and her cousin Earl Dunn invite me and photographer Christopher Katsarov Luna to Reggie's West, a cavernous dive bar frequented by steelworkers in the Sault. We sip cold beer at a table in the back where we won't be overheard.

Francis, 55, has a small frame and long blond hair that falls in tight waves. She's standoffish at first, but quickly warms up and is unafraid to speak her mind.

She worked at the steel plant for 12 years as a contractor for a fiberglass company. “It's the dirtiest place I've been in my life,” she says. “I've been in oil tanks and different things — that steel plant's no comparison. I refuse to work in there any longer.”

Partly to escape conditions at Algoma Steel, she found work out west. I was lucky to meet her on a trip home as she waits for the next call from Alberta.

Francis has a big family and spends as much time with them as she can. They grew up together in a home in the P6C postal code. But in recent years, her clan has shrunk in numbers. She lost her dad in 2011, followed by her two brothers — all steelworkers, all cancer.

Francis has her dad's eyes. Reginald Francis was 89 when he died.

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On Nov. 20, 2011, he went into the hospital with abdominal pain. The doctors found a mass in his colon. He had surgery on Nov. 22, and passed away Dec. 2.

Workplace Safety and Insurance Board records confirm he worked at the steel plant from 1947 to 1989 and succumbed to colon cancer. Tammy says he smoked cigars and a pipe until he quit in his early 40s.

The union provided The Narwhal and Environmental Health News with a list of occupational disease claims that are currently accepted by the insurance board. It details the toxic chemicals that Algoma Steel workers have been exposed to on the job — benzene, coke oven emissions and asbestos are the most common. Chromium-6 is also on the list; the insurance board says workers may develop lung cancer from cumulative exposure to chromium-6 in steelmaking.

When Francis filed her dad's compensation claim in 2011, the insurance board had a policy covering colon cancer and asbestos exposure, acknowledging an association between the two. But after reviewing his case, the adjudicator wrote in a letter to Francis that she found “limited evidence for an association between stomach cancer and colorectal cancers and exposure in asbestos industries.”

The adjudicator acknowledged her dad may have had “some exposure” to asbestos but not enough to warrant compensation.

“To qualify for benefits, the evidence must show that it is more probable than not that the workplace exposures at Algoma Steel significantly contributed to the development of his colon cancer,” the adjudicator wrote. “I was not able to conclude that Mr. Francis's colon cancer was causally related to other workplace exposures at Algoma Steel.”

Francis appealed the decision in 2013 and is still waiting for a response. She contacted the union about his case, but she doesn't believe the union is doing enough to help.

According to the union, as of August 22, 2019, there were a total of 106 colorectal cancer claims like Francis's dad at Algoma Steel, but only 10 of those claims were accepted.

The numbers show compensation claims for cancer and other diseases are a long shot.

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Since 2001, Algoma steelworkers and their families have reported a total of 1,430 cases of serious illnesses and cancers. Of those cases, 960 claims have been denied and only 320 claims allowed.

The majority of the total — 895 claims — were for cancer. Only 164 of these were accepted by the insurance board.

In the six years between 2001 and 2007, families filed claims with the insurance board for 40 Algoma Steel workers who died due to occupational disease, according to the union. The deaths led the union to organize an intake clinic in May 2008 to reach out to the community and identify cases that had gone unreported.

Francis doesn't care about the money. If her dad's claim had been allowed, she says it would have meant an acknowledgement that Algoma Steel is polluting the city and causing death.

"If I could have had one more hug, one more kiss — not a million dollars could replace that," she says. "One more day with my father, or my brothers for that matter. I would give my life to have one more conversation."

Francis heard about the ferrochrome plant from a Facebook post. "First, of course you think jobs for the city," she explained. "But as soon as I started looking into it at all, I was 100 percent against it."

In September, a group of local doctors published an [open letter](#) suggesting they might leave town if the ferrochrome facility is built: «Such facilities are strongly associated with increased cancer rates, mortality, and poor health. Our community already suffers from excessively high cancer rates, amongst the highest in Ontario.»

"The site of the Noront facility would be in the heart of our city and on the shores of the Great Lakes waterway with the potential to expose the 70,000 people in our city and the 30 million around the Great Lakes to its toxic by-products," the letter states.

Rob Suppes, the emergency room doctor who spearheaded the letter, told me people come into the ER with injuries and he's the first one to tell them they have cancer. It's one of the hardest parts of his job. Sometimes they're quiet, sometimes they have questions, sometimes they cry. Suppes, who previously practiced in Winnipeg, says never before working in the Sault has he had to diagnose so many people with cancer.

When Francis read the doctors' letter, she immediately worried about the health effects, and her grandkids. "What are we leaving them?"

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The idea of a ferrochrome plant has made her reflect more on the industry that's already here.

"The air we breathe in this city is unreal," she says. "The smell of eggs at times, the cloud over [the Sault] on a sunny day is unreal. Honest to God ... I don't know how they're getting away with this."

Algoma Steel's free pass

Luna and I are up before dawn on a frigid Sunday morning to meet Selva Rasaiah, a former auditor of Algoma Steel who has agreed to show us the plant's emissions from his favourite vantage point. Rasaiah takes photos of Algoma's emissions on his own time and writes letters to the Ontario Ministry of Environment when he spots potential violations.

We drive to the base of the towering international bridge on the Canadian side. Rasaiah leads us on foot under the bridge, across train tracks and up a hill through deep snow drifts. At the top of the hill, we see plumes of smoke glowing against the dark sky. The only sounds are a low hum from the steel plant, a truck beeping in the distance and Rasaiah's voice.

Rasaiah is a talker, especially about environmental regulations. He explains that the clouds we're seeing are mostly a mix of water vapor and carbon dioxide. Some emissions are from industrial plants owned by other companies: Praxair, an industrial gas company, and Tenaris, steel pipe and tube manufacturer. But the majority of the visible emissions are from the steel plant, Rasaiah says.

The environment ministry says it sets "science-based" air quality standards to protect human health, but recognizes that companies can't always meet those requirements. So it grants [exemptions](#) — called «site specific standards» — on the condition that emissions improve over time.

As of July 1, 2016, the Ontario air standard for benzene was set at an annual average of 0.45 micrograms per cubic meter. But the ministry allowed Algoma to emit an annual average of 5.5 micrograms per cubic meter until the end of 2019. As of Jan. 1, Algoma Steel's new limit is an annual average of 2.2 micrograms until June 2021. It's not yet clear if the company will meet that limit.

The ministry says it monitors compliance with the site-specific standard by confirming that Algoma Steel is implementing an action plan designed to reduce emissions.

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Algoma is required to observe and record visible emissions from its coke oven batteries and report them on an annual basis. If the company exceeds air standards, it must submit an updated action plan on how it will address the issue.

But Rasaiah questions the reliability of the company's self-reporting.

In summer 2018, he worked for Pinchin Ltd., auditing Algoma's emissions. He used something called Method 303 to check for visible emissions of benzene and benzo(a)pyrene.

When workers fill the ovens with coal, it's called charging. While working for Pinchin, Rasaiah would look for yellowish-orange raw coking gas coming out when the ovens were charging and time it. This gas contains benzene and sulphur. Rasaiah would count the number of leaks, time them and tap the results into a tablet. The numbers are run through a formula to model the total amounts of benzene and benzo(a)pyrene.

Although he is no longer an auditor at the plant, Rasaiah continues to visually monitor emissions from the plant and documents them with photos and video. When a reportable event occurs that should trigger a report with the ministry, Rasaiah says he checks the government's website. There are several recent occasions when emissions events should have been reported to the province, but were not, according to Rasaiah, who says he notifies the ministry every time he documents this happening.

The ministry says it received annual reports from Algoma Steel in 2017 and 2018 showing estimates of its benzene levels were below the site specific standard. Algoma Steel hasn't handed in its 2019 benzene report yet.

The company also has to meet opacity limits — opacity is the degree to which an emission obstructs light. Algoma must meet a limit of no more than 20 percent of light blocked over six minutes.

Companies must report discharges and spills to the ministry in a timely manner. Residents can also call the ministry's Spills Action Centre if they see pollution. When the ministry receives a report, an environmental officer looks into it and decides how to respond.

The ministry says it takes "swift and prompt actions" when companies break the rules and can fine or prosecute them.

In the last 10 years, the Ontario Ministry of the Environment has prosecuted Algoma Steel and its predecessor Essar Steel Algoma on two occasions, leading to convictions and \$200,000 in fines. Also in the last

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decade, the ministry has issued four environmental penalty orders with an additional \$27,000 in fines, and 11 provincial officer's orders requiring improvements to operations.

Rasaiah says air pollution from the steel plant is drifting across the river from Canada to the U.S. Fine particulate matter, also called PM 2.5, is tiny particles in the air so small that when inhaled, they can reach the lungs and lead to all kinds of health issues, including asthma. Long-term exposure can lead to lung cancer and heart disease.

"It's going to affect your lungs, no different than if you smoke," he says.

The Inter-Tribal Council of Michigan installed an air quality monitor for PM 2.5 on the U.S. side of the river to monitor fumes from Algoma Steel.

"I feel that the American side is by far getting the worst pollutants, because of the direction of the wind," says Robin Clark, an ecologist with the council.

It's tough to prove, though. The group removed the air quality monitor last year because PM 2.5 levels weren't high enough to be of concern. But Clark believes the monitor was in the wrong location for the wind direction, leading to lower readings.

"We're all in the same air shed, whether it's Canada or the U.S. We all own this air that we're breathing," she says. "Except now a corporation is going to be taking it further."

Noront hasn't approached the ministry about the ferrochrome plant yet, so it's not clear what specific limits or regulations the facility would have to meet.

Noront says they will run an environmentally responsible facility, but Rasaiah asks: if the ministry gives exemptions to Algoma Steel, will it go easy on the ferrochrome plant too?

First Nations opposition

Seven people attend a "petition party" on a Saturday in January in Sault Ste. Marie, Ont. The storm outside may have kept people away, but Rasaiah is here, eager to chat about regulations.

Kathie Brosemer, environmental program manager for the Sault Tribe of Chippewa Indians, is organizing events like this regularly to gather signatures opposing Noront's facility. She lives in Canada but travels to the U.S. for work.

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The Michigan-based Sault Tribe passed a resolution against the facility, stating that the tribe must protect the land, air and water, and that ferrochrome production has a track record of pollution.

A woman drops by with a yellow folder containing four pages of signatures, about 240 names, bringing the total to about 1,000.

The Sault Tribe is not the only Indigenous community opposing the ferrochrome plant.

In December, the Batchewana First Nation on the north side of the river came out against the project. In a statement, the chief and council said the decision did not come lightly, and it was their duty to protect the land and waterways. Chief Dean Sayers did not reply to a request for comment.

The chief and council reached the decision based on several key principles, including the Water Declaration of the First Nations in Ontario, which states that First Nations have laws and protocols to ensure clean water for all living things, and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which says they have the legal right to own, use, develop and control their lands and resources.

Garden River Chief Andy Rickard was elected last September and the ferrochrome facility has been top of his agenda since then. He says many Garden River community members disapprove of the project. Noront has reached out to him to set up a meeting. He says his community will make a decision once the company answers their many questions.

Rickard says his community suffers from high rates of cancer, especially among young people. Too often he sees online fundraisers for cancer treatments.

The chief of another local community, the Missanabie Cree First Nation, declined to comment for this story.

Noront CEO Alan Coutts says the company had set up meetings with the chiefs and councils of the First Nations. Asked if any First Nations had consented to the project, Coutts says, "We have not asked for consent — it's too early in the process. Once we have the design and test work complete, we will communicate the results and will allow people to make informed decisions based on factual information."

Coutts says the company had not yet consulted with anyone on the Michigan side of the river. He says the company was currently scheduling meetings with "various interest groups, including in Michigan."

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"Consultation is a formal process that will begin when the design is finalized and the environmental assessment begins," he says.

Blindsided

Sault Ste. Marie mayor Christian Provenzano says the city first began talks with Noront about the facility in November 2016. The company announced it was holding a formal competition, asking cities to compete against each other to be selected as the site for the ferrochrome facility.

On May 10, 2017, Noront presented the idea in the Sault during a luncheon. Provenzano says this was a public event and listing for the meeting notes tickets were available for sale: \$28 plus tax for Chamber of Commerce members to attend; \$38 plus tax for non-members.

The mayor says in an email that there was "little time" between the date that Noront sent a request for information and the deadline for a proposal. He says he didn't have enough information to host public consultations.

Usually if a company is selecting a site for a facility, it will do work to identify an appropriate site. In this case, Noront invited cities to do that legwork.

"There was so much interest in attracting the facility that we wanted any city that qualified to have a chance to attract the plant," Coutts says.

According to emails obtained through freedom of information, the mayor and city representatives made dinner reservations with the Noront team on Feb. 1, 2018 at Luma, a contemporary seafood restaurant in downtown Toronto, to present their submission.

Coutts says he didn't pay for dinner. The mayor says the city split the bill with the Sault Ste. Marie Economic Development Corporation.

As the city courted Noront, there were still no public consultations. Then on May 7, 2019, Noront and government officials announced the 'good news.' The mayor said after a hard few years the Sault had been selected for the ferrochrome plant and was "open for business." He said this was only the beginning of the process, and next steps would include environmental assessments and consultation.

Blowback was immediate.

The next day, Batchewana First Nation issued a press release saying the announcement "came as a shock" and they had not consented. Chief Dean Sayers says he had met with the Sault Ste. Marie Economic Development

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Corporation in January 2018, but says “they didn’t go far beyond a simple introduction to the project.” Sayers says the nation sent a letter to the city outlining the steps forward to secure consent, but never heard back.

On its [website](#), the city says its bid to Noront “included letters of support from Batchewana First Nation, Garden River First Nation and Missanabie Cree First Nation.”

Asked about the letter of support, Garden River Chief Andy Rickard says, “I think that’s a false interpretation of that.” He says the previous chief had provided a letter, but it did not grant consent.

“It wasn’t in support of the project, it was just in support of the application going in,” Rickard says.

It’s hard to know exactly what the bid contained because the city won’t make it public. The Narwhal and Environmental Health News filed a freedom of information request asking for it, but the city refused to release it. We have appealed the decision.

On Oct. 3, after sustained backlash, the mayor held a news conference. “Everything that has happened to date has happened within the full view of the public,” he said, adding that Noront doesn’t have permission to build the facility yet.

Provenzano says he understands criticism that the city didn’t engage enough with the public before submitting a bid, but adds that there will be an environmental assessment, permits and public consultation before the facility can be built.

That’s not entirely accurate.

According to the Ontario Ministry of the Environment, private sector projects including ferrochrome production facilities or smelters “are not automatically subject to Ontario’s Environmental Assessment Act.”

The environment minister could designate it for an environmental assessment, or the proponent can volunteer for one. The ministry says Noront has not yet volunteered for an environmental assessment.

“In three to five years, after the engineering, design, test work and economic analysis is completed, if we decide to progress, we would initiate a governmental assessment,” Coutts tells me in an email.

Once built, industrial plants stand for decades. In the case of the steel plant, as long as a century. They are the scaffolding on which people build

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their lives. Will the ferrochrome facility ever really be built? It’s not clear. But it has awoken a town to what they have in their backyards.

The snow crunches under our feet as Ruddell and I walk toward the old tannery site on the Michigan side of the river. Two snowmobiles zoom past. “This all should be blocked off, all of it, even the snowmobile trails,” she says.

I ask Ruddell how she feels about the ferrochrome plant.

“Some people would look at it as, this area’s already been hit, who cares? But if that happens, there’s no fixing anything then. That’s dangerous. I’ve looked into these things enough that I know what can happen.”

She worries that Americans can’t stop the ferrochrome plant. “Especially being on this side, how much can we really fight against them in Canada?”

“We can do and say whatever to try to stop it, but whose ear do you gotta pull on? I don’t know. Does it worry me? Heck yeah.”

Update April 7, 2020 12:33 p.m. PST: This article was update to note that in a 2008 worker compensation, a kidney and part of a bladder was valued at \$3,300, according to Mike Da Prat, president of United Steelworkers Local 2251. Previously it was indicated that the \$3,300 figure referred to a kidney or a bladder last year.

ehn.org, 7 May 2020

<https://www.ehn.org>

No ‘away’: why is the U.S. still offshoring plastic waste around the world?

2020-04-07

In just two short years, the world has awoken to the hidden, harsh realities of the plastic waste trade that is called “recycling.” More than 100 investigations and reports have shown serious environmental and social harms in receiving countries. In the recent “Plastic Wars,” FRONTLINE and NPR showed plastic waste from the United States (U.S.) dumped and burned in Indonesian communities in 2019. Making climate change worse, millions of tons of carbon have been emitted in shipping U.S. plastic waste to far frontiers where the reports show that the plastic waste may not have actually been recycled.

Now, a new reason to end export of post-consumer plastic waste has appeared: coronavirus COVID-19.

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Now, a new reason to end export of post-consumer plastic waste has appeared: coronavirus COVID-19. The virus is spread from human contact and was found alive on “a variety of surfaces” of the Diamond Princess cruise ship after 17 days, according to the U.S. Centers for Disease Control and Prevention (CDC). Since [transit times of sea freight shipments](#) can be less than 17 days and the [investigations and reports](#) clearly show that exported post-consumer plastic waste is often manually sorted by poor workers of all ages in unsafe conditions, there is the potential for people in receiving countries to be exposed.

Circulating post-consumer plastic waste around the world doesn't create the clean economy we need to protect human health and ecosystems. There were more than enough valid reasons to stop the plastic waste trade before the outbreak of the global pandemic in 2020. It is clear now more than ever: the harms and risks far outweigh the perceived benefits of avoiding plastic waste disposal to U.S. landfills. **Actions to find markets for discarded plastic materials collected in U.S. communities should not negatively impact communities in other countries.**

A Brief Recap

Back in 2017, there was little public understanding of what happens to plastic waste that consumers in industrialized countries put in bins for recycling. Outside of the waste and recycling industry, the U.S. public assumed that safe, clean U.S. factories ground up the plastic and American workers made it into new products. With credit to the [New York Times Opinion video “The Great Recycling Con,”](#) some of us thought it was like a scene from Toy Story. The public didn't know that the U.S. exported 276,200 shipping containers (1.5 million metric tons) of plastic waste to countries with poor waste management in 2017. As shown in the documentary “[Plastic China](#),” it turns out that our plastic waste was not cleanly or efficiently processed into new plastic products that Americans bought. It was sometimes crudely sorted, shredded and melted by impoverished families in unsafe, unhealthy conditions into low quality plastic that never returned to the U.S. in new products. A waste and recycling [expert now states](#) that even before China's policy changes, “**a lot of areas fooled themselves into thinking they were recycling when they were really not.**”

Two years ago in 2018, China enacted the National Sword policy restricting plastic waste imports to protect their environment and develop their own domestic recycling capacity. In response, many recyclers moved their

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operations from China to other countries in Asia, leading to the rise of over [two hundred illegal operations in Malaysia](#). Since exporting plastic waste is a convenient way for the U.S. and other industrialized countries to count plastic waste as “recycled” and avoid disposal costs and impacts at home, there was a significant increase of plastic waste shipments to other countries instead of China. As [Malaysia's Environment Minister stated](#): **“Garbage is traded under the pretext of recycling.”** The executive director of the [New Haven Solid Waste and Recycling Authority](#) agreed: “Ninety percent of our stuff was going over to China. They were taking all of our plastics, cardboard, paper, you name it. **We were in essence shipping them our garbage.**”

One year ago, we published “[157,000 Shipping Containers of U.S. Plastic Waste Exported to Countries with Poor Waste Management in 2018](#)” to quantify the amount of U.S. plastic waste exports and document the harms that were being caused in other countries. Over the past year, we called for an end to this irresponsible method of handling of our nation's plastic waste and asked U.S. waste companies and cities to stop exporting it.

Now we report that progress was made in 2019 in reducing U.S. plastic waste exports down to 88,000 shipping containers to countries with poor waste management. Much of the reduction was due to the effective enactment of a plastic waste import ban by India in August 2019. Another positive trend has been an increase in public awareness and opposition to this irresponsible practice and commitments from some waste/recycling companies and communities to stop exporting. **But we've also learned that the social, environmental and economic harms caused by plastic waste exports in developing countries are even worse than we knew a year ago.** In addition, the significant carbon emissions from the sea freight of exporting all U.S. plastic waste around the world have been overlooked while contributing to climate change.

As we started 2020, several nations continued to be flooded with U.S. plastic waste and we had hit a plateau in reducing plastic waste exports. Figure 1 shows that the U.S. exported 436 million kg in 2019 and is still exporting over 5,600 shipping containers (30 million kg) of plastic waste every month to countries with high waste mismanagement. That means about 225 large 20-ft (TEU) shipping containers per day landed in countries without adequate environmental, health, safety and labor laws to be processed by “recyclers” who provide no proof of what happens to the imported plastic waste.

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The actual amount of U.S. plastic waste that ends in countries with high waste mismanagement may be even higher because the U.S. exports millions of kgs of plastic waste to countries like Canada and South Korea who may re-export U.S. plastic waste to other countries. Figure 1 shows that as plastic waste exports to India declined, exports to Malaysia dramatically increased, more than tripling from 3 million kg/month in January 2019 to 9.8 million kg/month in December 2019.

Figure 1 – 2019 U.S. Plastic Waste Exports to Countries with High Waste Mismanagement Rates

Data Sources:

1. U.S. Plastic Waste Exports (U.S. Census Bureau data)
2. Country Waste Mismanagement Rates (Jambeck et. al, 2015). In this assessment, high waste mismanagement rates are considered 5% and larger.

More Harms and New Concerns Exposed

In the past year, investigations and reports have exposed more harms and new concerns:

1. Food chain contamination: As the BBC reported in November 2019: “the burning of plastic waste in Indonesia, much of which has been sent there by the West, is poisoning the food chain. Environmental group IPEN found, in one East Java village, toxic dioxins in chicken eggs 70 times the level allowed by European safety standards.”

2. Harm to domestic waste collection and recycling system development in countries that need it most. In June 2019, the Guardian USA reported that “a surge in foreign waste shipments is disrupting efforts to handle locally generated plastics” in Turkey, a country with a 16% waste mismanagement and less than 1% recycling rate. As an Istanbul recycler stated: “I want to tell people in U.S. this: recycle in your own yard. Don’t bring down our income and put us all in danger of hunger.” As Malaysia’s Prime Minister stated: “We don’t need your waste because our own waste is enough to give us problems.” The mayor of a Philippine town flooded with plastic waste imports said: “I think we have enough waste in the country to process, reuse and recycle. We don’t need waste from abroad.” In Indonesia, recycling businesses prefer to process imported plastic waste instead of investing in collection of domestic plastic waste. Proving the point, industrialized South Korea recently restricted import of PET bottle plastic waste in order to promote collection and recycling of domestic PET in their own country.

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3. Health and safety impacts to workers and communities: The Center for Public Integrity showed evidence of plastic packaging labeled “Made in USA” being burned and dumped in Malaysia. Burning of plastic is causing breathing problems in residents who live nearby facilities in Malaysia. A village in Indonesia is being buried by plastic waste imports. The Guardian reports that in Valenzuela City, Philippines residents blame recycling plants for pungent smells and respiratory illnesses.

4. Global plastic waste shell game: As some countries restrict imports, there are reports of exporters and brokers mislabeling waste and routing it through Hong Kong to avoid traceability. The Malaysian government found that brokers have been falsifying declaration forms by using other Harmonized System (HS) codes to bring in plastic scraps. As the South China Morning Post reported in January 2020, “Hong Kong is one of biggest re-exporters of waste after mainland China stopped importing it.” While Hong Kong itself has very limited plastic recycling capacity, it has become an intermediate port that enables more shipments into Asia, both legal and illegally. The re-export step creates confusion in the traceability of plastic waste. Environmental groups in Hong Kong are calling on authorities to not accept plastic waste that is not destined for reprocessing there. Even when illegal waste is found, returning the waste to the country of origin is problematic. In October 2019, the Basel Action Network reported that illegal U.S. waste shipments that were supposed to be returned to their U.S. senders were instead shipped to India, Thailand, South Korea, and Vietnam. Inspection of paper imports identified illegal plastic waste hidden in the bales.

5. Potential transmission from post-consumer plastic waste: Stored piles of plastic waste and manual sorting of post-consumer waste are creating risks for disease and virus transmission:

a. Plastic waste piles: The Tamil Nadu (India) Health Secretary said that plastic waste is one of the reasons for mosquito breeding that is causing an increasing number of dengue fever cases. The city of Laredo, Texas sent collected recyclable materials directly to landfill over concerns that storage of materials at the recycling center posed a risk to community health.

b. Manual sorting: The CDC advises that people with the coronavirus should not share dishes and drinking glasses and their waste products should be disposed. But the WHO states that “Some people become infected but don’t develop any symptoms and don’t feel unwell.” The WHO also states that coronavirus can live on plastic surfaces for “up to several days.” While a direct link has not yet been proven, it is logical to reason

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that post-consumer waste may pose a potential health risk to both U.S. and foreign workers that manually sort collected materials from people who are unaware that they have the virus. **The risk is particularly acute in poor countries where workers lack health and safety equipment.** At the time of this update in early April, concern over coronavirus spread has led to the closure of some municipal recycling curbside and community collection programs to protect workers, including throughout Orange County, California. The situation is still unfolding and the latest news is being reported by Waste Dive.

Tracing the Paths of U.S. Plastic Waste Flows

Figure 2 shows the 2019 exports of plastic waste by origination and destination for the fifteen states with largest amount of plastic waste exports.

California: With ports on the West Coast and a large population, California shipped the most plastic waste to countries with high waste mismanagement: 78 million kg (14,675 TEU shipping containers). This included 6.6 million kg (1233 TEU shipping containers) to Turkey – a nautical distance of 11,301 miles away. The carbon emissions of sea freight of California's plastic waste exports to Turkey alone are equal to the annual carbon emissions of 364 U.S. cars. (See carbon emissions estimation below).

Northeast States: Prior to the enactment of India's ban on plastic waste imports on August 30, 2019, states in the Northeast U.S. were shipping millions of kg each month to the country. At the peak in May 2019, New Jersey shipped 3 million kg to India in one month. By December 2019, this declined 87% to 382,000 kg.

Southeast States: While Southeast U.S. states are cited as a top location for U.S. domestic plastic recycling, the U.S. Census Bureau data shows that these states are major exporters of plastic waste to countries with high waste mismanagement rates. Georgia, South Carolina, North Carolina, Alabama and Tennessee exported 80 million kg of plastic waste to countries with poor waste management in 2019 and did not recycle that plastic waste in their states.

Figure 2: Top 15 U.S. States Exporting Plastic Waste to Countries with Poor Waste Management in 2019

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The Forgotten Carbon Footprint of Plastic Recycling: Sea Freight and Long-Distance Trucking Emissions

Commonly cited metrics for carbon emission savings from recycling post-consumer plastic compared to using other materials or new plastic overlook two major sources of carbon emissions: sea freight and long-distance trucking. The Association of Plastic Recycler's Life Cycle Impacts of Postconsumer Recycled Resins study is based on trucking and rail distances less than 500 miles for moving bales to processors.

Figure 3 shows the top 20 U.S. district dispatch ports exporting plastic waste in 2019. The carbon emissions from the sea freight can be credibly estimated through use of an existing sea freight carbon emissions calculator. While long distance trucking of the plastic waste from inland states to dispatch ports also creates carbon emissions, it is not possible to estimate those emissions due to lack of land logistics and route data.

Figure 3: Top 20 U.S. District Dispatch Ports Exporting Plastic Waste in 2019

Sea Freight Emissions: Employing the Kuehne and Nagel Sea Freight Carbon Calculator, the carbon emissions of dispatch port-to-receiving country port were made for the 451 shipping routes in 2019. For example, the carbon emissions of shipping 4,030 shipping containers from Los Angeles to Hong Kong was 3.45 million kg which is equal to the emissions from 750 cars for an entire year (based on the U.S. EPA's estimate of 4600 kg of CO₂/car/year). Overland transport to Canada and Mexico from nearby states and shipments less than 1 full TEU shipping container were excluded from the carbon emissions analysis.

The total sea freight carbon emissions from 2019 U.S. plastic waste exports is estimated to be 120 million kg which is equal to the emissions from 26,000 cars per year. It should be noted that while import trade from Asia enables low cost return shipping via empty containers, the "carbon cost" of adding freight weight to ships is not free or low carbon. Added tonnage requires additional fuel for transporting the freight weight.

Diversion Goals Are Pushing Plastic Waste Exports and Freight Carbon Emissions

U.S. states and the Federal Government have been promoting "diversion" of waste from landfills for decades. The pressure to "divert" plastic waste appears to be a driver for exporting plastic waste since the U.S. lacks domestic plastic reprocessing capacity. Even in states where secure

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landfills are available with long term capacity at low cost, plastic waste is being trucked long distances to ports and shipped to countries with poor waste management to meet diversion goals. Too often, the media supports the myth that “diversion” is an admirable goal and achievement without evaluating the final fate and destination of the collected waste.

For example, the state of California’s previous 50% waste diversion goal and new “75 Percent Initiative” put pressure on cities to divert waste from landfills and continue exporting plastic waste because California is not equipped to reprocess its own plastic waste. Instead of safely disposing of waste in the nearby Buckeye landfill with a 100+ year capacity, the City of Phoenix, Arizona exported waste to Indonesia to meet the city’s diversion goal of 40%.

It is time for every state and community to examine the unintended, harmful consequences of their diversion goals and revise legislation to ensure responsible management of each state’s waste. Actions to find markets for discarded plastic materials collected in U.S. communities should not negatively impact communities in other countries. The carbon emissions of waste thousands of miles around the world also cannot be overlooked.

Public Sentiment to Stop Plastic Waste Exports Grows

There has been good news over the past year as some U.S. waste collection companies and communities have ended plastic waste exports to countries with high waste mismanagement. In 2019, Waste Management adopted a corporate policy to ship post-consumer plastics to only North American plastic recyclers/processors. Casella Waste Systems, the nation’s fifth largest waste collection and sortation company, no longer exports residential plastics.

As investigations and reports showed that plastic waste exports were dumped or burned after being shipped thousands of miles, the awareness has led to growing public and professional sentiment against the offshoring practice. As the Cape May Herald reported, “Even staunch advocates of recycling began to question how this made any environmental or economic sense.”

According to chemical industry experts at Independent Commodity Intelligence Services (ICIS), “China is no longer a route for recycling and the expectation is that countries now deal with their own waste.” A representative of the Solid Waste Association of North America (SWANA)

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stated: “We’re producing a lot of waste ourselves, and we should take care of it ourselves.”

“We Cannot Turn a Blind Eye to the Hard Truths Being Uncovered”

Faced with the knowledge that their plastic waste could harm communities in other countries, responsible U.S. communities are choosing to stop exports:

- **Cordova, Alaska:** The Copper River Watershed Project has stopped collecting plastic waste because “we cannot turn a blind eye to the hard truths being uncovered. By continuing to recycle plastic, evidence strongly suggests we as a nation may actually do more harm than good because we are simply passing the problem onto countries less fortunate than ours and we are avoiding the inevitable changes society will need to make if we really want to do what is best for the environment.”
- **Erie, Pennsylvania:** The city now instructs residents to only recycle #1 and #2 plastic bottles and jugs, stating: “We cannot collect an item for recycling, unless we have an end user who is willing to purchase and recycle that item. China used to accept most of the #3, 4, 5, and 7 plastics, but it turns out that most of these plastics were not actually being recycled. They were mostly being burned for fuel.”
- **San Carlos, California:** ReThink Waste, a public agency that operates the Shoreway Material Recovery Facility (MRF) in San Carlos, California, publishes a traceable account of the destination of collected plastics and does not export to countries with poor waste management and states that collected plastics #3-7 material is sent to landfill.

Plastic Waste Trade Lacks Transparency and Accountability

But not all waste/recycling companies and communities have stopped exporting plastic waste to countries with poor waste management. Some companies and communities are aware that their waste is being shipped to poor countries and others employ brokers as middlemen in the process. Use of brokers presents a challenge to reducing plastic waste exports to countries with poor waste management because brokers are financially incentivized to maximize shipments and the original waste generators can claim that they don’t know where their waste is going and tell residents that it is “recycled.” **Use of brokers to trade waste means that contracts can change hands several times between the source and the destination without accountability.** States and cities do not require that brokers or MRFs report the final destination or fate of collected materials, including final destination countries for plastic waste exports.

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As a representative from a major waste company stated, "Plastics that are sold to brokers have the potential to be sent overseas, as well as to Canada, as the broker has the ability to do what they see fit with the material." While some brokers may operate legitimate export businesses, the lack of transparency and accountability creates an open playing field for unethical business practices.

In the comprehensive survey of the 367 MRFs in the U.S. performed for Greenpeace's Circular Claims Fall Flat report, some MRFs stated that materials collected in their communities are shipped to countries with poor waste management or to brokers. For example:

- **Albuquerque, New Mexico:** Friedman Recycling is exporting collected materials to Vietnam, India, Indonesia, and Malaysia.
- **San Diego, California:** City representative states about local recycler: "If they can't find a domestic buyer for a bale of cardboard or plastic bottles, they're going look anywhere else in the world — Vietnam, Indonesia, other parts of Asia."
- **Sacramento, California:** Cal-Waste Recovery Systems "has brokers looking for new markets, like Mexico, Vietnam and wherever it can ship."
- **Rochester, Massachusetts:** The material collected at Zero Waste Solutions new MRF will reportedly be sold to domestic markets as well as to Canada, Thailand, Pakistan, India, Vietnam, Indonesia, Turkey and China.
- **Newton, Connecticut:** City representative stated that collected materials "goes to whichever markets will take it."
- **Charlotte, North Carolina:** The local newspaper reports that "the county and its contractor, Republic Services, sometimes give away bales of plastic and mixed paper or **even pay countries to take them.**" The county's solid waste director states: "I have no guarantee what someone will do with it once they get it. Where it goes is a bit out of our control sometimes. If it stays in this country, we know it will be taken care of. When it goes to a different country, they aren't as environmentally safe. Whether they recycle it or landfill it or burn it, we don't know."

Illegal Plastic Waste Trade Grows

Reports of illegal plastic waste trade and unethical business practices grew in 2019. By January 2020, Malaysia announced that it had closed more than 200 illegal recycling factories. Flooded with plastic waste exports for more than a year, countries increased inspection and returned more

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plastic waste to exporting countries. But the lack of traceability made this difficult to do. Throughout Asia, there are many ports of entry that make it difficult for countries to monitor what is actually in shipping containers.

Examples of illegal trade activity and return of plastic waste:

- **Philippines:** Local authorities discovered illegal mixed plastic waste shipped from Hong Kong and export it back to Hong Kong (May 2019). Sixty-nine containers of plastic waste were sent back to Canada, after more than five years of debate (May 2019). The Department of Environment and Natural Resources reports that Japan, South Korea, and Australia have also dumped illegal trash in the Philippines. In August 2019, illegal plastic waste that was to be returned to South Korea caught fire in an open dump.
- **Malaysia:** In May 2019, Malaysia announced that they are returning 3,000 tonnes of plastic waste to the countries of origin that shipped it. Since the third quarter of 2019, Malaysia sent back 150 containers of plastic waste. Greenpeace Italy found that 43 of 65 shipments were destined for Malaysia plants without permits to import and recycle foreign waste in 2019.
- **Indonesia:** In June 2019, Indonesia announced the return of plastic waste. In September 2019, Indonesia announced the return of 547 shipping containers to European countries. Civil society groups in East Java, Indonesia have called on five countries (including the U.S.) to pick up the trash illegally dumped along the Brantas River. In October 2019, 87 containers of plastic waste were illegally exported from Hong Kong and other countries into Indonesia.
- **Thailand:** Government inspectors found poor grade, non-recyclable plastic waste sent from 35 countries.
- **Cambodia:** Seventy containers of illegal plastic waste from the U.S. were discovered in Cambodia in July 2019.
- **Europe:** In Bulgaria and Romania, there are reports of imported waste being illegally burned. 220 tons of 'recycled' waste from Britain was found dumped in a warehouse in Poland.

"It's Our Waste": Other Countries Take Responsibility

There are compelling reasons for the U.S. and other countries to stop exporting plastic to countries with poor waste management, including reducing plastic pollution to the ocean and freight carbon emissions, increasing the focus on development of domestic waste management and recycling systems in developing countries and spurring domestic innovations to responsibly address plastic use and waste.

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Other industrialized countries faced with similar plastic waste and export challenges are moving to take responsibility for their plastic waste:

- **Australia:** In August 2019, Australia was the first country to commit to ending plastics waste exports. Australia's Prime Minister stated: "It's our waste, and it's our responsibility." The Australian Government says it will no longer export plastic waste from July 1, 2020.
- **United Kingdom (UK):** The Environmental Bill 2020 would restrict exports of plastic waste to non-OECD countries for recycling.
- **European Union (EU) Circular Economy Plan:** Announced on March 11, 2020, the plan aims to "restrict exports of waste that cause negative environmental and health impacts in third countries by focusing on countries of destination, problematic waste streams and operations."
- **Basel Amendment agreed to by 184 countries:** In May 2019, the Parties (countries) to the United Nations Basel Convention adopted the Plastics Waste Amendment to "to specifically include plastic waste in a legally-binding framework which will make global trade in plastic waste more transparent and better regulated." According to the head of the UN organization that administers the Basel Convention, the Basel Amendment is intended to keep more recycling of plastic scrap in the countries where it is created.
- **Canada:** In February 2020, a bill was introduced to the House of Commons to prohibit the export of non-recyclable plastic waste from Canada to foreign countries. The Member of Parliament introducing the bill stated: "We have the means and capability to ensure the proper disposal of plastic waste right here in our own country, and we shouldn't be exporting it for someone else to deal with." But while Canada is a signatory to the Basel Convention, the country recently requested extra time to comply with the treaty, which will be enforced starting 2021.

The Responsible Response is to Stop Offshoring Plastic Waste

Now that the curtain has been pulled back and the harms of plastic waste exports have been exposed, the responsible response is to stop. While exporting may help U.S. communities meet "diversion goals" and avoid the problem and cost of disposing their plastic waste to landfill or incineration, there's no denying that we're offshoring the problem, harming other countries and making a carbon intensive, long distance contribution to the plastic pollution in the ocean we share.

Firm and effective bans are not yet in place in many countries and the end of harmful plastic waste imports is not certain as illegal trade

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flourishes. We cannot expect other countries to restrict and inspect our harmful plastic waste exports or expect them to stop the illegal waste trade at the receiving end. After conducting an investigation of exports to Malaysia, Greenpeace Italy stated: "We know that only a small number of containers leaving Italian ports are properly checked. A civilized country cannot close its eyes and dump the problem on a less developed nation." In the Philippines, Greenpeace and EcoWaste Coalition identified policy loopholes in Philippine laws as an enabler of illegal and 'legitimized' waste trade.

The most effective way to stop the harmful and illegal plastic waste trade is to stop loading U.S. plastic waste onto ships for export.

While the U.S. and other countries have been exporting plastic waste to countries which are ill-equipped to manage it, those same countries are being blamed as the leading polluters of plastics to the ocean. The Save Our Seas 2.0 Bill largely blames Asian countries for plastic pollution to the ocean and does nothing to stop plastic waste exports to those countries. The recent addition of some types of plastic waste to the Basel Convention will not stop the flow of U.S. plastic waste to countries who are not equipped to safely and securely manage it due to illegal waste trade and non-ratification and opposition by the current U.S. Federal Administration. As the Guardian reported in May 2019, "The US is not a party to the convention so it did not have a vote, but attendees at the meeting said the country argued against the change, saying officials didn't understand the repercussions it would have on the plastic waste trade."

The Right SOS: Stop Our Ships

There now is proposed legislation in the U.S. Congress to stop plastic waste exports to countries with poor waste management. The plastic waste export restrictions in the "Break Free From Plastic Pollution Act of 2020," championed by Senator Udall and Representative Lowenthal, are a major step towards taking responsibility for our plastic waste and reducing long-distance plastic pollution to the ocean, as well as here at home. Representative Lowenthal stated that "he was especially proud the bill would prevent plastic waste being exported to less developed countries where it ends up in landfills and waterways, harming human health and endangering wildlife."

The harms of plastic waste exports to other countries and sea freight carbon emissions are proven. Our response is a measure of our integrity in dealing other countries and our true concern for the ocean and climate. At

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the federal, state and local levels, we must bring an end to irresponsible, damaging plastic waste exports.

plasticpollutioncoalition.org, 7 April 2020

<https://www.plasticpollutioncoalition.org>

Climate change has already made parts of the world too hot for humans

2020-05-08

Global warming has already made parts of the world hotter than the human body can withstand, decades earlier than climate models expected this to happen.

Jacobabad in Pakistan and Ras al Khaimah in the United Arab Emirates have both repeatedly crossed a deadly threshold for one or two hours at a time, an analysis of weather station data found.

Wet bulb temperature (TW) is a measure of heat and humidity, taken from a thermometer covered in a water-soaked cloth. Beyond a threshold of 35°C TW the body is unable to cool itself by sweating, but lower levels can still be deadly, as was seen in the [2003 European heatwave that killed thousands without passing 28°C TW](#).

A US-UK team analysed [weather station data across the world](#), and found that the frequency of wet bulb temperatures exceeding temperatures between 27°C TW and 35°C TW had all doubled since 1979. Though 35°C TW is thought of as a key threshold, harm and even death is possible at lower temperatures, so the team included these in their analysis.

Most of the frequency increases were in the Persian gulf, India, Pakistan and south-west North America. But at Jacobabad and Ras al Khaimah, 35°C TW appears to have been passed, the first time the breach has been reported in scientific literature.

“The crossings of all of these thresholds imply greater risk to human health – we can say we are universally creeping close to this magic threshold of 35°C. The tantalising conclusion is it looks like, in some cases for a brief period of the day, we have exceeded this value,” says Tom Matthews at Loughborough University in the UK.

His team corroborated the threshold being breached by looking at another weather dataset, [based on temperature and humidity observations and modelling](#). That analysis suggested several areas of the

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Persian Gulf will see the possibility of 35 °C TW happening once every 30 years at around 2.3°C of global warming. The world [has already warmed about 1°C due to human activities](#).

Such intense humid temperatures have so far largely affected affluent Gulf states, which have the capacity to cope by investing in air conditioning. But Matthews warns that with continued climate change, the extremes will affect more parts of Pakistan, and India too, which may have not have the capacity to adapt. Even if they they could, it would require huge amounts of energy for cooling, further exacerbating climate if it came from fossil fuels. “We are already exquisitely close, closer than we thought, to that line in the sand,” he says.

While there are uncertainties over temperature and humidity readings from a few weather stations, because of where they are sited or how they are calibrated, Matthews says the overall picture is “unequivocal”.

Steven Sherwood at University of New South Wales in Australia, who was not involved in the research, says it makes a convincing case that the measurements are accurate, though it could not be guaranteed. “The implications of this study are that such extreme conditions which push the tolerance of the human body are not as far off into the future as we thought, at least in a few locations on Earth,” he says.

Clare Heaviside at University College London says the work is broadly in line with existing research, but cautioned against the focus on the threshold of 35°C TW. “It is difficult to link a wet bulb temperature threshold to specific health outcomes, and for different population groups,” she says.

[newscientist.com](https://www.newscientist.com), 8 May 2020

<https://www.newscientist.com>

‘Promiscuous treatment of nature’ will lead to more pandemics - scientists

2020-05-07

Humanity’s “promiscuous treatment of nature” needs to change or there will be more deadly pandemics such as Covid-19, warn scientists who have analysed the link between viruses, wildlife and habitat destruction.

[Deforestation](#) and other forms of land conversion are driving exotic species out of their evolutionary niches and into manmade environments, where they interact and breed new strains of disease, the experts say.

Deforestation and other forms of land conversion are driving exotic species out of their evolutionary niches and into manmade environments, where they interact and breed new strains of disease, the experts say.

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Three-quarters of new or emerging diseases that infect humans originate in animals, according to the US Centers for Disease Control and Prevention, but it is human activity that multiplies the risks of contagion.

A growing body of research confirms that bats – the origin of Covid 19 – naturally host many viruses which they are more likely transfer to humans or animals if they live in or near human-disturbed ecosystems, such as recently cleared forests or swamps drained for farmland, mining projects or residential projects.

In the wild, bats are less likely to transfer the viruses they host to other animals or come into contact with new pathogens because species tend to specialise within distinct and well-established habitats. But once land is converted to human use, the probability increases of contact and viruses jumping zoonotically from one species to another.

As natural habitats shrink, wild animals concentrate in ever smaller territories or migrate to anthropogenic areas, such as homes, sheds and barns. This is particularly true of bats, which feed on the large number of insects drawn to lamplight or fruit in orchards.

Two years ago, scientists predicted a new coronavirus would emerge from bats in Asia, partly because this was the area most affected by deforestation and other environmental pressures.

One of the authors, Roger Frutos, a specialist in infectious diseases at the University of Montpellier, said multiple studies have confirmed the density and variety of bat-borne viruses is higher near human habitation.

“Humans destroy the bats’ natural environment and then we offer them alternatives. Some adapt to an anthropomorphised environment, in which different species cross that would not cross in the wild,” he said.

Habitat destruction is an essential condition for the proliferation of a new virus, he added, but it is only one of several factors. Bats also need to pass the disease on to humans. There is no evidence of this being done directly for coronaviruses. Until now there has been an intermediary – either a domesticated animal or a wild animal which humans came into contact with for food, trade, pets or medicine. In the 2003 Sars outbreak in China, it was a civet cat. In the Mers outbreak in the Middle East in 2012, it was a camel. Scientists are not yet certain of the animal for Covid-19, though Frutos said initial theories that a pangolin was the intermediary now seem less likely.

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In a soon-to-be-published paper in Frontiers in Medicine, Frutos and his co-authors argue the key to containing future epidemics is not to fear the wild, but to recognise that human activities are responsible for the emergence and propagation of the zoonosis. “The focus must be on these human activities because they can be properly organised,” notes the paper titled, the Conjunction of Events Leading to the Pandemic and Lessons to Learn for Future Threats.

Scientists have detected about 3,200 different strains of coronavirus in bats. Most are harmless to humans, but two very closely related sarbecoviruses found in east Asia were responsible for Sars and Covid-19. The paper says future sarbecovirus emergence will certainly take place in east Asia, but epidemics of other new diseases could be triggered elsewhere.

South America is a key area of concern due to the rapid clearance of the Amazon and other forests. Scientists in Brazil have found viral prevalence was 9.3% among bats near deforested sites, compared to 3.7% in pristine woodland. “With deforestation and land-use change, you open a door,” said Alessandra Nava, of the Manaus-based Biobank research centre.

She said diseases were naturally diluted in the wild, but this broke down when humans rapidly disrupted the ecological balance. As a local example, she pointed to Lyme disease, which has spread to humans through capybaras. Some municipalities are culling the giant rodents to prevent contagion, but Nava said this was not necessary in pristine forests that still had jaguars. “You don’t find Lyme disease in areas with jaguars because they keep the capybara numbers in check,” she said.

“The problem is when you put different species that aren’t naturally close to one another in the same environment. That allows virus mutations to jump to other species,” she said. “We have to think about how we treat wild animals and nature. Right now we deal with them far too promiscuously.”

Her conclusions were echoed by Tierra Smiley Evans, an epidemiologist at the University of California who studies virus distributions in the rapidly degrading forests of Myanmar. She has found that endangered or threatened species are more likely to have viruses than animals at lower risk of habitat loss and hunting. She said the connection between environmental stress and human health had been made more apparent by Covid-19 pandemic.

“I’m hopeful that one of the most positive things to come out of horrible tragedy will be the realisation that there is a link between how we treat

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the forest and our wellbeing," she said. "It really impacts our health. It is not just a wildlife issue or an environmental issue."

To prevent future pandemics, the academics said international cooperation was needed to encourage monitoring and education at a local level so that virus outbreaks could be detected and contained at an early stage. Although this would be expensive, they said it would be more economically efficient than waiting for an outbreak to become a pandemic, which forces the world into lockdown.

They also emphasised that bat culls and bans on wet markets were likely to be ineffective and could prove counterproductive because bats play an important role in insect control and plant pollination. "Living safely with bats is what we should be focusing on, not eliminating them," Evans said.

Conservation groups have also urged greater protection of existing habitats. A recent Greenpeace [report](#) warned the Amazon could see the next spillover of zoonotic viruses because the Brazilian president, Jair Bolsonaro, is putting a higher priority on opening up the forest than protecting people's health.

"It's unforgivable. His appetite for destruction is fuelling the current health crisis and will make future crises we face even worse," Daniela Montalto, Greenpeace forests campaigner, said. "He must be stopped and forest protection prioritised. Without it, we will all pay the price."

theguardian.com, 7 May 2020

<https://theguardian.com>

Global boom, pandemic, crash: Is history just repeating itself?

2020-05-06

The coronavirus pandemic is, among other things, a tribute to human ingenuity and our relentless pursuit of globalization, an impulse thousands of years old. Previous civilizations, from the Romans to the Mongols, traded aggressively and invaded new ecosystems. They, too, connected far-flung geographies in innovative ways. None of it, however, ended particularly well.

By trading in all manner of peoples, plants, germs and animals, these empires diligently tested the limits of globalization and its growing complexity by seeding their own disintegration.

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The corona pandemic, a pretty mild affair in the scheme of things, is telling us that we are now in the middle of a historic cycle where hyper-connectivity combined with hyper-complexity could rapidly lead to decline, if not collapse.

In fact, pandemics are not black swans, but predictable and natural events that often appear like clockwork in the evolution of human empires. They trigger other crises or partner up with them.

These mass reversals often appear after periods of intense population growth and changes in population density just as an imperial adventure unknowingly begins its descent.

In the process of pruning human numbers, pandemics invariably play a significant role in the disintegration of civilizations. They reveal wealth inequalities and technical fragilities. In this regard pandemics announce both the ending and beginning of things. They can have both negative and positive effects.

Peter Turchin, a Russian historian, has long [argued](#) that civilizations expand and contract in distinct waves or what he calls "secular cycles" that last about 300 years.

Here's my rough sketch of his sharp thinking: In the initial wave, a troop of united elites marshal the masses to go forth and connect parts of the world with newfangled trade and political networks.

But as wealth and populations peak, the elites turn on each other as they seek to monopolize the spoils. (Turchin calls this a case of "elite overproduction.") And then the cycle of expansionist thinking and radical growth comes to a crashing end with a roaring pandemic and other mayhem.

The Roman stoic Seneca [observed](#) that things do not perish as slowly as they come into being. Instead, "the way to ruin is rapid." And pandemics prove the point.

But waves of disease aren't the only horseman that take empires over Seneca's cliff.

Cycles of global expansion also tend to be humbled by incompetent leaders, climate change (always a factor in decline), food shortages and forced migrations of people, which in turn add more fuel to pandemic fires.

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According to Turchin, every growth cycle or pulsation comes in four distinct phases. A period of population growth, good eating and consensual elites is followed by stagflation, which begets some sort of economic or biological crisis that ends in a depression. And then the cycle renews itself.

Epidemics tend to erupt during the stagflation period for several reasons. That's when populations peak and economic misery increases. It is also a period when long-distance trade connects everything; cities get too crowded and migrants clog the highways.

The Black Death, for example, found Europe in a dismal state of misery in the 14th century. The pathogen travelled down the Silk Road, a highway revived by the expanding Mongol empire, a flourishing global concern if there ever was one.

The Roman Empire offers another pandemic tale. At its height Augustus established the Principate in 27 BC. The Romans were such grand globalists that 400 African and Asian perennials can still be found sprouting on the grounds of the Colosseum.

As the Romans expanded into every nook and cranny of the Mediterranean and Africa, their wealth created new problems. Rome's elites grew so large in number that their competition for power invited the kind of political polarization now eroding the United States.

Three bad emperors were followed by five good ones. But the empire never completely recovered from the Antonine plague. Returning troops from the Near East probably dispersed the disease as effortlessly as modern day jet-setters.

This outbreak of measles or smallpox came in waves and killed a third to a quarter of the population. The disease rotted lungs, and victims spat blood.

The plague exposed the fragility of the empire's connectedness. Growing poverty and the hoarding of wealth by elites was followed by decades of civil wars and a population collapse. A new cycle began with the late Roman Empire centred in Constantinople. But that cycle ended in part due to the impact of another epidemic, the plague of Justinian.

China's Han Dynasty, which traded sorghum for camels in East Africa, followed a similar course as the Principate. Major epidemics accompanied its disintegration.

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It can be easy in our fossil-fuelled civilization to imagine ourselves decoupled from such cycles, even history itself. We embrace the fruits of globalization while assuming we are protected by its risks because of our highly-evolved technologies.

In fact, technology can be the fuel to set pandemics alight. The Spanish flu of 1918 offers a cautionary example. It erupted during a period of unprecedented global movement of peoples. In Europe, troops from all parts of the world (and many ravaged by gas attacks) mingled with Chinese workers building trenches for warring empires. As soldiers fought and died in those trenches, the crowded Western front helped the flu virus become more virulent.

Steamships, a marvel of global connectivity, brought the pandemic everywhere in record time, killing more than 100 million people in a world occupied by 1.8 billion people.

Now consider the COVID-19 pandemic.

It arrives at a point in the cycle where much of the industrialized world is experiencing declining economic fortunes. The second half of the 20th century delivered exponential human population growth, which now appears to have peaked at nearly eight billion.

In this period of fast globalization the virus emerged in China, the world's new economic kingpin and energy consumer. The country pursues global trade dominance while its one-party state holds onto power by granting its citizenry the means for steadily increased consumption. Its cycle at the top of the globalized heap may be short.

One reason China has long been identified as a hot spot for emerging diseases such as avian flu and SARS is because of the intense pressures its population places on biological diversity. Now China has made itself a global crossroads, sending its products and emissaries everywhere on the planet to advance its economic interests.

When Europe colonized North America, its deadly pathogens killed nearly 90 per cent of the continent's inhabitants. "Bringing previously isolated ecosystems together is much like flicking a cigarette lighter near open containers of gasoline," wrote the great historian Alfred Crosby Jr. "Some of the time nothing will happen. Some of the time the fumes will ignite and blow your head off."

Disease ecologists and other experts have repeatedly warned that unpredictable pathogens will explode from the new frontlines of

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globalization. As Dan Werb explained in the New York Times several months ago, the virus instantaneously exploited the rich pathways offered by global connectivity.

At the time of the SARS outbreak, China had about 233 international airline routes. But 16 years later it offered COVID-19 nearly 800 routes. During that same period the number of Chinese travellers jumped from three million to 53 million a year.

It is unlikely a computer could have designed a better network for rapid diffusion of a novel pathogen. Wuhan, where the pandemic began, is a major transportation hub for central China. Every year it facilitates the largest human migration on the planet as hundreds of millions of Chinese people celebrate Lunar New Year and crisscross the country in planes, trains and automobiles.

Nicholas Nassim Taleb, the former quant trader and now a professor of risk engineering, warned about the fragility of this global connectedness on Jan. 25.

With two colleagues he wrote a short note on systemic risks posed by what was then an emerging pathogen in Wuhan. Taleb, a math guy, described the contagious virus as “an extreme fat-tailed process owing to an increased connectivity, which increases the spreading in a non-linear way.”

In plain English, that means a new pathogen can have unexpected consequences that build exponentially. Therefore, to prevent ruin, argued Taleb and his colleagues, the general precautionary principle should prevail.

The note added that “Global connectivity is at an all-time high, with China one of the most globally connected societies.”

The only way to stop a virus moving through highly-connected societies is to quickly reduce or shut down global pathways. If governments don't act quickly and agilely, the pandemic will overwhelm them.

The intensification of global connectivity has consequences for the survival of the species if a highly-fatal pathogen were to emerge, added the note. “With increasing transportation we are close to a transition to conditions in which extinction becomes certain both because of rapid spread and because of the selective dominance of increasingly worse pathogens.”

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Because of the increased connectedness of the world, a pandemic can't be assessed like any other risk. “While there is a very high probability for humanity surviving a single such event, over time, there is eventually zero probability of surviving repeated exposures to such events.”

The note concluded with an urge to disconnect, at least for a time. “It will cost something to reduce mobility in the short term, but to fail to do so will eventually cost everything — if not from this event, then one in the future. Outbreaks are inevitable, but an appropriately precautionary response can mitigate systemic risk to the globe at large.”

No government took the note seriously because very few elites understand what an unsafe and unpredictable world they have built for ordinary people.

But this much is now plain. The intensification of globalized networks creates more instability, insecurity and unpredictability. Even civilizations with computers can cultivate too much complexity, peak and decline.

Unpredictability can arrive in the form of tyrannical technologies, the cascading effects of climate change or in the form of a globe-trotting pathogens.

As a consequence, tomorrow will not look like yesterday. This modest pandemic, which will be followed by more pathogenic mischief, has reminded us that our society has entered a very dangerous phase in its historic cycle.

Can we build a simpler society that can survive random shocks? Can we re-localize the economy, tax the rich, support small farms, simplify our brutal technologies, power down and distribute authority more evenly among local communities?

Or do we return to “normalcy” by courting more catastrophe with accelerated globalization, sending ourselves galloping over the cliff?

This pandemic has given us a clear historic choice: change or collapse.

thetyee.ca, 6 May 2020

<https://www.thetyee.ca>

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We might have just found the next great lighting material

2020-05-05

Researchers in Switzerland have found a new organic light emitting diode (OLED) material that could scale the technology up to inexpensively light entire rooms and homes for the first time. The results come from a new arrangement of copper electrons, CuPCP, that replaces more costly precious metal diodes (PHOLEDs).

Let's have some alphabet soup and learn about OLEDs.

OLEDs are a natural descendant of original light-emitting diode (LED) technology. About 10 years ago, plasma and LED TVs competed head to head in different categories, and plasma was the clear winner. But plasma TVs represented a proprietary technology that only worked for certain large sizes, and in bright light, they weren't able to compete. LEDs, meanwhile, had improving (but still inferior) black levels that looked garish and unbelievable in the dark.

Enter OLED TVs, which married and improved both technologies. Instead of the bright backlight of a LED TV, OLEDs have their own light. This means deeper, truer blacks, but without the brightness tradeoff associated with a plasma. Plus, OLED has better image quality and contrast. And since OLED pixels are individually controlled, they're also fast to change color. That's important for things like gaming, or watching sports or action movies.

For all their perks, however, scientists have found it difficult to scale OLEDs up for broader usage. The materials are limited by the naturally occurring limitations of their fluorescence: "Classical organic dyes emit light due to fluorescence and have a theoretical limit of 25 [percent] for the internal quantum efficiency," these researchers explain.

Phosphorescent OLEDs (PHOLEDs) change the physics and "can reach internal quantum efficiencies up to 100 [percent]," they say, but that's because PHOLEDs require costly precious metals like iridium, ruthenium, and platinum.

PHOLEDs are still mostly in experimental stages of any potential application, and they could hypothetically take over the TV market, too; they use less energy because of their high efficiency, and they can do the work of many more plain OLEDs. But these products will cost a fortune, and that's not the way to persuade consumers to trade up for their home lighting and other applications.

Let's have some alphabet soup and learn about OLEDs.

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The secret to the Swiss team's new material is a behavior called thermally activated delayed fluorescence, or TADF. Like a supercooled superconductor or a hot nuclear reactor, these TADF OLEDs must get to a certain temperature before they can operate as designed, and they use a supply of outside energy to get to that temperature.

Several years ago, researchers began to make these diodes using copper in a similar excited state to the way precious metals work in PHOLEDs. The results were phenomenal: "A remarkable photoluminescence quantum yield [greater than] 99 [percent] was recently achieved for such materials," the researchers say.

To help further that research, this team has done a battery of tests of copper-based organic luminophores—the atoms that enable thermal fluorescence:

"[W]e apply complementary pump-probe X-ray techniques: absorption, emission, and scattering including pump-probe measurements at the X-ray free-electron laser SwissFEL. Obtained data can be used to verify computational methods for the development of luminophores."

The scientists hope others will be able to find and fine-tune even more versions of this copper TADF, with an eye on applications and even more reduction in cost. And when it comes to your TV or home lighting future, this new look could be just years away.

popularmechanics.com, 5 May 2020

<https://www.popularmechanics.com>

Stanford researchers demonstrate a new method to transmit electricity wirelessly

2020-05-05

Engineers at Stanford have demonstrated a new method of transmitting electricity wirelessly to multiple devices. The wireless electricity transmission system they developed could send electricity to electric cars, robots, and drones as they move. The team says that the technology would need to be scaled up to be able to power electric cars as they drive on highways or to power robots on factory floors.

Wireless power transmission also has the potential to be able to transmit power to drones as they fly through the skies. Stanford researchers Shanhui Fan and Sid Assaworarith have demonstrated the technology in the past that was able to charge objects that were in motion wirelessly,

The wireless electricity transmission system they developed could send electricity to electric cars, robots, and drones as they move.

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but the technology was too inefficient to be used outside the lab. The team says that their new research is a significant step towards a practical and efficient system for wirelessly recharging cars or robots.

Fan says that to be able to recharge a moving electric car would require their system to be scaled up. However, he doesn't believe scaling the technology up would present a significant roadblock. He says the technology is already within the range of practical usefulness recharging movie robots.

The first part of the breakthrough that allows this wireless recharging came three years ago when the researchers were able to develop a charger that can transmit electricity even as the distance to the receiver changes. This range improvement was made possible by incorporating an amplifier and feedback resistor allowing the system to adjust the operating frequency as distances changed automatically. The downside to that technology was that it was only able to transmit 10% of the power going through the system.

The new technology the researchers developed can transmit up to 92% of the power that flows through the system. That improvement was possible by switching the original amplifier to a more efficient "switch mode" amplifier. In the lab, the team can wirelessly transmit 10 W of electricity over a distance of two or three feet. Scaling of the system to transmit the tens or hundreds of kilowatts a car would require is possible. The system could transmit electricity quickly enough to power a vehicle traveling 70 mph through a four-foot charging zone. The team admits one limitation is how fast the car batteries can absorb power. The electricity can be transmitted through people without them feeling it, and without any health issues.

slashgear.com, 5 May 2020

<https://www.slashgear.com>

Our moon is not as 'dry' as we thought

2020-05-08

New research is challenging the image of a "dry" Moon. Many astronomers believe our lone satellite is devoid of volatile elements such as carbon, which would have burned off in the **superheated collision between Earth and a Mars-size object** that formed the Moon. But a new study from Japan's Kaguya lunar orbiter (seen in an artist's rendition above) finds that **carbon ions are ubiquitous across much of the**

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Moon's surface, researchers report this week in *Science Advances*. The uneven distribution—ions were more common along the Moon's dark, basaltic plains—rules out external sources such as solar winds or micrometeoroids, suggesting that the Moon has its own internal carbon. The findings **contradict analyses of rocks retrieved during the famous Apollo missions**, *New Scientist* reports, and will likely lead to new ideas about the conditions under which the Moon formed.

sciencemag.org, 8 May 2020

<https://www.sciencemag.org>

California is the nation's ag capital. Here's how it's addressing the food crisis

2020-05-11

As the COVID-19 pandemic ushers in levels of food insecurity more severe than what we saw during the Great Recession—an estimated 1 in 5 U.S. households don't have enough to eat—the nation's most populous state is taking a number of steps to fight hunger.

In late April, California Governor Gavin Newsom announced initiatives to curb food insecurity among recipients of CalFresh and the state's SNAP program, children receiving free or reduced school lunches, and the elderly. The state has enlisted restaurants to serve three meals daily to vulnerable seniors (although that program has yet to achieve its lofty goals) and scaled up its Farm to Family program, which allows farmers to donate their goods to food banks rather than destroy the products they can't sell.

And tomorrow, the state is expected to unveil guidelines to allow restaurants to reopen for dine-in service, a hotly anticipated move that would ease the unemployment crisis in the state and boost economic activity.

The state's moves come as specialty crop producers across the country report approximately \$5 billion in losses from cancelled or reduced contracts, with California farmers and ranchers suffering a loss of 50 percent of their markets. At the same time, food banks in the state have seen demand from the public rise to 73 percent over last year, and CalFresh has experienced a 140 percent increase in applications. This disparity highlights the importance of connecting farmers with surpluses food to food banks.

The uneven distribution—ions were more common along the Moon's dark, basaltic plains—rules out external sources such as solar winds or micrometeoroids, suggesting that the Moon has its own internal carbon.

At the same time, food banks in the state have seen demand from the public rise to 73 percent over last year, and CalFresh has experienced a 140 percent increase in applications.

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Bottom of Form

“Putting food on the table during this pandemic is hard for families on the brink,” Newsom said in an April 29 statement. “It’s in that spirit that we’re expanding our Farm to Family program while also working to connect low-income families with vital resources and financial support. We thank our farmers for stepping up to donate fresh produce ... And we want families struggling to access food to know we have your backs.”

The governor has credited [CDFA Secretary Karen Ross](#) with spearheading the movement to fight food insecurity in the state, particularly the expansion of the Farm to Family program. Civil Eats spoke with Ross, who has served in her role for nine years, about her efforts as California contends with a projected [18 percent unemployment rate](#) and a [\\$54 billion budget deficit](#). So far, 128 farmers and ranchers are donating to food banks and another 200 farmers have expressed interest in doing so.

Can you explain the Farm to Family program and the plans to expand it during the pandemic?

This is a program that has been in place for more than 10 years, but there’s a need to scale it up. We’re in a time where you have farmers who’ve already put their product in the ground, and that’s going to have to get harvested somehow or another.

This program will offset those harvest costs, so that food doesn’t go to waste. When we grow so much seasonal, highly perishable food, you only have a short window of time to get it harvested, packed, and delivered.

Farmers would always prefer to have people eat their food, not throw it away. And the infrastructure of [the California Association of Food Banks](#) has really perfected [their approach] over the last 10 years. They’ve got their centralized warehousing. They have trucks. They have a longstanding network of 128 farms that they work with every year. They have four regional coordinators. And they’ve got a way of getting it into their facilities [safely]. From there, they break it down into the types of packaging and the amounts of food that are needed by the individual food banks.

You don’t want to send a food bank more food than they can store, because that’s the point when food waste usually happens. What we found, though, is that with this horrendous unemployment and sudden demand for food, they have to get trucks to a lot of those smaller food

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banks more frequently—and they have to send more every time. We work closely with the Department of Social Services, which oversees about 10 food banks, and the gap we’re try to fill now is with our tribal communities.

Why has there been a gap in [serving tribal communities](#)?

In our state, the tribal communities have been very successful in the hospitality industry. As we know, the stopping of travel has really impacted any type of entertainment, hospitality, or tourism setting. So, the tribes now have a need for food banks, and as sovereign nations, they are not always directly connected to the existing food bank system. There are tribal assistance programs at USDA and other agencies, but the need has been so dramatic and so sudden, we want to make sure we’re able to partner with the tribes on any future programs to make sure that they will also have their needs met.

How many pounds of food from farmers will be going out to California food banks monthly?

We jumped from 11 million pounds in January to 14 million pounds in March. The numbers were projected to be 21 million for April, and that’s what we’re projecting going into the rest of the year. Our goal is to raise enough money to be able to run this program through the end of the year at that level.

How are you managing the financial aspects of pulling this off?

The Department of Food and Agriculture identified some yet-unspent specialty crop block grant dollars, and we sought a waiver from USDA to redirect those dollars to this program. I’m very hopeful, if Congress does consider additional coronavirus relief packages, that they would consider things like block grants, so each state could spend more of these dollars at food banks locally.

The USDA has made \$3 billion available for acquisition of meat, dairy products, and specialty crops. A lot of those will be big bulk buys for the national food bank system, but I believe these state block grants could do a lot within the state and local economies to go directly to supporting small and mid-sized farmers who might not otherwise get to participate in the big commodity buy program.

The state has partnered with a number of farms and food organizations to make this program possible. Can you discuss their contributions?

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Pacific Coast Producers is one of the country's largest private-label food processors of vegetables and fruit. They are made up of several hundred small and mid-sized farmers of things like tomatoes, peaches, pears, and other crops. They made a truckload of fruit cup and tomato-product contributions to the food banks.

We have Sunkist, a citrus cooperative over 100 years old, made up of several thousand growers of oranges, lemons, and grapefruits. We've had Driscoll's and Dairy Farmers of America, a large farmer-owned dairy cooperative, make contributions.

Foster Farms is our largest contributor. They have already made two or three separate contributions to food banks in the Central Valley, where most of their workforce is. They've donated well over a million pounds of poultry, and they've been a longtime partner and participant in the Farm to Family program.

And Grimmway Farms is a wonderful contributor to the food banks in the Kern County area. Their CEO, Jeff Huckaby—I reached out to him when we were trying to build up this program—said, "I'm going to give you six loads of carrots," and he did: Within a week, we got baby carrots from Grimmway Farms.

We've talked a lot about farmers, but since you're part of an inter-agency food supply task force, what are some of the other ways California is fighting food insecurity—for starters, the decision to allow CalFresh recipients to buy food from online retailers like Amazon and Walmart?

That was a waiver that was granted by USDA. It's a very important program because of the shelter-in-place orders; even when some of those are lifted, vulnerable populations—especially our seniors—will still stay at home. So being able to use those benefits online and get their groceries delivered is huge.

I know that the goal of the Department of Social Services is to quickly expand the network to additional suppliers. Walmart and Amazon already have that infrastructure and relationship with USDA, and we want to expand to many more vendors.

In addition to CalFresh recipients, are children who receive free and reduced school meals also getting more help during the pandemic?

Our friends at the Department of Education sought a lot of waivers, and this one was to add [more Pandemic EBT (P-EBT) benefits] to the amount

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that children receiving free and reduced lunches were getting. On average, it's up to \$365 to be added onto a family's EBT card to use for food purchases.

Governor Newsom recently announced a program in which restaurants provide vulnerable seniors with three meals a day. How did this idea come about?

With all the restaurants that have been shut down, they had to start laying off so much of their workforce, and that's added significantly to the unemployment rolls. So, several Sacramento restaurants started doing family pilot meals to keep a few of their staff employed, and those were very popular. They understood the needs seniors have, so they started getting very creative and pitched this pilot program to us. It's keeping the market going for these small-scale farmers who've just lost so much of their distribution program.

[Under the program,] preference will be given to restaurants using local, California-grown food. It's a great program. It is temporary, and it is unique in that it's the first time FEMA dollars could be used for reimbursement on these meals because of the unique circumstances seniors are put in because of COVID-19.

When we nourish our citizens to build their immune systems to be healthy, that's got to be one of the most important things that we can do, and when we can purchase within our local communities that helps the community, it helps families, and it helps our economy rebound.

civileats.com, 11 May 2020

<https://www.civileats.com>

Quarantine fatigue is real

2020-05-11

In the earliest years of the HIV epidemic, confusion and fear reigned. AIDS was still known as the "gay plague." To the extent that gay men received any health advice at all, it was to avoid sex. In 1983, the activists Richard Berkowitz and Michael Callen, with guidance from the virologist Joseph Sonnabend, published a foundational document for their community, called "How to Have Sex in an Epidemic." Recognizing the need for pleasure in people's lives, the pamphlet rejected abstinence as the sole approach and provided some of the earliest guidance on safer sex for gay men, including recommendations about condoms and which sex acts had a lower or higher risk for disease transmission.

Likewise, asking Americans to abstain from nearly all in-person social contact will not hold the coronavirus at bay—at least not forever.

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Public-health experts have known for decades that an abstinence-only message doesn't work for sex. It doesn't work for substance use, either. Likewise, asking Americans to abstain from nearly all in-person social contact will not hold the coronavirus at bay—at least not forever.

#StayHome had its moment. The United States urgently needed to flatten the curve and buy time to scale up health-care capacity, testing, and contact tracing. But quarantine fatigue is real. I'm not talking about the people who are staging militaristic protests against the supposed coronavirus hoax. I'm talking about those who are experiencing the profound burden of extreme physical and social distancing. In addition to the economic hardship it causes, isolation can severely damage psychological well-being, especially for people who were already depressed or anxious before the crisis started. In a recent poll by the Kaiser Family Foundation, nearly half of Americans said that the coronavirus pandemic has harmed their mental health.

Meanwhile, most public-health experts agree that a premature return to the old version of normalcy would be disastrous. States continue to lack the capacity for widespread coronavirus testing or contact tracing. Serologic testing to date suggests that the majority of the population is still susceptible to infection. A vaccine is months or even years away. New cases continue to rise, with thousands of people dying each day, and those numbers will inevitably increase if communities go back to business as usual.

But the choice between staying home indefinitely and returning to business as usual now is a false one. Risk is not binary. And an all-or-nothing approach to disease prevention can have unintended consequences. Individuals may fixate on unlikely sources of contagion—the package in the mail, the runner or cyclist on the street—while undervaluing precautions, such as cloth masks, that are imperfect but helpful.

Public-health campaigns that promote the total elimination of risk, such as abstinence-only sex education, are a missed opportunity to support lower-risk behaviors that are more sustainable in the long term. Abstinence-only education is not just ineffective, but it's been associated with worse health outcomes, in part because it deprives people of an understanding of how to reduce their risk if they do choose to have sex. And without a nuanced approach to risk, abstinence-only messaging can inadvertently stigmatize anything less than 100 percent risk reduction. Americans have seen this unfold in real time over the past two months as pandemic shaming—the

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investive, online and in person, directed at those perceived as violating social-distancing rules—has become a national pastime.

The anger behind shaming is understandable. Photos of crowded beaches or videos of people at a large indoor party may make viewers feel as if they're watching coronavirus transmission in action. Calling out seemingly dangerous behavior can also provide an illusion of control at a time when it's particularly hard to come by. But, as years of research on HIV prevention have shown, shaming doesn't eliminate risky behavior—it just drives it underground. Even today, many gay men hesitate to disclose their sexual history to health-care providers because of the stigma that they anticipate. Shaming people for their behavior can backfire.

Berkowitz and Callen knew that indefinite abstinence wasn't realistic for everyone, and instead of shaming, tried to give gay men the tools they needed to be able to have sex with a low but non-zero risk of HIV transmission. In essence, this is the harm-reduction model, which recognizes that some people are going to take risks, whether public-health experts want them to or not—and instead of condemnation, offers them strategies to reduce any potential harms. This approach meets people where they are and acknowledges that individual-level decisions happen in a broader context, which may include factors that are out of people's control.

What does harm reduction look like for the coronavirus? First, policy makers and health experts can help the public differentiate between lower-risk and higher-risk activities; these authorities can also offer support for the lower-risk ones when sustained abstinence isn't an option. Scientists still have a lot to learn about this new virus, but early epidemiological studies suggest that not all activities or settings confer an equal risk for coronavirus transmission. Enclosed and crowded settings, especially with prolonged and close contact, have the highest risk of transmission, while casual interaction in outdoor settings seems to be much lower risk. A sustainable anti-coronavirus strategy would still advise against house parties. But it could also involve redesigning outdoor and indoor spaces to reduce crowding, increase ventilation, and promote physical distancing, thereby allowing people to live their lives while mitigating—but not eliminating—risk.

Second, health experts can also acknowledge the contextual factors that affect both a person's decisions and their risk of coronavirus transmission. Some people are seeking human contact outside of their households because of intense loneliness, anxiety, or a desire for pleasure. The decision

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to go for a run with a friend or gather in a park with extended family may be in conflict with current public-health guidance in some communities, but for some people, the low risk of coronavirus transmission in these settings may be outweighed by the health benefits of human connection, exercise, and being outdoors. We can also acknowledge that some people can't comply with public-health guidance because of structural factors, including systemic racism, that render physical distancing a privilege. If we ignore this broader context, people of color will continue to bear the brunt of not only the pandemic itself, but also American society's response to it.

Third, Americans can accept that, despite our best efforts, some people will choose to engage in higher-risk activities—and instead of shaming them, we can provide them with tools to reduce any potential harms. Want to see your grandkids? Still planning to have that party? Meet up outside. Don't share food or drinks. Wear masks. Keep your hands clean. And stay home if you're sick.

As long as the Centers for Disease Control and Prevention is silenced, local and state health departments, epidemiologists, and clinicians may need to lead the way. The New York City Department of Health and Mental Hygiene and faculty from Harvard Medical School each created guidance on sexual health during the coronavirus pandemic that could provide a road map for a harm-reduction approach to socializing, work environments, schools, and other settings. They communicated the urgent need for physical distancing and the idea that, as the New York document puts it, "you are your safest sex partner." At the same time, the New York and Harvard guidelines implicitly acknowledge that some people may choose to have sex within or outside of their households and offer tips to reduce harm in different potential scenarios, making the risk continuum clear.

The U.S. is in the midst of an infectious-disease crisis that has wrought global devastation and taken the lives of more than 75,000 Americans to date, with no end in sight. But, as other epidemics have shown, trying to shame people into 100 percent risk reduction will be counterproductive. What Americans need now is a manual on how to have a life in a pandemic. If no one else provides the guidance that the CDC won't, each of us will need to figure out our own.

theatlantic.com, 11 May 2020

<https://www.theatlantic.com>

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Blood clots are mysteriously tied to many coronavirus problems

2020-05-11

Purple rashes, swollen legs, clogged catheters and sudden death—blood clots, large and small, are a frequent complication of COVID-19, and researchers are just beginning to untangle why. For weeks, reports have poured in of the disease's effects throughout the body, many of which are caused by clots. "This is like a storm of blood clots," says Behnood Bikdeli, a fourth-year cardiology fellow at Columbia University in New York City. Anyone with a severe illness is at risk of developing clots, but hospitalized patients with COVID-19 appear to be more susceptible.

Studies from the Netherlands and France suggest that clots appear in 20% to 30% of critically ill COVID-19 patients. Scientists have a few plausible hypotheses to explain the phenomenon, and they are just beginning to launch studies aimed at gaining mechanistic insights. But with the death toll rising, they are also scrambling to test clot-curbing medications.

Double whammy

Blood clots, jelly-like clumps of cells and proteins, are the body's mechanism to stop bleeding. Some researchers view clotting as a key feature of COVID-19. But it's not just their presence that has scientists puzzled: it's how they show up. "There are so many things about the presentations that are a little bit unusual," says James O'Donnell, director of the Irish Centre for Vascular Biology at the Royal College of Surgeons in Dublin.

Blood thinners don't reliably prevent clotting in people with COVID-19, and young people are dying of strokes caused by the blockages in the brain. And many people in hospital have drastically elevated levels of a protein fragment called D-dimer, which is generated when a clot dissolves. High levels of D-dimer appear to be a powerful predictor of mortality in hospitalized patients infected with coronavirus.

Researchers have also observed miniature clots in the body's smallest vessels. Jeffrey Laurence, a haematologist at Weill Cornell Medicine in New York City, and his colleagues examined lung and skin samples from three people infected with COVID-19 and found that the capillaries were clogged with clots. Other groups, including a team led by O'Donnell, have reported similar findings.

anyone with a severe illness is at risk of developing clots, but hospitalized patients with COVID-19 appear to be more susceptible.

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“This is not what you’d expect to see in someone who just has a severe infection,” he says. “This is really very new.” This might help to explain why some people have critically low blood-oxygen readings, and why mechanical ventilation often doesn’t help. It’s a “double hit”, says O’Donnell. Pneumonia clogs the tiny sacs in the lungs with fluid or pus, and microclots restrict oxygenated blood from moving through them.

Viral impacts

Why this clotting occurs is still a mystery. One possibility is that SARS-cov-2 is directly attacking the endothelial cells that line the blood vessels. Endothelial cells harbour the same ACE2 receptor that the virus uses to enter lung cells. And there is evidence that endothelial cells can become infected: researchers from the University Hospital Zurich in Switzerland and Brigham and Women’s Hospital in Boston, Massachusetts, observed SARS-Cov-2 in endothelial cells inside kidney tissue. In healthy individuals, the blood vessel is “a very smoothly lined pipe”, says Peter Liu, chief scientific officer at the University of Ottawa Heart Institute. The lining actively stops clots from forming. But viral infection can damage these cells, prompting them to churn out proteins that trigger the process.

The virus’s effects on the immune system could also affect clotting. In some people, COVID-19 prompts immune cells to release a torrent of chemical signals that ramps up inflammation, which is linked to coagulation and clotting through a variety of pathways. And the virus appears to activate the complement system, a defence mechanism that sparks clotting. Laurence’s group found that small, clogged vessels in lung and skin tissue from people with COVID-19 were studded with complement proteins. All these systems—complement, inflammation, coagulation—are interrelated, says Agnes Lee, director of the Hematology Research Program at the University of British Columbia in Vancouver, Canada. “In some patients with COVID, all of those systems are kind of in hyperdrive.”

But Lee adds that there could be other factors at play that aren’t specific to COVID-19. People with the disease who become hospitalized typically have a number of risk factors for clotting. They might be elderly or overweight, and could have high blood pressure or diabetes. They show up with high fevers and, because they’re seriously ill, have probably been immobilized. They might have a genetic predisposition to clotting, or be taking medications that increase the risk. “It’s kind of like a perfect storm,” she says.

Race to new therapies

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Even as researchers begin to unravel how clotting occurs in people with COVID-19, they’re sprinting to test new therapies aimed at preventing and busting clots. Blood-thinning medications are standard of care for patients in the intensive-care unit, and those with COVID-19 are no exception. But dosing is a matter of hot debate. “The question is now, how aggressive should you be?” Says Robert Flaumenhaft, chief of the division of homeostasis and thrombosis at Beth Israel Deaconess Medical Center in New York City. Researchers from Mount Sinai School of Medicine, also in New York City, reported that hospitalized patients with COVID-19 on mechanical ventilation who received blood thinners had a lower mortality than those who weren’t treated with them. But the team couldn’t rule out other explanations for the observation, and high doses of these drugs carry risks.

At Columbia University in New York City, researchers are launching a clinical trial to compare the standard clot-preventing doses of blood thinners with a higher dose in people who are critically ill with COVID-19. Similar trials are planned for Canada and Switzerland. And scientists at Beth Israel Deaconess Medical Center have begun enrolment for a clinical trial to evaluate an even more powerful clot-busting medication called tissue plasminogen activator, or tpa. This drug is more potent, but carries higher risks of serious bleeding than do blood thinners.

Scientists hope that these trials and others will provide the data necessary to help physicians to make difficult treatment decisions. Lee worries about the amount of ‘reactionary medicine’ happening. “People are changing their therapeutic approach in reaction to their local and personal experience,” she says. She understands the impetus, “but we have to remember the main thing is first do no harm”.

scientificamerica.com, 11 May 2020

<https://www.scientificamerican.com>

I just flew. It was worse than I thought it would be
2020-05-08

HE CABIN WAS RESTLESS. It was a weekday afternoon in late April, and I was among dozens of people boarding an airplane that most of us had assumed would be empty. Flight attendants were scrambling to accommodate seat-change requests. Travelers—stuffed shoulder to shoulder into two-seat rows—grumbled at one another from behind masks. An ominous announcement came over the in-flight PA system: “We

“We apologize for the alarming amount of passengers on this flight.” Each of us was a potential vector of deadly disease.

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apologize for the alarming amount of passengers on this flight." Each of us was a potential vector of deadly disease.

I arrived at my assigned row, and found a stocky, gray-haired man in the seat next to mine. When I moved to sit down, he stopped me. "Sit there," he said gruffly, pointing to the aisle behind us. "Social distance."

Not eager for a confrontation, I decided to comply. Within seconds, though, a flight attendant materialized and ordered me back to my assigned seat. My recalcitrant would-be seatmate, vigorously objecting to this development, responded by blocking my entrance to the row with his leg.

A standoff ensued, with the irate passenger protesting that there were plenty of empty rows where I could sit (there weren't) and the long-suffering flight attendant all but threatening to kick him off the plane (she didn't). Finally, he relented and I squeezed awkwardly into my seat as the man muttered profanities under his breath.

Why did I think flying would be easy right now?

In the days leading up to my trip, colleagues and family members had repeatedly expressed envy. "I'm so jealous," one co-worker told me. "Taking a flight without kids sounds like heaven," my wife said. The travel wasn't anything extravagant; I was going on a short reporting trip that couldn't be rescheduled. But I understood the sentiment. Like millions of Americans, I'd been social distancing for nearly two months—cooped up at home, growing a gnarly quarantine beard, and manically wiping down groceries with Lysol. The prospect of packing a suitcase, putting on real pants, and boarding an airplane sounded like a thrilling indulgence, a grand adventure. Travel by air! Who could even imagine such a thing?

But flying during a pandemic turned out to be more stressful—and surreal—than I'd planned for. The scenes played out like a postapocalyptic movie: Paranoid travelers roamed the empty terminals in masks, eyeing one another warily as they misted themselves with disinfectant. Dystopian public-service announcements echoed through the airport—"This is a message from the Centers for Disease Control and Prevention ..." Even the smallest, most routine tasks—such as dealing with the touch-screen ticketing kiosk—felt infused with danger.

My trip took place in two legs, and the first was weird mostly in the ways that I'd expected. All but a few of the shops and restaurants at Washington National Airport were closed. Beverage service in the main cabin was

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suspended (though apparently serving ginger ale to first-class passengers was ruled epidemiologically acceptable). My first flight was so empty that the pilot warned we would experience "a very rapid acceleration for takeoff." The plane leapt into the sky and my stomach dropped. I spent much of the flight using my baggie of Lysol wipes to scrub and re-scrub every surface within reach.

The layover at O'Hare was where my fellow travelers' fraying nerves came more fully into view. In the restroom, men hovered over sinks like warriors returning from battle, fervently washing their hands and shooting menacing looks at anyone who got too close. At the food court, a shouting match broke out among several stressed-out strangers, and police had to intervene.

Outside the gate, passengers sat five or six seats apart, barely acknowledging one another, let alone attempting conversation. The eerie silence wore on me after a while. When my wife texted to ask how it was going, the best description I could muster was a grimacing emoji.

Flying has always been unpleasant, and rife with small indignities. It's likely that I was more alert than usual to the agitation of those around me. But as America lurches awkwardly toward an economic "reopening" in the weeks ahead, my fraught travel experience highlighted an unwelcome truth: The glittering allure of "normalcy" that waits on the other end of these stay-at-home orders is a mirage.

The things we miss most about our pre-pandemic lives—dine-in restaurants and recreational travel, karaoke nights and baseball games—require more than government permission to be enjoyed. These activities are predicated not only on close human contact but mutual affection and good-natured patience, on our ability to put up with one another. Governors can lift restrictions and companies can implement public-health protocols. But until we stop reflexively seeing people as viral threats, those old small pleasures we crave are likely to remain elusive.

I only had to sit next to my angry seatmate for a few minutes. Shortly after his tantrum, a flight attendant came back to our row and—after treating the man to a withering glare—informed me that I was being upgraded. I gathered my things and sheepishly made my way up the aisle while the aggrieved passenger sarcastically exclaimed, "Ooh, *first class!*"

As the plane ascended, I pressed my head against the window and peered down at the disappearing runway. I tried to ponder the miracle of human flight, to savor this rare privilege I was experiencing. But then an unhappy

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thought asserted itself: *How many people have touched this window today with their filthy hands?* I jerked back, and squirted some hand sanitizer onto my forehead.

theatlantic.com, 8 May 2020

<https://www.theatlantic.com>

Neanderthals may have learned jewellery-making from us

2020-05-11

When modern humans first settled in Europe, they met Neanderthals – and possibly passed on jewellery-making tips.

Jean-Jacques Hublin at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and his colleagues have confirmed for the first time that modern humans were in Europe at least 45,000 years ago. They also suggest that modern humans taught Neanderthals to make necklaces out of bear teeth.

The researchers re-excavated Bacho Kiro cave in Bulgaria, which has been studied since the 1930s. Human remains were found there in the 1970s, but these were lost. Attempts to date those remains gave contradictory results. "It did imply that potentially this was a really old assemblage," says team member Helen Fewlass.

Using new decontamination methods, the researchers dated 95 pieces of bone, identified by analysing their DNA and protein content. Six came from modern humans, and the remainder were animal bones with cut-marks or other signs of human activity (*Nature Ecology & Evolution*, DOI: [10.1038/s41559-020-1136-3](https://doi.org/10.1038/s41559-020-1136-3)).

The oldest human bones were between 43,700 and 45,800 years old. A deeper layer of rock that was 46,900 years old hasn't yet yielded human remains, but also contained marked animal bones, suggesting humans were present.

The dating "reinforces what we thought we knew with some stronger evidence", says Emma Pomeroy at the University of Cambridge in the UK. Previous signs of modern humans in Europe came from sites like Kents Cavern in the UK and the Grotta del Cavallo in Italy, but these bones were only indirectly dated to about 45,000 years ago.

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It makes sense that the Bacho Kiro people were there earlier than those in Italy or Britain, says Katerina Harvati at the University of Tübingen in Germany, as humans were coming from the east, so would have reached eastern Europe first.

Before humans arrived, Neanderthals lived in Europe for hundreds of thousands of years. When the two met, they interbred. Neanderthals died out a few thousand years later: the last well-dated evidence of their presence is 40,000 years old.

Neanderthals got more creative with their tools in their final millennia. The Grotte du Renne cave in Arcy-sur-Cure, France, contains pendants made of bear teeth, which Hublin argues were made by Neanderthals. All are younger than 45,000 years.

The Bacho Kiro re-excavation found 11 pendants made of cave bear teeth that predate the supposedly Neanderthal ones. Hublin says this means modern humans brought the idea with them, and Neanderthals copied it (*Nature*, DOI: [10.1038/s41586-020-2259-z](https://doi.org/10.1038/s41586-020-2259-z)). The only alternative, he says, is that Neanderthals also invented the pendants just after humans arrived, but he calls this idea "ridiculous".

The problem with the idea is that we can't be sure the later pendants were made by Neanderthals, as humans were in Europe by then, says Pomeroy.

newscientist.com, 11 May 2020

<https://www.newscientist.com>

Environmental toll of plastics

2020-05-09

From cell phones to bicycle helmets to IV bags, plastic has molded society in ways that make life easier and safer. But the synthetic material also has left harmful imprints on the environment and perhaps human health.

More than 60 scientists from around the world contributed to a 2009 report, the first to offer a comprehensive review of the impact of plastics on the environment and human health, and to present possible solutions.

"One of the most ubiquitous and long-lasting recent changes to the surface of our planet is the accumulation and fragmentation of plastics," wrote David Barnes, a lead author and researcher for the British Antarctic

Plastic manufactured in the first 10 years of this century eclipses the total produced in the entire last century.

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Survey. The report was published a special issue of *Philosophical Transactions of The Royal Society B*, a scientific journal.

As the scrutiny of the environmental toll of plastic increases, so has its usage, the scientists reported.

Plastic manufactured in the first 10 years of this century eclipses the total produced in the entire last century

Since its mass production began in the 1940s, plastic's wide range of unique properties has propelled it to an essential status in society. Globally almost 360 million tons of plastic were produced in 2018. The amount of plastic manufactured in the first ten years of this century will approach the total produced in the entire last century, according to the report.

"Plastics are very long-lived products that could potentially have service over decades, and yet our main use of these lightweight, inexpensive materials are as single-use items that will go to the garbage dump within a year, where they'll persist for centuries," Richard Thompson, lead editor of the report, said in an interview.

Evidence is mounting that the chemical building blocks that make plastics so versatile are the same components that might harm people and the environment. And its production and disposal contribute to an array of environmental problems, too. For example:

- Chemicals added to plastics are absorbed by human bodies. Some of these compounds have been found to alter hormones or have other potential human health effects.
- Plastic debris, laced with chemicals and often ingested by marine animals, can injure or poison wildlife.
- Floating plastic waste, which can survive for thousands of years in water, serves as mini transportation devices for invasive species, disrupting habitats.
- Plastic buried deep in landfills can leach harmful chemicals that spread into groundwater.
- Around 4 percent of world oil production is used as a feedstock to make plastics, and a similar amount is consumed as energy in the process.

People are exposed to chemicals from plastic multiple times per day through the air, dust, water, food and use of consumer products.

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For example, phthalates are used as plasticizers in the manufacture of vinyl flooring and wall coverings, food packaging and medical devices. Eight out of every ten babies, and nearly all adults, have measurable levels of phthalates in their bodies.

In addition, bisphenol A (BPA), found in polycarbonate bottles and the linings of food and beverage cans, can leach into food and drinks. The U.S. Centers for Disease Control and Prevention reported that 93 percent of people had detectable levels of BPA in their urine.

High BPA and phthalate exposure by premature infants in neonatal intensive care units is 'of great concern'

Polybrominated diphenyl ethers or PBDEs, which are flame-retardants added to polyurethane foam furniture cushions, mattresses, carpet pads and automobile seats, also are widespread.

The plastics industry maintains that its products are safe after decades of testing.

"Every additive that we use is very carefully evaluated, not just by the industry, but also independently by government agencies to look at all the materials we use in plastics," said Mike Neal, a consumer and environmental affairs specialist at PlasticsEurope, an industry trade association, and a co-author of the report.

But some of these chemicals have been shown to affect reproduction and development in animal studies, according to the report. Some studies also have linked these chemicals with adverse effects in people, including reproductive abnormalities.

"We have animal literature, which shows direct links between exposure and adverse health outcomes, the limited human studies, and the fact that 90 to 100 percent of the population has measurable levels of these compounds in their bodies," said John Meeker, an assistant professor of environmental health sciences at the University of Michigan School of Public Health and a lead author. "You take the whole picture and it does raise concerns, but more research is needed."

Shanna Swan, director of the University of Rochester's Center for Reproductive Epidemiology, conducted studies that found an association between pregnant women's exposure to phthalates and altered genital development in their baby boys.

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Also, people with the highest exposure to BPA have an increased rate of heart disease and diabetes, according to one recent study. Animal tests studies of PBDEs have revealed the potential for damaging the developing brain and the reproductive system.

Yet the effects on human health remain largely unknown. To help shed more light on the issue, the report recommends more sophisticated human studies.

“It’s tough to have a smoking gun with a single animal study or observational human study,” Meeker said. “We need to have different types of studies indicating a consistent pattern to more definitively determine health effects resulting from these chemicals.”

But testing humans for endocrine disruptors can be tricky because phthalates and BPA pass through the body so quickly. In addition, tests for each chemical cost about \$100 a pop.

Deciding which chemicals to test and at what dose is also an issue. To date, most studies have addressed single chemicals, and there are limited data on the interactions between chemicals. Compounding the problem is the discovery that endocrine disrupting chemicals may have effects at doses lower than those used in the Environmental Protection Agency’s standard toxicity tests.

Current testing efforts should be thrown out. The new goal? Tests that mimic real human exposure.

“It’s a very complicated picture and the laboratory model of just taking one isolated chemical and giving it to a genetically pure strain of rats in clean cages, clean air and clean water and seeing what it does just doesn’t come close to mimicking the human situation,” Swan said.

Many researchers recommend studies that test pregnant women as well as their children. The National Children’s Study will do just that by examining environmental influences on more than 100,000 children across the United States, following them from before birth until age 21.

“There are so many questions now with these chemicals in relation to cardiovascular disease, age and puberty, obesity, developmental disorders,” said Swan. “We don’t know what’s causing it, only hints, so the beauty of the National Children’s Study is that we can look at all of these endpoints and it should reveal a lot of answers.”

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Plastic’s problems extend beyond the human body, according to the report. More than one-third of all plastic is disposable packaging like bottles and bags, many of which end up littering the environment.

Although the image of a bird tangled in a plastic necklace is by now burned into the public’s eye, ingestion of plastic fragments is much more common. Once inside, plastic can pack a one-two punch by both clogging an animal’s stomach and poisoning it with chemicals that have concentrated in the plastic. Some chemicals are then transferred to the food web when animals eat them.

More than 180 species of animals have been documented to ingest plastic debris, including birds, fish, turtles and marine mammals, according to the report.

Unfortunately, collecting data on plasticizers’ impacts on wildlife suffers the same pitfalls as studying human health. Still, there is already evidence that chemicals associated plastics might harm wildlife.

For example, laboratory studies have shown that phthalates and BPA affect reproduction in all studied animal groups and impair development in crustaceans and amphibians.

“While there is clear evidence that these chemicals have adverse effects at environmentally relevant concentrations in laboratory studies, there is a need for further research to establish population-level effects in the natural environment,” according to the report.

Charles Tyler, a professor at the University of Exeter School of Biosciences in the United Kingdom and a senior author of the report, said that scientists have shown that “some of these chemical compounds are getting into the environment and are in some environments at concentrations where they can produce biological effects in a range of wildlife species.”

Traveling from coast to coast, plastic can endure for thousands of years due to the reduced UV exposure and lower temperatures of aquatic habitats.

Barnes demonstrates plastic’s mobility with his account of a plastic sighting during an expedition to the Amundsen Sea where he took biological samples, the first there ever. The Amundsen, located in the Pacific Sector of Antarctica, is the only sea in Antarctica with no research station on its coast and the nearest urban center thousands of miles away.

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“Even for us, getting in was a challenge because there’s so much ice and it’s so difficult to get there,” said Barnes. “But even in that remotest of environments, there was plastic floating on the sea surface.

Plastic also serves as a floating transportation device that allows alien species to hitchhike to unfamiliar parts of the world, threatening biodiversity. Global warming further aids the process by making previously inhospitable areas like the Arctic livable for invasive species, which can be detrimental to local species.

For example, plastic items are commonly colonized by barnacles, tubeworms and algae. Along the shore of Adelaide Island, west of the Antarctic Peninsula, ten species of invertebrates were found attached to plastic strapping that was littering the ice.

“Raising the temperature just one degree can make the difference between getting to someplace and actually surviving once you get there,” said Barnes.

Plastic is so resilient that even burying it deep within the earth doesn’t keep it from impacting the environment. Currently it accounts for approximately 10 percent of generated waste, most of which is landfilled. But, as the report notes, placing plastics in a landfill may simply be storing a problem for the future, as plastic’s chemicals often sink into nearby land, contaminating groundwater.

Plastics as a major user of fossil fuels

In addition, production of plastics is a major user of fossil fuels. Eight percent of world oil production goes to manufacturing plastics.

As plastics grow in volume at a rate of about nine percent each year, the authors emphasize that tackling its problems means addressing its sustainability.

One solution is to treat plastic as a reusable material rather than as a disposable commodity that’s quickly discarded. That means making plastic more easily recyclable from the get-go by using fewer materials in the manufacturing process and increasing recycling facility availability.

“The recycling message is simple; both industry and society need to regard end-of-life items, including plastics, as raw materials rather than waste,” stated the report.

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Increasing the availability of biodegradable plastic, which can be made from renewable materials from plants such as corn and soy, is another option.

“Biodegradable plastics have the potential to solve a number of waste-management issues, especially for disposable packaging that cannot be easily separated from organic waste in catering or from agricultural applications,” according to the report.

However, currently production capacity for biodegradable plastics worldwide is around only 350,000 tons, representing less than 0.2 percent of petrochemical-based plastic. In addition, “most of these materials are unlikely to degrade quickly in natural habitats, and there is concern that degradable, oil-based polymers could merely disintegrate into small pieces that are not in themselves any more degradable than conventional plastic,” stated the report.

To help mitigate the potentially harmful chemicals in plastics, the authors recommend that more studies be conducted on the biological mechanisms that may be affected by plastic additives and in particular, low-dose chronic exposures.

In the meantime, the report recommends reducing the use of these chemicals and developing safer alternatives, a strategy known as green chemistry.

“Had this approach been in place 50 years ago it would probably have prevented the development of chemicals that are recognized as likely endocrine disruptors,” the report said.

The report also suggests that plastic waste can be reduced by using labels that allow consumers to choose packaging based on a lifecycle analysis that includes all components of the manufacturing process. For example, if the product were made of mostly recycled materials, used minimal packaging and could be easily recycled, it would get a green dot. If the product were made of excessive packaging that used a lot of virgin materials, it would get a red dot.

“Personally, I feel that’s the way to do it, rather than a knee jerk reaction where legislation says we can’t use certain types of plastic,” said Thompson. “Having that information will help drive the system because I think consumers are keen to make the right choice when provided with all the information.”

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Neal of PlasticsEurope said consumers, not the industry, are responsible for making sure plastics don't wind up littering the environment.

"In my view the responsibility is fairly and squarely on the consumer," he said. "People tend to pick on plastics because perhaps it's the most visible form of litter and because it's lightweight so it can move around a bit, but actually it's only a small part of the litter problem."

A responsible way to help solve environmental problems

The authors said that if plastics are made and used responsibly, they can help solve some environmental problems.

For example, one study found that packaging beverages in PET (a type of plastic) versus glass or metal reduces energy use by 52 percent and greenhouse gas emissions by 55 percent. And, solar water heaters containing plastics can provide up to two-thirds of a household's annual hot water demand, reducing energy consumption.

Plastics, if used wisely, "have the potential to reduce mankind's footprint on the Earth," Thompson said.

ehn.org, 9 April 2020

<https://www.ehn.org>

Homemade cultured butter is more buttery than normal butter

2020-05-07

What you need

500 ml of cream
2 tbsp of live yoghurt or buttermilk
A cheesecloth

Have you been using time stuck indoors to [master homemade bread](#)? The next step is to make your own butter. Or if you haven't got into bread, maybe start with butter – it's actually much easier and the result is much tastier than the shop-bought variety.

A century ago, butter was made by leaving milk out in big vats until cream formed on top. This took a few days and the cream would ferment, thanks to bacteria that metabolise lactose to produce lactic acid. The same types of microbes are involved in [making kimchi and sourdough bread](#). Apart

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from acid, the bacteria produce a range of aroma compounds that make for a more richly flavoured butter.

The key molecules include buttery diacetyl, cheesy butanoic acid and peachy delta-decalactone. Diacetyl is added to many foods to add butter flavour. It is also present in some alcoholic drinks, and may help to create the [buttery flavour of wines like chardonnay](#).

In milk and cream, the fat is contained within globules coated with a membrane, which allows the fat to remain suspended in water as an emulsion. To make butter, cream is churned, which ruptures the fat globules, allowing the fat inside them to stick together and form a solid mass.

Most butter is now made from pasteurised cream using machines that separate the cream quickly, without live bacteria having a chance to add to the flavour. Some restaurants make their own cultured butter, and it's easy to do at home, using a source of lactic acid bacteria, such as from buttermilk or live yoghurt.

Mix 500 millilitres of cream with 2 tablespoons of yoghurt or buttermilk and leave in a covered container at room temperature for at least a day. It will thicken and smell tangy at first, then more pungent, but don't worry – most of the smell will be in the liquid that gets separated out. Leaving the cream for up to a week gives the butter a slightly cheesy flavour.

Before churning, chill the cream to 14 °C so that the butter will be solid, but not so firm that it sticks to the sides of the mixer. Process in a food processor until the butter separates from the buttermilk – this should take up to 3 minutes.

Line a sieve with cheesecloth over a bowl and pour in the butter mixture. Wrap the cloth around the butter, squeeze and twist to press out liquid, stopping when butter starts to come through. Dunk the cloth-wrapped butter in a bowl of ice water to chill it for a few minutes, then tip the butter into a large bowl and knead with a wooden spoon to press out any remaining buttermilk and pour away. If desired, add salt, then put in a clean container.

The tangy buttermilk can be used to make pancakes, salad dressings or buttermilk-marinated roast chicken.

newscientist.com, 7 May 2020

<https://www.newscientist.com>

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