Is container shipping costing the Earth?

Contamination and invasive species spread across the globe by shipping containers can wreak devastation on local eco-systems.

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Gregory Wolff the outgoing chair of the Sea Containers Focus GroupCredit: IPPC

Widespread devastation caused by the ordinary workings of the container industry is literally costing the Earth in terms of environmental and financial losses of billions of dollars across the globe.

Gregory Wolff the outgoing chair of the Sea Containers Focus Group (SCFG), which was established to find a solution to the major problem of invasive species and contamination facilitated by the movement of cargo containers across the globe, says that industry and regulators must collaborate to find a solution.

SCFG was established by the Commission on Phytosanitary Measures (CPM) the governing body of the International Plant Protection Convention (IPPC), which itself was established under the United Nations' Food and Agriculture Organization (FAO)'s. SCFG includes container industry representatives from the World Shipping Council and the Global Shippers' Forum, representing shipping lines and cargo owners, respectively.

Wolff explained that soil and other contamination as well as invasive species, including from the international movement of containers and other sources of contamination, are costing agriculture, the clothing trade and other industries in excess of $220 billion a year.

"Microscopic pathogens can be carried in the smallest amounts of soil and once it has landed across the ocean, infestations of pests and diseases could wreak devastation on regional ecosystems before anyone is aware of its presence," said Wolff.

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Controlling the spread of soil and other contamination that can carry invasive species is critical not just to ecosystems, and the climate but also to economies who depend on plant life for industries such as agriculture, clothing and pharmaceuticals.

Twenty million containers moving at any one time

“There are 250 million container movements per year and at any given time there can be 20 million containers moving around in any direction, in an open-ended loop,” explained Wolff, “even if you have a small percentage that are contaminated with plant pests and diseases, that represents a very large volume of plant pests that can move into new areas, cause economic damage, cause environmental damage and cause costs in trying to control them.”

With reported contamination rates being in the range of 10% or over 55%, which can depend on which country is reporting the contamination, the impact facing the agricultural industry is massive, and the challenge of cleaning all these containers, both inside and outside, is formidable.

The IPPC, which began looking at the challenges posed by the international movement of goods in containers some 15 years ago, has recognised just how sensitive supply chains can be to any kind of impediment.

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“I'm very pleased that at last year's annual meeting of the IPPC’s governing body, at the Commission on Phytosanitary Measures, we adopted a breakthrough piece of guidance, which is the IPPC recommendation on minimising the risk, the pest risk related with the sea container pathway,” said Wolff.

Covid was a wakeup call to the sensitivity of supply chains to problems with container backlogs building up at ports on the shoreside and vessels moored offshore waiting weeks to be offloaded.

Knock-on effects of these logistical challenges were shortages of goods and inflation, and the IPPC must be very careful with how it proceeds, “We've got to find a very balanced approach,” explained Wolff.

Working with the logistics and container industry

Both the IPPC and the SCFG recognise that it must find solutions to minimise contamination that the logistics industry will accept and support, “because without that support, whatever we try and do, it won't be successful,” said Wolff.

As a result, IPPC wanted to work with the logistics industry and so it established the SCFG with container industry representatives as full members, with a view to finding solutions, to what is a major departure from its usual work.

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Wolff concedes that there have sometimes been “immense difficulties” in discussions in our work on this, but “What's been very refreshing and reassuring is that we've always managed to work through these difficulties and find collaborative ways forward.”

It was a “breakthrough moment” in Shenzhen, China, in 2018 that helped the IPPC and governments realise that full collaboration with the logistics industry was needed. The work of the SCFG was disrupted and delayed by Covid, but we found ways to continue our work until an agreement on how to deal with the issues was reached.

In its role to protect the flora of the world, the IPPC understood that once a new, and potentially destructive, pest or disease had reached an area it was very difficult to detect its presence until it was too late to eradicate.

“If a new pest or disease reaches a staple food crop, in a region such as Africa or any major crop producing area or forestry area, it can cause immense losses of crop yields, up to 40% losses through plant diseases has been recorded with an annual cost of $220 billion,” explained Wolff.

Then there is the environmental damage, where a forest can be destroyed, which can have consequences for carbon capture, urban cooling and the health of local ecosystems.

“The cost is not just monetary, it’s climatic and environmental too,” emphasised Wolff, adding that, “plant production with the associated food products, construction and clothing and so on that come from plants are an immense economic driver. And so, we shouldn't minimise the importance of plant production and therefore plant health to the global economy, but also to the environment.”

With protecting the environment a key factor, while making sure trade flows continued unimpeded, the emphasis was from the discussion group was on prevention and communication.

Prevention of the spread of contamination and invasive species would mean communicating to all those operating global supply chains playing their part in making sure sea containers are clean, both inside and outside.

It would be critical to spread information on what each element of the supply chain can do to help prevent the spread of contamination and pests that could damage fragile regional ecosystems.

Measures such as placing boxes on hard standings so that they do not pick up even a little bit of soil, inspections at every stage in the supply chain by each custodian of a box, with brushing or cleaning containers where possible, and cleaning at empty depots before containers are returned to service, and loading containers in day time, where possible, to prevent lights attracting unwanted insects to the boxes.

Wolff emphasises the criticality of these types of measures at each stage in the logistics chain, from factory to truck, to dock to vessel and through each subsequent step to the consignee.

The Khapra beetle – waiting for the right conditions

Explaining the reasoning behind these moves he described the characteristics of just one invasive and destructive pest.

“The Khapra beetle has a very long resting stage, even three to four years. And they're just waiting for the right conditions to re-emerge from the resting stage, then suddenly they're in large numbers. They can emerge from a container that looks like it's clean. While some soil borne pathogens, pests and diseases can survive for 40 years in a resting stage,” explained Wolff.

He added: “The fundamental concept is we've got to just end up with a [logistics] system which maximises the likelihood of the vast majority of containers moving around being free from contamination.”

Wolff admits that finding solutions to the inadvertent carriage of pests has been a struggle: “With 20 million containers moving at any given time and 250 million per year, no government has the resources to be able to inspect those, and even if they did, inspecting each box would just cause chaos in the logistics system.”

IPPC guidance is there to advise on how to deal with a pest infestation safely, because on finding insects on opening a container they must not escape.

Redesigning containers to minimise contamination

A meeting in Rotterdam last November set up by the logistics industry and which the IPPC attended looked at different aspects of container design and how contamination could be minimised.

Longer term approaches to solving the problem included the prospective redesign of a standard shipping container, taking out wooden floors and replacing them with steel bottoms, reducing the number of nooks and crannies that insects and or soil can collect in. These new designs, said Wolff, have not added any weight to the empty container and the costs are the same.

These changes would be introduced gradually, the IPPC recognises that a shipping container is “a pretty durable thing” and can be in service for up to 20 years, so the realistic approach is to “encourage container manufacturers to change slowly over 20 years.”

Essentially replacing older designs with the newer containers as the originals come to the end of their operational life.

Using AI to examine exterior images

Another potentially useful solution is to use artificial intelligence to analyse exterior images of a container, by using this technology government representatives at ports would be able to identify the few containers that may be contaminated and inspect them more closely.

As Wolff steps down the SCFG will be left in the capable hands of Thorwald Geuze from the Netherlands and Australia’s Rama Karri up to 2027 when the working group’s mission will end.

Until then the SCFG will consider whether the IPPC should develop a standard, “But really what we're expecting the focus group to do over the next two years is to be ready to come back to the Annual CPM meeting in March 2027 with clear proposals, on what we do with containers in the next 10 years. What should the IPPC do about guidance? What is the emerging technology which shows some promise,” asked Wolff.

He concluded that while the IPPC is fundamentally a standard setting body, it provides guidance in various forms. The most prominent is its international standards.
They convey requirements for the 185 members of the IPPC to follow so that their governments can implement those standards at the next level of guidance.

“An IPPC Recommendation differs from these formal standards in that it doesn't provide firm requirements. Instead, it encourages certain behaviours, and we are moving towards a firmer decision point about the long-term approach.”