EcoAméricas

A monthly report on development and the environment in Latin America

‘Pharmaceutical fingerprint’ seen in region’s rivers

Region

Antibiotics, pain relievers, anti-anxiety medicines, anticonvulsant drugs—any medications humans take eventually make their way into rivers and streams. A new global study found pharmaceuticals in virtually every inhabited part of the world, with some of the highest cumulative concentrations in South America.

The study, published in February in the Proceedings of the National Academy of Sciences, involved analysis of samples taken at 1,052 locations along 258 rivers in 104 countries, nine of them in Latin America. The result, the authors said, is a “pharmaceutical fingerprint” of more than 471 million people.

Samples were gathered in 36 countries where such studies had never been done, among them Bolivia, Panama, Peru and Uruguay in Latin America and Antigua and Barbuda in the Caribbean. The analysis was designed to detect 61 “active pharmaceutical ingredients,” mainly substances used in medicines, but also caffeine and nicotine. Sampling sites were chosen to reflect a range of conditions, from high alpine areas to deserts, both heavily and sparsely populated places, countries experiencing political instability, polar regions (one site was in Antarctica) and all major climate zones.

The only places where no pharmaceutical compounds were detected were in Iceland and a Yanomami indigenous village in Venezuela.

“We’re finding these products in all kinds

continued on page 9

Impacts of Mexican agroforestry drive scrutinized

Mexico

When Mexican President Andrés Manuel López Obrador launched Sembrando Vida, his signature initiative to address rural poverty and environmental degradation through agroforestry, he described the goal as “rescuing the countryside.”

The program pays marginalized rural dwellers to plant damaged lands with trees that can be grown in combination with crops or livestock to provide an additional income stream—for instance, from timber or fruit—while supporting biodiversity and climate protection.

Sembrando Vida, or Sowing Life, certainly has not stood still since its inauguration on Feb. 1, 2019, just two months after López Obrador took office. To date, it has steered subsidies to over 442,000 people in 20 of Mexico’s 32 states at an overall cost of US$3.7 billion.

It has also inspired plans for a similar initiative in Central America. In December, the United States and Mexico announced their aim to extend the model to El Salvador, Guatemala and Honduras, partly to give rural people there an economic alternative to northward migration.

A woman growing coffee plants under Mexico’s Sembrando Vida agroforestry program. The government says women make up 137,549 of Sembrando Vida’s 442,415 beneficiaries, who receive subsidies for planting on degraded lands. (Photo by Luis Revo, Ministry of Social Affairs)

Despite Sembrando Vida’s torrid start in Mexico and its promise as a blueprint for Central America, however, some experts warn that serious collateral damage could occur if those implementing the model do not give environmental considerations greater weight.

They point to a variety of problems, a key one being inadequate environmental expertise,

continued on page 10

May 2022

Vol. 24 - No. 7

Inside

EcoAméricas

Coverage of Latin American environmental developments and trends for academic institutions, businesses, NGOs and public agencies.

Editor & Publisher
George Hatch

Design
Marina Tubio

Business Manager
Diana Guevara

Editorial/Subscriptions Office
Fourth Street Press
3 Ellis Square
Beverly, MA 01915

Tel: (978) 232-9251
Fax: (978) 232-9351
E-mail: ecoamericas@fspress.com
Web site: www.ecoamericas.com
@Fourthstreetpress
@EcoAmericas
@EcoAmericas

Ecoméricas is published monthly by **Fourth Street Press, Inc.** It is available in print and electronic versions. One-year charter subscription rate is $225, with discounts available for organizations needing multiple subscriptions. Back issues are $25

ISSN 1532-835X

Around the Region

"Surprise" hunting decree gets pushback in Uruguay

When it comes to hunting, Uruguay is seen as occupying the permissive end of the spectrum.

The impression was reinforced this month with the implementation of a decree that relaxes hunting restrictions, most notably by allowing nighttime hunting and making it easier to get permission from private property owners to hunt on their land.

Two networks representing hunters and hunting businesses—respectively, the National Hunters Association of Uruguay (ACU) and the Pro-fauna Hunting Association of Uruguay—acknowledge that they wrote the decree, which was signed by Uruguayan President Luis Lacalle Pou.

Mauricio Álvarez, president of a Uruguayan conservation network called Conservation of Native Species of Uruguay (Coendu), publicly denounced the decree, describing it as a "surprise."

"Aside from the hunters who worked on this, nobody expected it," Álvarez says. Referring to a green-friendly tourism-promotion motto Uruguay began using in 2001, he adds: "It is a new reversal that shovels more dirt on the cadaver of what once was 'Uruguay Natural.' "

Uruguay allows hunting of three exotic invasive species—wild boar (Sus scrofa), rabbits (Lepus sp.) and axis deer (Axis axis). Permits are required in the case of rabbits and axis deer, but not when it comes to wild boar, which attack sheep, eat crops and do not have natural predators.

The country also allows hunting of certain native species. Licenses are required in the case of spotted nothura (Nothura maculosa) and nutria (Myocastor coypus), but not for doves, sparrows, monk parakeets (Myiopsitta monachus) and three poisonous snake species—the southern coral (Micrurus frontalis) and two species of pit viper (Bothrops alternatus and Bothrops neuwiedi).

The hunting-sector associations requested a decree that would allow legal nighttime hunting of wild boar and lower the license charge for hunting axis deer. They also asked for a simplification of firearms licensing so tourists could get permits more easily and for a less cumbersome means of getting permission from landowners to hunt on their property. Rather than requiring landowners' assent in writing, as used to be the case, the new decree allows permission to be obtained "verbally."

The nighttime hunting and verbal authorization to hunt on private land have stirred particular concern among farm and ranch operators, who worry the provisions could be easily abused and put their properties at risk.

Álvarez says the decree's aims are purely economic: to promote hunting-tourism business and rein in exotic species that undercut agricultural production. He argues the decree could increase pressure on native species, which he says hunters are likely to kill while ostensibly going after wild boar.

Says Álvarez: "Hunting-tourism is being promoted in a country that can't control it, and sport hunting is not the way to address invasive species."

Álvarez points out that when Coendu successfully pushed for the suspension of duck hunting in 2018, it researched 20 hunting-tourism businesses and discovered they enabled the hunting of protected species and of permitted species in excess of official quotas. The group also found that the government had not been monitoring the size of duck populations.

"Even worse, right in the tourism literature the species they offered foreigners the opportunity to hunt included protected species, and they continue to do that," he says. "It's clear they do it because there is no enforcement and in the field they can kill anything."

In a meeting that Álvarez and other environmentalists had with Lacalle Pou, the president said he was a fan of hunting wild boar during the day with dogs, and stated the decree would remain in place.

Follow-up: Mauricio Álvarez, President, Coendu, Montevideo, Uruguay, +(598) 9926-9549, **coendu@coendu.org**. The newly implemented Uruguayan hunting decree: **https://bit.ly/3PKm4wR**

Mexican gravel-quarry closure prompts an investment dispute

Mexico in May announced the closure of a gravel quarry in eastern Quintana Roo state, accusing its operator, Vulcan Materials Company, the largest U.S. producer of construction aggregates, of illegally extracting gravel and sand and exporting it to the United States.

Calica, Vulcan's local subsidiary, runs the 4,200-hectare (10,400-acre) quarry, which is located near the Caribbean resort community of Playa del Carmen.

Parts of the quarry have been excavated below the water table and Mexico's lead environmental agency, the Secretariat of Environment and Natural Resources (Semarnat), says mining activities threaten water quality and subsoil conditions.

"Vulcan strongly believes that this latest action by Mexico is arbitrary and illegal," the

continued on page 11

Amid some concerns, Chile ramps up desalination

Chile

With its rainfall languishing below historical levels for more than a decade, Chile has been looking increasingly to its extensive coastline for relief in the form of desalination projects.

The country so far has built desalination plants mostly to serve mines and other industries, but the technology is being used to supply potable water for cities, too. Among them is Antofagasta, whose 360,000 inhabitants—the country's sixth biggest urban population—rely on a Colombian-owned desalination plant for 85% of their drinking water.

The move to desalination has not come controversy-free. Environmental concern about the process has intensified since the inauguration of Gabriel Boric, who became Chile's president in March after winning office in December with strong support from green advocates. A prominent concern—that concentrated brine waste discharged into the ocean by desalination plants could harm marine life—has drawn comment from Boric himself.

"Desalination plants often pump the brine into the ocean, which can affect the sea bottom," Boric said in April during a visit to Coquimbo, a port city that—like other areas of northern Chile—has been suffering from drought in recent years. "We have to create solutions that don't aggravate problems, and I am willing to explore alternatives."

Another big project

Despite such reservations, however, the government is weighing plans for a US$181 million desalination plant capable of meeting the drinking-water demand of Coquimbo and neighboring La Serena. The Environmental Evaluation Service (SEA), the agency that oversees environmental-impact review in Chile, recently asked the project sponsor for more technical information about the plan, which forecasts output of up to 1,200 liters (317 gallons) of potable water per second.

Chile is Latin America's leader in desalination, producing some 500 million liters (130 million gallons) of industrial and drinking water daily, according to the Terram Foundation, a leading Chilean environmental group. Terram says that as of November of last year, 30 desalination projects awaited SEA approval, with 80% of their production slated for industrial uses, principally for mining.

The country has no legislation specifically addressing desalination standards and practices. While there is no official information on the number of plants currently in operation either, Claudio Sáez, director of an environmental research center at Chile's University of Playa Ancha, says 22 large plants are in operation. Half of them were built in the past 10 years, he says, adding the rest are 20 to 30 years old.

Sáez says conditions driving the need for desalination show no signs of letting up. "There is a lasting decline in rainfall, and I would speak of desertification," he says. "The Atacama Desert is advancing south."

Sáez, who also leads a three-university project to research sustainable desalination, says brine from the plants must be mixed with seawater in pools before being discharged so the wastewater pumped into the ocean is less saline. This process is used in other parts of the world—Spain, for instance—but not in Chile, he says. Despite such challenges, Chile's use of desalination to produce drinking water is sure to grow in the coming years, Sáez forecasts.

"The industries of this country have caused important environmental impacts, and citizens' perception of desalination is not much different than their perception of other industries. In that sense, it is logical that Boric has not come out in favor of desalination. But the government knows there is no alternative."

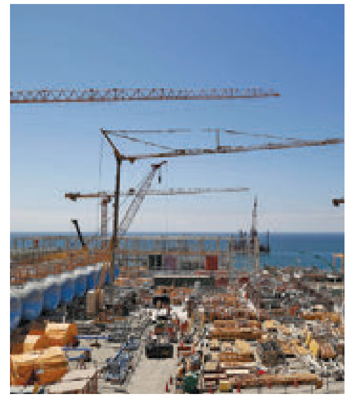
Call for coastal planning

Among those raising objections is Terram. "We are not against [desalination plants], but are trying to call attention to their environmental impacts," says Terram researcher Elizabeth Soto, a marine biologist. "We believe land-use management must occur on the coast because not all ecosystems are equal, and some already are impacted by multiple industries."

Another issue is social impact, a subject University of Chile researchers have studied in connection with the Antofagasta desalination plant. Reporting that most residents have a negative opinion of the quality of the water from the plant, the scientists questioned why desalinated water is used for humans while huge quantities of superior water from the Andes are consumed by Chilean mining operations.

"Water is poorly distributed in this country," says María Christina Fragkou, director of the University of Chile's geography department and leader of the social-impact study. "In Antofagasta people drink desalinated water while the utility is selling higher-quality water from the mountains to the mining companies. On the other hand, desalination isn't worth much if it doesn't protect conventional water sources. The good health of ecosystems and the recovery of rivers and groundwater sources must be assured. Human water consumption must also be guaranteed so that, ultimately, it can be determined whether there is enough water for agriculture and mining."

–Daniel Gutman



Chile is Latin America's leader in desalination. Photo shows the Escondida copper mine desalination plant, located near Antofagasta, when that facility was under construction. Another desalination plant currently provides 85% of Antofagasta's drinking water.
(Photo by Chilean Public Works Ministry)

Contacts

María Christina Fragkou
Director
Department of Geography
School of Architecture
and Urban Studies
University of Chile
Santiago, Chile
Tel: +(562) 2978-3143
mariac.fragkou@uchilefau.cl

Claudio Sáez
Environmental Hub Director
University of Playa
Ancha (UPLA)
Valparaíso, Chile
Tel: +(563) 2250-0270
claudio.saez@upla.cl

Elizabeth Soto
Marine researcher
Terram Foundation
Santiago, Chile
Tel: +(562) 2269-4499
esoto@terram.cl

Aviation-biofuel plant project debated in Paraguay

Paraguay

The Omega Green project site borders the Paraguay River, where a port is planned so barges can take biofuel south to Argentina for transshipment.
(Photo courtesy of Heñoi)

Contacts

David Cardozo
Coordinator
Network of Environmental NGOs of Paraguay
Asunción, Paraguay
Tel: +(595 98) 144-507
biodiversi@sobrevivencia.org.py

Mira Kapfinger
Spokesperson
Stay Grounded
Vienna, Austria
Tel: +(43 680) 145-1307
press@stay-grounded.org
www.stay-grounded.org

Eduardo Ritschel
ECB Group
Spokesperson
São Paulo, Brazil
Tel: +(55 11) 99688-0850
eduardo.ritschel@analitica.inf.br

Ángel Tuninetti
Researcher
Heñoi
Asunción, Paraguay
Tel: +(595 21) 553-083
angeltuninetti@gmail.com

Documents & Resources

Omega Green case study commissioned by Stay Grounded:
https://bit.ly/38vPP3w

Report on the potential use of pongamia (Pongamia pinnata) in Argentina published by the University of La Plata:
http://bit.ly/3DU12

Plans for the construction in Paraguay of a US$1 billion aviation-biofuel refinery is drawing questions about its possible environmental and social impacts. The Omega Green project, proposed by Brazil's ECB Group and approved by the government in 2019, is being touted as the first advanced biofuel refinery in South America. Plans call for its construction at a site on the Paraguay River in Villeta, a city some 35 kilometers (22 miles) south of the Paraguayan capital of Asunción.

Three million liters (792,000 gallons) of aviation and diesel biofuel would be made daily from inputs including slaughterhouse fats, oils from soybeans, canola pods and seeds of pongamia (Pongamia pinnata), an Asian tree ECB plans to introduce and plant at scale. Fuels would be loaded onto vessels at a duty-free river port planned for the project site and sent south by river for export from Argentina.

ECB, which reports that it has agreements from British Petroleum and Shell to buy half of its production, says that despite Paraguay's approval of the project in 2019, the start of work had to be delayed because of the pandemic. Its president, Erasmo Battistella of Brazil, forecasts production will begin in 2025.

International exposure

Omega Green was showcased by its sponsors at last year's COP-26 climate conference in Scotland. But critics argue that by further spurring monocrop production in Paraguay, the ECB would accelerate environmental destruction. Large-scale cultivation of soybeans for export in Paraguay has driven deforestation and involves heavy agrochemical use, boosting pressure on the country's plant and animal biodiversity, experts argue. It has also caused social dislocation, displacing indigenous peoples and smallholder farmers, they say. A ranching boom has had similar impact in the Chaco, Paraguay's semi-arid western region.

While project critics acknowledge that using aviation biofuel could help reduce greenhouse-gas emissions, they assert negative environmental and social impacts of the fuel's production outweigh that benefit. Currently, the only genuine way to address the problem of carbon emissions from aircraft, they say, is to cut back on air travel. "Biofuels are a false solution," says David Cardozo, coordinator of the Asunción-based Network of Environmental NGOs of Paraguay. "The production of the primary inputs would aggravate the environmental impacts we're seeing today."

That was the conclusion of a Green Omega case study commissioned by Stay Grounded, a global network dedicated to highlighting aviation's environmental impacts. Conducted by the Paraguayan green group Heñoi and the Global Forest Coalition network, the report said responsible use of cropland means giving domestic food production and habitat protection precedence over aviation fuel refining. "It is a perfect example of greenwashing," the report said. "Omega Green will provide 'green' fuels for foreign aircraft instead of healthy and sufficient food for the population."

Says Heñoi researcher Ángel Tuninetti: "It's another excuse to expand cattle ranching and soy cultivation, and for introducing pongamia, an Asian tree whose seed is not fit for human consumption but can be used as a biofuel input and in livestock feed." (ECB Group signed an agreement with the Dutch company Investancia to plant 125,000 hectares, [309,000 acres] of pongamia, or about 50 million trees, over 10 years to reach production of 300,000 tons of oil annually.)

River and road access

Battistella, the ECB president, said in February the company at the time was completing groundwork such as bringing electric power to the project site, a 500-hectare (1,200-acre) expanse of land that borders the Paraguay River and has a highway access road.

"The property gives us the opportunity to accommodate future expansion, with extra space to develop the port and also to allow us to invite strategic partners to invest in related activities," Battistella said. A company statement issued last November said that a fifth of the property will be conserved, "maintaining the identity of the current biome."

Questions about possible land-use impacts of the biofuel project are rooted in concern not only about increased demand for soy boosting land-clearing in farming areas. There is also worry that planting pongamia trees in the Chaco would exacerbate acute land-use pressures exerted there by cattle operations serving the lucrative beef-export sector.

After the release of the study by Stay Grounded, Heñoi and Global Forest Coalition, ECB Group said it had "not been consulted, is not in agreement and does not recognize the assertions and supposed findings of the document." ECB Group said that "by not reflecting reality, [the study's] conclusions are reckless and have the sole objective of defaming this company and the professionals involved."

Heñoi's Tuninetti took issue with the company statement, saying ECB Group had been asked for input but did not respond. He also faulted the company statement for not addressing the case study's specifics.

–Javier Lyonnet

Settlement boosts Tijuana River cleanup projects

Mexico-United States

Stakeholders say a recent legal settlement will help curb water pollution along the Tijuana-San Diego portion of the U.S.-Mexican border.

Three lawsuits filed in 2018 pitted the California-based Surfrider Foundation and various California state agencies against the U.S. section of the International Boundary and Water Commission (USIBWC), the binational entity that oversees U.S-Mexico water agreements and boundary issues.

Plaintiffs contended the USIBWC was violating the U.S. Clean Water Act by permitting contamination of the Tijuana River which flows into the United States near Tijuana and into the Pacific Ocean at a state park in Imperial Beach, California. In April, the parties announced a legal settlement requiring new wastewater-treatment and pollution-control infrastructure on both sides of the border. The improvements will be carried out in phases and overseen jointly by the U.S. Environmental Protection Agency (EPA) and Mexico's National Water Commission (Conagua), the two agencies say.

"We're really happy with the combined infrastructure solution," says Angela Howe, the Surfrider Foundation's senior legal director. "Unfortunately, it's partially funded. We're not going to solve everything in one fell swoop."

Monitoring addressed

The settlement also obliges USIBWC to continue discussing water-quality monitoring at the agency's regular San Diego Citizens Forum meetings and to report water-quality test results on its Twitter account within eight hours of receiving them, she says. (Water quality will also be addressed in a proposed minute, or amendment, that the U.S. and Mexican sections of the IBWC are drafting for the 1944 water treaty that covers the Tijuana River.)

The settlement unveiled in April calls for implementation of a suite of transboundary water-pollution-control measures that the EPA refers to as the Tijuana River Comprehensive Infrastructure Solution. These measures range from gray-water recycling and the expansion of sewage treatment capacity to the installation of trash booms in the river channel.

Wastewater treatment and garbage collection have lagged behind population growth in Tijuana, spurring ecological crises and public health emergencies in the Tijuana River watershed. Swimmers and surfers have contracted illnesses linked to fecal bacteria; and in 2021 alone, California beaches registered 246 closures due to public health concerns, Howe notes. Beach closures related to fecal coliform levels have become a persistent problem for Tijuana and Baja California beaches as well.

Raw sewage in the Tijuana River is particularly troublesome during the relatively rainy winter months, but pollution problems crop up in the summer as well, says Doug Liden, an EPA environmental engineer.

At the heart of the cleanup plans is a project to boost the capacity of the USIBWC-managed South Bay International Wastewater Treatment Plant (ITP), which treats an average of 25 million gallons a day currently. Though located on the U.S. side of the border, the ITP only processes wastewater from Mexico. The expansion will allow it to up the volume to 35 million gallons a day, Liden says. The EPA calculates its Comprehensive Infrastructure Solution will reduce "impaired water quality" events during tourist season at California's popular Imperial Beach. Incidents in which the Tijuana River carries raw sewage into the United States will decline by 76%, the agency forecasts.

Partial funding

The EPA pegs the total cost of the sanitation strategy at US$627 million, with operating costs amounting to $26 million annually. Some $300 million will come from a specific appropriation that the U.S. Congress made as part of its funding for the new U.S.-Canadian-Mexican trade agreement that took effect in 2020. EPA's Liden says this appropriation will be spent entirely on expanding the ITP, while other project components will require financing by separate U.S. and Mexican sources. He says Mexico's Secretariat of the Treasury and Public Finance is mulling a budget for the project that will require approval of the Mexican Congress.

Before ITP expansion can begin, however, project plans must be certified to be in compliance with the U.S. National Environmental Policy Act, which will involve environmental-impact review and an upcoming public meeting. Liden expects the expanded plant to be operating by 2027. Meantime, USIBWC has agreed to undertake other actions, some of them immediately, including intercepting and diverting transboundary flows. For its part, the Surfrider Foundation plans to campaign for full funding of the EPA's Comprehensive Infrastructure Solution and monitor implementation of the legal settlement. Says Howe: "We're still the watchdog on the ground."

Mexico's Secretariat of Foreign Affairs says the binational effort could open "important opportunities for using [recycled] water in regions affected by drought." For EPA's Liden, the Tijuana River saga has resulted in "serious planning for the future that I think can be replicated in other areas of the border."

–Kent Paterson

Raw sewage carried seaward by the Tijuana River periodically fouls beaches near the U.S.-Mexican border.
(Photo by Surfrider Foundation)

Contacts

Soledad Calvino
Press Officer
U.S. Environmental Protection Agency Region 9
San Francisco, California
Tel: (415) 972-3512
calvino.maria@epa.gov

Angela Howe
Senior Legal Director
Surfrider Foundation
San Clemente, California
Tel: (949) 492-8170
ahowe@surfrider.org

Lori Kuczmanski
Public Affairs Officer
U.S. Section, International Boundary and Water Commission (USIBWC)
El Paso, Texas
Tel: (915) 832-4106
lori.kuczmanski@ibwc.gov

Documents & Resources

Page where the EPA posts Tijuana River watershed public meeting information:
https://bit.ly/3t03hE2

Centerpiece

Scientists urge holistic view of Pantanal

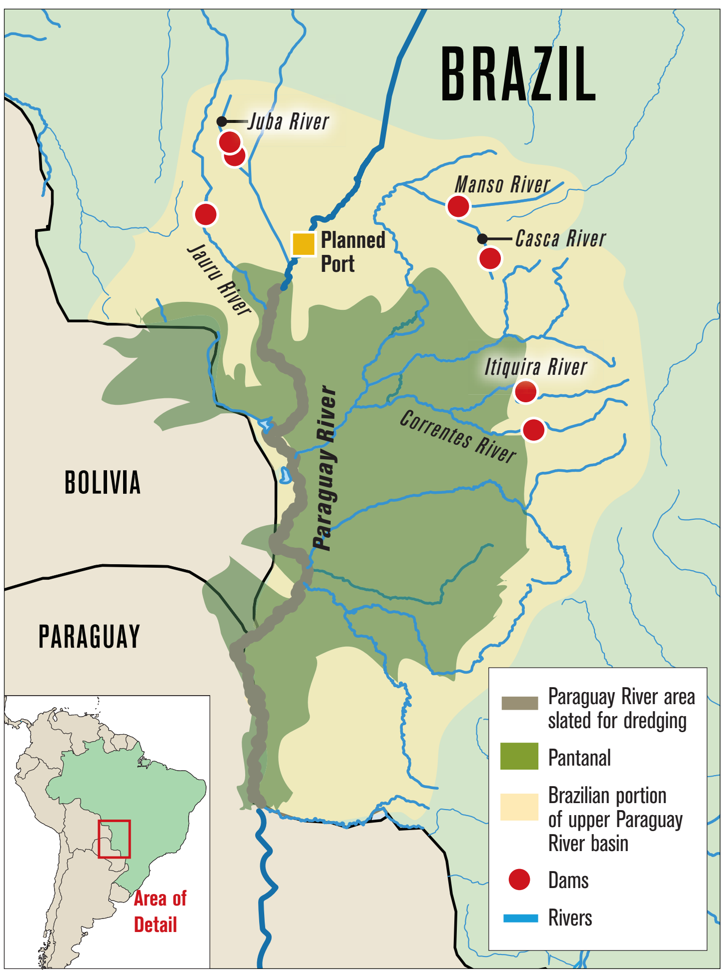
Brazil

The Pantanal, one of the world's largest freshwater wetlands, could face ecological, economic and social collapse due largely to the cumulative effects of seemingly isolated development decisions, four researchers warned in a letter published this month in the journal BioScience.

In their letter, published May 4, the Brazilian scientists said there "is still hope" for the Pantanal, which occupies an enormous geological depression in South America's upper Paraguay River basin. But they warned of the collective impact of existing and planned development projects, pointing specifically to the construction of upstream dams and to a planned river-dredging project aimed at easing grain-barge transport through the region.

"[The Pantanal's] sustainable use must not be challenged by the consequences of small, mistaken decisions that fail to consider their cumulative impacts, compromising the future of sustainable cattle ranching, fishing, ecotourism, traditional communities, biodiversity, and ecosystem services," they wrote.

The letter was coauthored by scientists from Embrapa Pantanal, a research unit of Brazil's Agriculture Ministry; ICMBio, an arm of the Environment Ministry that oversees federal protected areas; the Institute of Ecological Research (IPÊ), a Brazilian research nonprofit; and the Brazilian office of Panthera, a global wildcat conservation group.



Map shows locations of the seven largest dams in the Brazilian portion of the upper Paraguay River basin, those with an installed capacity of over 30 megawatts. In all, 50 dams have been built in the region. A port and dredging project are also planned to bolster grain shipments south through the Pantanal along the Paraguay River to Argentina.

Although the Pantanal comprises 179,000 square kilometers (69,112 square miles) in Brazil, Paraguay and Bolivia, the letter focuses on the biome's Brazilian portion, which faces the greatest development pressure.

That portion, located in western Brazil, accounts for 80% of the Pantanal overall, covering 140,000 square kilometers (54,050 sq. miles)—an area roughly the size of New York state. It is bracketed by the Cerrado, a sprawling savannah just south of the Brazilian Amazon and, more specifically, by the Cerrado plateaus of the upper Paraguay River basin, a four-country network of rivers.

Rainwater runoff from the Cerrado, most of whose precipitation originates in the Amazon region, swells rivers flowing into and around the Pantanal. Water covers up to 80% of the Pantanal several months a year, with the timing of the flooding varying from location to location.

Prominent among the causes of the Pantanal's environmental threats is the array of small and large dams that have been built in the Brazilian portion of the upper Paraguay River basin, the four researchers said in their BioScience letter. Over the last two decades, private developers and the government have built a total of 50 dams in the region, taking advantage of the elevation change at the edges of the plateaus to generate hydropower.

Seven of these 50 dams are classified as large, with an installed capacity of over 30 megawatts; 24 as small, with five to 30 megawatts of installed capacity; and 19 have an installed capacity of five megawatts or less, according to Ecology and Action (Ecoa), a Brazilian environmental research and advocacy nonprofit. Another 13 small dams are being built, and a further 125 dams—two of them large, 96 of them small and 27 under five megawatts—are planned but not yet approved by the government, Ecoa says.

Scientists blame the dams for blocking the flow of sediments into the Pantanal—both the inorganic variety, such as waterborne sand and clay, and the organic kind from, for instance, decomposing wood and plants. They point out that the dams also cut the floodplain's upstream supply of nutrients such as nitrogen, phosphorus, potassium and magnesium.

"Diminishing this floodplain's lifeblood starves the Pantanal and reduces its biodiversity," says Pierre Girard, a professor of ecology at the Mato Grosso Federal University (UFMT), who specializes in Pantanal hydrology.

Experts say the size of Pantanal fish could decline as a result, compromising the health of the fish as well as their numbers. That, in turn, would compromise the food source for fish-eating birds and the livelihoods of commercial fishers in the region. Further threatening fish populations is the role dams play in preventing them from migrating and spawning upstream.

The reduced flow of nutrients also constricts the growth of native grasses. These serve as pasture for cattle-raising operations and for native herbivores such as deer—a key food source, in turn, for jaguars and pumas.

In harming the Pantanal ecosystem, dams add to other pressures that are threatening what some experts view as a unique coexistence of economic activity and natural processes amid one of the richest concentrations of wildlife in the world.

"The Pantanal is one of the few large-scale biomes, in or outside Brazil, where sustainable economic development, be it cattle ranching or commercial fishing, can thrive alongside biodiversity

Experts worry that dredging planned for part of the Paraguay River could diminish the seasonal flooding that underpins the ecosystem of the Pantanal (above). They say dams already are affecting the region by blocking sediment and nutrients carried by rivers that flow into the enormous wetland. The second largest of these dams, the 176-megawatt Ponte de Pedra (right), is located on the Correntes River.
(Photos, respectively, by Greenpeace and Ecoa)

conservation," Rafael Morais Chiaravalloti, an IPÊ researcher who coauthored the BioScience letter, told EcoAméricas. "But the land-use changes that have occurred in the biome in the last two decades, mainly the damming of upper Paraguay basin rivers for hydropower, along with droughts and record Pantanal fires in 2020, have altered the natural dynamics of the biome and now threaten its survival."

The BioScience letter highlights other development decisions that could further jeopardize the region's environment. These include a proposed 1,272-km (789-mile) dredging project to enable barge-transport of soybeans and corn south through the Pantanal along the Paraguay River, to the Paraná River and, further downstream, transshipment from Argentina or Uruguay to export markets. The dredging is slated to be heavy along the northern 680 kilometers (422 miles) of that stretch and lighter along the lower 592-kilometer (367-mile) portion. Construction of a river port is also planned for a site 60 kilometers (37 miles) north of the area slated for dredging so grains from Brazil's Cerrado region can be trucked there and loaded onto barges for the trip south.

The governments of Brazil and two Brazilian states on the river route's northern portion, Mato Grosso and Mato Grosso do Sul, support the project. But ecologists point out that because the work would deepen the Paraguay River and in certain areas straighten its course, thereby speeding its flow through the Pantanal, the giant wetland's water levels—and, thus, its seasonal inundations—would diminish.

That would mean a decline in sediments and nutrients, shrinking fish habitats and other negative ecological knock-on effects says Alcides Faria, executive director of Ecoa.

Chiaravalloti says the impacts would be far-reaching: "Because nutrient- and sediment-bearing inundations are the source of the Pantanal's life, diminished flooding caused by the planned waterway would threaten the biodiversity of this wetland."

He and the other coauthors of the BioScience letter also take issue with decision-making on the proposed river port. The

continued on page 8 ▸

Contacts

Débora Calheiros
Biologist and researcher
formerly with
Embrapa Pantanal
Corumbá, Mato Grosso do Sul,
Brazil
calheirosdebora@gmail.com

Alcides Faria
Executive Director
Ecology and Action (Ecoa)
Campo Grande, Mato Grosso
do Sul, Brazil
alcidesf@riosvivos.org.br

Philip Fearnside
Senior Researcher in
Amazon Ecology
National Institute of
Amazon Research (INPA)
Manaus, Amazonas, Brazil
Tel: +(55 92) 3643-1822
pmfearn@inpa.gov.br

Pierre Girard
Professor
Department of Ecology
and Botany
Mato Grosso Federal
University (UFMT)
Cuiabá, Mato Grosso, Brazil
pierregirard1301@gmail.com

Rafael Morais Chiaravalloti
Researcher
Institute for Ecological
Research (IPÊ)
São José do Rio Preto
São Paulo, Brazil
rafaelmochi@gmail.com

Fernando Tortato
Researcher
Brazilian arm of Panthera
Chapada dos Guimarães
Mato Grosso, Brazil
ftortato@panthera.org

Documents & Resources

Press Release on letter published in Bioscience:
https://bit.ly/38q3l37

continued from page 7

In 2020, record wildfires (above) consumed more than a quarter of the Brazilian Pantanal, incinerating enormous expanses of the habitat of wildlife including the toco toucan (Ramphastos toco).
(Photos, respectively, by André Zumak/Ecoa and Greenpeace)

port, to be named Barranco Vermelho, or Red Ravine, has won preliminary approval from Mato Grosso state authorities and is slated to be built by a consortium of private developers. "[A]lthough the [port's] approval has followed the legal process, the ecosystem-scale consequences of the port were ignored; the analysis was rather focused on the port's local, isolated impacts, despite the fact that the port will be viable only if the engineered waterway is implemented," the letter says.

Letter coauthor Fernando Tortato, a researcher with the Brazilian arm of Panthera, argues that the port and dredged barge route must be viewed in a broader context.

"In the last two decades, regionally approved infrastructure like dams have already impacted the Pantanal, reducing its biodiversity," Tortato says. "If other projects like the port and waterway are implemented, they will create a synergy of adverse environmental shocks to the biome that will further threaten biodiversity and sustainable economic activities, such as cattle ranching and commercial fishing."

Analysts find such blows especially worrisome amid the growing pressure being exerted on the Pantanal by climate change, drought and dry-season wildfires. In 2020, the largest number of wildfires ever recorded in the Brazilian Pantanal burned 26% of the biome. (See "Once again, devastating dry-season fires in Brazil"—EcoAméricas, Sept. '20.) The next year, another outbreak of wildfires blackened an additional 12.6% of the Brazilian Pantanal.

The blazes are attributed mainly to brutal drought conditions in the Pantanal in recent years, a phenomenon that climate experts associate in part to climate change. Also cited are the burns Pantanal ranchers and farmers conduct on pasture and cropland for nutrient release and for brush and weed control.

Experts say most Pantanal ranchers and farmers manage their land sustainably and respect fire regulations such as the 120-day nationwide burning ban that the federal government declared, belatedly in July 2020, halfway through the April-to-October dry season. Because of the severe drought, however, many of those who attempted controlled burns—whether legally before the ban was declared or illegally after it was imposed—were unable to contain the blazes.

In their BioScience letter, the researchers portrayed the pressures on the Pantanal as multilayered, with decision-making on such activities as dam construction and river dredging a crucial variable in an overall picture that also includes drought and fires.

"[L]and-use changes [add] to the global, continental and regional-scale threats to challenge the Pantanal's conservation status," the letter states. "…[I]n such a multi-scale context, regional and local decisions are key to mitigating the negative impacts of broader, difficult-to-access threats."

Numerous Brazilian scientists are expressing agreement with the BioScience letter, arguing that it is past time for government bodies to recognize the collective impact that piecemeal development decisions have on prized ecosystems such as the Pantanal's.

Says Philip Fearnside, a senior researcher in Amazon Ecology at the government-run National Institute of Amazon Research (INPA): "The Pantanal is in dire straits because existing and planned dams, and a planned waterway going through it, as well as climate-change-generated impacts, like devastating fires, are converging on the biome, greatly limiting its capacity to recover."

–Michael Kepp

Pharmaceutical pollution
continued from page 1

of rivers worldwide," says Silvia Echeverría, a researcher and professor at the National University of Costa Rica's Regional Institute of Studies on Toxic Substances, one of the report's authors. "It doesn't matter if they are metropolitan, or rivers without much urban influence."

Besides testing for individual pharmaceutical substances, the researchers measured the cumulative load of all of the compounds identified in the water samples. The highest combined total worldwide was measured in the Seke River that flows through El Alto, the sprawling metropolitan area on the Bolivian Altiplano above the city of La Paz. The sampling site was downstream from sewage-discharge locations and garbage dumps.

Along with the Seke, Costa Rica's Torres River, which flows through the capital of San José, was in the top 10% of rivers with the highest cumulative concentrations of pharmaceuticals. Another Latin American river to rank among the world's top 10% was Argentina's Riachuelo River, which flows near Buenos Aires and upstream is known as La Matanza. Along with the Yanomami village in Amazonian Venezuela, Chile's Maipo River had one of the lowest levels in Latin America.

Pharmaceutical compounds typically get into waterways after people who have been taking them urinate or flush expired medicines down the toilet. They then make their way into rivers, either directly or by way of sewage-treatment plants.

Many types found

Echeverría was not surprised to see high levels of substances such as caffeine or acetaminophen, a common over-the-counter pain reliever, but she was startled by the high levels of other compounds found in medication for illnesses such as diabetes and epilepsy. Because those are chronic health problems for which people take medication for a long time, the buildup in ecosystems can be substantial.

The rivers with the highest concentrations were neither in the wealthiest nor the poorest nations, but in middle-income countries. The reason, the researchers say, is that the people in those countries are able to afford medications, but live in areas that lack adequate sewage treatment plants. Even where such plants exist, however, the treatment processes often are not designed to remove substances like pharmaceutical compounds, Echeverría notes.

In Costa Rica, the sampling site with the highest levels of pharmaceutical compounds was downstream of a sewage treatment plant that collects water from several rivers, then discharges all of the treated water into the Torres.

There are various reasons for concern. Some compounds found in rivers are endocrine disruptors, which can cause hormonal changes in fish and other wildlife. Exposure to antibiotics in the environment, meanwhile, can lead to the emergence of antibiotic-resistant pathogens.

"In some cases, some substances have been shown to affect patterns of movement [of fish]," says Andreu Rico, an ecotoxicologist at Spain's Madrid Institute for Advanced Studies, who has researched pharmaceuticals and other substances in the Brazilian Amazon. "They can affect feeding. Some blood pressure medicine can cause changes in their locomotion or in their aggressiveness toward other species."

The number of pharmaceutical compounds found in water samples raises questions about what Rico calls "cocktails of substances that have combined effects, sometimes additive and in some cases synergistic."

Throw in agricultural chemicals that regularly wash into Latin American rivers—fertilizers, fungicides, herbicides, insecticides and others—and the potential impacts multiply, Echeverría says.

Impacts unclear

There is little study of the ways pharmaceuticals might alter ecosystems and biodiversity, Rico says, and the more ingredients there are in the mix, the harder that research will be. "A lot is still unknown about how these complex cocktails affect living beings," he says.

Echeverría says the study highlights the need to reduce the use of medications often over-prescribed in the region, such as antibiotics, and provide safe ways to dispose of outdated medicines. Improved treatment of sewage and drinking water is also urgent, she argues.

As of 2020, 73% of people in Latin America and the Caribbean had access to safely managed sanitation systems, up from 67% five years earlier, according to a joint monitoring program of Unicef and the World Health Organization. But there are wide disparities between nations—ranging from 79% in Chile to 18% in Colombia, for example—and between urban and rural areas.

For Rico, a key finding of the study is the surprising extent of the problem, even in places considered remote.

"I think it's a wake-up call to say that modern societies and industrial and intensive agricultural activities have arrived in the Amazon, and they should therefore be accompanied by a timely management and sustainability plan," he says, "especially because we're talking about a region where there is great biodiversity."

–Barbara Fraser

Costa Rican researcher Freylan Mena takes a water sample from his country's Torres River for a study of pharmaceutical pollution in rivers around the world. (Photo courtesy of Silvia Echeverría Sáenz)

Contacts

Silvia Echeverría Sáenz
Researcher
Ecotoxicological
Studies Laboratory
National University
of Costa Rica
Regional Institute of Studies
in Toxic Substances
San José, Costa Rica
Tel: +(506) 2277-3885
silvia.echeverria.saenz@una.cr
http://www.iret.una.ac.cr/

Andreu Rico
Ecotoxicology researcher
Madrid Institute for Advanced
Studies (Imdea-Water)
Madrid, Spain
Tel: +(34 91) 830-5962
andreu.rico@imdea.org
https://www.agua.imdea.org

Documents & Resources

For the study of pharmaceutical pollution in world rivers:
https://bit.ly/3NBrGHJ

For data from WHO/Unicef Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP):
https://bit.ly/3NAKVkL

Sembrando Vida
continued from page 1

Property owner Juan Carlos Jauregui of Tabasco state has planted banana trees under the Sembrando Vida program.
(Photo by Luis Revo, Ministry of Social Affairs)

weak oversight and inadequate baseline study to guide implementation. A consequence, they say, is worrisome evidence that some program enrollees have deforested standing woodlands in order to receive payments for planting trees.

"Although the intention behind the program is in essence good, the implementation has been unsatisfactory," says Javier Warman, forest director at the Mexico unit of the World Resources Institute (WRI), a U.S.-based research nonprofit. "You cannot compare reforestation of pastureland or grasslands, where there is a benefit, to deforesting in order to reforest. It's illogical and results in a loss of biodiversity."

Of the 1.1 million hectares (2.7 million acres) of Sembrando Vida projects thus far, 71% are slated for timber; 20% for orchards; 7% for agroindustry such as shade-coffee production; and 2% for spice cultivation. The program pays the equivalent of US$250 monthly to farmers in marginalized areas who have at least 2.5 hectares (6.2 acres) available for tree planting.

One objection green advocates raise is that to help generate the US$3.7 billion spent so far on Sembrando Vida, Mexico's government cut budgets for important environmental programs. There is also concern that the ranks of Sembrando Vida staff with environmental expertise is far thinner than it should be. Perhaps as a result, experts say, projects are skewed to commercially appealing tree species that are inappropriate for certain regions.

Non-native species

Pablo Chankin, an elder of Lacandon indigenous heritage, says he notices the problem in his home state of Chiapas. Though not enrolled in Sembrando Vida, Chankin is reforesting a piece of his land that was cut by illegal loggers. In accordance with Lacandon tradition, he is using native species such as mamey (Calocarpum sapota) and laurel (Lauraceae).

"In the Sembrando Vida program they are planting achiote, mango, lemon, guanabana, papaya and other non-native fruit trees that need a lot of watering," he says. "I am deeply concerned because the jungle cannot recover with those species of non-native fruit trees."

Experts are particularly concerned about the possibility that Sembrando Vida might have unwittingly spurred deforestation by enrolling some landowners who cleared native woodland specifically to claim reforestation subsidies. Organizers insist they are not allowing such abuses.

"Land which has been deforested or burnt is not accepted and we in no way incentivize destruction of forest or any other existing ecosystem," says Hugo Paulín, undersecretary for productive inclusion and rural development at Mexico's Social Affairs Ministry. "Only degraded land, pasture, grassland or abandoned land is eligible under the rules of Sembrando Vida."

But Warman points to a WRI analysis that suggests Sembrando Vida was responsible for over 72,000 hectares (178,000 acres) of forest loss in 2019 alone.

The analysis, issued in 2021, drew on data from Global Forest Watch, a monitoring service of WRI. Overall, Mexico lost 8.4% of its tree cover in the two decades ending in 2021, Global Forest Watch says, with the heaviest deforestation occurring in 2019 and 2020, the first two years of Sembrando Vida. Recently issued 2021 figures show 189,000 hectares (467,000 acres) of forest loss during the year, a 0.36% deforestation rate compared to 0.62% in 2019 and 0.56% in 2020.

Deforestation driver?

Cautioning that it is premature to draw firm conclusions, Warman suggests deforestation might have spiked in 2019-20 due partly to the land-clearing done by would-be enrollees aiming to obtain subsidies.

The relative decline in 2021, in turn, could have been the result of a pause that year in new enrollment, which might have effectively removed the incentive for such abuses, he adds. (The government paused enrollment throughout 2021 after Sembrando Vida bumped up against budgetary limits. Enrollment resumed this year.)

"It would appear the program intensified loss of forest density because the areas with the highest numbers of beneficiaries coincide with the worst deforestation," Warman says.

Chankin says he witnessed such abuses. "Some locals…preferred to receive [US$250] per month from the government than to protect the Lacandon jungle," he says. "I watched how hundreds of hectares of forest were deforested and burnt so they could participate in Sembrando Vida handouts. We have a responsibility to protect Mexico's lungs."

Analysts agree that if Sembrando Oportunidades, the Central American version of Sembrando Vida, is to succeed, it must ensure tight monitoring and on-the-ground engagement with property owners.

Warman argues it must also involve rigorous technical groundwork such as baseline land-use and geographical mapping to ensure successful reforestation and prevent abuses.

"If done well, the program has the potential to achieve social and environmental targets simultaneously," he says, "and this could be a win-win situation for all involved."

–Lara Rodríguez

Contacts

Hugo Raúl Paulín Hernández
Undersecretary for Productive Inclusion and Rural Development
Mexican Ministry of Social Affairs
Mexico City, Mexico
tania.navarro@bienestar.gob.mx

Javier Warman
Mexico Director of Forests
World Resources Institute
Mexico City, Mexico
javier.warman@wri.org

Documents & Resources

Joint U.S. and Mexican press release on Sembrando Oportunidades initiative:
https://bit.ly/3PJNiDA

WRI analysis of Sembrando Vida's possible role in forest loss in 2019 (in Spanish):
https://bit.ly/3MHgs4d

Global Forest Watch figures for Mexico:
https://bit.ly/3yWIN

Around the Region
continued from page 2

company said on May 13.

Calica claims the Mexican move violates the United States-Mexico-Canada Agreement (USMCA), the regional trade pact that in 2020 replaced the three-nation North American Free Trade Agreement.

The International Centre for Settlement of Investment Disputes is expected to determine before the end of the year if Mexico violated its obligations under the USMCA and, if a violation is found to have occurred, to determine the compensation.

Ten U.S. Republican senators cited the Vulcan case in a letter they sent to U.S. President Joe Biden in May, asking him to stand firm against Mexican President Andrés Manuel López Obrador's "aggression" toward U.S. companies in Mexico.

"The Vulcan case is of key importance for evaluating the mechanisms of the USMCA because of the judicial impact and precedents that will be generated," says Daniel Basurto, a lawyer on the board of directors of the Mexican Academy of Environmental Impact.

Critics have raised concerns about the true intentions behind the closure. In April, Interior Minister Adán Augusto López said Vulcan had accepted a proposal to redevelop the quarry into a tourist attraction. This fueled speculation that the closure might be related to the quarry's proximity to the route of the Tren Maya, the president's flagship rail project to connect Yucatán tourist destinations. Others have pointed out the gravel would be useful as track ballast for the Tren Maya.

"There is no real clarity as to what the real intention behind the closure is at present," says Basurto, who questions how Vulcan could function for over 30 years without proper permits. "What is clear is that the economic interests of a certain few with a lot of capital at stake explain what might otherwise appear to be an inexplicable decision."

On May 24, President López Obrador met with Thomas Hill, the executive director of Vulcan Materials Company. Following the meeting, President López Obrador said Mexico would go to local and international courts if no agreement is reached with the U.S. firm.

Crude production begins in major oilfield in Yasuní Park

A subsidiary of China National Petroleum Corporation (CNPC) has begun pumping the first crude from Ishpingo oilfield in biodiversity-rich Yasuní National Park, mainland Ecuador's largest and best-known protected area.

Contracted by the Ecuadorian state oil company, Petroecuador, CNPC Chuanqing Drilling Engineering Company (CCDC) started up two wells, one in April and the other in May. The wells are located in an oil-concession area known alternatively as Block 43 and Ishpingo-Tambococha-Tiputini—the names of the block's three oilfields.

Block 43 has been the cause of long-running controversy because of its location largely inside Yasuní, a key conservation asset in the Ecuadorian Amazon. The park is considered one of the most biodiverse places on the planet and is home to indigenous people with little or no contact with the outside world.

Nearly all of Block 43 is within Yasuní's boundaries, with only the Tiputini oilfield lying outside. The Tambococha and Tiputini oilfields have been producing crude for years, but not until April had oil extraction begun in Ishpingo, the oilfield with Block 43's greatest reserves.

In all, a total of 40 wells are planned for Ishpingo, which is expected to produce 50,000 barrels daily by the end of this year.

Ishpingo is particularly controversial because some of it occupies a 10-kilometer- (6.2-mile-) wide buffer area around a portion of Yasuní where extractive activity of any kind is prohibited to safeguard two nomadic groups living in isolation in the region.

Named the Tagaeri-Taromenane Intangible Zone (ZITT) after the two indigenous groups, the protected area covers 758,000 hectares (1.87 million acres) of Yasuní.

Ítalo Cedeño, general manager of Petroecuador, says over 500 conservation steps have been taken in Block 43, including protection of water sources, wetlands and important tree species.

Cedeño also cites 149 environmental safeguards including canopy bridges and environmental corridors within and beyond Yasuní Park.

Block 43 has proven oil reserves of 458 million barrels, 400 million of them in the Ishpingo oilfield. As such, it has become a prime focus of Ecuadorian President Guillermo Lasso's effort to double Ecuador's oil production to one million barrels daily by 2025, when his term in office expires.

In October of 2013, Ecuador's unicameral National Assembly declared oil production in Block 43 and Block 31, another oil concession area largely within Yasuní National Park, in the national interest.

This determination allows oil drilling on protected land within those blocks except in the case of the ZITT, where no such projects are allowed under any circumstances.

Follow-up: Eduardo Pichilingue, former Coordinator of Protection of Isolated Indigenous Peoples, Ecuadorian Environment Ministry, now based in Lima, Peru, eduardopi@gmail.com; Ítalo Cedeño, General Manager, Petroecuador, Quito, +(59 32) 394-2000.

Comparatively good winter for monarchs, report says

A rebound in the number of monarch butterflies (Danaus plexippus) overwintering in Mexico and signs of a relatively strong spring migration have fueled hopes of a slight recovery in the endangered insect's population.

Data published in late May by the World Wildlife Fund indicates that monarchs spending the winter of 2021-22 in the oyamel fir (Abies religiosa) forests of central Mexico occupied a total of 2.8 hectares (seven acres), up from 2.1 hectares (5.2 acres) the previous winter.

Jorge Rickards, director general of WWF Mexico, said the increase in the area where the monarchs cluster on trees—a proxy for the size of their population—was "good news" and a sign that "we should redouble our protection measures."

An estimated 10 to 50 million monarchs roost in each hectare of woodland.

Also in May, experts in the United States noted that the overwintering butterflies' offspring—which are born in Texas—had flown north earlier and in larger numbers than usual. (The monarch's migratory cycle involves four generations of butterflies, the first born in Texas and the next three in the Midwest; members of the fourth generation fly to Mexico in the fall.)

Monarch sightings above the 40th parallel during the second week of May suggest the Texas generation was reasonably large, says Orley "Chip" Taylor, who directs the U.S.-based nonprofit conservation group Monarch Watch. However, arrivals above the 40th parallel tapered off in the third week of May, perhaps due to cooler weather. What happens over the next three weeks will be crucial, Orley says.

Follow-up: Link to WWF monarch winter population report (in Spanish): https://bit.ly/3PMTUR

Q&A:

Argentine crop scientist assesses state of transgenic agriculture

Drought-tolerant wheat is about to reach the world marketplace, and drought-tolerant soy is not far behind. That's due in no small part to Raquel Chan, an Argentine molecular biologist. Chan led a government-funded team at Argentina's National University of the Littoral that developed the transgenic soy and wheat varieties, known as HB4, in partnership with the Argentine company Bioceres Crop Solutions. Commercial plantings of HB4 wheat, the world's first transgenic wheat of any type to win regulatory approval, began this year in Argentina, and purchase of the resulting flour has so far been approved by Brazil, Colombia and Australia. Commercial plantings of HB4 soybeans, the world's first drought-tolerant soy variety, are also expected to begin in Argentina this year once government approval is granted. China, the world's top soy importer, has already announced it would import them. Chan, who holds a biochemistry degree from Hebrew University in Jerusalem and a doctorate from Argentina's University of Rosario, spoke recently by telephone from Santa Fe, Argentina, with EcoAméricas correspondent Daniel Gutman.

Raquel Chan
(Photo by Instituto de Agrobiotecnología del Litoral)

What are the benefits of HB4 wheat and soy in your view?

HB4 is a sunflower gene that, when it is introduced in other plant species, makes them more tolerant to a lack of water. The potential of these GMOs [genetically modified organisms] is enormous because they can improve productivity in regions of infrequent rains or that go through periods of drought, as has been the case lately with Argentina and many other countries that have suffered large agricultural losses as a result.

We scientists don't like to anticipate the future, but what we can say is historic is that this biotechnological development was carried out by an Argentine government laboratory and a business formed by Argentine agricultural producers. Currently, there are 63 GMOs approved in the country and only three are [Argentine-developed]—the HB4 wheat and soy, and a potato variety that is resistant to the PVY virus [also known as Potato Virus Y].

What purposes have transgenic crops served thus far and what purposes will they serve in the future?

The first generation of transgenic crops were oriented toward resistance to herbicide or insects. It was hoped that a second generation would provide tolerance to drought or other sources of non-biological stress such as floods, storms and salts in soils. However, these types of transgenics don't exist in the world, and I've often asked myself why. I suppose that the answer is that they're not as profitable as the first kind.

A GMO that is resistant to herbicide, such as Roundup Ready, is a technology with universal value that can produce results anywhere in the world. By contrast, a GMO that is drought-tolerant produces better or worse results depending on the local conditions and the influence of other stress factors such as temperature, soil salinity or the presence of insects.

In terms of what is coming, experimentation by the large [international agrotechnology] companies is secret. But it is known that one objective of many researchers is to produce crops with greater nutritional value, since the world population will continue growing and the supply of arable land is limited.

How do you view the growing demand globally for health food and the continued consumer resistance to transgenics?

I think there is a fantasy about natural food that is in vogue and that creates big business. All the crops we eat are the product of improvements and mutations. Broccoli and cauliflower, to name two vegetables, didn't even used to exist in nature.

Nor are organic crops natural. Instead, they have been grown without agrochemicals. That type of agriculture can be carried out in small operations but not on a large scale. Funguses, weeds and insects create large losses in agriculture, and there is no way to fight them efficiently without agrochemicals. I'm not saying that this will not be possible in the future, but today it is not viable to feed the world without agrochemicals.

Yet transgenics are criticized precisely because they prompt wider use of agrochemicals.

That is the case with Roundup Ready soy, which is resistant to glyphosate herbicide, but all the transgenics shouldn't be put in the same basket.

I agree that we should work to reduce the use of agrochemicals, but today they cannot be eliminated, because agricultural production would go way down. Think of a country like Argentina, which lives on agricultural exports; it could be a catastrophe to stop using agrochemicals from one day to the next. Nowhere in the world has scientific research managed to develop cheaper alternatives to agrochemicals that are friendly to the environment.

Transgenics also are faulted for driving expansion of the agricultural frontier as crops are grown on more marginal lands, which increases deforestation and displacement of indigenous and smallholder farming communities.

Those things should not happen. We must separate technological advances from policies. If deforestation were prohibited in a certain area, then that would have to be monitored, but Argentina is a country where we are accustomed to regulations not being enforced. The idea behind these biotechnological advances is not to deforest nor to displace communities, but to produce more in the same place.

HB4 wheat has been questioned in particular because it is consumed primarily by humans, whereas transgenic soy and corn are mostly used as animal feed.

That criticism is unfounded. HB4 wheat has a sunflower gene, which is one of 50,000 genes. In Argentina we were asked to perform many, many tests before it was approved and Brazil required more. Now Australia, whose food regulations are very demanding, has said that this wheat's flour can be eaten. We either trust the regulatory bodies or we don't eat anything. This wheat is absolutely safe, and the suggestions to the contrary are scientifically unfounded.