Money Doesn't Grow on Dead Trees: Invasive Species in Our Globalized Economy

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Michael Chu (Host) - *[Voiceover] One by one, they fly off their ships. Armor-clad with bizarre bodies and menacing antennae, these alien invaders from a distant land evade every defense measure that protects our nation. They insert themselves into our everyday lives, taking over entire regions while facing little resistance and showing no remorse for the damage they cause. By the time humanity realizes their presence, it's too late. They've already sabotaged our society.*

Of course, I'm referring to Asian Longhorned Beetles.

A few months ago I was rudely awakened by a loud, grinding noise outside of my Cobble Hill apartment—a group of workers were cutting down my neighborhood's row of prized maple trees. Apparently, the trees had been infected by Asian Longhorned Beetles, and the U.S. Department of Agriculture had swooped in to remove them.

In pursuit of answers, I began investigating these mysterious insects and reached out to my friend, Dr. Claire Thacher from the USDA, to learn more. I took the M train over to Bushwick to see her efforts in preventing the spread of these beetles and to talk about their threat.

[horns honking, subway cars whooshing below, street chatter]

Claire Thacher (Ecologist) - Hi, Michael, how's it going?

MC - Not bad, but something has been *bugging* me lately. I understand there are some insects infesting trees here in Brooklyn?

CT - Yeah, let's head down to Bushwick and I can show you!

MC - On our way, do you mind telling us a little about the beetle that's responsible?

CT - The Asian Longhorned Beetle, or ALB for short, hitched a ride to the United States from East Asia and was first detected in New York Harbor in 1996 ("Asian Longhorned [nyis.info]").

MC - What do you mean by "hitched a ride?"

CT - They're believed to have crossed over in wood-packing materials used primarily in container ships—things like wooden crates and pallets. Each ship can carry hundreds of thousands of pallets, and there are roughly 58,000 merchant vessels trading internationally each year ("Number of Ships"). This provides a great mode of transportation for wood-boring pests to infest vulnerable ecosystems.

MC - I'm seeing many holes in these trees. I assume the Asian Longhorned Beetle is the culprit?

CT - Yep, the holes are created when female beetles lay their eggs in the bark of a hardwood. As the larvae mature, they burrow into the heartwood of the tree, eating the plant's nutrients before wiggling out and leaving dime-sized holes in the bark. If you take a closer look, you can see sap oozing out of the divots. Once an ALB infestation starts, there's only a short amount of time before the tree dies ("Asian Longhorned Beetle - About").

MC - Wow. I read a Vox piece last week and learned that a lack of trees can elevate temperatures of surrounding neighborhoods by up to eight degrees Fahrenheit—raising energy bills, increasing the likelihood of heatstroke, and exacerbating poverty within the community (Fong). I'm sure this is only one of many reasons why the beetles are harmful. How far have they spread?

CT - We're sort of playing whack-a-mole with the outbreaks down here. Just as we eradicate one node of infestation, another springs up a few miles away. So far, the beetle has only widened its range onto Long Island ("Asian Longhorned Beetle - New York"). What we're working diligently to prevent, however, is the movement of ALB upstate through the transportation of infested wood.

MC - As a city guy myself, I feel like upstate is all trees. I imagine their destruction would have economic consequences.

CT - Absolutely. Currently, the major concern is the threat to the maple syrup industry. New York boasts the largest resource of tappable maple trees in the nation, with upwards of 2,000 maple sugarmakers ("Our Industry"). In 2020, we produced $27.7 million in maple syrup—if these trees become infected, we would not only experience significant environmental impacts and economic costs, but worst of all, less maple syrup to consume (USDA)!

MC - Oh no, I love maple syrup! I make a yearly trip up to the Adirondacks to visit a syrup farm.

CT - I know, it's terrible! The Adirondack economy also relies heavily on tourists who visit to admire the seasonal foliage. Pre-COVID, tourism accounted for $447 million in income for workers in that region, who then used that money to support many local businesses, generating an additional $738 million ("Economic Impact")! If large swaths of the trees in the Adirondacks were dead, would you make the trip up north?

MC - I certainly wouldn't—the view from the mountaintop would be a lot less picturesque with a bunch of dead trees. How are you preventing this from becoming a reality?

CT - We're committed to containing the bugs in New York City. At the moment, we're using a quarantine system to eradicate hotspots of infestation. Once an infested tree is cut down, it cannot leave the area without being "bug-proofed": in other words, destroyed, chemically treated, or inspected prior to transport at the expense of local businesses (Rose). Ensuring tree service, firewood, and landscaping companies comply with restrictions on these materials is honestly the toughest part of the process because it forces them to either accept lower profits or pass the additional costs onto consumers.

MC - Given the complexity of the issue, it seems like a larger, more unified effort is required.

CT - Precisely, we can only do so much locally. [city sounds fade out]

MC - I'm back in the studio with Claire and David VanDyke, an economics professor at the University of Michigan who's been working on a global agreement combating invasive species.

CT - Wow, I’m excited to hear how David’s work could help us on the ground!

David VanDyke (Economist) - Thanks for having me on!

MC - So, David, how did you become interested in this issue? I don't normally associate economists with climbing trees to look for weird insects.

DV - Trust me, a few years ago I didn't envision I'd be writing about bizarre bugs either—my specialty is international economics. Yet, it was my research in that field that exposed me to the tremendous effect economic globalization has had on the proliferation of non-native species. Since 1950, the share of the world GDP tied to merchandise imports has tripled, a number buoyed in the last decades by the growth of developing countries and the creation of numerous free trade agreements. Consequently, the number of new invasive species recorded has also tripled during the same timeframe. Through trade, organisms are unintentionally transported from their native homes to environments thousands of miles away that would otherwise be unreachable. Consider the path of a single shipping container tracked by the BBC in 2014: in a year and a half, it traveled 47,076 miles by sea, 3,229 miles by rail, and 1,349 miles by road, visiting scores of nations (Hulme). The risk of invasive species spread is astronomical.

MC - And how does this growing trend affect us? What is its economic impact?

DV - The global financial toll of invasive species over the last 50 years is estimated at $1.2 trillion, and the average annual cost has tripled each decade since 1970 (Diagne et al.). The agricultural sector has been particularly affected: in the U.S. alone, crop losses due to non-native organisms amount to over $40 billion per year. However, invasive species also result in costs related to the spread of disease, lost tourism revenue, and campaigns designed to eliminate the organisms (Paini et al.).

MC - That’s certainly concerning. So what is being done to deal with this issue? Clearly, it must be on the minds of most policymakers.

DV - Well, Michael, unfortunately, it isn't. Part of the issue is that it takes an average of 10 years before a non-native organism is detected in an ecosystem, making it difficult to quantify the future financial effect of invasive species and to conduct accurate cost-benefit analysis (Reaser et al.). The lack of urgency on this problem is also caused by hyperbolic discounting: our cognitive biases tend to nudge us toward near-term gratification over the more valuable, long-term benefits that prevention measures would bring (Orrell 98).

MC - So that's why we need a new international agreement?

DV - Exactly. While there are existing international regulations that attempt to prevent invasive species spread, they are primarily focused on intentional transmission. It’s vital that we improve standards regarding physical measures that prevent *unintentional* invasive species spread. These physical measures include three main types, classified by where they are executed: pre-border, before the goods arrive at their destination port; at-border, when they arrive at their destination port; and post-entry, after they have been transported beyond the destination port (Stas et al.).

MC - So I guess it's true—an ounce of prevention is worth a pound of a cure! Which measures are most effective?

DV - Pre-border measures are widely considered to be the most effective type, yet are least considered in international law (Stas et al.). Take biofouling, the process by which non-native organisms attach themselves to commercial ships and other aquatic vessels. It accounts for nearly 69% of all invasive species and has caused millions of dollars in damages to coastal ecosystems and local industries ("Non-Indigenous"). However, no international regulations have been passed to address it. If common-sense pre-border mechanisms were made mandatory, such as the treatment of boat hulls with antifouling agents, the spread of invasive species could be significantly lowered ("Biofouling"). Other pre-border measures—including the chemical treatment of wood before shipment, pest-proof packaging, and rigorous inspections—offer similar benefits if practiced more frequently and efficiently.

MC - So you want to make these mandatory, but I'd think these measures could amount to a high cost for developing nations. How will you ensure they have the resources to implement them?

DV - You raise an excellent point, Michael, especially since developing countries attribute a lot of their economic growth to loose trade regulations. The revenue gained from the removal of all trade barriers would actually amount to double the aid they are currently receiving from industrial countries—a hefty sum (IMF Staff). Therefore, in the face of more pressing issues like poverty or public health, they lack incentive to allocate already scarce resources to adopt measures that could, in the short-term, decrease their revenue (Stas et al.). In order for these countries to implement the mandatory pre-border standards, we must create a funding program in the style of past UN-sponsored health initiatives. They can't take on this financial burden alone.

MC - Now here's the million dollar question: where would the money come from?

DV - Governments from around the world would contribute based on their portion of global trade volume, having discretion over how the funds are raised. For instance, American exports and imports make up about 13% of world trade, so the U.S. would put up 13% of the total ("World Trade"). One viable method of raising funds could be a Pigovian tariff on imports, which would internalize the negative externality that invasive species pose by directing the cost onto shipping companies responsible for the spread of the organisms. That said, the unintended consequences of such a policy could be damaging: due to higher costs, firms might reduce their trade with nations that enact the tariff.

MC - This all sounds great, David, but is it feasible? International agreements are difficult to craft. Why can't the U.S. take its own steps to reduce the spread of invasive species in the country, at least in the meantime?

DV - Simply put, global issues require global solutions. Invasive species prevention resembles a chain whose strength is determined by its weakest link. Regardless of the strength of our national policies, the effectiveness of our efforts would be undermined by inferior protocols in other countries. Besides, even if the U.S. wanted to enact unilateral prevention policies at its ports,

they'd be subject to intense legal scrutiny. The World Trade Organization's General Agreement on Tariffs and Trade, or GATT, stresses non-discrimination as the fundamental basis of international commerce: countries should treat imported products from one nation no differently than products from any other nation (“General Agreement”). Suppose the U.S. wanted to subject wood imports from South Korea to more rigorous at-border inspection due to the heightened risk of invasive beetles in shipments originating from the country. South Korea could claim such an act violates the non-discrimination principle and respond by filing a complaint with the WTO.

MC - I can see why international cooperation is crucial. Claire, in your opinion, how would David's overall plan work in practice? Would it be useful in dealing with species like the ALB?

CT - Definitely! I think improved trade regulations and a fund that allows developing nations to implement them is a great idea. In the 1990s, when the ALB first came over, most of East Asia was comprised of developing countries (“World Economic”). If this fund was available, they may have been more proactive in preventing the spread. I recently spoke to one of my colleagues in Kenya about the Yellow Crazy Ant, an invasive species they’ve been struggling to contain to their country for years. Like the Asian Longhorned Beetle, these ants can travel in wood packing materials used in trade. Unfortunately, Kenya’s government does not properly enforce a mandate for companies to have their goods inspected before they are exported (Wafula et al.).

DV - I love that you brought that up, Claire. Due to infrastructural and financial difficulties, Kenya has struggled to implement the WTO’s Sanitary and Phytosanitary Standards, which aim to stop commercial exports that threaten human or environmental health (“Agreement”). Consequently, Kenyan avocados have frequently been vectors for the unintentional spread of fruit flies overseas. Many nations, including South Africa and China, have responded by banning the importation of these products, causing $16 million in annual losses for Kenyan farmers (Holland). If Kenya had access to this proposed world fund, they'd be able to afford the costs associated with executing inspections and treating products. By reducing the spread of invasive species, they'd not only protect the global biosphere but expand and repair fruitful commercial relationships with nations that had previously been wary to trade due to Kenya's lax regulatory environment (“Certification”).

MC - David, Claire, thanks for joining us today! Clearly, there are effective economic methods of addressing the invasive species issue that should be enacted as we move forward.

MC - [Voiceover] *International trade has brought us year-round bananas, life-changing medical developments, and my precious air fryer. As we continue to globalize, more people, especially those in developing nations, will enhance their economic prosperity, leading to improvements in living conditions, health, and education.*

Unfortunately, increasing global commerce will also exacerbate the grave issue of invasive species. The Asian Longhorned beetle may have already arrived in the United States, but unless we act now to craft a multilateral agreement that updates outdated trade standards and provides developing nations with the funds to adequately implement them, it won't be the last invasive species we encounter.

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