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Trade as Part of the Climate Solution?

Evaluating ASEAN's Status Quo

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Trade as Part of the Climate Solution? Evaluating ASEAN's Status Quo

Ammu George, Ulrike Sengstschmid, and Taojun Xie

Abstract

We examine the intricate relationship between trade and climate change within the ASEAN context. We document that trade, traditionally seen as a driver of environmental degradation due to pollution and carbon emissions, also has potential for promoting sustainability through the exchange of green technologies and practices. Despite the incorporation of "green clauses" in trade agreements aiming to harness trade for environmental protection, their effectiveness remains limited. Through a detailed examination of ASEAN's role as a net exporter of emissions amidst rapid economic growth and environmental challenges, we underscore the region's increasing trade in environmental goods without a corresponding rise in their share of total trade. Our findings call for innovative approaches, highlighting green economy agreements like the Singapore-Australia pact, which can be more effective mechanisms for reconciling trade expansion with environmental sustainability in ASEAN and beyond.

I. Introduction

Promoting trade and enhancing environmental sustainability are often perceived as competing outcomes: On the one hand, trade liberalization and acceleration can cause increased pollution-intensive production activities, higher carbon emissions from trade-related fossil fuel combustion, and more natural resource degradation as general economic activity increases (Balogh & Mizik, 2021). On the other hand, trade has the potential to support the greening of the economy through a higher availability of sustainable goods and services, technology transfers to spread green production techniques, and trade shifts to countries or regions with cleaner production methods (Brenton & Chemutai, 2021). The desire to ensure that the climate-positive effects of trade expansion outweigh the negative has increasingly prompted policymakers to include so-called 'green clauses' in their countries' free trade agreements. However, due to their limited nature and lack of deep collaborative efforts, the effectiveness of this tool currently seems doubtful. Instead, more innovative approaches, such as green economy agreements, including the one signed by Singapore and Australia last year, seem more promising.

The literature on this issue highlights the multifaceted and complicated nature of the climate change-trade nexus: First, the relationship between the two can be bidirectional, with international trade contributing to climate change, for example through transport emissions, or climate change can contribute to effects on trade with an increase in extreme weather events obstructing certain trade routes or changing traditional patterns of comparative advantage (Asian Development Bank, 2023; Brenton & Chemutai, 2021). Second, trade can impact climate change through multiple channels, including the economic scale of production, the industrial structure, and the method of production, and how these factors compare and contrast between the importing and exporting economy (Griffin et al., 2019). And third, the relationship can be both positive or negative with increased trade causing increased economic production and thus more emissions, as well as trade facilitating technological exchange and thus allowing for cleaner production (Balogh & Mizik, 2021; Brenton & Chemutai, 2021).

Furthermore, existing literature addresses the question of how effective trade agreements have been in promoting the advantageous environmental effects of trade while limiting the harmful ones. Generally, trade agreements can support sustainability efforts by removing tariffs and harmonizing standards on environmental goods and services, by eliminating subsidies on fossil fuels or the agricultural sector, and by reducing the direct emissions from trade (Asian Development Bank, 2023; Griffin et al., 2019). These positive effects are further deepened by a reputation-based spreading of norms between signatories of trade

agreements (Balogh & Mizik, 2021), by a positive relationship between environmental provisions in trade agreements and the adoption of domestic sustainability-related policies, especially in developing countries (Brandi et al., 2019), as well as by an increase in green and a decrease in dirty exports from developing countries, which in turn facilitates longer-term shifts in production patterns (Brandi et al., 2020). Furthermore, Berger et al. (2017) has found that the driver for green clauses in trade agreements is not a cynical covering up of protectionist measures, but usually is a response to citizen pressure. However, various scholars have also cast doubt on the effectiveness of trade agreements in tackling climate-change-related issues. For example, Griffin et al. (2019) find that similar tariff reductions in dirty and clean products are likely to increase trade more in the former than the latter. Additionally, language in environmental clauses remains soft, meaning that even with penalty mechanisms in place, the emissions reductions effect will be muted (Balogh & Mizik, 2021; Griffin et al., 2019). Finally, Balogh & Mizik (2021) also find that while free trade agreements between only developing or only developed countries have relatively neutral environmental effects, those with both one developed and one developing countries will typically increase GHG emissions due to shifting trade and production patterns.

While a detailed investigation in each of these aspects are beyond the scope of this study, we aim to give a descriptive overview of the role of trade on climate change in the ASEAN (Association of Southeast Asian Nations) region as well as to analyze how ASEAN trade could contribute towards climate change mitigation. The ASEAN region is particularly interesting in this regard, as it is experiencing rapid economic growth, and increasing integration into global trade networks, but also one of the most severely affected by the effects of climate change. Currently, the region may even be "growing at the expense of its environment", partially due to its emission-intensive trade (Nathaniel & Khan, 2020). As such, green clauses in trade agreements or other solutions to greening trade have the potential for a particularly significant impact in this region.

In this study, we first examine ASEAN's emissions relating to trade to find that the region is a net emissions exporter and has an increasing quantity of emissions embodied in both its imports and exports, significantly driven by the rapid economic development of Vietnam and growing intra-Asian trade. Next, we look at the status quo of green trade in ASEAN to find that while the trade in green goods and services has increased over the past decade in terms of total value, it has remained stagnant as a share of total trade in the region. In the following section we study ASEAN countries' involvement in trade agreements containing green clauses, to find that while the region performed on par with the rest of the world in the 2000s, they have not kept pace in the last decade, including fewer green provisions per agreement than the global average. Due to the already limited nature of green clauses in trade agreements in combination with the relatively weak demand for these in the ASEAN region, we use a case study of the Singapore-Australia Green Economy Agreement compared with the EU's proposed Carbon Border Adjustment mechanism, as newer and more innovative approaches, to shed light on how trade can be integrated with environmental objectives rather than seeing them as contradictory in the ASEAN region and beyond.

II. Trade-Related Emissions in ASEAN

Analyzing emissions related to trade involves two distinct but interrelated dimensions: the generation of emissions within a country and the emissions embedded in traded goods. The first dimension can be quantified by measuring production-based and demand-based emissions, as these two metrics measure emissions related to all domestic production and to all domestic consumption. Therefore, the difference between production- and demand-based emissions represents net emissions imports or exports, if the former is smaller or larger than the latter, respectively. The second dimension – the emissions embedded in traded goods – can be measured by examining the quantity of emissions embodied in imports and exports, respectively. This allows for an analysis of which countries and to what extent they are involved in ASEAN's emissions. At a global level, the two indicators in both dimensions should sum to zero, indicating that if a region is a net exporter of emissions, the rest of the world will be a net importer from that region, and vice versa.

In the following subsections we examine both of these dimensions in ASEAN as a region compared to other regions, as well as by country within ASEAN. We use the OECD's $TECO_2$ dataset which calculates carbon dioxide emissions embodied in international trade using both demand-based and production-based accounting, as well as import-embodied and export-embodied emissions (OECD, 2021). This data has been derived from combining the OECD Inter-Country Input-Output database and CO_2 emission statistics from the International Energy Agency. The database covers 66 countries in total, including all 10 ASEAN member states. However, for other regions in the Global South, especially Africa, the Middle East and Central Asia, and Latin America data coverage is significantly lower, making comparisons with regions in the Global North and Asia more reliable.

II.a. ASEAN's Emissions Embodied in Production and Demand

ASEAN's emissions both in terms of production and demand have increased more than 2.6-fold between 1995 and 2018, as seen in Figure 1 below. While emissions embodied in production have risen steadily over this time period, emissions embodied in demand have faced a significant negative shock following the 1997 Asian financial crisis, with the upwards trend, however, quickly recovering and rising particularly steeply between 2009-2012 and between 2015-2018. The steady growth in emissions mirrors the rapid economic growth Southeast Asian economies have faced during the same timeframe – regional GDP increased 2.8-fold over this period (World Bank Group, 2024) – with emissions being a by-product of increased industrialization, economic production, and integration into global value chains. In the region, rapid increases in the economic scale and shifts in the industrial structure could not be offset by technological shifts towards cleaner production technologies during these 25 years.

Trade allows for the difference between demand-based and production-based emissions. As further discussed below, the positive gap between the two indicates that throughout this time period, ASEAN is a net emissions exporter to the rest of the world. Since emissions embodied in demand and production will match on a global level, the rest of the world is a net importer of emissions from ASEAN.

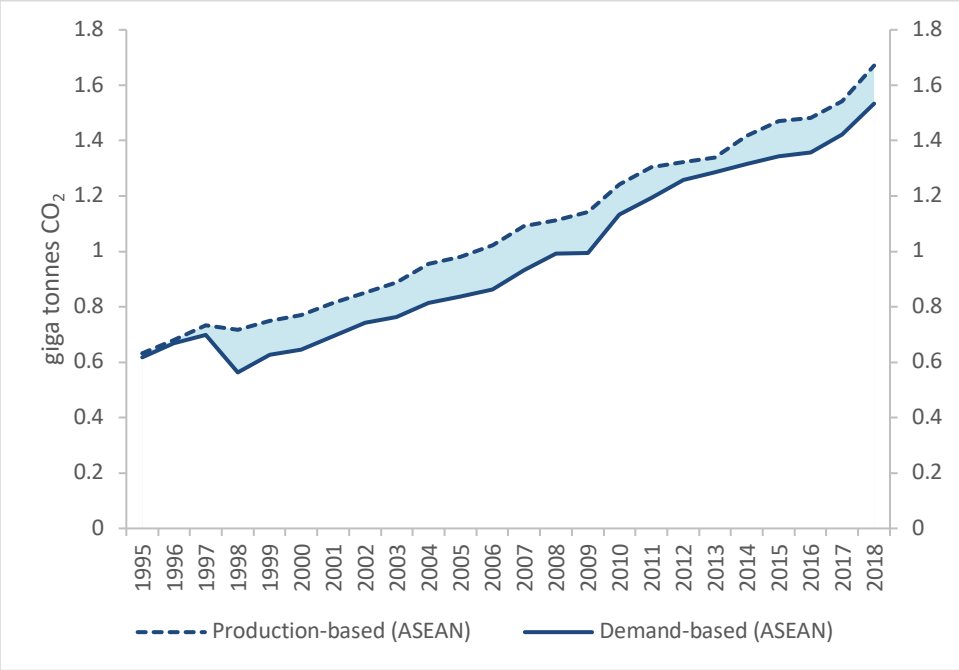

Figure 1: Production- and demand-based emissions embodied in ASEAN's trade, 1995-2018.
Source: Own calculations based on the $TECO_2$ dataset (OECD, 2021).

In a global comparison (Figure 2), ASEAN still has relatively low production- and demand-based emissions. The rest of Asia has overtaken North America in the early 2000s in a steep and steady rise of emissions especially driven by East Asian economic expansion in the first decade of the 2000s. Today both its

production- and demand-based emissions are double that of North America, the region with the second highest emissions globally. Production-based emissions of North America and Europe have remained relatively stable until 2008 and have since then seen a slight declining trend. While demand-based emissions in these two regions still saw slight increases until 2008, they have also been on the decline since then. ASEAN today has a level of emissions comparable to that of the Middle East and Africa, while it has clearly overtaken South and Central America.

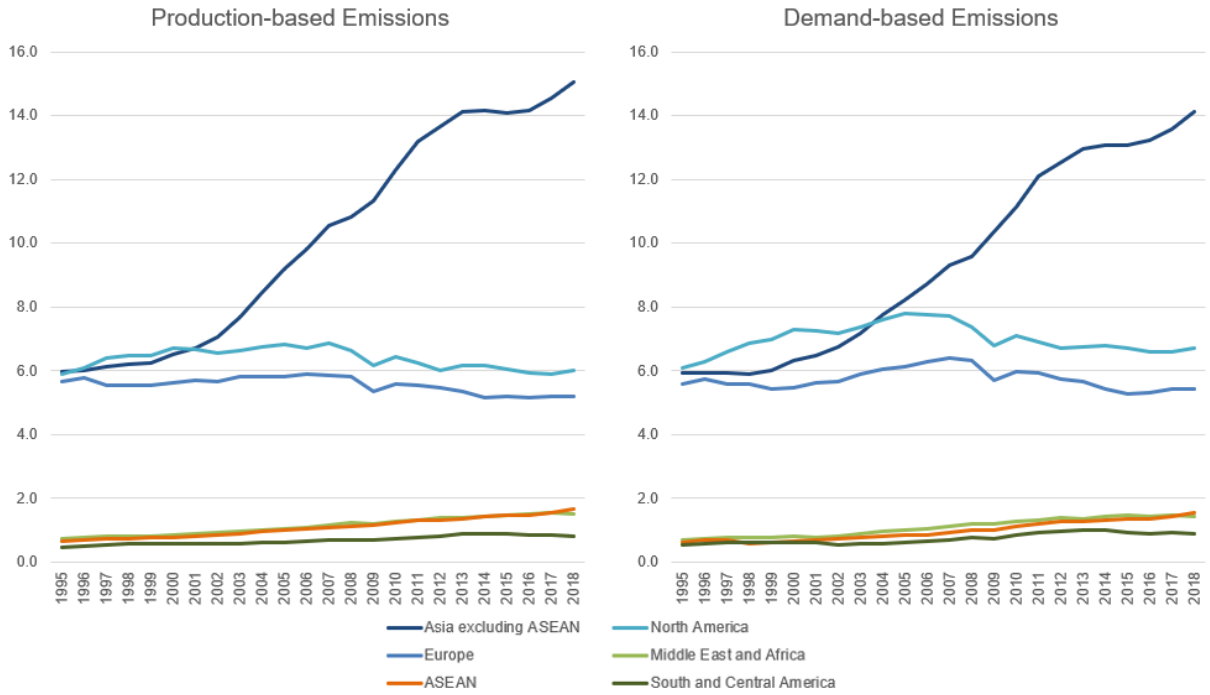

Figure 2: Global regional comparison of production-based (left) and demand-based (right) emissions, 1995-2018
Source: Own calculations based on the TECO$_2$ dataset (OECD, 2021).

As visualized previously in Figure 1, ASEAN has higher production-based than demand-based emissions, making it a net exporter of emissions. Since 1995 the net exports of emissions have ranged between 0.01 and 0.16 giga tonnes of CO_2 per year (Figure 3). While during the Asian financial crisis net exports of emissions soared as local demand contracted whereas production levels remained similar, an average export level of 0.12 giga tonnes annually has been maintained since then. On a global scale, this is the second-highest level of regional net emission exports, as seen in Figure 4 below, making the region a key player in global trade. The rest of Asia is by far the largest emissions exporter, with exports rising rapidly between 2002-2009, but having seen a declining trend since then as demand-based emissions have increased, reaching 0.9 gigatonnes of emissions exports in 2018. North America followed by Europe are the largest emission importers, with emission imports in these regions having somewhat stabilised since 2009 at around 0.6 and 0.3 gigatonnes of CO_2 per year.

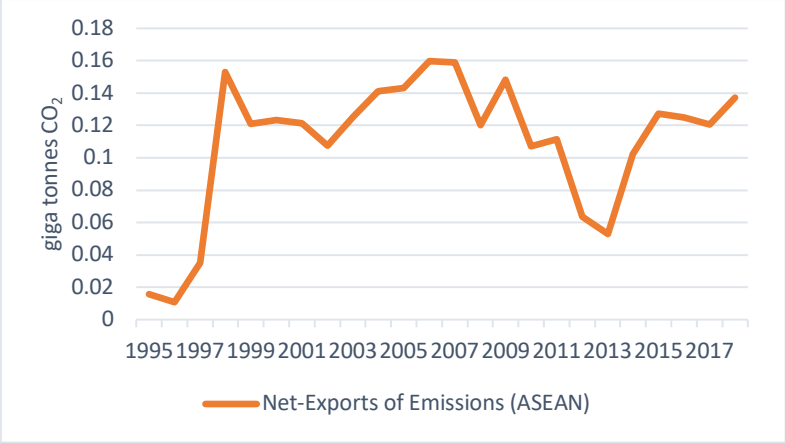

Figure 3: Net emission exports of ASEAN, 1995-2018
Source: Own calculations based on the TECO$_2$ dataset (OECD, 2021).

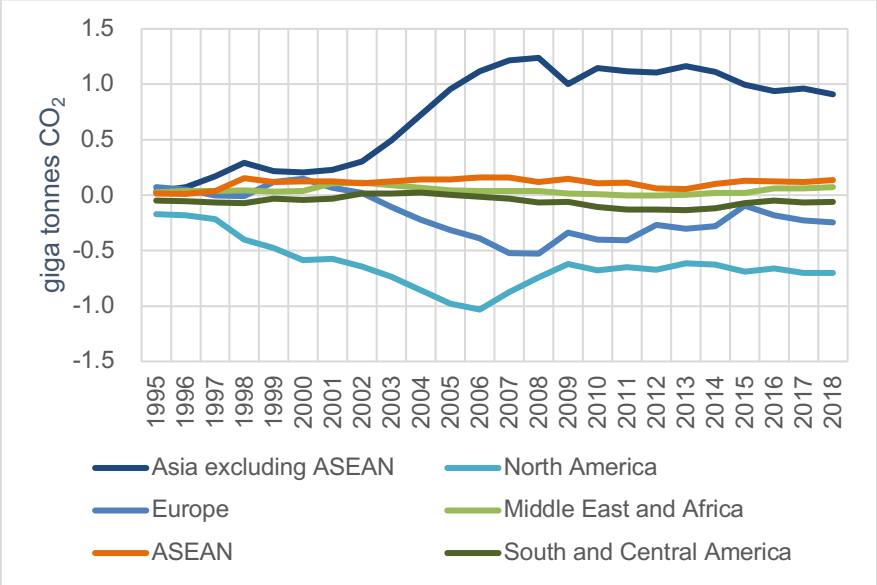

Figure 4: Global comparison of regional net emissions exports, 1995-2018
Source: Own calculations based on the TECO$_2$ dataset (OECD, 2021).

II.b. ASEAN's Emissions Embodied in Trade

The patterns observed with regard to emissions embodied in production and demand are also reflected in regional trade patterns. Figure 5 below shows the carbon emissions embodied in imports by region. ASEAN's emissions embodied in imports have increased more than four-fold from 0.19 gigatonnes in 1995 to 0.85 gigatonnes in 2018, which is the largest percentage any region has seen. Asia, excluding ASEAN, has seen the largest absolute increase from 1.11 gigatonnes in 1995 to 2.68 gigatonnes in 2018. If Asia and ASEAN are grouped as one region, the Asian continent has surpassed Europe in 2011 to become the region with the largest emissions embodied in imports. Similarly, to demand-based emissions trends above, while most developing regions have seen increases over this time period, Europe and North America's emissions embodied in imports reached their peaks in 2008 and 2006 respectively and have since then stabilized or even seen slight declines.

When breaking these trends down by country in Southeast Asia (Figure 6), we can see significantly different trends emerging: While Brunei, Laos, Cambodia and Myanmar have continuously had relatively stable and low trends, most other countries have seen significant import emission growths over this time period. Within the region, Vietnam has seen the strongest and most continuous growth trend, increasing its emissions embodied in imports from just 14.8 million tonnes to 152 million tonnes between 1995-2018,

and overtaking the Philippines, and Malaysia in the process, to be third behind Singapore and Thailand. In contrast, the Philippines, saw declining trends in import-embodied emissions until 2009, only after which it has nearly doubled its value. Additionally, it must be noted that the countries starting out with higher emissions embodied in imports also experienced significantly larger negative shocks during the Asian financial crisis of 1998, the global financial crisis 2009, and around 2015-2016. This indicates a higher integration of these economies into global value chains and thus more exposure and vulnerabilities at the face of external shocks.

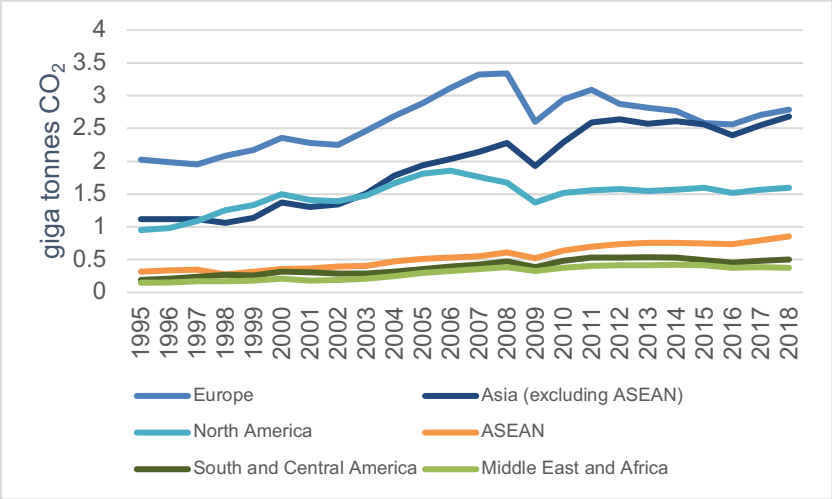

Figure 5: Global regional comparison of embodied carbon emissions in imports (gigatonnes of CO_2)
Source: Own calculations based on the TECO$_2$ dataset (OECD, 2021).

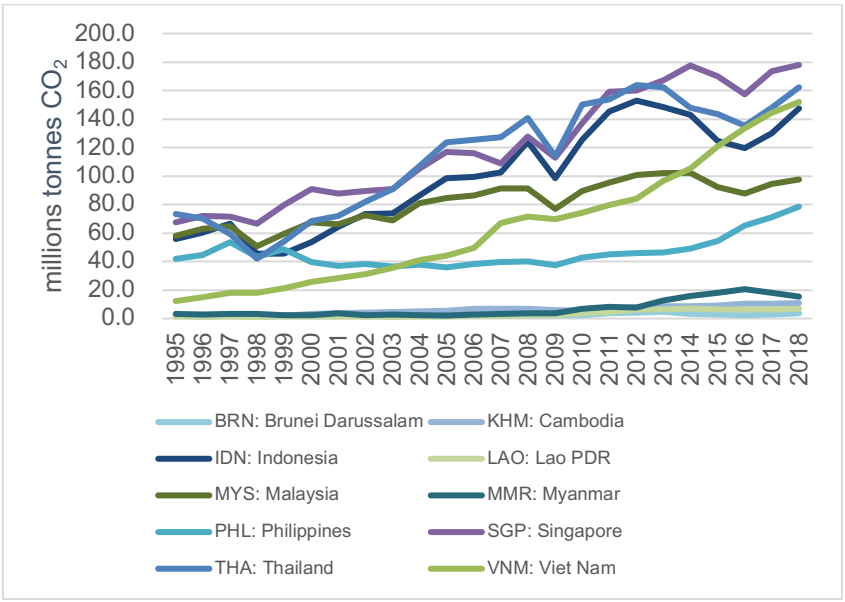

Figure 6: ASEAN's embodied carbon emissions in imports by importing country (millions of tonnes of CO_2)
Source: Own calculations based on the TECO$_2$ dataset (OECD, 2021).

Similar to imports, the emissions embodied in exports of ASEAN have also risen rapidly since 1995 (Figure 7). While in 1995 ASEAN's export-embodied emissions reached 0.34 gigatonnes, this has increased nearly three-fold to 0.98 gigatonnes in 2018, with Southeast Asia also overtaking North America on this measure in 2017. The rest of Asia, mostly driven by China, perhaps saw the most dramatic increase in emissions embodied in exports, with emissions increasing from 1.16 in 1995 to 3.5 in 2008 and then levelling-off at around 3.7 after overcoming the negative shock in 2009 of the global financial crisis. As previously, North America's trend has remained more or less stable throughout the whole period, while Europe still saw emissions growth until 2008 after which it also stabilised and even saw slight decreases since 2011.

When decomposing ASEAN's trend by country (Figure 8), we can again see differences between country groups. As with imports, Brunei, Laos, Cambodia and Myanmar have continuously had relatively stable and low trends in export-embodied emissions as well. The Philippines also does not see any significant growth in export-embodied emissions during this timeframe. Again, it is Vietnam that has seen the most spectacular growth from just 14.2 million tonnes in 1995 to 204.3 in 2018, which reflects its role as an increasingly important production and exporting hub in the region. The remaining, already higher performing countries, again saw more unstable growth trends. However, compared to imports more differences can be detected in export-embodied emissions. While Malaysia consistently outperformed Thailand until 2008, it could not recover the growth trajectory after the global financial crisis shock, whereas the latter continued growing although, since 2013, at a much slower pace. Indonesia, despite facing more growths and declines has remained in the range of 100-135 million tonnes of export-embodied emissions since 2003. Of the higher performing countries, Singapore has seen the steadiest growth until 2014, and has since 2009 clearly established itself as the lead in the region – although this position could soon be threatened by Vietnam.

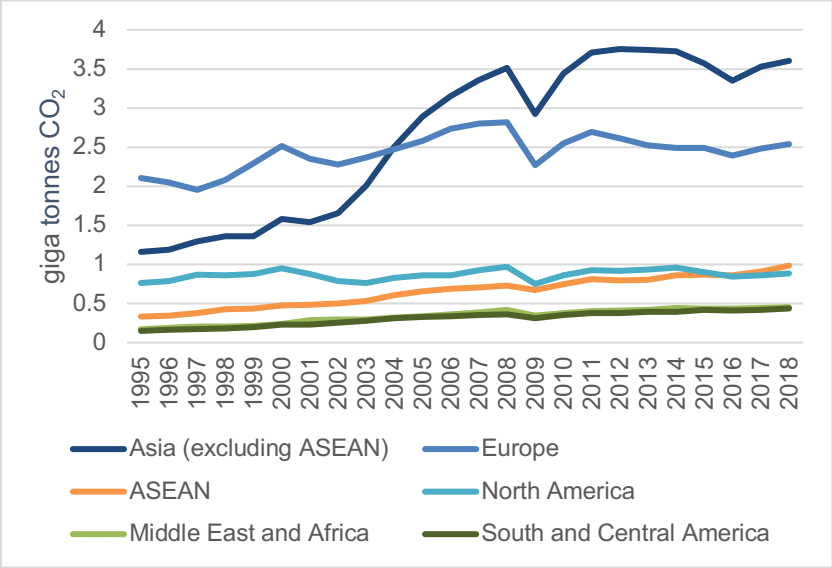

Figure 7: Global regional comparison of embodied carbon emissions in exports (gigatonnes of CO_2)
Source: Own calculations based on the $TECO_2$ dataset (OECD, 2021).

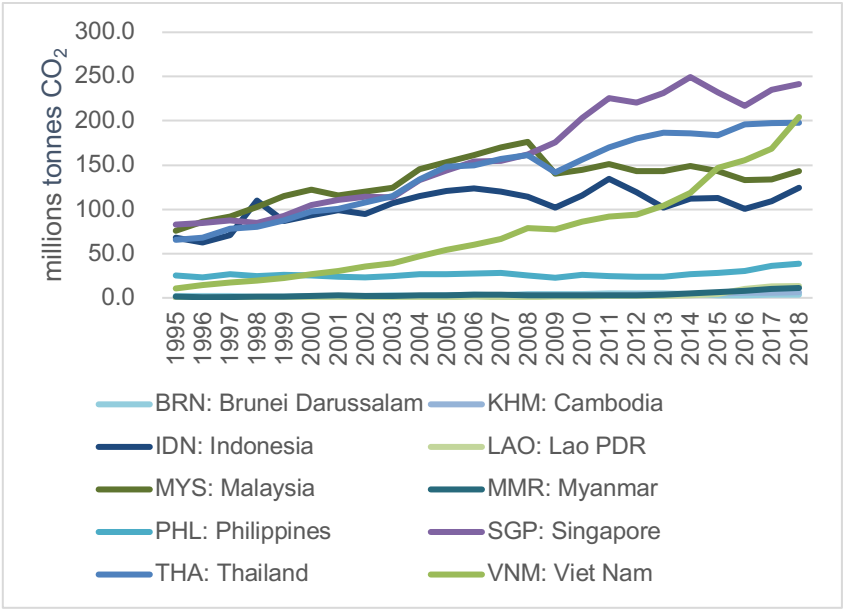

Figure 8: ASEAN's embodied carbon emissions exports by exporting country (millions of tonnes of CO_2)
Source: Own calculations based on the $TECO_2$ dataset (OECD, 2021).

Interestingly, while emissions embodied in production and demand increased at a very similar pace to overall GDP growth in ASEAN between 1995 and 2018 – facing a 2.6- and 2.8-fold increase, respectively – somewhat diverging trends emerge when examining emissions embodied in trade: On the one hand, at the ASEAN level the total value of imports increased 3.3 fold (ASEAN Secretariat, 2017), while the emissions embodied in imports increased more than 4-fold. On the other hand, the total value of exports increased 3.8-fold (ASEAN Secretariat, 2017), while emissions embodied in exports increasd less than 3-fold. This indicates that the emissions patterns of trade in and out of the ASEAN region changed over time, with the region importing increasingly emissions-intensive goods and services, while exporting increasingly cleaner products.

The growth in emissions embodied in exports and imports of ASEAN is to a large part driven by intra-Asian trade growth. As Figure 9 shows, emissions embodied in imports and exports from and to the rest of Asia have increased more than three-fold from 150 million tonnes to 530 and 450 million tonnes respectively between 1995-2018. Similarly, imports and exports with the ASEAN region have seen a four-fold increase from 50 to nearly 200 million tonnes of CO_2. Imports from all other regions have remained rather constant and by now significantly fallen behind Asia. In terms of exports, on the other hand, emissions to North America and Europe have doubled from 60 to over 130 million tonnes by 2018. Yet, the speed of this growth cannot keep up with intra-Asian growth rates.

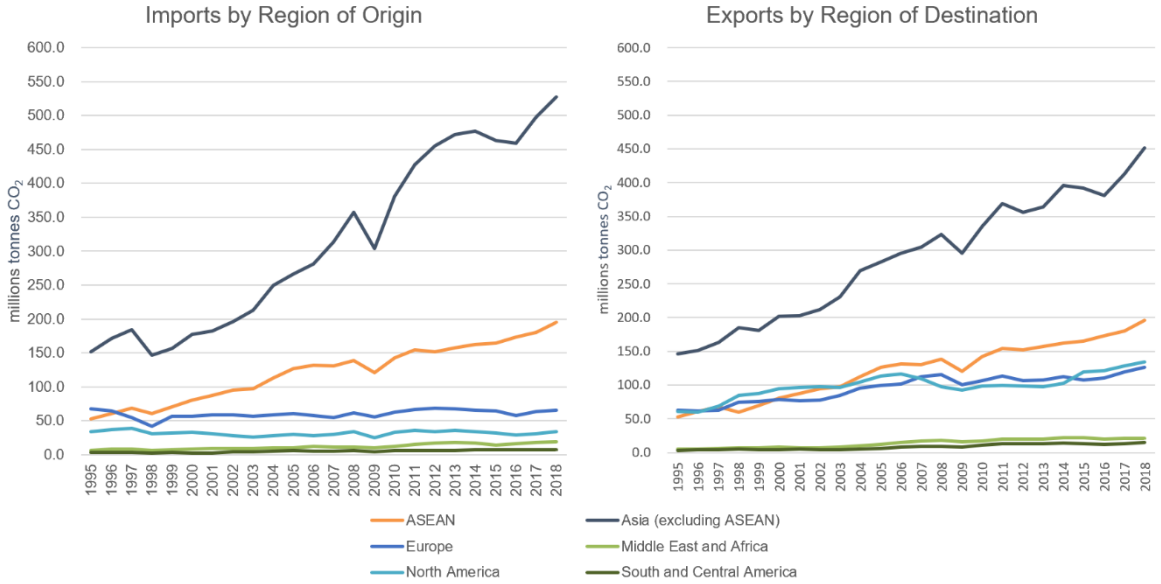

Figure 9: ASEAN's embodied carbon emissions in imports by region of origin (left) and exports by region of destination (right) (millions of tonnes of CO_2)
Source: Own calculations based on the TECO$_2$ dataset (OECD, 2021).

III. Taking Stock of ASEAN's Trade in Environmental Goods

As ASEAN's economies grow and are increasingly integrated into global value and supply chains, the region also becomes a more and more important player in working towards reducing the environmental impact. A large amount of emissions is both directly embedded in goods and services traded between economies, but that is also indirectly linked to trade as domestic demand and supply grows as the economy expands when integrated into the global economy and global value chains. Subsequently, trade and various trade-regulating measures also have a large potential in reducing and mitigating emissions and climate change impacts, through channels that include (1) facilitating trade in green goods and services through reducing trade barriers and increasing internationally recognized eco-labelling and certification schemes; (2) directly reducing the environmental impact of trade through reducing waiting times and facilitating paperless trade; and (3) through including other provisions, including those on environmental goals.

This section will, first give a short overview of the mechanisms through which trade can promote environmental sustainability efforts. Then, it will examine the current state of the global and specifically ASEAN's trade in environmental goods using data from the IMF's Climate Change Dashboard..

III.a. Mechanisms Through which Trade can Contribute to Emission Reduction

The carbon footprint of trade can be reduced through facilitating the trade of sustainable goods, services and technologies, or through directly greening the trade process itself.

Facilitation of Trade in Green Goods and Services

Besides own production, trade is a key channel through which economies, businesses, and individuals can have access to environmentally friendly goods and services to reduce GHG emissions. As with other efforts to facilitate international trade, typical measures like reductions in both tariff- and non-tariff barriers can also be used to promote the trade in environmental goods and services. This, however, raises the question of what environmental goods and services are. One commonly used approach is the APEC list of environmental goods and services, which has been agreed upon by 21 APEC member states and lists 54 goods and services that should be considered environmentally friendly. De Melo and Solleder (2020) estimate that eliminating all tariffs on these goods could raise import volumes by over 14% for low-income economies.

However, to make significant progress on greening trade, this list may be too limited in scope as it only covers a low number of goods and services, the covered goods are mostly industrial in nature and do not include sustainable agricultural goods that may be of interest to less industrialized and manufacturing-based economies, and it does not keep up with technological developments and thus its relevancy decreases over time. Therefore, continuously expanding and updating this list of environmental goods is necessary to ensure that negotiations of trade barrier reductions based on this list have a relevant positive environmental impact.

Alternatively, more general definitions of environmental goods could be used, as for example Eurostat and the OECD do, but as these are heavily dependent on production methods it may be difficult to prove which specific goods should be included. One solution to this is to use eco-labelling or certification schemes. This can correct information failures both for consumers as well as for authorities on the environmental costs of production and consumption. However, such certification schemes not only have the potential to significantly facilitate trade in environmental goods and services, but they can also quickly turn into non-tariff barriers by potentially placing significant regulatory burdens on producers. Thus, to ensure their effectiveness and avoid such pitfalls it is essential that these schemes have as low regulatory burdens as possible, that they are interoperable on an international scale to avoid firms having to undergo multiple such processes, and that, where the latter is impossible, mutual recognition agreements between governments on at least parts of the certification scheme still retain market access.

Reduction of the Direct Environmental Impact of Trade

The environmental impact of trade itself mostly arises from transportation-related emissions. In 2015 international freight transport accounted for approximately 1.14 gigatonnes of CO_2 emissions (Wang et al., 2022), which is more than 7% of global emissions (International Transport Forum, 2015) and equivalent to 27% of emissions embodied in exports in the same year. Projections by the International Transport Forum estimate a nearly four-fold increase in international freight transport emissions until 2050 vis-à-vis the 2010 baseline, due to a combination of longer and more complex supply chains and increasing road-transport especially as intra-Asian and intra-African trade grows rapidly (International Transport Forum, 2015). Trade agreements can directly address this issue by increasing cooperation on environmentally friendly transportation flows.

In addition, general trade facilitation efforts can also have positive environmental side-effects by reducing waiting times at customs checkpoints which reduces traffic congestion and emissions from idle vehicles as well as by increasing paperless trade which also reduces transport, time, and transaction costs. While global estimates of the environmental impacts of such processes are difficult to obtain, Reyna et al. (2016) estimate

that increased efficiency due to partially digital customs operations at the US-Mexico border could reduce GHG emissions at customs checkpoints by around one third (Reyna et al., 2016). In another study, Duval and Hardy (2021) estimate that digital paperless trade could reduce GHG emissions by an average of 14 million tonnes annually in the Asia Pacific region (Duval & Hardy, 2021). However, these figures are still relatively small when compared to total trade-related transport emissions.

III.b. Current Level of Trade in Environmental Goods in ASEAN

Using the IMF's Climate Change Dashboard (International Monetary Fund, 2023) data on trade in environmental goods, it can be seen in Figure 10 in the left panel below that except for two dips in 2009 and 2015-2016, total trade in environmental goods has been increasing steadily. Until 2008 an exponential increase can be observed, which significantly slowed after the global financial crisis. In the right panel, the environmental goods trade balance of the various region is visualized, showing that Europe has always been a net exporter of environmental goods although the size of this surplus has been decreasing in the past decade, while Asia has rapidly increased its net export size since 2007. North America remains the largest net importer of environmental goods.

Trade in environmental goods in Southeast Asia has steadily increased, seeing a 40% increase in the total trade volume of environmental goods between 2012-2021. However, ASEAN's trade growth in environmental goods has been on par with the global average in this past decade, with the region's share in total global trade fluctuating between 6.3% and 7.2%. While ASEAN was generally found to be an emissions exporter, it is clearly a net importer of environmental goods, with its imports being almost 30% larger than its exports in this sector. This is visualized more clearly in Figure 11 below.

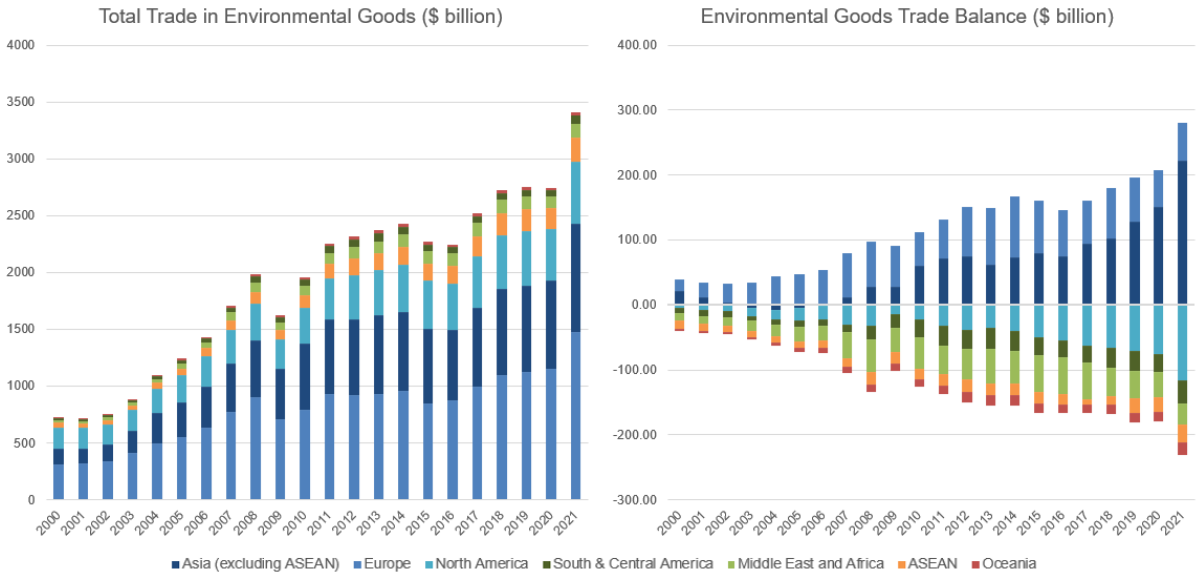

Figure 10: Total trade (left) and trade balance (right) in environmental goods by global region in billions of USD, 2000-2021
Source: Own calculations based on the IMF Climate Change Dashboard (International Monetary Fund, 2023).

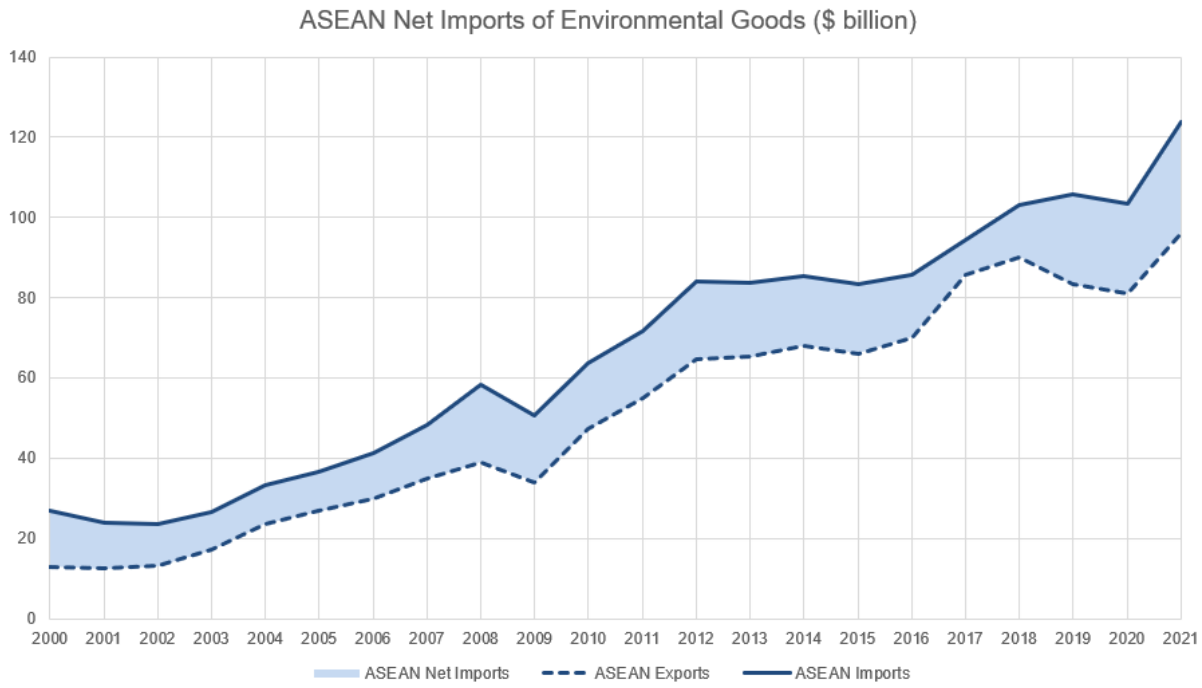

Figure 11: ASEAN's net imports of environmental goods in billions of USD, 2000-2021
Source: Own calculations based on the IMF Climate Change Dashboard (International Monetary Fund, 2023).

When examining the country breakdown of these figures within ASEAN (Figure 12, left panel), Vietnam stands out as having seen the most significant growth in total trade volume of environmental goods in the past decade. The majority of other countries in the region also saw trade increases, but only at a much smaller scale. In terms of environmental goods trade balance, multiple patterns emerge (Figure 12, right panel): While Singapore and Malaysia have been the main net exporters of environmental goods, Malaysia's net exports grew rapidly, while Singapore's have been decreasing in the past 5 years. Similarly, among net importers, Vietnam has seen the largest growth in imports, while Thailand's imports have been declining between 2012-2017 and have since fluctuated at a much lower level. The Philippines is the only country that have seen significant shifts between being a net exporter and net importer.

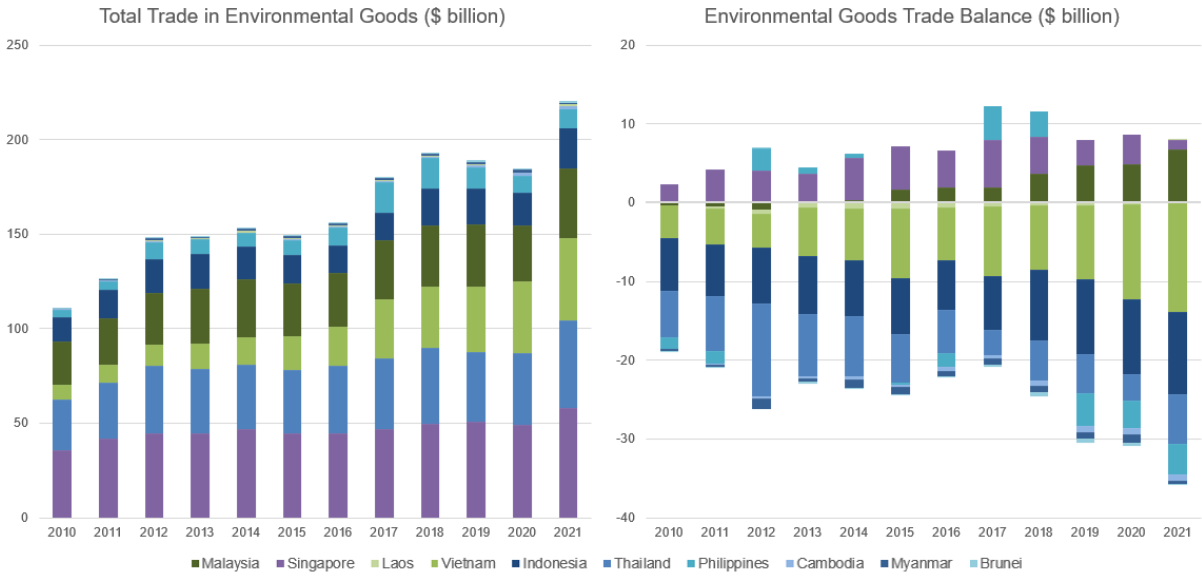

Figure 12: Total trade (left) and trade balance (right) in environmental goods by ASEAN country in billions of USD, 2000-2021
Source: Own calculations based on the IMF Climate Change Dashboard (International Monetary Fund, 2023).

When comparing ASEAN's growth in total trade it was found not to be above the global average. Similarly, when examining environmental goods exports and imports as a share of total exports and imports of each country in the region (Figure 13), it can be seen that most countries observed no significant growth rates – only Thailand, Malaysia and Singapore, and Vietnam saw a 1 percentage point (pp) or 2pp growth in share of exports, respectively, over the past decade, while Indonesia, the Philippines and Singapore, and Vietnam saw a 1 percentage point (pp) or 2pp growth in share of imports, respectively. This indicates that trade in environmental goods did not grow significantly faster than over trade flows.

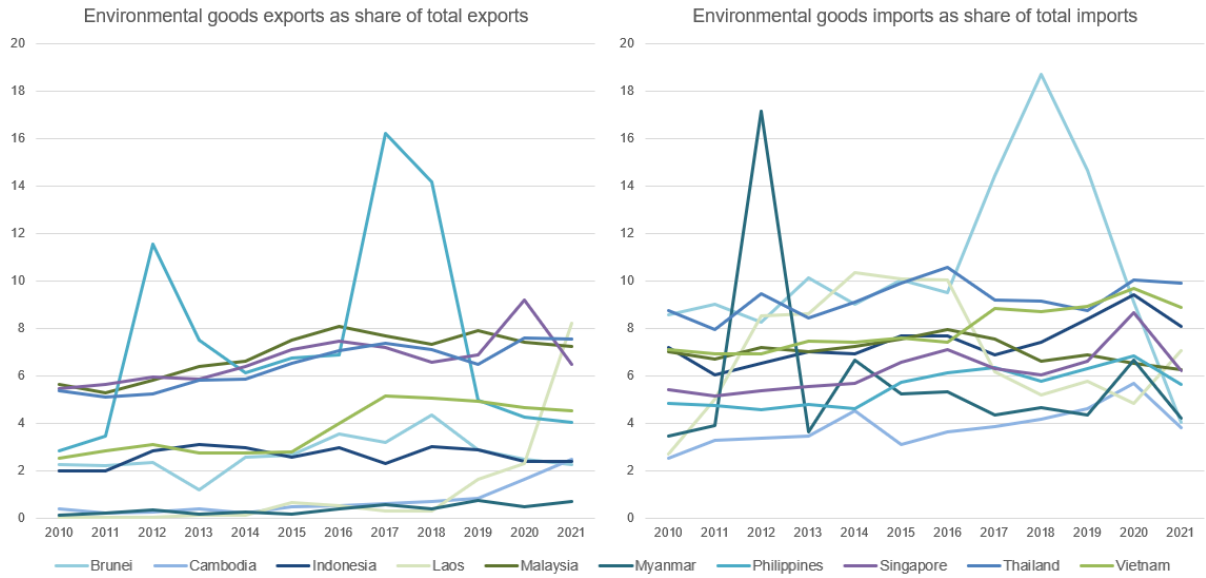

Figure 13: Environmental goods exports (imports) as share of total exports (imports) in ASEAN countries, 2010-2021
Source: Own calculations based on the IMF Climate Change Dashboard (International Monetary Fund, 2023).

IV. Free Trade Agreements as Enablers for Further Trade Impetus in Environmental Goods?

Due to the international nature of trade, national-level initiatives to greening trade can be an important first step but may naturally be limited in effectiveness. Free trade agreements (FTAs) have traditionally played a significant role in regulating trade flows, and more recently an increasing share of FTAs include so-called 'green clauses' that deal with environmental issues. Currently, most green clauses in trade agreements focus on facilitating trade in environmental goods and services. This may be due to the fact that traditionally trade agreements are more focused on the goods and services traded than how the trade and transportation takes place. Thus, trade agreements seem to generally be less suited to reducing some of the more direct environmental impacts of trade. The latter seems to require closer collaboration at various points in the economy, including in research into more sustainable transportation options or in business support schemes to take up more environmentally friendly transport options. Due to this different nature of the solution, the remainder of this paper will focus on facilitating trade in environmental goods and services, and thus on the role of trade agreements.

IV.a. Prevalence of Green Clauses in FTAs

Global Trends and Developments

To further facilitate growth in trade of environmental goods and services, trade agreements with clauses benefitting these types of goods may be useful. While progress on trade in environmental goods and services has stalled in global or megaregional forums like the WTO or APEC where either no agreement or only voluntary and unenforceable agreements have been reached on this matter since the early 2000s, this does

not mean that there is no progress on attempting to facilitate green trade. Figure 14 below uses data from the 2022 edition of the TRade and Environment Database (TREND) collated by Jean-Frédéric Morin of the Université Laval, to show the total annual number of preferential trade agreements (PTAs) signed as well as the average number of environmental provisions per PTA per year (Morin et al., 2018). While the number of PTAs signed peaked in the 1990s and early 2000s, the average number of environmental provisions per PTA has seen an exponential rise until 2016 after which it has declined somewhat with no clearly distinguishable trend to date.

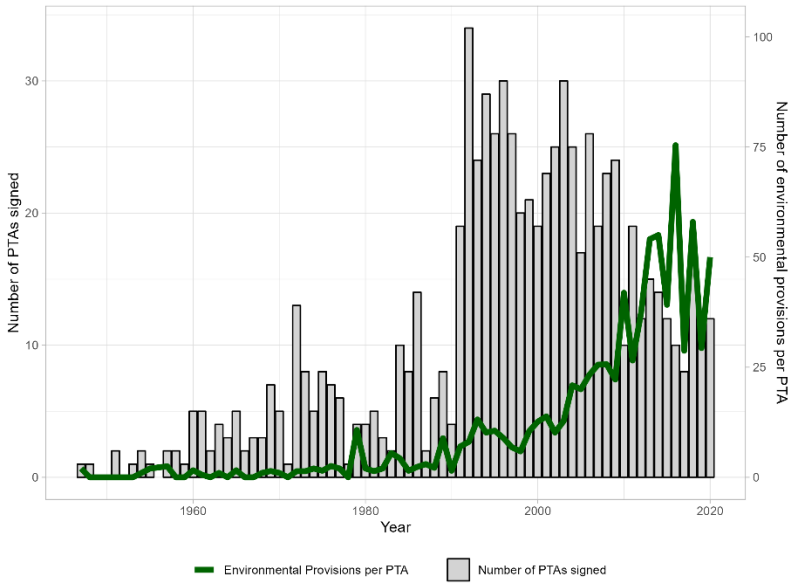

Figure 14: Trade agreements and environmental provisions per trade agreement globally.
Source: Own calculations based on the TREND Dataset (Morin et al., 2018).

ASEAN's Performance vis-à-vis the Rest of the World

When looking at Southeast Asia's inclusion of environmental clauses in trade agreements compared to other regions in the world, we can see that it is on the lower end of the mid-level performers in the last decade (Figure 15). On average between 2010 and 2020, PTAs signed by countries located in ASEAN include 39 environment-related provisions which is just over half of those PTAs signed by the top performer, the European Union with 70 such provisions. Among Asia's five sub-regions, ASEAN is the middle performer, with both East and West Asia including on average more environmental provisions in their agreements and Central and South Asia including significantly less.

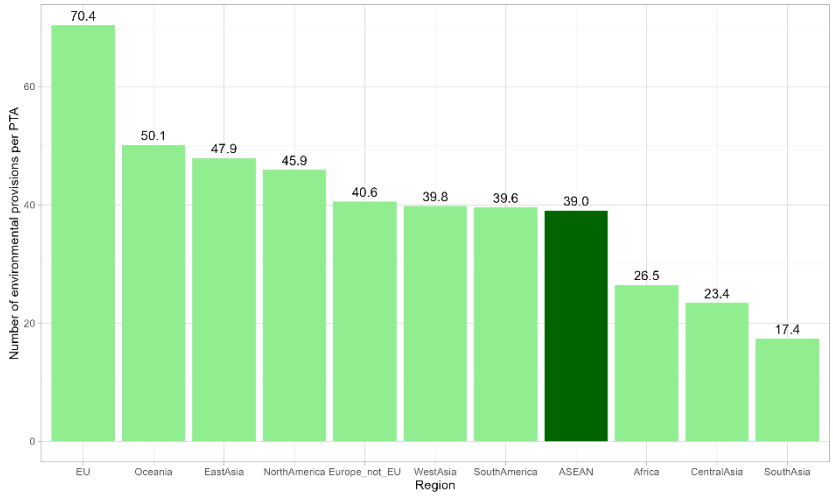

Figure 15: Regional comparison of the average number of environmental provisions per PTA, 2010-2020
Source: Own calculations based on the TREND Dataset (Morin et al., 2018).

When comparing ASEAN's overtime trend in including environmental agreements in trade provisions with the rest of the world (Figure 16), two findings must be noted. First, Southeast Asian countries only started including environment-related clauses in their trade agreements in the 1990s and only continuously from the early 2000s onwards, which is significantly later than other parts of the world. However, it must be noted that before the 2000s ASEAN countries did not sign PTAs every year, which partially explain the low average inclusion rates of environmental clauses in the previous century. Second, although the increase in the annual number of environmental provisions per PTA in ASEAN has seen a similar growth as the global trend between 2000 and 2010, the growth did not continue at the same rate in the last decade. Additionally, the year 2016 seems to be an outlier: The EU-Vietnam FTA signed that year includes 123 provisions ranking it fourth globally in terms of total environmental provisions, which due to the few agreements signed in ASEAN per year significantly increases the average.

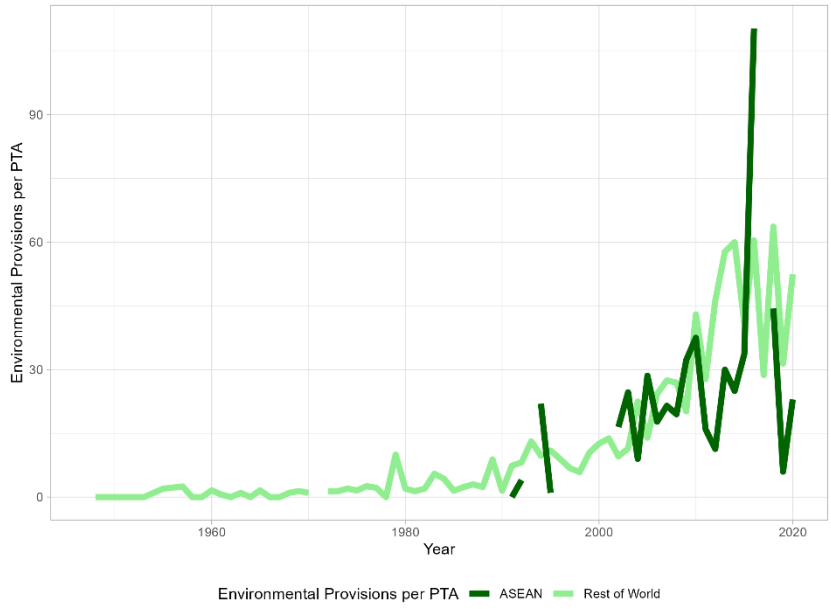

Figure 16: Comparing ASEAN with the Rest of the World in terms of average annual environmental provisions per PTA
Source: Own calculations based on the TREND Dataset (Morin et al., 2018).

IV.b. Limitations of Green Clauses in FTAs

Despite the growing number of environmental provisions included in free trade agreements around the world, these remain rather limited and are unlikely to be ambitious enough to achieve national and international climate targets. Multiple issues can be identified in the majority of current trade agreements with environmental provisions:

1. Many clauses, especially in regional agreements, are not binding or have significant exceptions that can ultimately undermine the policy intention.
2. As mentioned previously, many trade agreements work with a list-based approach to define what counts as an environmental good or service. This is overly restrictive already today and is difficult to adapt to the changing economic and technological needs and possibilities in the future.
3. Most trade agreements today include a dedicated chapter or dedicated clauses to environmental provisions. This places environmental concerns separate from the other economic provisions considered. As countries are adapting to climate change realities and the urgent need to restructure economic process to mitigate GHG emissions, it may be significantly more effective to treat economic and environmental considerations as inherently integrated rather than as a trade-off or unlinked issues.
4. Finally, many FTAs still fundamentally view the economy-environment nexus through the lens of constraints, not only by seeing environmental concerns as constraining economic processes, but also seeing the solution as constraining non-environmentally friendly processes. However, it may be much more productive to view this nexus more collaboratively. There is huge economic

potential in clean energy and clean technologies, which is only expanded if collaboration between countries in terms of science, technology, and policy is facilitated to tackle this global issue.

V. The Potential of Green Economy Agreements

International green economy collaborations are one potential solution to address these issues. These go beyond deep trade agreements to be classified as 'international green industrial policy' which highlights their "function in solving market failures that inhibit the emergence and growth of green technologies and industries" (Asian Development Bank, 2023, p. 235). As such, green economy agreements (GEAs) as one prominent example of such collaborations aim to address relevant market failures that arise due to the embeddedness of local economies in regional and global value chains that can thus not be effectively tackled at the national level. In combination with the established depth, legal commitment, and institutional capacity of traditional deep trade agreements, GEAs promise to overcome many of the shortcomings of current FTA by not limiting environmental issues to being a constraint on economic objectives and instead recognizing the interconnectedness between the economy and the environment as well as by focusing on collaboration to capitalize on the green transition.

The first and most prominent example of such a GEA is the Singapore-Australia Green Economy Agreement (SAGEA) signed in October 2022. Its features will be discussed below and contrasted with carbon pricing mechanisms which have been suggested especially by Western economies as alternative ways to tackling the economy-environment linkage more comprehensively.

V.a. The Singapore-Australia Green Economy Agreement (SAGEA)

The Singapore-Australia Green Economy Agreement (SAGEA) complements the Singapore-Australia Free Trade Agreement by combining economic and environmental objectives to support the growth of the green economy in both countries. By reducing non-tariff barriers for trade in green goods and services, the regulatory burdens for companies trading these between Singapore and Australia will be reduced. In addition, by developing interoperable policy frameworks through common standards and rules green cross-border activities will be promoted. Furthermore, the SAGEA initiates various forms of cooperation at the government-, industry-, and research-level to further develop green economy initiatives.

The SAGEA consists of 7 key areas with 17 joint initiatives, including a list of 527 environmental goods and services to support the reduction of trade barriers, a commitment to cooperate on green and transition finance, a collaboration on ecolabelling, and plans to establish green shipping corridors and environmental cooperation in the aviation sector. In terms of green finance, the *Joint Statement of Intent on Green and Transition Finance* outlines the following aspects of cooperation (Governments of Singapore and Australia, 2022): (a) interoperable green and transition finance taxonomies; (b) advance the agenda of the International Sustainability Standards Board on developing baseline global sustainability reporting standards; (c) developing financing solutions that facilitate the flow of green and transition finance; and (d) support efforts of companies to promote innovative fintech solutions and to strengthen ESG ecosystems.

How the SAGEA Goes Beyond Traditional Trade Agreements

Like other trade agreements, the main goal of the SAGEA is to increase trade and investment between the two signatory economies. However, there are three differences to other existing trade agreements that warrant its description as a "first-of-its-kind": (1) the explicit focus on the green economy that elevates environmental issues to be on par with economic growth; (2) its broad scope, as it recognizes the interconnectedness of multiple economic sectors in greening the economy; and (3) its emphasis on partnership and collaboration, rather than a more traditional focus of predominantly increasing competition.

First, the SAGEA is the first trade agreement that explicitly focuses on issues of the green economy. In contrast to previous trade agreements that have included environmental issues such as the CPTPP or most of the European Union's trade deals, the green economy is integrated into every clause of the SAGEA rather than being treated in an individual isolated chapter. For example, the EU's trade agreements include

a specific chapter on "Trade and Sustainable Development" (and the CPTPP has Chapter 20 on "Environment"), however, as the EU Commission itself noted, "mainstreaming sustainability beyond the [Trade and Sustainable Development] chapter of trade agreements" (European Commission, 2023) is necessary to successfully navigate the transition to the green economy. In a similar vein, but even less explicit, the RCEP mentions in Chapter 18 that a Committee on Sustainable Growth is to be developed, which postpones rather than integrates the dealing with environmental issues (Malingrey & Duval, 2022).

Second, the SAGEA's broad scope allows it to more successfully tackle issues of the green economy as it recognizes the vastness and interconnectedness of environmental issues. For example, the CPTPP's "Environment" Chapter, lists rather specific provisions on certain environmental issues such as the protection of the Ozone layer, the marine environment from ship pollution, and biodiversity. However, these are treated as additional constraints to economic growth, rather than seeing environmental degradation as an integral part of the current economic system and treating the green economy as a potential source of future economic growth. Instead, the SAGEA does not focus on many environmental issues in such detail, but instead creates an overarching framework for accelerating the benefits of the green economy.

Finally, while other trade agreements promote some degree of cooperation, partnerships are one of the main focus areas of the SAGEA. For instance, the CPTPP does mention that it "recognize[s] the importance of cooperation as a mechanism to implement this chapter [on "environment"]" but it does not outline any specific channels through which cooperation can take place. Similarly, even the EU, as one of the most active players in the sustainability field, notes that there is a "need to be more proactive in cooperating with partners" on issues of sustainable development (European Commission, 2023). The SAGEA, on the other hand, takes concrete steps in building four avenues for cooperation between the signatory countries: (a) The *Austrade-Enterprise Singapore Memorandum of Understanding (MoU) to Support Green Business Partnership* aims to facilitate business-to-business engagements; (b) the *CSIRO-A*STAR Master Research Collaboration Agreement* strengthens scientific, technological and innovative collaboration; (c) the *MoU on Cooperation in Environmental Protection and Promotion of Ecolabelling Certification* aims to increase interoperability of ecolabelling programs; and (d) the *Joint Workgroup on Cross-Border Electricity Trading* intends to develop the required architecture and share information between experts on bilateral electricity trade.

Given the intended ability to both better tackle environmental issues and capitalize on the green transition, Singapore is looking to sign more green economy agreements with its trading partners in the future. Most recently, the Singapore-UK Green Economy Framework (UKSGEF) has been announced which will be similar in approach to the SAGEA. However, currently, it seems that the UKSGEF will be less extensive, covering only three key areas (green transport, low carbon energy and technologies, and carbon markets and sustainable finance). Similar to the SAGEA it emphasises collaboration between both countries' governments, businesses, and researchers.

V.b. Comparison to Carbon Border Adjustment Mechanisms

Carbon pricing mechanisms have been introduced in many economies around the world as part of domestic environmental policies. By putting a price on carbon, the negative production externalities stemming from GHG emissions are partially internalised. Generally, such carbon pricing instruments have been found effective at increasing the take-up of low-cost emissions reduction solutions as well as in new technological developments that allow for production processes with lower emission output (Baranzini et al., 2017). However, a potential negative consequence of carbon pricing mechanisms is that domestic producers are disadvantaged vis-à-vis foreign producers as they face higher costs of production, resulting in domestic demand being increasingly met by more emission-intensive imports, or in production shifting abroad.

To counter this, many Western economies, including the European Union (EU), Canada, the UK, and the US are considering implementing a border carbon adjustment mechanism (Asian Development Bank, 2023). The EU's carbon border adjustment mechanism (CBAM) is the closest to being operational with the

transitional period having begun on October 1, 2023, and full effectiveness scheduled for January 2026. This mechanism will impose a carbon price similar to that facing domestic producers on selected imported goods, especially those in carbon-intensive and trade-exposed industries, including steel, aluminium, fertilizer, and electricity (European Commission, n.d.).

On the one hand, the CBAM is likely to reduce carbon leakage and thus contribute to further reducing production emissions by ensuring that goods produced outside of the EU with less environmentally-friendly production processes cannot have a competitive advantage vis-à-vis similar products that are more environmentally friendly. On the other hand, however, the CBAM mechanism is likely to have negative impacts on foreign firms and economies. Of course, trade in affected sectors is likely to decrease if production methods in the respective country of origin are not environmentally friendly – while the impact on Southeast Asia as a region is relatively limited, the effects can nevertheless be as high as 380 million USD of foregone revenue for Vietnamese exporters (NewClimate Institute, 2023). Additionally, increased administrative costs for measuring carbon emissions must be borne by affected firms, which will be especially problematic in setting where institutional measuring and reporting capacity is lacking (Asian Development Bank, 2023). Furthermore, CBAM favours economies with relatively clean and often technologically advanced production processes, which will again hit countries with lower infrastructure and development levels harder. In combination therefore, CBAM is likely to worsen inequalities between the Global North and South, with experts from the IMF predicting a welfare loss of 106 billion USD in developing countries and a welfare gain of 141 billion USD in developed countries at the broadest implementation of the CBAM (He et al., 2022).

Thus, in comparison to the SAGEA, the CBAM is likely to have more unintended negative consequences, especially on countries in the Global South. Nevertheless, as a direct policy instrument (Duggal, 2023) its positive impacts on emissions reductions are also likely to be significantly higher than those of the more indirect tools included in the SAGEA. However, compared to the green economy agreements discussed above, none of the positive benefits of collaboration emerge with CBAM, including in innovation driven by partnerships or facilitated trade in green goods and services. Therefore, especially for smaller economies with less developed emission trading schemes or carbon taxes, like the countries of ASEAN, green economy agreements are more likely to be a promising avenue in policy making to ensure an alignment of trade and environmental concerns.

VI. Conclusion

As Southeast Asian economies have developed and grown rapidly in the last decades, they have become an increasingly important player regarding emissions embodied in trade and trade in environmental goods. While the region is a net exporter of emissions, it is also a net importer of environmental goods, indicating that production in the region is comparatively more emission-intensive, either due to the exporting sectors or the methods of production. Thus, further integrating into global trade networks will in itself be detrimental to environmental goals in the region. Instead, it is necessary to focus on channels through which greener trade can be promoted, either by further increasing trade in environmental goods, or by greening its own exports through competition, technology exchanges, and access to more markets.

While environmental clauses in trade agreements have increased rapidly globally this speed was not matched in ASEAN in recent years and this trend also did not go hand in hand with an increasing growth in volume of environmental goods traded vis-à-vis other goods in the region. Besides this, green clauses in free trade agreements may also be insufficient for significant progress towards environmental goals due to their limited and targeted rather than comprehensive approach to the environment-economics nexus. Instead, green economy trade agreements seem much more promising in successfully integrating and addressing economic and environmental targets and concerns, and are thus expected to be much bigger drivers in greening trade. In contrast, carbon border adjustment mechanism like the CBAM proposed by the European Union are likely necessary for reducing carbon leakage from territories with well-established carbon pricing schemes, such mechanisms are currently unfeasible for ASEAN member states to implement successfully. Thus, while it must be noted that the SAGEA is signed between two small and

highly developed economies, and such comprehensive GEAs may be out of reach for larger or less developed economies due to institutional capacity concerns, governments and societies around the world and especially in ASEAN would benefit from more such agreements – even if at a smaller scale initially that can be deepened over time – to move closer to solving the dilemma of economic growth and environmental sustainability by integrating the two at an economy-wide level.

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Appendix A: Climate Change in ASEAN

Climate change and global warming are already significantly affecting Southeast Asia as a region, and these effects are likely to further increase in the coming years and decades with significant negative effects on human life and economic development. In addition to temperatures rising at a rate of between 0.14-0.20°C per decade (Kwan & McCoy, 2022), Southeast Asia is one of the most affected regions globally by natural disasters and extreme weather events. Since 2000, nearly 40% of all natural disasters occurred in Asia (

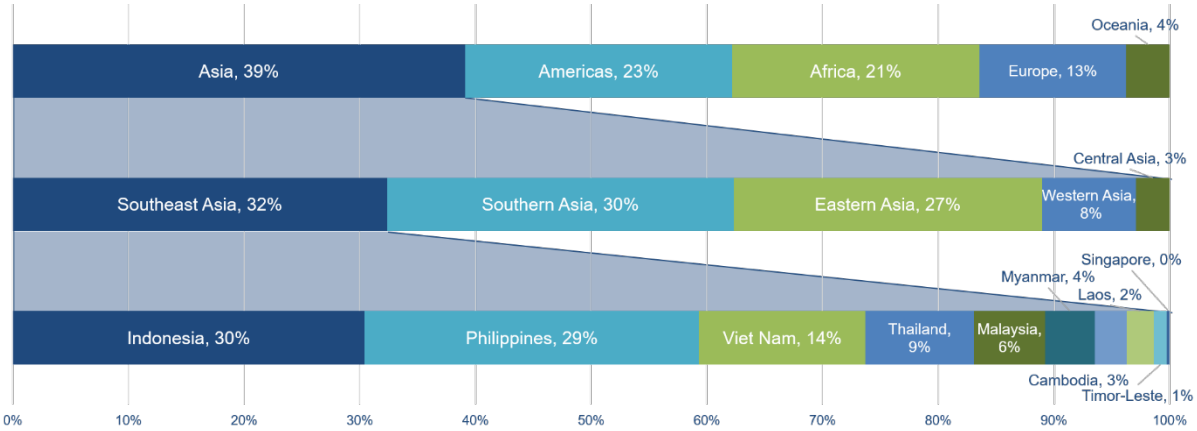

Figure 17), and within the continent, one-third of natural disasters occur in Southeast Asia. Similarly, on the Global Climate Risk Index compiled by Germanwatch, 5 of the 10 ASEAN countries (Myanmar, the Philippines, Thailand, Viet Nam, and Cambodia) rank in the top 15 most affected countries by extreme weather events between 2000-2019 (Eckstein et al., 2021). Furthermore, the number of natural disasters has risen steadily over the past decades (Figure 18). Importantly, these data points are likely an, as they exclude slow-onset events like sea-level rise which are likely to significantly more negatively affect Southeast Asia compared to many other regions, as over 77% of its population lives in coastal areas (Rahman, 2023).

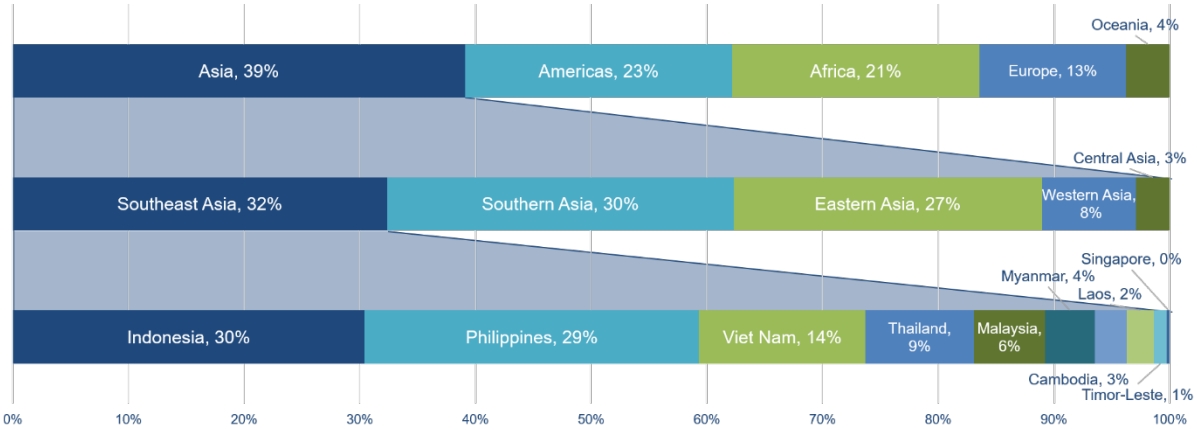

Figure 17: Number of Natural Disasters, 2000-2022 (UC Louvain, 2022)

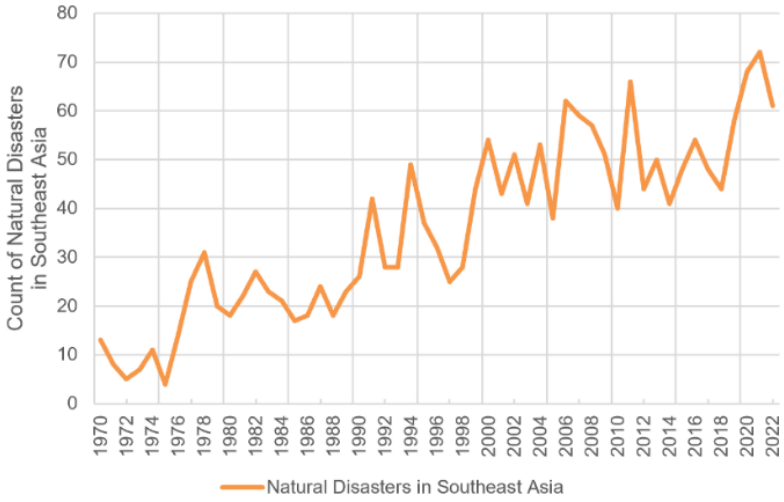

Figure 18: Number of natural disasters in ASEAN over time, 1970-2022 (UC Louvain, 2022)

Besides the large human costs of climate change-induced natural disasters, increased extreme weather events also negatively impact economic activities. In general, if no action on climate change is taken, the Asian Development Bank (ADB) predicts the GDP of Southeast Asia to shrink by 11% until 2100.[1] ASEAN countries are increasingly involved in global trade and value chains. Therefore, disruptions of production or transportation due to climate change could therefore not only directly negatively affect trade in the region but could also weaken the countries' roles in global supply chains. Additionally, as economies are becoming more embedded in the globalized economy, Southeast Asian countries will also increasingly be negatively affected by climate change-induced events in up- and down-stream economies. While addressing climate change through mitigation and adaptation measures has significant upfront costs, these will pay off in the longer term. For example, the ADB estimates emissions mitigation costs to reach the 500ppm scenario in Southeast Asia to range around 3% of regional GDP, whereas net benefits of climate stabilization in the region would reach between 5-11 times these initial costs between 2010-2100. [2]

[1] Southeast Asia and the Economics of Global Climate Stabilization | Asian Development Bank (adb.org)
[2] Southeast Asia and the Economics of Global Climate Stabilization (adb.org)