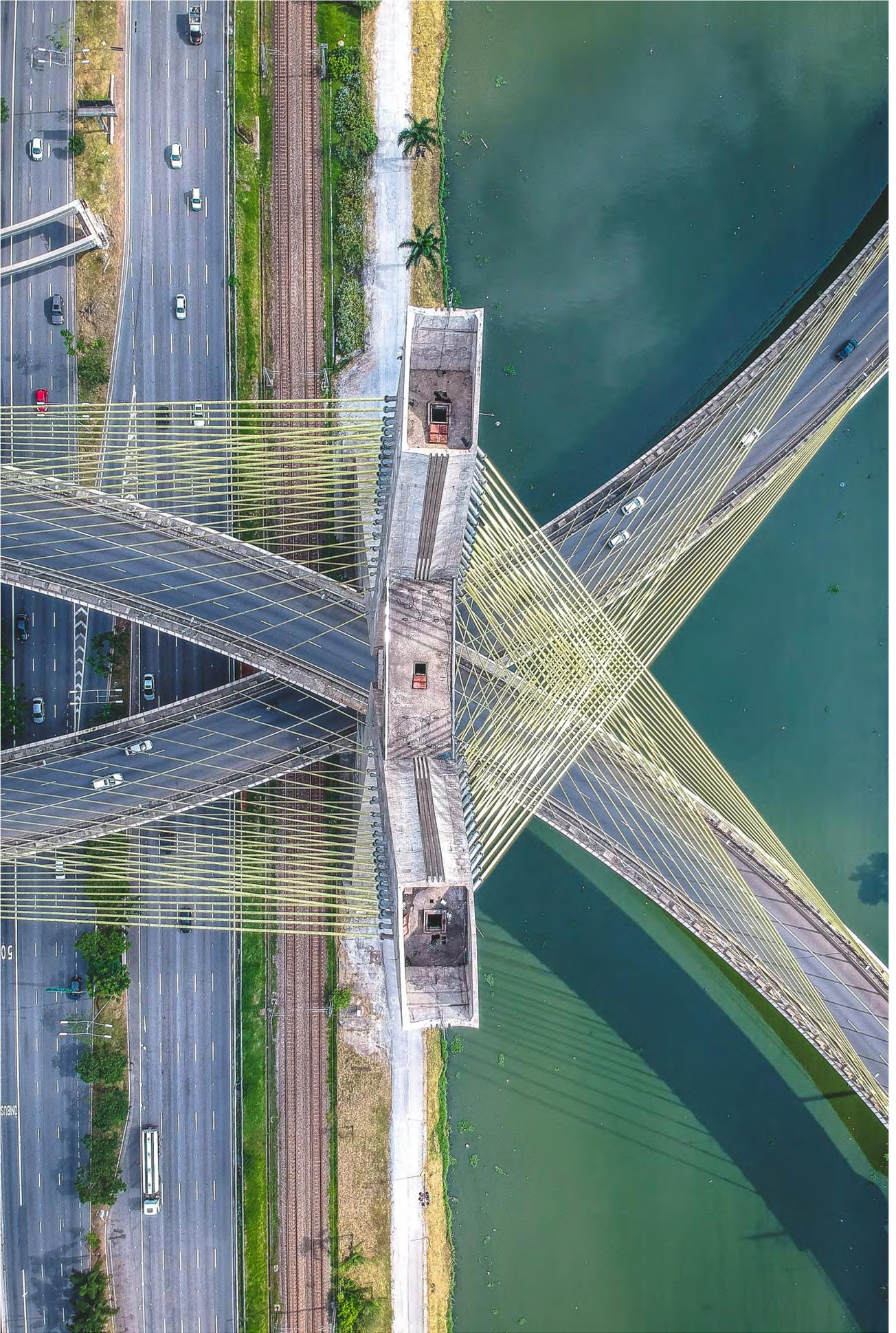
An aerial photograph of a tropical forest. In the upper left, a construction site is visible with a yellow excavator and several square markers on the ground. The rest of the image is dominated by a dense canopy of palm trees and other tropical vegetation.

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Sovereign Analysis: Natural Capital vs the Nature of Capital

CANDRIAM 
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About the authors

Kroum Sourov

Lead ESG Analyst – ESG Sovereign Research



Kroum Sourov joined Candriam as Lead Sovereign ESG Analyst in 2018. Most recently, he was the Director of Sustainable Investment Management at a sustainable investments startup. His previous roles include a global macro portfolio manager at Mako Global, a Director of foreign exchange market strategy at UBS, an Assistant Vice President in the Strategic Transactions Group of Barclays Capital, and a bond trader at Goldman Sachs.

Kroum holds a Master's degree in International Affairs with a specialization in Environment, Resources and Sustainability from The Graduate Institute in Geneva, Switzerland; a Master of Finance from the University of Cambridge, and a Bachelor of Arts in Mathematics from Colgate University, United States.

Wim Van Hyfte, PhD

Global Head of ESG Investments and Research



Wim has headed Candriam's research on environmental, social, and governance issues since 2016. He is responsible for the implications of ESG factors and their integration into portfolio and risk management across asset classes. Previously, he spent ten years co-managing global quantitative ESG portfolios. He is Visiting Professor at ULB Solvay School of Economics and Management, and previously Visiting Professor at Vlerick Business School.

Wim holds a PhD in Financial Economics, an MBA in Finance, and a Master's degree in Applied Economics. His peer-reviewed academic research covers both empirical and corporate finance with a focus on asset pricing, risk modelling, and portfolio management.

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Summary: Pricing Sovereign Sustainability

“A community already exists within finance which is committed to adding value for investors, while collectively changing the world. Both we and the next generation deserve nothing less.”

- Vincent Hamelink, Chief Investment Officer

At Candriam, we have been a part of this community for 25 years, seeking to add value by investing responsibly. We established an in-house team of ESG Analysts in 2005, expanding to Sovereign Sustainability analysis in 2009. Once alone in the wilderness, we are now part of a fast-moving body of thought among financial market participants and academics. Committed to remaining at the forefront, this year we launched our third Sovereign Sustainability model.

Sustainability: From Weak to Strong

We introduce two major enhancements to our previous Sovereign Sustainability models. The most important change is our move from a model employing four types of freely-interchangeable capital, to our introduction of a model *which places a limit on Natural Capital*.

Economists continuously grapple with externalities. Just as a mining-based national economy is

unsustainable after the mineral deposits are exhausted, the global economy is unsustainable if large economies such as the US 'free ride' by growing their Human Capital, Social Capital, and Economic Capital by producing emissions which reduce the Natural Capital of the globe.

As before, our model outputs are mappable to the 17 UN Sustainable Development Goals.

Materiality: Linking the Short Term and the Long Term

A second major change is adapting the materiality of the data to the developmental stage of each individual country. For example, a data series on electric vehicles would be much more heavily weighted in the score of a country such as Norway. It tells us little about Uganda, where food security would be more material to the sustainability of the country.

We are able to reflect both the short term and the long term in our scores by linking two elements -- a materiality-based weighting reflecting where a country stands today, and a limit on the substitutability of Natural Capital to reflect its finite nature in the long run.

Risks: Identify. Select. Value, or Eliminate.

It is easy to view sustainability analysis as a tool to help identify unwanted risks, or negative tail risks. Yet investing also consists of choosing, *and setting prices* for, those risks we wish to accept to generate return.

Our enhanced Sovereign Sustainability Model is designed to provide a more sophisticated analysis of Strong Sustainability. More than a score; it is also rich in insights. It is constructed so that

our Candriam analysts and portfolio managers can delve deeply into individual issues of either opportunity or concern.

It is the history of emerging market debt investing that extra-financial elements may fail to be reflected in credit ratings. These factors can either deteriorate or improve, and be reflected in bond prices, long before they are reflected in economic reports.

The Search for the Truth

We offer examples of the richness of our model, one from each of the four Capital Pillars. For example, within Natural Capital, what does our model say – or not say – about deforestation? What insights on Covid-19 can we uncover within our Human Capital factors? Do our Social Capital inputs help us understand whether the recent questions of law and order in the US is an aberration or a trend? And with all the conversation about 'outsourcing' emissions to other countries through trade, can our Economic Capital model offer any clarity regarding who is impacted?

The emphasis of sovereign analysis must shift from economic development to sustainable development. The ability of 193 countries to agree to the UN Sustainable Development Goals shows our universal agreement. Now we must monitor our progress not only towards our collective 2030 Agenda, but beyond, to a sustainable future for generations to come. Finance has a central goal in this collective good. To achieve this, we must measure and monitor our progress.



The Four Capital Pillars: Natural Capital as the Cornerstone



Most of the environmental impact over the coming decade has already been determined by current and past economic activities, putting sustainability in finance in the spotlight.

We believe that the inflection point in sustainable economic development was reached in 2015 - the year history will record as sustainability's moment of truth. It was the year of the landmark COP21 Paris Agreement on Climate Change, the first-ever nearly universal, legally-binding global climate change agreement. Negotiated by representatives of 196 state parties and of the United Nations under the Principles for Responsible Investing and the Global Compact, it represents the evolution of thought regarding sustainability in both society and the investment community. The current framework, the UN 17 Sustainable Development Goals (SDGs), provides an outline for the global community through 2030.

The investment community's growing incorporation of sustainability-related metrics in investment decisions has been aided by both semi-formal initiatives and formal regulation. Examples include the Shareholders Right Directive II, the Non-Financial Reporting Directive (NFRD) for companies and the Sustainable Finance Disclosure Regulation (SFDR) for asset managers. The Network of Central Banks and Supervisors for Greening the Financial System, launched at the 2017 "One Planet Summit" by eight banks and supervisors, blossomed to 66 active members by mid-2020. This commendable initiative is designed to strengthen the global response to the Paris agreement and enhance the role of the financial system in combating climate change. Non-financial reporting, especially in the EU, now encourages or requires companies to report on how they operate, impact, and manage social and environmental challenges, including environmental protection, respect for human rights, corruption,

diversity, social responsibility, and treatment of employees. While these apply mostly to large corporations, they influence general practices across economies where they are prevalent. This 'multiplier effect' is beginning to benefit the environment in which these companies operate, including protection of common resources such as the natural environment.

In normal times, these developments would make us optimistic. Surely, central bank actions and regulatory pressure will increasingly shape the thinking of market participants?

The inability to go outdoors has an uncanny ability to focus the mind. Wildfires in Australia and California. Regions around the world rolling in and out of lockdowns and other attempts to combat Covid-19. An acceleration of new extreme records in weather.

Might it be, that all the initiatives from the UN, regulators, central banks, and others could prove completely insufficient? Tipping points are often identified only after they have been passed.

While a warm winter might be pleasant, the warmest winter on record in 2019-2020 portends a potential magnification of the disasters that the world experienced in 2019. The most recent being the record heatwave in Siberia, with temperatures in excess of 10°C *above previous records* for the region.¹

Covid-19 has shown that counting ICU beds and healthcare system investments by governments is no longer a niche domain for specialist ESG (Environmental, Social, and Governance) analysts, tucked away in the corner of the market. Analyzing the healthcare capacity of countries, as well as age group distribution, obesity rates, and whatever other metric may emerge as a risk factor for Covid-19, has decidedly entered the mainstream of financial analysis.

The importance, and sudden immediacy, of such metrics is now apparent. Is analysis the solution, or are we 'papering over the cracks'? Is there a larger lesson, that of long-term survival? The global pandemic is demonstrating the importance of relying on the science to the broadest possible audience. We must take the science beyond the pandemic to the root causes of what is happening to our societies today.

Climate change will not only increase the frequency with which we experience previously rare events, but it will also make them more devastating. The strength of hurricanes and the massive forest fires are testaments to this phenomenon. Not to forget, those fires themselves emit enormous amounts of greenhouse gasses (GHGs), further accelerating the effects. During this pandemic food security has been problematic as outbreaks threatened supply chains, and panic buying of non-perishable foods emptied many stores. In the longer term, water and food pressures may lead to social instability, mass

migration and, quite possibly, conflict at every level of society globally. Because these changes occur over a period of time, we often have difficulty comprehending their magnitude and consequences. With temperatures in Siberia hitting 25°C when the usual is 0°C² (yes, zero degrees Celsius), the thawing permafrost could open a Pandora's box of previously unknown viruses and bacteria.^{3,4} Not to mention, it is yet another source of methane released into the atmosphere.

We lack preparation for these new threats in an atmosphere of rejection of science. Institutions such as the World Health Organization are being defunded, and international cooperation is diminishing. If the first wave of the coronavirus pandemic was costly, every subsequent pandemic has the potential to be even more damaging.

The message in a joint 2020 op-ed from the WHO, the UN, and the WWF is anything but ambivalent:

“We have seen many diseases emerge over the years – such as Zika, AIDS, SARS and Ebola – and although they are quite different at first glance, they all originated from animal populations under conditions of severe environmental pressures.

And they all illustrate that our destructive behavior towards nature is endangering our own health – a stark reality we’ve been collectively ignoring for decades. Research indicates that most emerging infectious diseases are driven by human activities.”⁵

The science is clear – destruction of our natural environment produces long-term consequences. These consequences are much closer to home than the plight of an endangered giraffe somewhere in sub-Saharan Africa. Today, and close to home, we are suffering many thousands of victims of disease, physical isolation, and badly damaged economies; it is very likely that the Covid-19 virus originated as a result of habitat destruction. Government intervention on an unprecedented scale has been required to prevent mass starvation and riots by the many millions who have lost their livelihoods.

While it might be tempting to focus on healthcare, we must not lose sight of the underlying issue – environmental destruction and climate change. Covid-19 may have upended the traditional understanding of the role of government in the economy. The notion that we can merely tweak our existing neoclassical macroeconomic and monetary policy models to reflect the new realities is misguided at best.

Weak versus Strong Sustainability: This brings us to the very definition of *sustainability*. To date, most of the conversation has assumed that natural capital and manufactured capital are freely interchangeable, and what matters is the total amount of capital stock that we preserve for future generations.⁶ This is the definition of *Weak Sustainability*. This can result in the notion that destruction of natural resources has a cost, and that as long as that cost is reflected in the market price, the activity is sustainable. This idea lies at the core of carbon pricing proposals. The current scientific consensus of the consequences of climate change and environmental destruction, and the palpable results we are witnessing today with Covid-19, expose some of the flaws of this thinking.

Strong Sustainability incorporates the scenario that destruction of nature is often irreversible.

In these instances, Natural Capital and other forms of capital are complements, and *not* substitutes. In our revised framework, we take the next step that Natural Capital should not be treated as a stock of resources that are freely interchangeable for any other type of resource. Instead, Natural Capital must be treated as a complex and non-substitutable system of critical elements, which make a unique contribution to well-being, welfare and more specifically to socio-economic development. Strong Sustainability differs from Weak Sustainability in that *there is no price that one can pay today to compensate for irreversible environmental damage that is left for future generations*. This is materially different from the approach so far taken by much of the investment community when considering the impact of environmental damage on the overall sustainability of a country.

Our revised Sovereign Sustainability Model moves our analyses towards Strong Sustainability.



Strong Sustainability: Natural Capital Stands Apart

“It [sustainability] is development that meets the needs of the present without comprising the ability of future generations to meet their own needs.”

- Brutland Report, 1978

The four-pillar Sovereign model of Natural/ Environmental, Human, Social, and Economic capital has been adopted for practical use by organizations such as the OECD. Typically, these different forms of capital stock are viewed as substitutable. If so, it would follow that what matters is that we leave future generations with at least as much *total* capital as we received. It would be easy to conclude that technology has enabled us to create economic capital at an accelerating pace, to develop Human capital through

advanced education and greater innovation, and to sharply increase life expectancy. Given the reduced scale of war in the last 70 years, social capital is higher. Under these assumptions, future generations can be expected to live better lives than we have, using those resources we have left for them. Progress has indeed been made, but considering the rising populism, inequality and discontent within society, it is questionable whether development has achieved as much as should have been expected.

Natural Capital cannot be replaced with other forms of capital, according to our analysis. This lack of substitutability is a tenet of 'Strong Sustainability'. And Natural Capital is *finite*. The environment, or Natural Capital, has long suffered from mispricing of externalities. The ability for anyone to benefit from this global common resource without cost, acting in accordance with their own self-interest, has unfortunately resulted in the depletion of that good, as it not in the self-interest of any individual to preserve that common resource, a phenomenon long known as the *Tragedy of the Commons*.⁷ Negative externalities of production have also long been a problem -- a company dumping pollutants in the nearby river for free, and not reflecting the clean-up costs in the price of their product. These clean-up costs are later paid by the general public, whether they consumed the product or not. It becomes even more complex when we consider greenhouse gas emissions. We are just now starting to see the direct costs in the form of hurricanes of increased intensity, floods, drought, etc. But the long-term costs resulting from the melting of the polar ice caps will result in amounts which are unfathomable for the investment community.

One way to resolve this has been to suggest that prices should reflect the environmental costs, and this is at the heart of what is called 'Weak Sustainability' -- the notion that the four capitals are interchangeable and as long as we determine a price for the damage, then the actor can compensate for their usage of natural capital, and increase the overall capital stock through production of other forms of capital.

There are two problems with this approach. We do not know the cost of reversing the damage of GHG emissions. The price would therefore be a guesstimate based on our limited understanding of the consequences -- or worse, a price based on what the market decides a unit of pollution is worth today.

Secondly, 'Weak Sustainability' fails to recognize that some processes in the natural environment are not reversible, and certainly not within the timeframe of a human generation. Many ecosystems are at a tipping point; once reached, it is likely there will be no turning back, at least within the time frame of a generation, regardless of how much money we are then prepared to spend. Humanity will place itself in truly uncharted territory.

“As temperatures rise, thawing permafrost may release large amounts of carbon dioxide and methane into the atmosphere, causing even more warming. At the same time, the disappearance of snow and ice cover - bright, reflective surfaces that help to beam sunlight away from the planet - will cause the Earth to absorb even more heat. The result is to worsen the progression of climate change even further.”⁸

- *Scientific American*, 2019

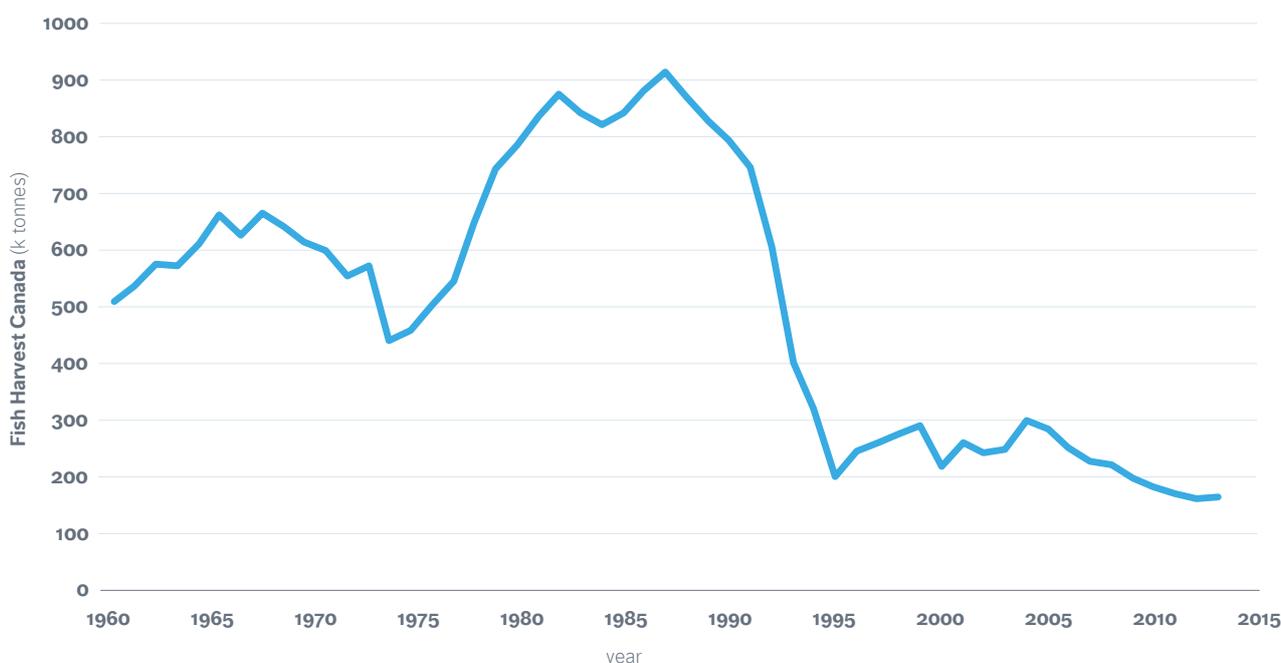
Strong Sustainability assumes that the natural environment, that is, Natural Capital, cannot be *substituted* for by any other form of capital and can only be *complemented* by other forms of capital. Depletion of natural resources is irreversible. More bluntly, we cannot ask future generations to breathe polluted air and be unable to enjoy nature outside of the artificial city park or the zoo, just so that we can have a bigger SUV today.

Strong Sustainability asserts that natural resources cannot be compromised without endangering the interests of future generations. Non-linear changes in ecosystems and their services have been encountered before; we must do what is necessary to avoid those often unexpected and sudden tipping points.

One salient example is the sudden collapse of cod fisheries in North America.⁹ After years of overfishing using new technology to trawl bigger areas and deeper waters, the quantity of adult fish able to procreate, and thus maintain overall biomass, reached a tipping point. Yields declined suddenly and precipitously. This is displayed graphically in Figure 1.¹⁰ Authorities were forced to declare a moratorium on cod fishing, an historic industry still essential to the coastal communities.¹¹

Figure 1: Cod Fishing in Newfoundland

Production of Cod and other Demersal Fish in Canada



Source: UN FAO

While in past decades we thought we could survive by viewing sustainability as what we call 'Weak' Sustainability, that appears to have been a grave error. The damage to the natural environment has already put the viability of our civilization at risk.

It is our view that development is a process of interaction between economic and non-economic development. That is, economic development cannot persist without corresponding advances in human and social development. Each stage feeds back into the other. In periods of positive global economic growth, underdevelopment of human and social capital limit a country's potential development, while during phases of deteriorating growth, low human and social capital exacerbate the effects of a global slowdown on a country. This notion is far from new.¹²

The opposite would occur for a country with highly-developed social and human capital. During periods of growth, a country can capitalize on opportunities, and during phases of global slowdown or recession, a social safety net and human capital cushion the blow of the deteriorating external factors.

The traditional four-capital country sustainability approach still allows for a high degree of substitution among Natural, Human, Social, and Economic Capital. As long as natural capital remains abundant, the trade-offs might be easily accommodated. When natural capital begins to be depleted, it acts more like a limit than a substitute. Inter-governmental institutions are warning that the situation for the natural environment is dire. Ecosystems from forests to oceans; from bees to wild mammals; and most pressing, climate change – are all flirting with tipping points of possibly irreversible collapse. The *Living Planet Report 2020* from the WWF and the Zoological Society of London announced that global wild animal populations plunged a shocking 68% between 1970 and 2016.¹³

Previously, our overall country sustainability score was calculated as the average of the four capital scores. This type of model, with full substitutability among

types of capital, allows good performance in other forms of capital to compensate for poor performance in using up natural capital. This has generally been the case across the financial community, whether using the four capitals approach such as the OECD,¹⁴ or a variety of ESG frameworks employed by investment managers. Broadly, in finance and society, greater importance has been attributed to a variety of shorter-term social and governance indicators at the expense of environmental performance. Humanity has missed every single environmental target we have set for ourselves.¹⁵

To move towards a Strong Sustainability framework, we adopt a form of the Environmentally Efficient Well-Being – a theory introduced in 2009 by Dietz, Rosa and York in the journal *Human Ecology Review*.¹⁶ The authors expand on this in 2012, when they explore the notion of *environmentally-efficient creation of well-being*.¹⁷

The crux of the theory is how well a country can create capital – Human, Social, or Economic -- which contributes to its development and the well-being of the population. To create capital, a nation consumes natural resources and causes irreparable damage on the environment. Some countries can create much more well-being per unit of damage caused – that is, they are “environmentally efficient” in creating capital. Others use significant natural resources and cause more damage to create lesser stocks of Human, Social, or Economic Capital, so they are much less “environmentally efficient” in their creation of well-being.

More-environmentally-efficient countries will be more sustainable. Less-environmentally-efficient countries will be less sustainable, because they cannot deplete large amounts of natural resources to create well-being indefinitely. At some point there will be no more resources available.

This approach is at the core of our updated analytical framework for assessing country sustainability. It puts the environment at the center of the model and, we believe, keeps us at the forefront of sustainability analysis.

The Candriam Sovereign Sustainability Model

Our approach adopts the concept of 'Environmental Efficiency'. Natural Capital is finite. To incorporate this constraint in our most recent model, we use the Natural Capital score as a multiplier for the other three types of capital. Countries are evaluated on the *efficiency* with which they create well-being in the form of Human, Social, and Economic Capitals, accounting for potential depletion of or damage to the natural environment in the process of creating this well-being.

Our sustainability framework is dynamic, and changes as our understanding of the phenomena we are trying to capture evolves. To reflect the urgency of the environmental risks ahead of us, we introduce several improvements to our approach. Sovereign sustainability concepts have often been developed with a one-size-fits-all approach, with less stringent criteria being applied to developing countries. This has resulted in often static results, which do not accurately reflect the changing circumstances and differing priorities of countries.

Previously, our overall sustainability score for a country was the average of the four capital scores – Natural, Human, Social, and Economic. While straightforward, our prior approach simply assigned

a 25% weight to environmental performance, which was still more than many widely-used sustainability frameworks. This not only allowed frictionless substitution between Natural Capital and creation of the other three forms of capital, but it did so at every level of environmental performance, however poor that might be.

The overall sustainability score of a country is the average of these three forms of environmentally-efficient Human Capital, Social Capital, and Economic Capital, created by using the Natural Capital as a multiplier.

Under this modelling approach, it is much more difficult for a country score to compensate for environmental damage by creating another form of capital, given that scores for expandable forms of capital are evaluated with respect to the environmental inputs required to create them. We do not claim that this method fully resolves all the issues of Weak versus Strong Sustainability, but we believe it is an important step forward. Environmental preservation takes center stage in our framework, and this is necessary in order to recognize the most significant challenge that faces humankind.

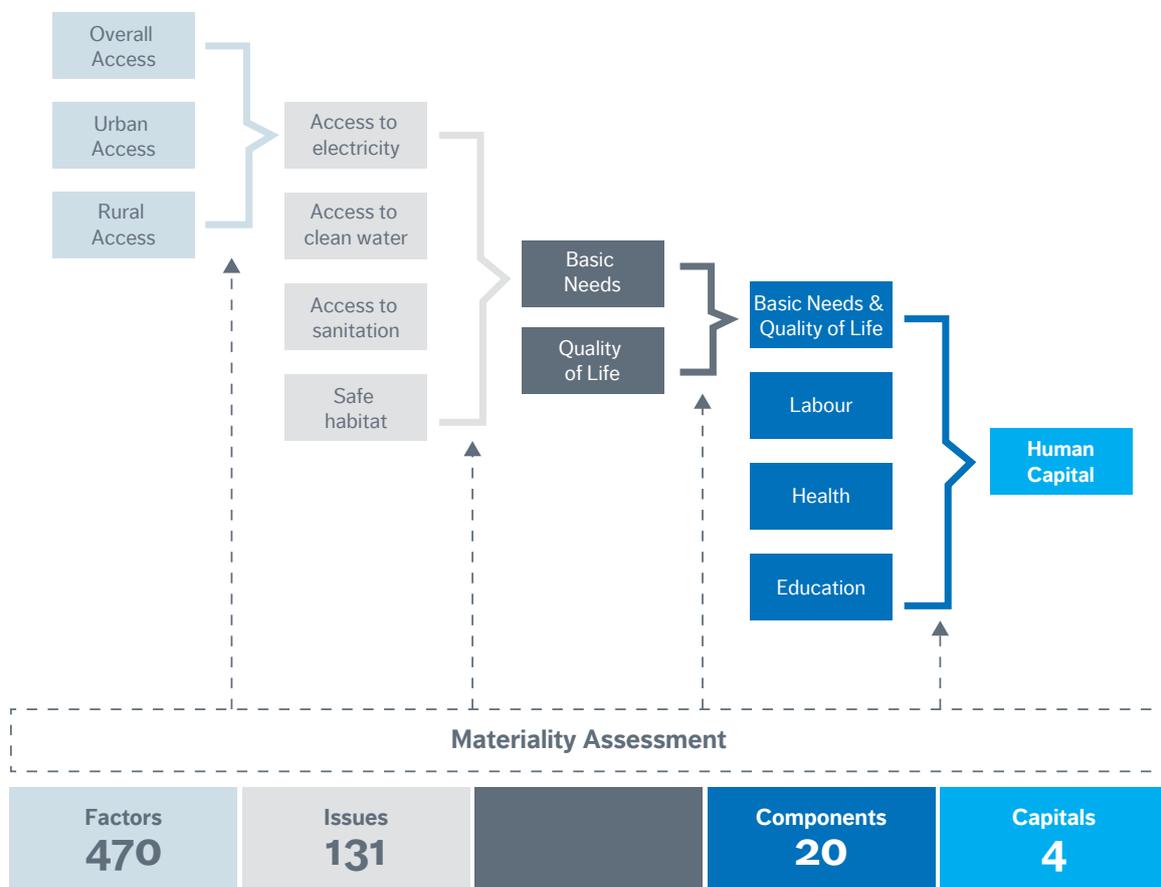
Taxonomy and Construction

We recognize that a country is much more complex than a company and therefore any approach requires a broad view on a variety of Factors that influence its development. These Factors are interconnected; examining any few of these Factors in isolation can produce a biased picture. Our database includes time series of more than 400 individual Factors, and evaluates the relevance of each Factor for each country at every level of development and point in time over the last ten years. The model identifies key performance indicators (KPIs) for each Issue under consideration (currently 131 Issues), and

constructs scores for each of the capitals, giving more weight to the areas that matter for each country (Figure 2).

Under this approach, our country evaluations put the most weight on those Factors which will influence the future development of the country and less weight on Factors which have little effect. Put another way, the proportion of electric cars in a country such as Norway can tell us quite a bit about Norway, but the same statistic tells us nothing about a country like Uganda, where securing food is of much greater concern.

Figure 2:
Construction of Pillar Model



Example above is for illustration purposes only. Actual taxonomy may vary in different model versions.

The data is sourced from a variety of private, public, and NGO sources. These capture a range of short-, medium-, and long-term Factors and are updated at varying frequencies, depending on the nature of the information. Similar Factors are grouped to measure the performance of a country on an Issue. For example, the Issue of 'Access to Electricity' can be measured by evaluating three interconnected Factors - access for the urban population, access for the rural population, and access for the overall population. We assess the materiality of individual Factors and select a KPI. The materiality of the KPI for an issue determines the importance the model assigns to an issue. We incorporate some discretion in order to emphasize more forward-looking measures. Similar materiality assessment

is performed at every level of the framework, to assign Factor, Issue, and Component weights, which are appropriate to the current and future level of development of each particular country.

Every country score includes the same Factors, Issues, and Components, but the materiality of each input is specific to each country, and to each point in time. This process is a significant departure from the broadly-accepted approach for construction of sustainability indices, where all countries are treated in the same way. We believe our model allows the users to concentrate on what is important for a country at each level of development and point in time.

Country Ranking and Exclusion

The resulting Capital Pillar scores are converted into scores for environmentally-efficient Human Capital, Social Capital, and Economic Capital. Countries are ranked by overall score; that is, by the arithmetic average of the three types of environmentally-efficient capitals, projected forward using existing trends for each environmentally-efficient capital for each country. By constructing the Capital Pillar scores using materiality for each country and each period, we eliminate the need for different eligibility thresholds for Developed (DM) versus Emerging (EM) economies. The bottom 25% of countries are excluded from our eligible investment universe.

Countries are also be subjected to our **normative filter**, with a **hard exclusion** for countries that do not pass our three-pronged Democracy and Freedom filter. We exclude:

- **Highly Oppressive Regimes**, Candriam's list of severe violators of human rights
- **Financial Action Task Force Call for Action List** of state sponsors of terrorism
- **Freedom in the World Index** list of states that are labelled 'Not Free' by Freedom House

Discretion is applied to countries that are violators of international agreements, when such violations are not yet reflected in the available data, given the annual frequency with which some data is reported.

Totalitarian regimes of any kind are by their nature unsustainable, because of the level of physical and psychological violence needed to enforce restrictions. Freedom of thought and expression is necessary for real progress. Without it, the Human, Social, and Economic Capital of countries tends to stagnate and eventually disintegrate. This process is slow and often imperceptible in the short term; it played out over eight decades (1922-1991) with the Soviet Union and the Warsaw Pact. The reverberations from that collapse

continue to echo in Europe to this day. In an increasingly polarized world, some seem to have forgotten the lessons of the past. For example, nationalistic populism is on the increase. While possible in the short term, populism has generally been unsustainable over time.

Our model is not suited for such long-term decision-making; therefore, we need to apply a normative filter from an independent source, so that we can minimize any biases that might exist in our own thinking. This is we exclude countries on the Oppressive Regimes list, as well as those that are considered Not Free by Freedom House.

Figure 3:
Evolution of Candriam ESG Country Analysis



Overall Results: Change Needed!

Our new methodology shows that sustainability measures declined over the most recent twelve month data period,¹⁸ both in developed markets and in emerging markets.

Natural Capital held steady globally, due to improvements in the Environmental Preservation component across both developed and emerging markets. These improvements were offset by declines in all other Natural Capital components – Environmental Regulation, GHG emissions and Carbon Footprint, Climate Change, and Responsible Use of Resources.

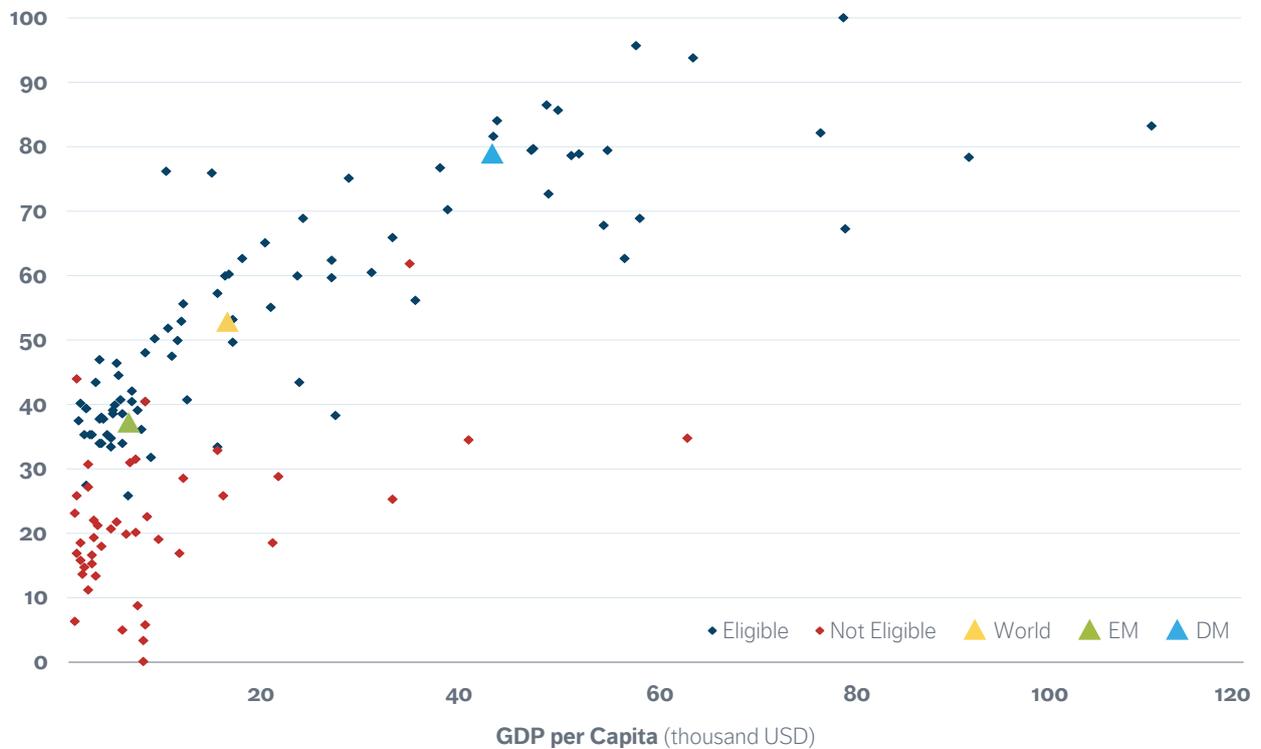
Human Capital decreased slightly overall, with modest increases in Basic Needs and Quality of Life, but decreases in Labor, Health, and Education/Knowledge/Innovation. **Social Capital** decreased

in both DM and EM, with a modest increase in DM Human Rights component scores offset by declines in all other components. The most marked decreases were in the Security component scores, but a decline in Rule of Law and Corruption, especially in developed economies, was also notable. This is associated with the rise of nationalistic populism in a number of countries, driven by economic and social inequality. **Economic Capital** scores increased overall, driven by Regulation and Tax, and a continued shift in Competitiveness from developed to emerging markets.

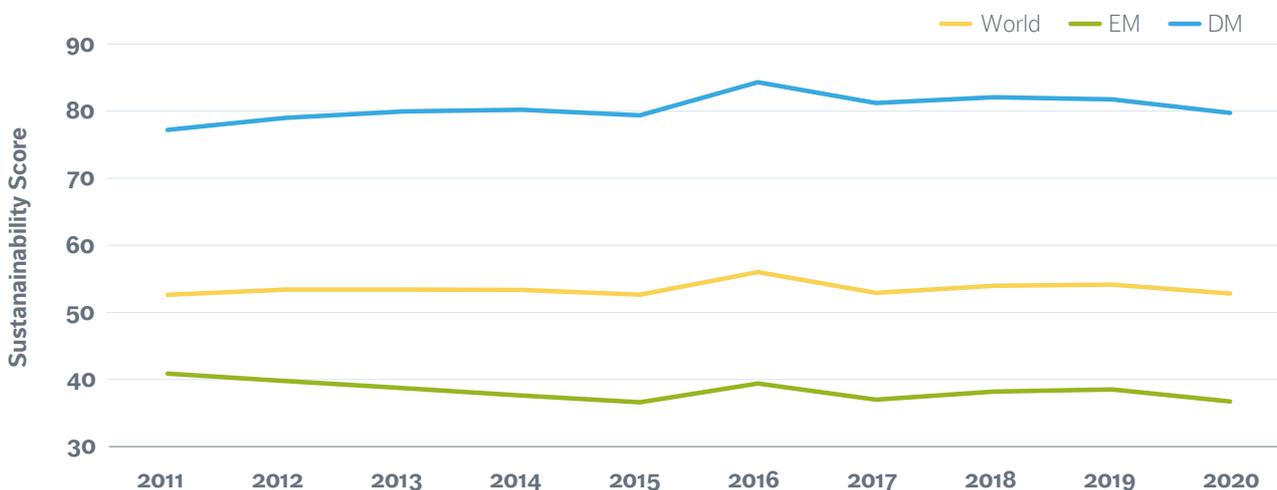
Figure 4 and 4a:

Sovereign Sustainability Scores

Sustainability Score



Sustainability Score History*



*Sustainability score history shows static scores, whereas ranking is done based on 5Y forward projections

Leaders and Laggards: The overall leader was Switzerland (Appendix), which also grabbed the top spots in the Natural Capital and Human Capital pillars. It was followed by Sweden, Denmark, and Finland. Amongst emerging economies, top spots were earned by Costa Rica, which was 17th overall, followed by Uruguay, Croatia, and Chile.

Laggards amongst Developed countries were Italy (38th place), Slovakia (40), and Greece (54). Overall laggards among those still included in the sustainable universe were Indonesia (87), Montenegro (89), Zambia (95), and Bosnia (97).

Ranking Changes under New Methodology:

The 2020 change in methodology did not affect the overall leader, Switzerland, due to its very high scores in all four types of capital, especially in Natural Capital. Sweden and Denmark swap places in the top three under the new methodology, due to Sweden's superior Natural Capital score, even though Denmark edges it out in Human Capital.

The most significant changes in developed market ranking due to the updated methodology were experienced by Australia. The country suffered from its low Natural Capital score, driven by its high carbon footprint. Australia has one of the worst trends in GHG emissions globally, as well as in use of natural resources, relying on mining and hydrocarbon exports to a much greater extent than its peer group.

Norway and the Netherlands also experienced reduced rankings under the new methodology, with each suffering an 8-spot decline in the overall list. In Norway's case, the main scoring drag was hydrocarbon exports. It is natural to be distracted by headline-grabbing news, such as US plans to drill in Alaska's Arctic refuge,¹⁹ but Norway's plans reach much further north. Norway's actions are out of sync with the sustainability image it tries to project.²⁰ Fossil fuel exploration and exports are not only hurting Norway's image, but also hurting its achievements as a country that tries to promote sustainability. Because our framework sharply increases the importance of Natural Capital, Norway is severely penalized, falling from 7th place overall under our previous methodology to 15th overall now.

The Netherlands suffers from its still-high proportion of fossil fuels-based energy generation in comparison to its peer group, as well as from its high exposure to climate change and sea level rise. Slower energy transition has had many unintended consequences. For example, gas extraction efforts have been identified as the source of a series of small earthquakes in the northern part of the country, which could have much more serious repercussions for the local ecosystems going forward.²¹

Within developed markets, Ireland and Lithuania enjoy higher rankings with the increased emphasis on the Natural Capital pillar. Within emerging markets, Costa Rica and Uruguay benefitted in particular, rising to 17th (from 41st) and 18th (from 35th) overall. The pledge by Costa Rica to become carbon-neutral and single-use plastic free by 2021 is well-documented. The superior score in Natural Capital relative to the country's other capital scores, especially for Uruguay (cf page 26), implies that even though the creation of Human, Social, and Economic capital might not be remarkable within their peer groups, this well-being is being created much more *efficiently* with respect to the finite Natural Capital consumed to produce these other forms of capital.



Natural Capital

The Natural Capital pillar is the central focus of our framework. It is also the key differentiation in our new model. Our model evolution efforts concentrate on constant improvement in data sources and expansion of the scope of the Natural Capital measurements.

The Natural Capital pillar consists of five components:

- **Environmental Regulation** evaluates the policies put in place to protect the environment.
- **Greenhouse Gas (GHG) Emissions and Carbon Footprint** accounts for emission trends, domestic emissions from the public and private sectors, as well as from various types of fossil fuels, particularly oil and coal.
- **Climate Change** metrics monitor both exposure to climate change, as well as preparedness of countries against natural disasters.
- **Environmental Preservation** metrics evaluate biodiversity preservation, air and water pollution, as well as recycling and waste management.
- **Responsible Use of Resources** measures account for general reliance on resource extraction, as well as for minerals, hydrocarbons, and forestry reliance.

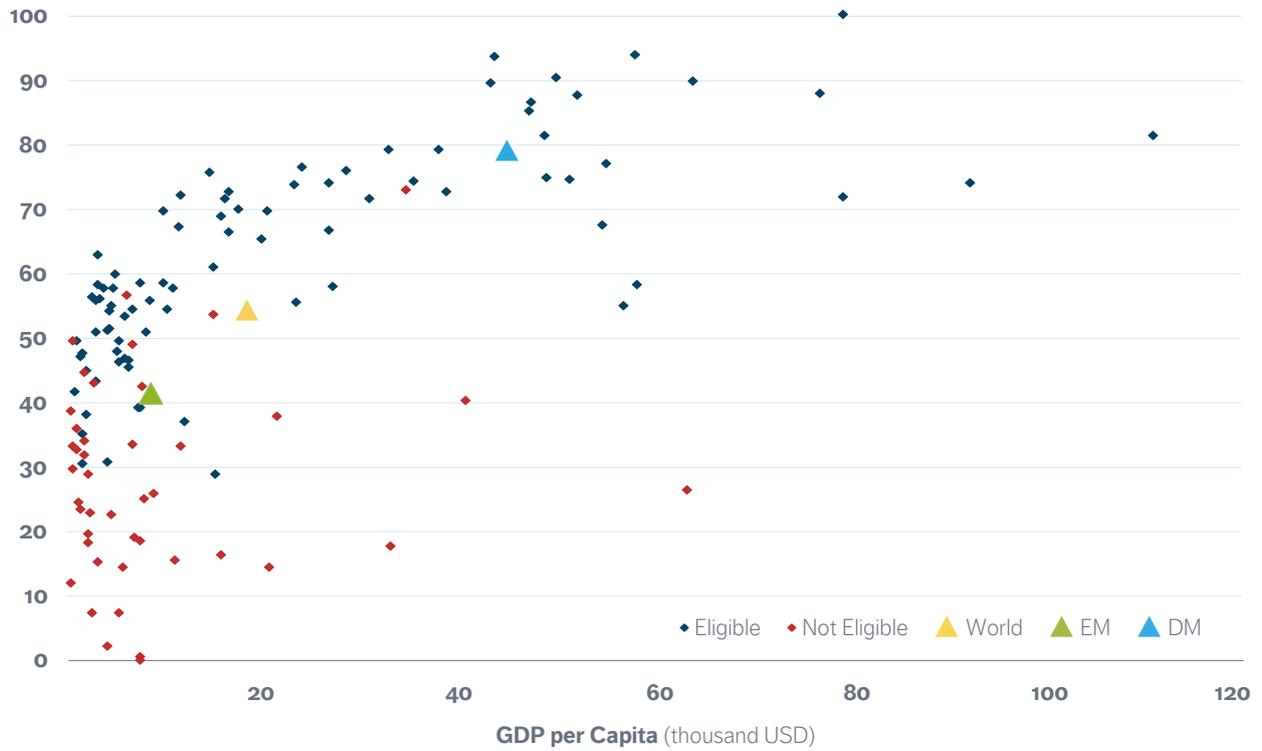
Environmental data is the most difficult to collect, especially historical data. The recent politicization of national regulators, especially in environmentally important countries such as the United States, China, and Brazil, makes the task even more difficult. We do benefit from enhanced data-gathering techniques, such as satellite imagery (see Focus).

Overall Results: Natural capital held steady in the past year on a global level. Developed markets managed a small pickup, while emerging economies continued to deteriorate. Whereas more steps were made towards preserving the environment, especially in developed countries, this was the only noteworthy improvement. Declines were suffered across the universe in all other components of this pillar. On a five-year horizon, the only hopeful element is the efforts to slow carbon footprint growth in developed markets, such as the gradual phasing out of coal-fired power plants and the proliferation of electric vehicles.

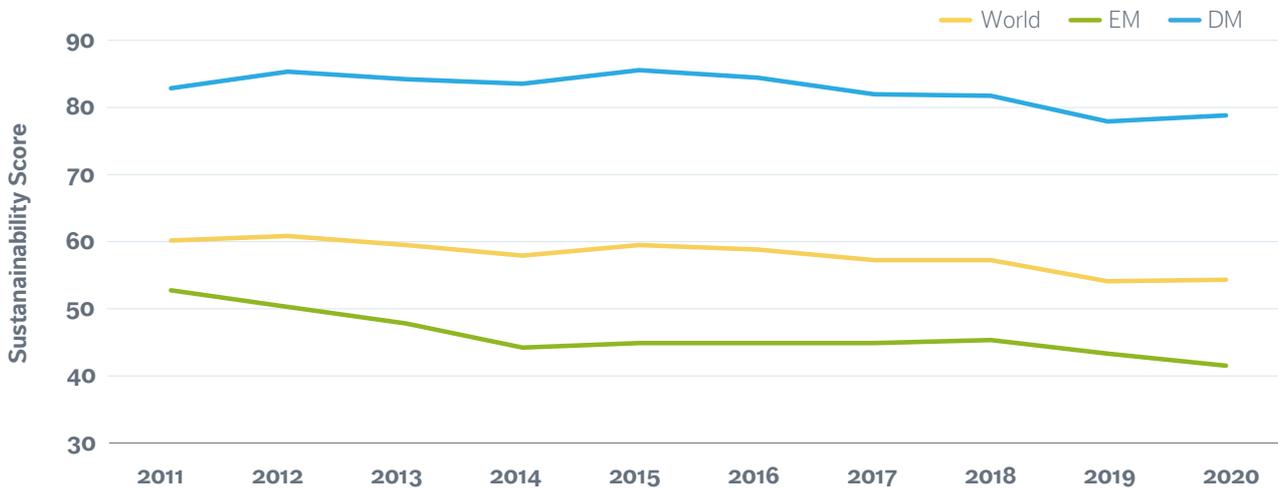
Figure 5 and 5a:

Natural Capital Scores

Sustainability Score



Sustainability Score History*



*Sustainability score history shows static scores, whereas ranking is done based on 5Y forward projections

Leaders and Laggards: The overall leader in Natural Capital was Switzerland, followed by Sweden, France, Austria, and Denmark. Natural Capital leaders in EM included Uruguay, Panama, and Costa Rica. The Natural Capital score was a major factor in the improvements in overall ranking for Uruguay and Costa Rica under the new methodology. Laggards in developed markets were South Korea, Estonia, Greece, and Australia; the latter fell sharply in overall ranking due to the increased importance of Natural Capital in our model. The overall laggards were all in the emerging world – Malaysia, Ghana, Indonesia, and Zambia.

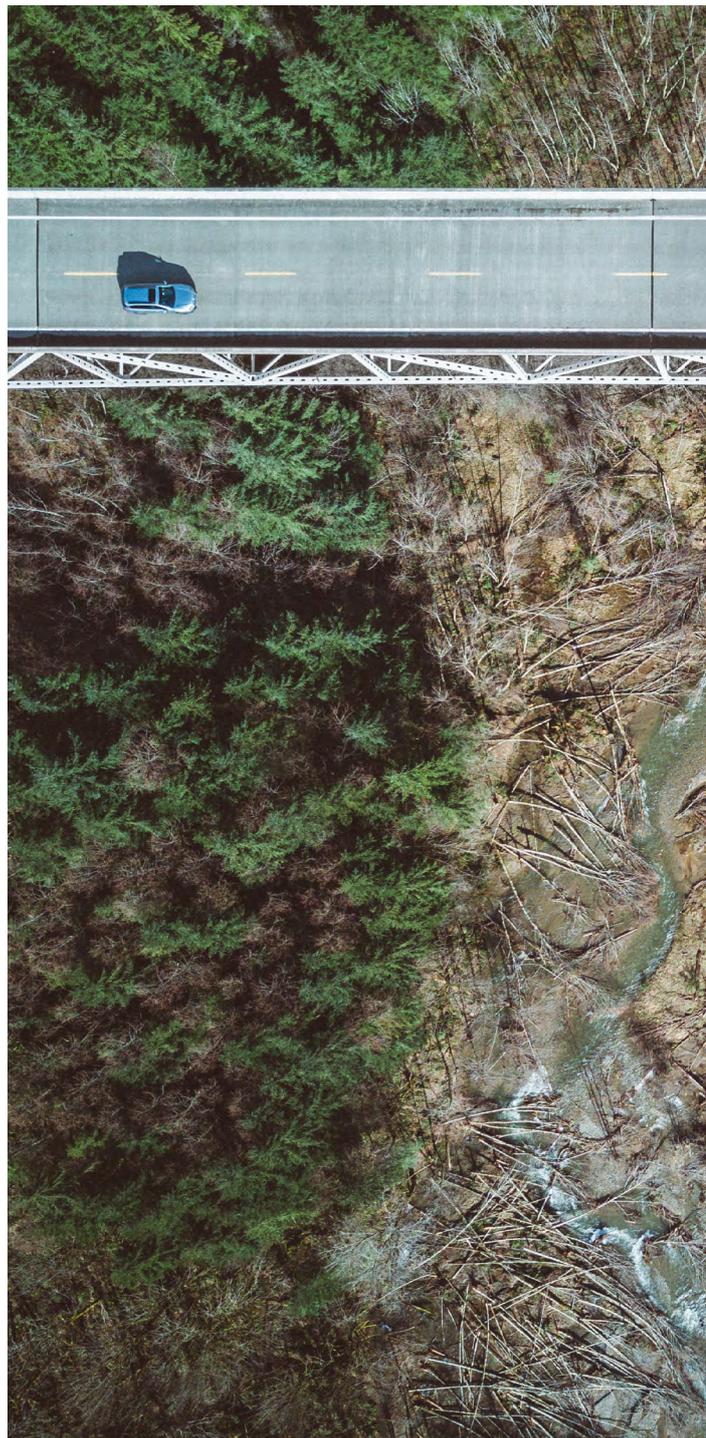
The Natural Capital leader Switzerland is also a leader in the Climate Change components, which track potential effects and preparedness, and among the leaders in every other Natural Capital component. Sweden earned top scores in Environmental Regulation and GHG emissions. Sweden underperformed Switzerland in overall Natural Capital due to the relatively higher reliance on agriculture and forestry in its trade mix, something observable in Denmark as well. Over-exploitation of forestry resources are connected to deforestation and land purpose change, which results in ecosystem degradation (see Focus). Environmental regulation and preservation have been drags on the progress of the overall leaders in France, Austria, and Denmark, although these countries are nevertheless among the leaders in the Natural Capital scoring.

Uruguay was the overall Natural Capital leader in EM, scoring better than 87% of the countries we analyze globally. The relative weakness is reliance on agriculture and forestry. Costa Rica is on an upward trend. Their progress towards their well-publicized pledge to become carbon-neutral and single-use plastic free by 2021 is visible in the data. Panama and Croatia have a relative weakness in Climate Change exposure and preparedness, but elsewhere the countries perform well in Natural Capital factors.

The laggards in developed markets were South Korea, Estonia, Singapore, Greece, and Australia. All have difficulty managing greenhouse gas emissions. Estonia, Greece, and Australia also have some difficulty in responsible use of resources. Singapore was relatively weaker in Environmental preservation as well, while Estonia excelled in this component.

Among the EM nations included in the sustainable universe, the laggards in Natural Capital were Malaysia, Ghana, Indonesia, Zambia, and Trinidad. Trinidad shows an overall weakness in

GHG emissions, but performs relatively well in environmental preservation. This is where the other laggards are very weak, especially Ghana and Indonesia. Environmental preservation includes biodiversity, atmospheric and water pollution, as well as deforestation, as illustrated by the experience of Borneo (see Focus).



Focus: Deforestation

Deforestation, land use change, and habitat destruction are a major cause of the proliferation of wild animal diseases being transmitted to humans.²² One need look no further than the box of surgical masks on the desk. Less obvious, but still vital, the loss of tree cover contributes to soil erosion and increases floods and mudslides, resulting in loss of life and property.



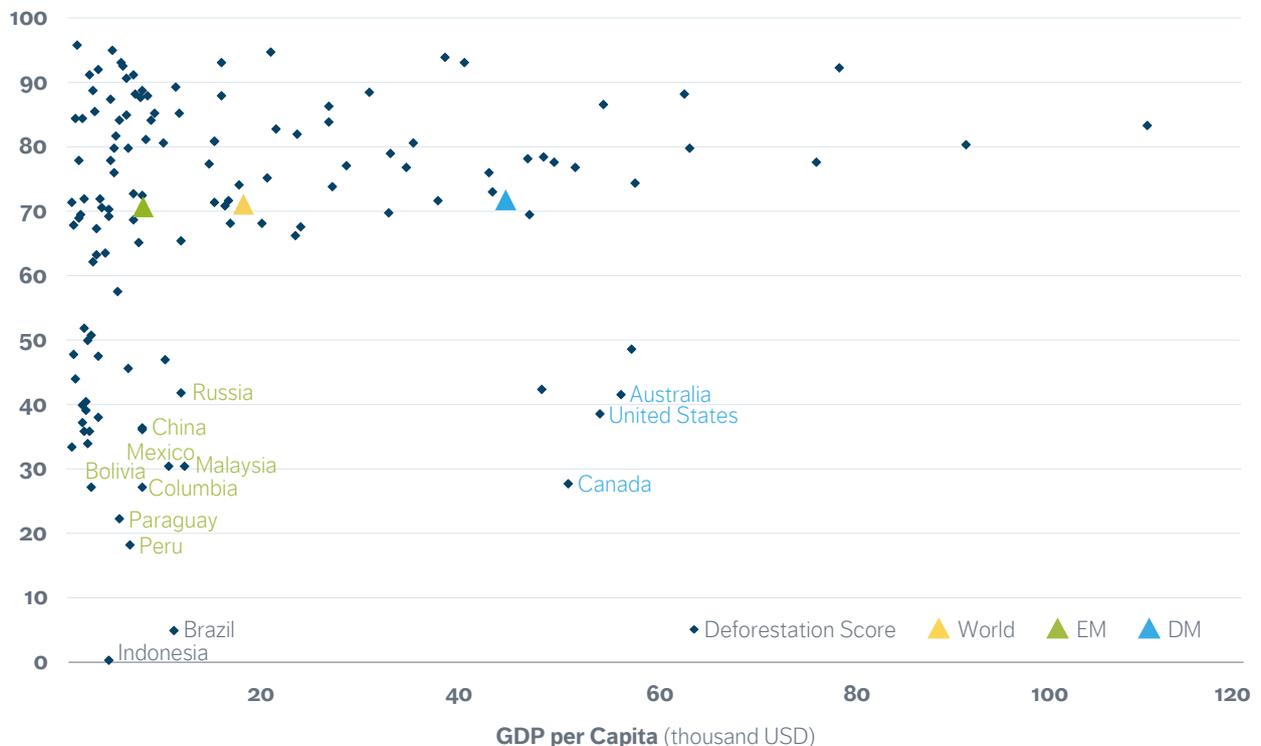
Most importantly, photosynthetic carbon capture by trees is one of the most efficient means of reducing the amount of carbon dioxide in the atmosphere. Studies estimate that the land available to plant trees could capture up to 25% of the CO₂ currently in the atmosphere.²³ Although not without limitations, this is by far the cheapest way to slow climate change currently available. New technologies need further development, followed by widespread adoption, potentially at great cost. While we must continue the transition to renewable energy sources, replanting trees on already available land is a cost-effective and efficient way to capture atmospheric carbon on a large scale.

Initiatives are already in place in Ethiopia,²⁴ India,²⁵ Ireland,²⁶ and the EU as a whole,²⁷ among others. A planned and concerted medium-term effort is needed. One-off projects may capture headlines, but the example of Turkey²⁸ shows that poor planning and execution can sharply reduce the effect.

Yet deforestation continues, especially in tropical regions, where emerging economies are clearing land for agriculture and for short-term timber profit, exacerbated by costly forest fires. Often led by regimes with little regard for science or the global community, these countries make clear that a concentrated international effort will be required to counter the phenomenon. The extent of the problem is poorly reported, with officials attempting to hide the extent of the problem.²⁹ Due to potential lack of reliable nationally-reported data, we rely on a variety of independent sources, for example satellite imagery of the change in forest cover.

Figure 6:

Deforestation



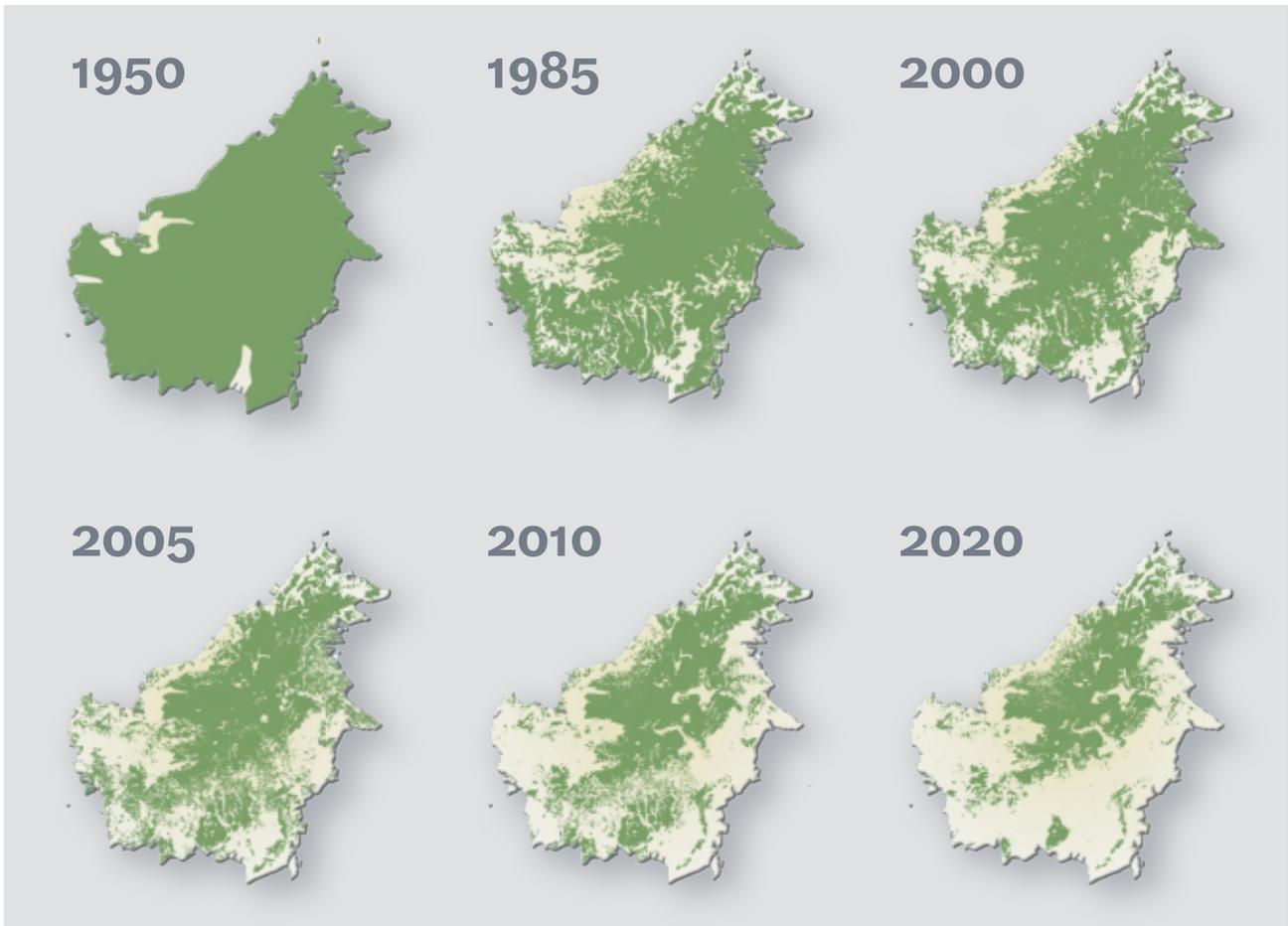
Deforestation (Figure 6) is not limited to emerging countries. Australia, the United States, and especially Canada score poorly. This data contradicts the theory that once a country achieves a certain level of development, deforestation can be reversed and the country will become more ecologically self-sustainable from this perspective.

Canada provides an illustration of these two phenomena – that the developed nations are also failing to control deforestation, and that reported deforestation data is often 'misleading'. The Wildlands League of Canada's Parks and Wilderness Society reports that approximately 40,000 football fields are cleared annually to construct roads and landings in the province of Ontario alone, or *seven times* what is officially reported for the whole of Canada. Only 17% of Canadian logging takes place in this province.³⁰ This would suggest a staggering 650,000ha

of deforestation in total over the past 30 years. It is extremely worrying that countries with large territory are failing to act. In addition to the three large developed countries mentioned, the large countries of Mexico, Russia and China also score very poorly on deforestation. Deforestation is geographically widespread -- North and Latin America on one side, Asia on the other, as well as Australia. Indonesia and Brazil are especially worrying. It is important to note that while Brazil is by far the country where the most forests are being lost, Indonesia scores lower, as an even greater *proportion* of the forested part of the country is disappearing. Without intense international pressure it is unlikely that these two examples would be reversed. The problem is well-known to the global community, and is aptly illustrated by the situation on the island of Borneo, which is shared between Indonesia (73% of territory), Malaysia (26%), and Brunei (1%).

Figure 7:

Deforestation of Borneo – tree cover over time



Source: Researchgate^{31,32}

Local measures must extend beyond environmental regulation. Rule of law seems to be another key element, as a significant portion of logging is done illegally.³³ International pressure has shown early signs of progress, particularly in Brazil,³⁴ where the government has established a military response to illegal deforestation, along with measures to combat forest fires. Much more is needed. Trade relationships must begin to embed meaningful environmental protections, along with control and enforcement.

The topic of deforestation is extremely important to Candriam. In October, 2020 Candriam signed the Investors Policy Dialogue on Deforestation.

Human Capital

The interaction between Natural and Human Capital, as well as our philosophy of analyzing countries according to the environmentally efficient creation of Human, Social, and Economic Capital, are well-illustrated by the coronavirus pandemic.

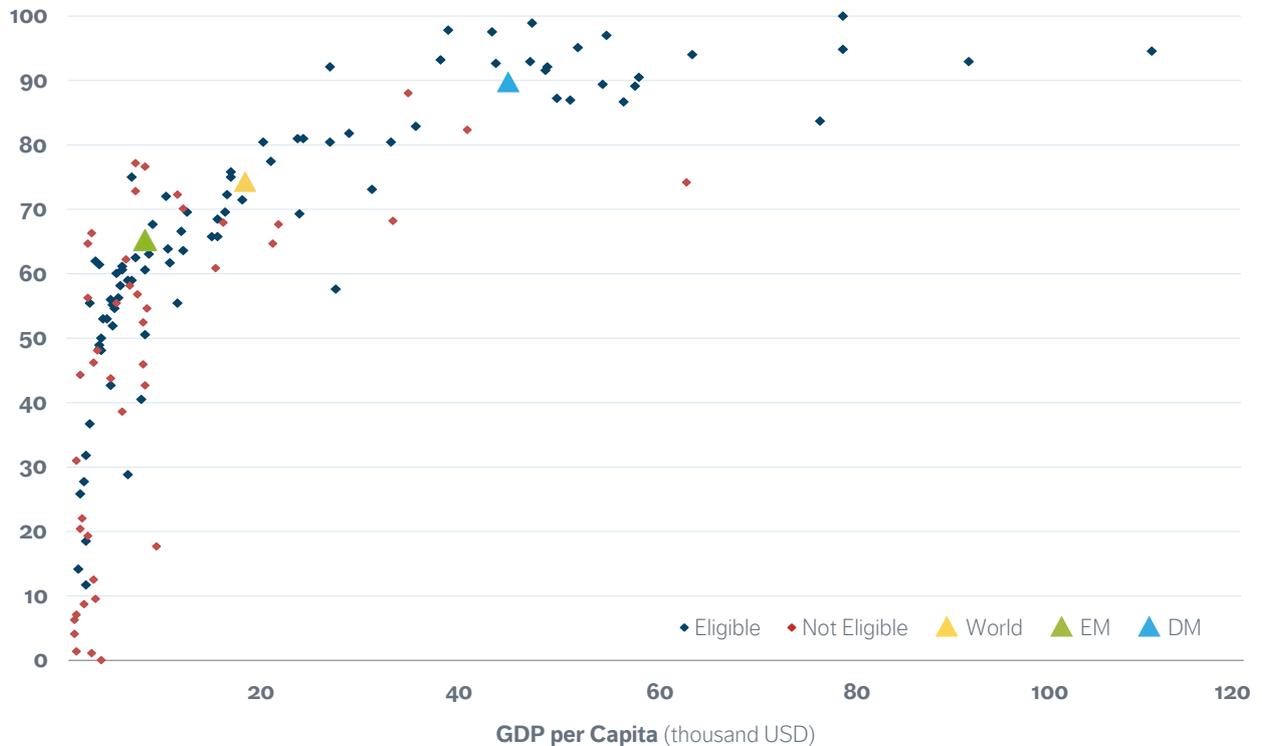
The Human Capital pillar consists of four components:

- **Basic Needs and Quality of Life** include access to electricity, sanitation, clean water, safe habitat, as well as life expectancy and survival rates.
- **Labor** factors monitor participation rates, employment, labor composition and sectoral profiles, as well as working conditions and various forms of labor discrimination and exploitation.
- **Health** metrics evaluate the capacity and readiness and readiness of the healthcare systems, reproductive and childhood health data, as well as immunization and preventive care.
- **Education, Knowledge and Innovation** measures include participation in and quality of educational institutions at every level.

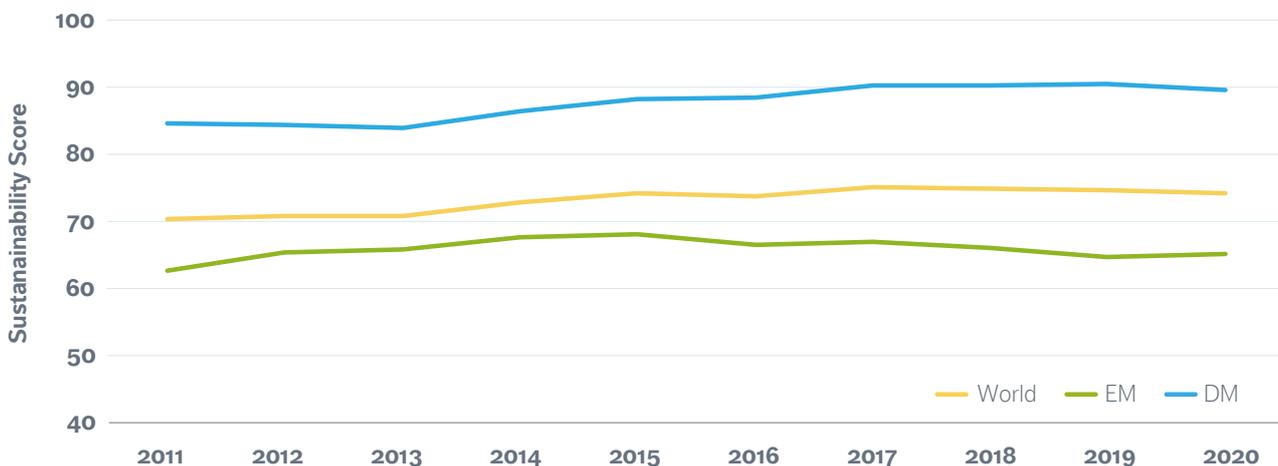
Overall Results: Human Capital marked a slight decrease on a global level over the most recent year, driven by a modest Developed Market deterioration in Health and Education, while Emerging Market nations showed a modest overall improvement. The global decline in Health and Education scores was partially offset by an overall increase in Basic Needs and Quality of Life scores, which improved globally.

Figure 8 and 8a:
Human Capital Scores

Sustainability Score



Sustainability Score History*



*Sustainability score history shows static scores, whereas ranking is done based on 5Y forward projections

Leaders and Laggards: Overall leaders in Human Capital were Switzerland, Germany, Hong Kong, the UK, and the Netherlands. Within EM, top Human Capital scores were achieved by Poland, Thailand, Hungary, Costa Rica and Croatia.

The overall leader, Switzerland, showed a relative weakness in the Health component, with immunization levels lagging those of other developed economies. Hong Kong also had a relative underperformance in the Health component, with a lower efficiency in treatment of infectious diseases. The other countries performed roughly as expected across all components of the capital.

Among the EM leaders, Poland performed relatively well on all components, despite a negative trend in Health, where secondary risk factors in the population, such as smoking and obesity, are relative weaknesses. Hungary displayed a worrying trend of declining life expectancy, which stands out as Hungary performed relatively well in other components. Croatia is the strongest performer on Health amongst the EM leaders, driven by success in treating infectious diseases, but somewhat hobbled by high rates of smoking.

DM laggards were Latvia, Lithuania and Greece, while overall laggards were Senegal, Kenya, Zambia, Tanzania and Ivory Coast. In Developed Markets, Latvia and Lithuania show relative weakness in Basic needs and Quality of life, with life expectancy below expectations, while Greece is held back by stubbornly high unemployment, and especially youth unemployment, a worrying trend for the future. Youth unemployment in Greece was at very worrying levels even before the Covid-19 pandemic. Local Greek press reported that as of Q1 2019 a staggering 39.6% of under-25s were unemployed in Greece, versus just 5.5% in Germany.³⁵ The events of 2020 are likely to further exacerbate this disparity.



We notice common patterns of improvement among overall laggards, such as a sustained increase in the scoring for Basic Needs and Quality of Life. This is especially important for Zambia, where there is significant room for improvement. Conversely, we are commonly seeing deterioration in Labor conditions, especially in Tanzania, as well as in Education, Knowledge and Innovation, where the Ivory Coast is very weak and deteriorating.



Focus: Health

Analyzing the Health component of the Human Capital score is a timely demonstration of both the interaction between Natural and Human Capitals, and of our emphasis on ranking countries according to environmentally efficient creation of Human, Social, and Economic Capitals.

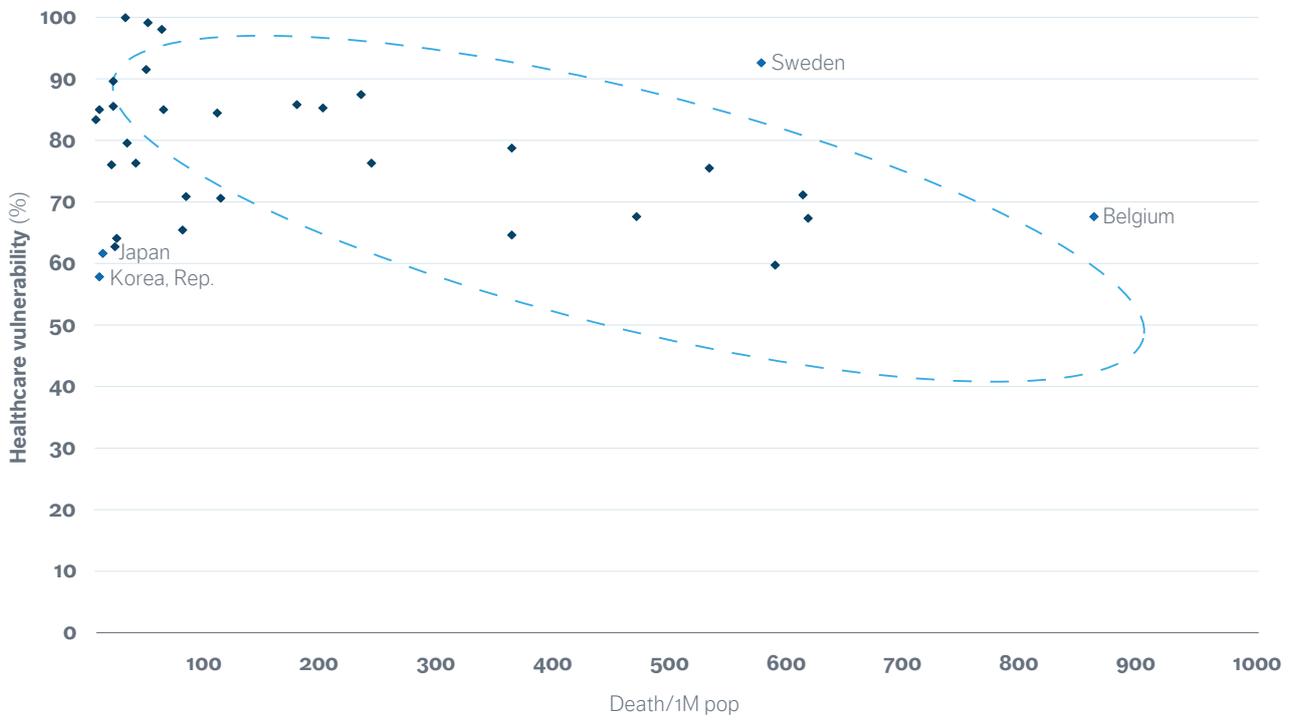
The coronavirus pandemic is unprecedented in the last 100 years. In a major study published in August 2020, the authors look at the effects of human activity on the proliferation of pathogens³⁶ by studying close to 7,000 ecosystems globally and analyzing the populations of 376 host species. The authors conclude that changes in land use causes proliferation of wild species that are known carriers of human-shared pathogens, making animal-human transmission much more likely.

The pandemic offers a glimpse of our framework's capability. Data on Covid-19 is limited by the available testing, and the extent of (under)testing

varies dramatically by country. Attribution of fatalities to Covid-19 infection being questionable in some emerging economies, we find that Covid-19 related fatalities in developed markets is the most reliable dataset to consider. We map fatalities per capita versus scoring on the Healthcare Vulnerability Issue within the Health component. This is where pandemic preparedness, transmission likelihood, as well as health-related effects of climate change, are incorporated into our framework.

Figure 9:

Healthcare Vulnerability



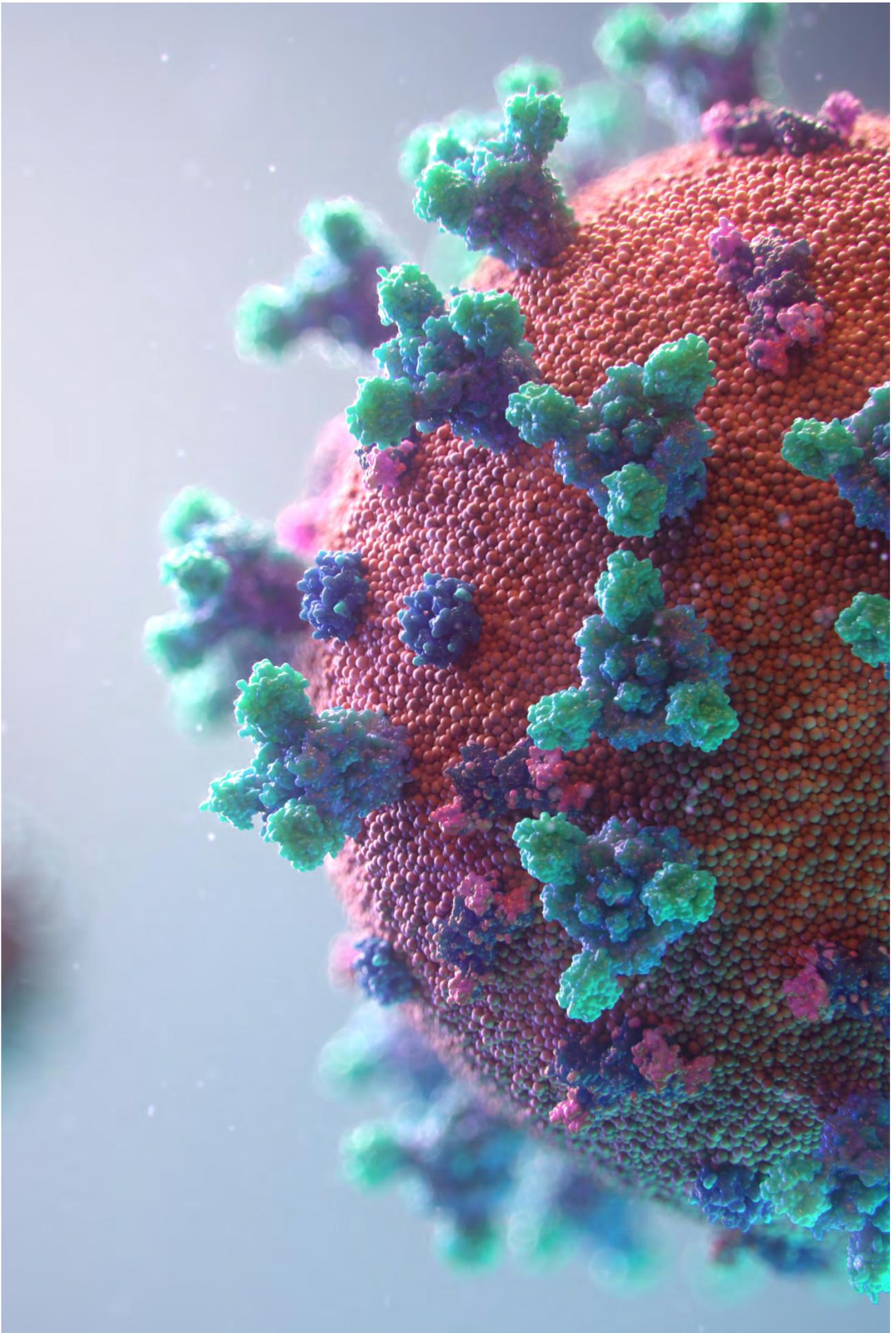
COVID-19 data is as of summer 2020, before the second wave.

The data on the Covid-19 fatalities aligns well with the 'susceptibility' predicted by the model. One set of outliers with lower scores and fatalities are countries such as South Korea and Japan, which have high population densities and ageing populations, but benefit from a culture of mask-wearing and adherence to rules, as well as from cutting-edge technology for aggressive track-and-trace efforts. The noteworthy negative outlier is Sweden, which chose not to implement mandatory lockdowns.

The case of Belgium shows the difficulty in comparing and assessing data even in developed markets. While it is true that Belgium has one of the highest rates of care home occupancy in Europe, the authorities took a conservative approach in assessing fatality rates at care

homes. Where testing was limited, the figures include not only confirmed Covid-19 fatalities, but also suspected ones at the discretion of the primary care physician.³⁷ By contrast, reporting in some countries has bent to political pressure to minimize negative public opinion about governmental response. The United States has been a prime example.³⁸

The effects of the deteriorating Health Component on the other components of Human Capital will continue after the pandemic has subsided. Labor and Education effects are front-page news around the globe, which further supports our conviction that Human Capital can only be properly assessed interactively with Natural Capital.



Social Capital

Social cohesion and strong institutions are essential not only for a nation to address crises, but also for the normal functioning of the social contract. That is, every citizen must have the opportunity for personal and civic development. To sustainably build social capital, rights and responsibilities must be finely balanced, and citizens must be supported by a functioning social safety net.

The Social Capital pillar consists of five components:

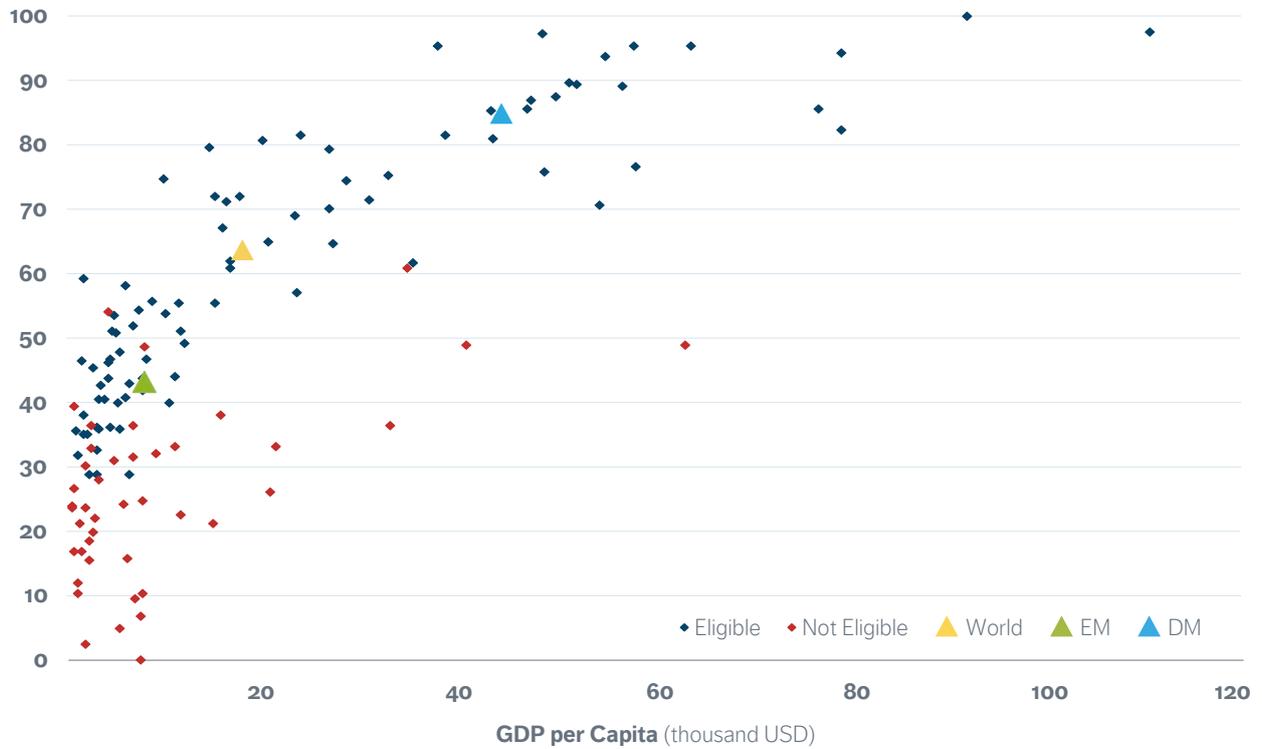
- **Human Rights and Civil Liberties** elements seek to account for basic human rights such as freedom of thought and expression, free association rights, rights of personal autonomy and privacy, as well as minority rights.
- **Rule of Law and Corruption** metrics assess the extent to which the system of government is based on primacy of the rule of law, and the prevalence of corrupt practices.
- **Democratic Governance** scores monitor democratic accountability, political stability and cohesion, effectiveness of the governance process, and the ability of the judicial system to function independently.
- **Fairness and Inequality** factors measure income, gender, and age inequality.
- **Security** metrics encompass both internal security issues, such as civil and political unrest, criminality, and terrorism; as well as external threats and military spending.

Overall Results: Social capital declined across the board over the most recent year in the investable universe. The only stabilization observed was for Human Rights in developed markets. This may be due to the increased visibility of minority issues and increased recognition of minority rights in developed countries, such as the recent recognition of same-sex marriage in Northern Ireland.³⁹ The most pronounced theme was a decline in the Security component, visible in both in developed and emerging economies.

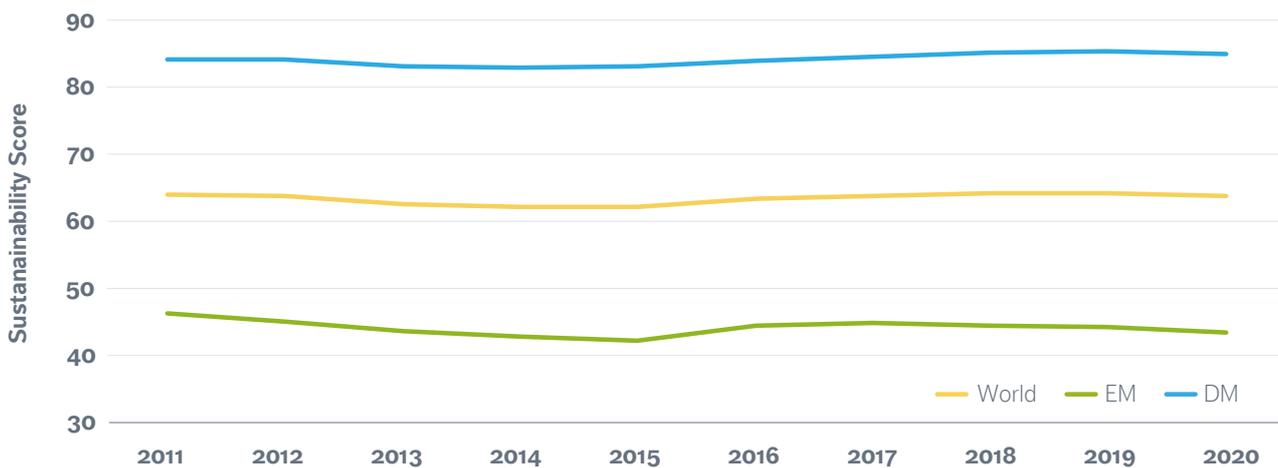
Figure 10 and 10a:

Social Capital Scores

Sustainability Score



Sustainability Score History*



*Sustainability score history shows static scores, whereas ranking is done based on 5Y forward projections

Leaders and Laggards: There were no surprises in the overall leaders, with Norway, Luxembourg, Finland, Sweden and Denmark registering the best overall scores. Among the developed markets, the laggards were South Korea, Slovakia, Italy, and Greece. In EM, the best scores were awarded to Uruguay, Costa Rica, Chile, and Croatia, while the Philippines, Kenya, Ukraine, Honduras, and Thailand being the laggards from the Emerging Markets within the investable universe. The EMs that are either EU members or preparing to become members benefit the most from having an association with the European institutions, even though the monitoring mechanisms have not been as effective as was hoped, especially for Bulgaria

and Romania. Still, these countries score much better than they would have without such an association. Understandably, there is a pushback against the plan to tie EU cohesion funds disbursement to the rule of law, primarily from countries that have problems with the rule of law. We consider this condition to be both necessary and long overdue.

Amongst the overall leaders, Norway was in the top three in each of the five component scores of Social Capital, while Fairness and Inequality represented relative weaknesses for the other leaders. Finland was the best performer in both Democratic Governance, as well as in Rule of Law and Corruption, which was not unexpected.

Among the DM laggards, the deteriorating trends in security were not uncommon in the investable universe. The score for South Korea suffers from a well-documented weakness in this component, largely explained by its geographical location. Slovakia, Italy, and Greece had a relatively weak scores in Democratic Governance, even though for Italy and Greece there has been a modest pickup over the last few years. Among this group of DM laggards, Slovakia was the best performer in Fairness and Inequality, suggesting that well-being improvements are more fairly distributed.

Amongst the top-scoring emerging markets, the relative weakness was again Fairness and Inequality. It is noteworthy that among the EM leaders, Costa Rica scores second only to Croatia on this Component. Furthermore, its scores are showing improvement in Fairness and Inequality, while for the rest of the high-scoring EM nations the trend is towards worsening inequality. It is also notable that Human Rights and Civil Liberties is a strong component for all EM countries near the top of the Social Capital ranking, and the trend is also improving.

Amongst both the overall and EM laggards, Security is a problematic and worsening component. This indicates a global potential for internal destabilization, as well as rising tensions

between countries. A bright spot for many DM and EM countries, and even for this laggard group, is that Human Rights and Civil Liberties scores are on a rising trend, with the exception of Honduras and Thailand. Fairness and Inequality scores are also improving, albeit from a much lower base, with the exception of Thailand, where it is getting marginally worse over time.



Focus: Rule of Law

The rule of law is essential for social development. During the current pandemic, many opinion pieces and analyses have argued that a number of leaders across the globe have used the pandemic to grab power. A prime example is Hungary, which passed a law in March 2020 suspending some existing laws and allowing the government to effectively rule by decree.⁴⁰

While it is too early to determine the effect of the pandemic on rule of law globally, our framework can help evaluate the existing conditions. In places already experiencing a deteriorating rule of law, it would be easier to use the pandemic to

further weaken it. While the situation in Hungary is localized, other nations with greater influence on the global community merit close monitoring. One such example is the United States.

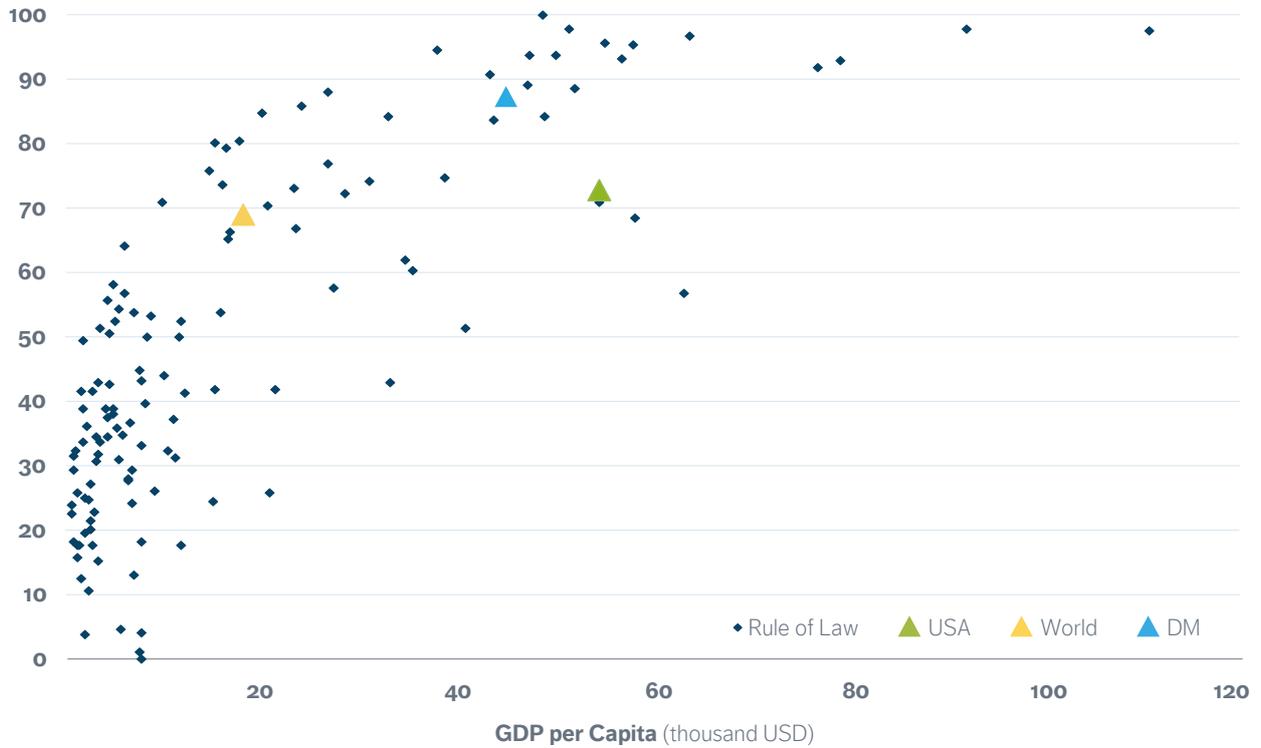
Note: This analysis was finalized on 4 September 2020. Since then we have seen the FBI foil a plot to kidnap Michigan Governor Gretchen Whitmer⁴¹, a refusal by now-former President Donald Trump to concede his defeat in the November 2020 elections to President Joe Biden, government agencies blocking information during the presidential transition process⁴², unprecedented interference by the Justice Department, and a direct attempt by Trump during the late stages of his presidency to interfere in the results of the election in Georgia⁴³, in which votes had already been counted three times. Following a January 6 speech in which Trump said, "All of us here today do not want to see our election victory stolen ... so we are going to walk down Pennsylvania Avenue..... to the Capitol... and take back our country."⁴⁴ The world witnessed a violent insurrection that breached the US Capitol. Congress upheld the election results, although more than 130 Republican members of the House of Representatives actually voted to challenge them⁴⁵. On 13 January 2021, Trump was impeached for charges including insurrection, his second impeachment. The 20 January inauguration of President Biden was conducted under extraordinary security.



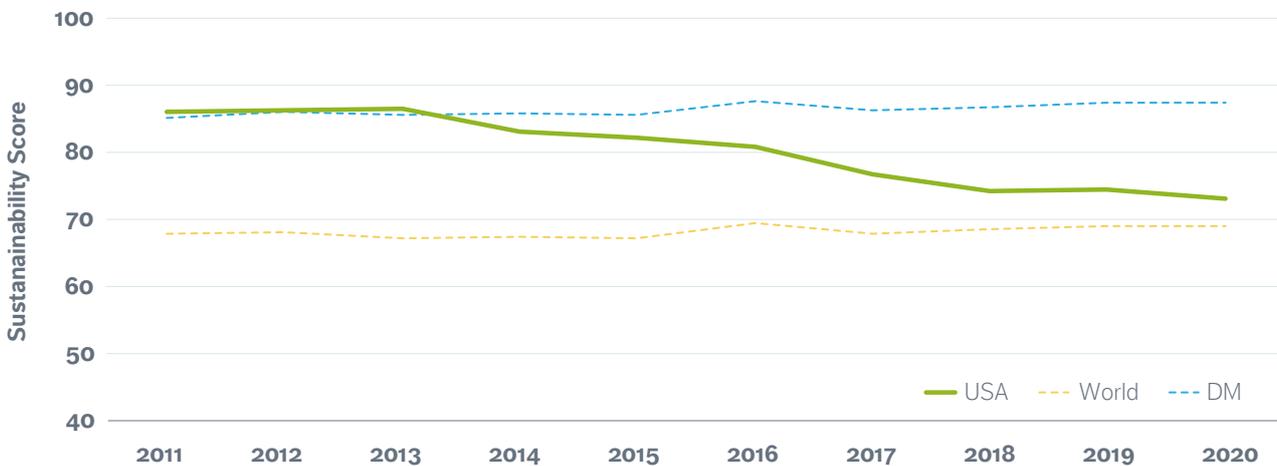
Figure 11 and 11a:

Rule of Law

Sustainability Score



Sustainability Score History*



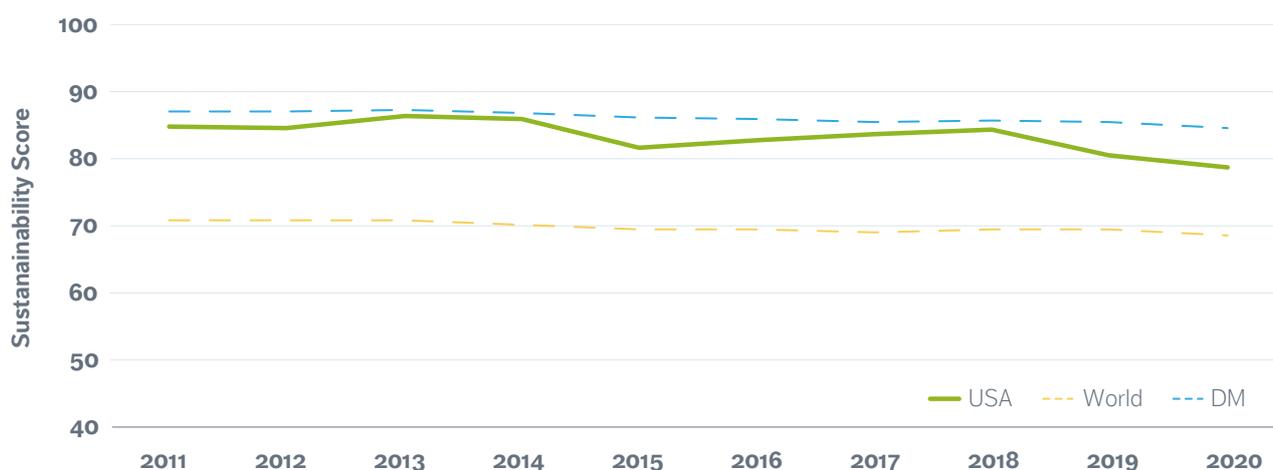
*Sustainability score history shows static scores, whereas ranking is done based on 5Y forward projections

Rule of law has been deteriorating in the United States for the last several years, with the downward trend accelerating from 2017 onward. One of the most prominent of several reasons has to be the erosion of the political independence of the US Department of Justice.⁴⁶ High turnover at the helm of the Department, as well as at institutions such as the FBI, has been accompanied by accusations of political motivations, and the appointment of a Special Counsel immediately

after the controversial dismissal of the Director of the FBI. Subsequently the President has granted a number of pardons to those in his immediate social and political circle – something that we would expect from much less developed countries. In a healthy democracy, checks and balances ensure that rule of law cannot stray from established practice for too long. It is illustrative to examine the historical trend of another component of Social Capital – Democracy and Political Stability:

Figure 12:

Democracy and Political Stability



Historically, the US had been scoring around the average for developed markets on Democracy and Political stability, but after 2018 it appears that the usual checks and balances have not been as effective. Congressional oversight powers have been sharply diminished by the current administration, through its successful orders to officials to defy subpoenas, in stark contrast to established precedent. In 2020 an Appeals Court ruled that it cannot enforce Congressional subpoenas, jeopardizing the system of checks and balances.⁴⁷ Another example of this erosion is the number of Inspectors General have been dismissed during ongoing investigations into the propriety of the actions of Administration officials.⁴⁸

The combination placed the United States in a previously unknown position at the start of the global pandemic – with democratic institutions in decline, and the rule of law approaching the *global* average, instead of the *developed markets* average.

The latest developments, beyond the scope of available model data, include service reductions at the US Postal Service, potentially jeopardizing the right to vote of vulnerable people and minorities.⁴⁹ These do not bode well for the US, and by extension for emerging economies, where the US has been historically very active in promoting the rule of law, democracy, and the fight against corruption.

Violations of laws such as the Hatch Act by the current administration⁵⁰ are something that the global

community expects from less developed nations, but is now beginning to expect from the US. In the run-up to the 2020 Presidential elections, with the domestic situation and social cohesion deteriorating, our model suggests the probability of violence is not insignificant.

The future of the United States is critical to the global community in a variety of ways. **Most importantly, the natural environment is both a common good and the one finite capital pillar among the four. It is not sustainable to have a 'free rider' of such size as the United States.**

If we are to halt and ultimately reverse climate change, this cannot be done without the US as an active participant. Withdrawing from international organizations such as the WHO, repudiating international agreements such as the 2016 Paris Climate Change Agreement, and the Iran nuclear deal, threatening the existence of NATO, are examples of the threat to the international community.

As priorities for US foreign policy shift away from democracy promotion and the support for the rule of law, we expect rule of law and democracy to decline in emerging countries as well. The current global pandemic certainly does not help in this respect. If this trend continues into the next year, there is a very serious cause for concern for international cohesion, the global rule of law, and environmental preservation globally, due to the outsized influence of the US.

Economic Capital

The definition of “developed” versus “developing/emerging” economies is a 20th century concept. Our Economic Capital pillar explores the economic transition as a country passes through the stages of development – starting as a system based on agriculture and the extraction of natural resources, through industrialization and growth in industry, to developing as a service economy. As the global economy focuses on the issues of climate change, and of exploitation and destruction of the natural environment, all countries may be thought of as 'developing' from the standpoint of the green and sustainable economy of the future.

This pillar explores this transition through six components:

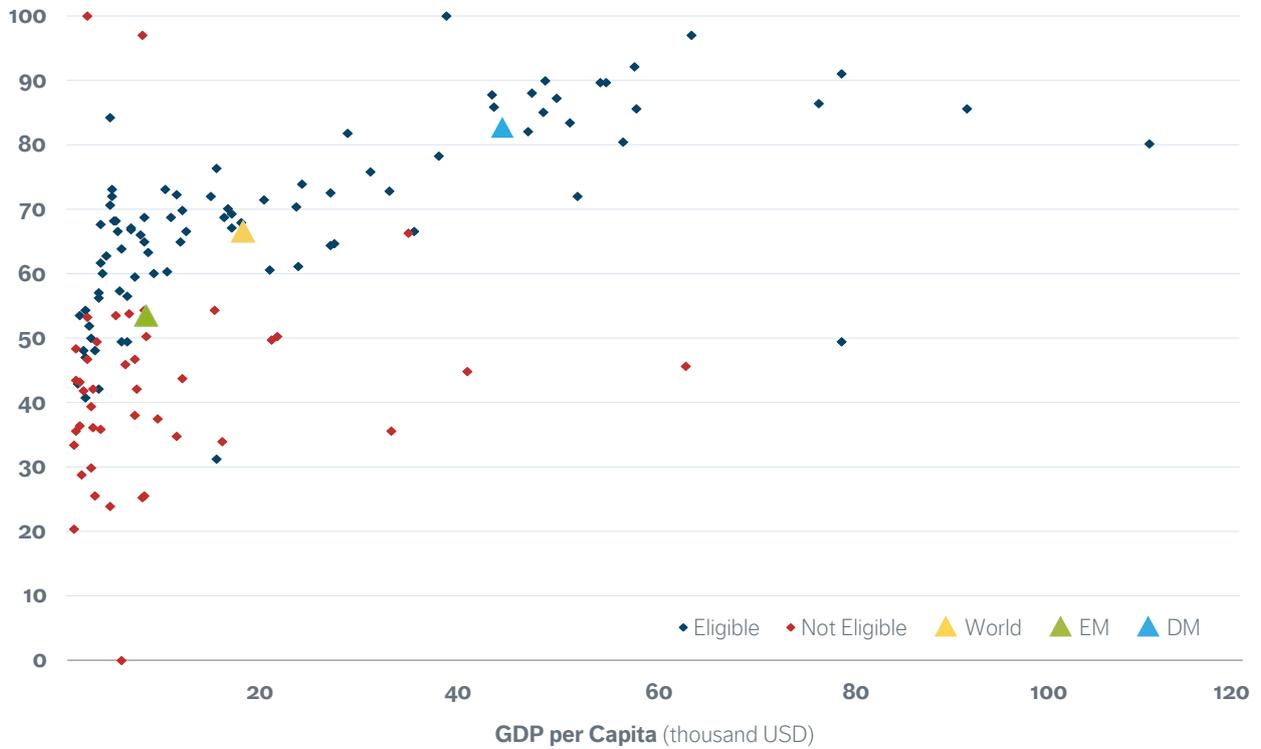
- **Competitiveness and Economic Transition** metrics analyze the sources of value added in the economy, the level of industrial innovation, as well as the state and development of the country’s infrastructure.
- **Regulation and Tax Regime** factors account for the economic regulation that is in place, and the revenue streams for the state.
- **Business Environment** scores analyze the health of the private sector, the ease of doing business, and the sources of domestic demand to support economic activity.
- **Sustainable Trade** analyses the global trading patterns of materials and goods and the sustainability of consumption, production, and trading relationships.
- **Energy Transition** measures examine the generation, sources, and efficiency of energy usage within the country.
- **Tail Risks** explore possible economic disruption as a result of natural hazards, food and water shortages, as well as illegal activity, such as money laundering that could result in embargoes.

Overall Results: Economic capital scores increased in the most recent year in both developed and emerging markets. Bear in mind that this analysis was performed before the recent events. As of early 2020, Hong Kong (21st overall) was the global leader in Candriam's scoring of Economic Capital, followed by Denmark, Sweden, Switzerland and Japan. The DM laggards were Italy (37th overall), Slovenia, Greece, and Slovakia. The overall laggards from the investable universe were Ukraine, Zambia, and Trinidad and Tobago.

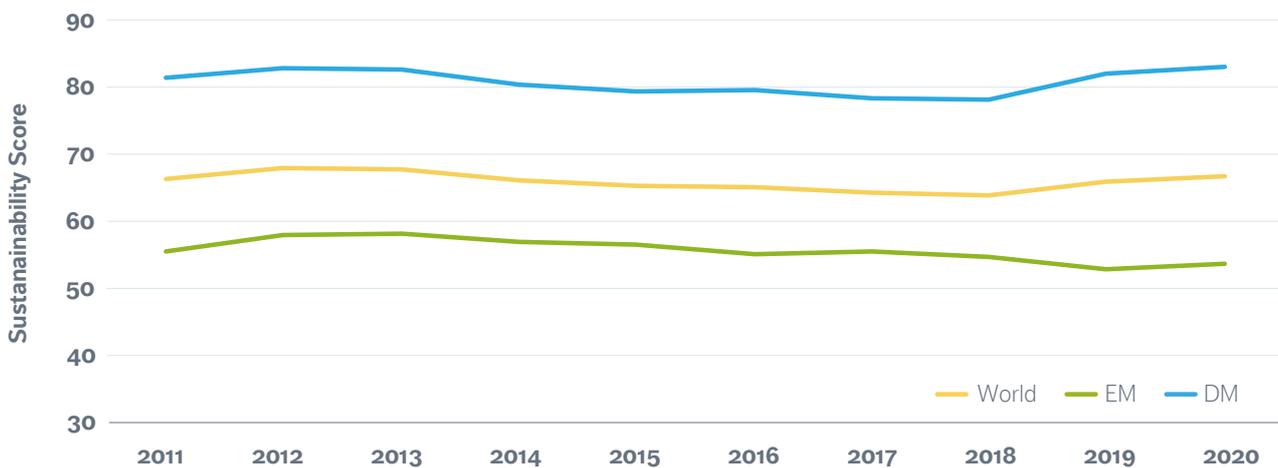
Figure 13 and 13a:

Economic Capital

Sustainability Score



Sustainability Score History*



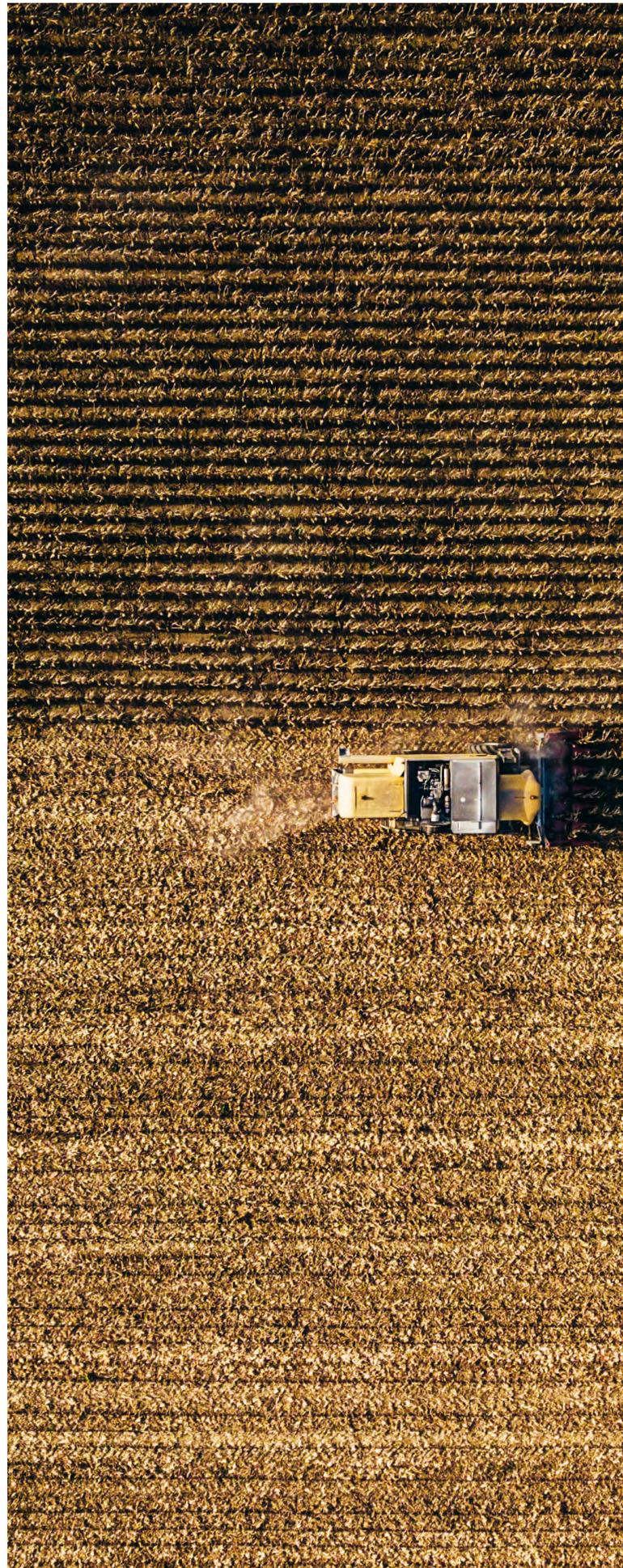
*Sustainability score history shows static scores, whereas ranking is done based on 5Y forward projections

Leaders and Laggards: Hong Kong performed best in the Business Environment component, while a major weakness for the country was in possible Economic Tail Risks, driven by exposure to natural hazards, short-term instability, and potential food shortage risks. The rest of the leaders suffered major weaknesses in scoring on Sustainable Trade (see Focus). **Put bluntly, overall consumption patterns in developed countries are highly unsustainable over the long term.** Other than Hong Kong, the leading Economic scorers showed an upwards overall trend in scoring, indicating that an economic transition is underway.

Developed Market Economic Capital laggards also showed relatively weak scores in Sustainable Trade. While their Business Environment component scores are on an upward trend, Tail Risk probabilities are also increasing. Greece, Slovakia, and to a lesser extent Italy are making progress in Energy Transition, whereas Slovenia is both relatively weak and shows a deteriorating score.

The Emerging Markets leaders in Economic Capital are Chile, Costa Rica, Brazil, and Uruguay. Much has been said about Costa Rica and renewable energy; indeed, the country scores exceptionally well in terms of generation and capacity, much higher than the average for emerging economies. That being said, the issues there are connected with energy efficiency – both in terms of regulation and in efficiency of the existing power plants. Brazil and Uruguay score very well on energy transition, a strong positive for emerging economies. Component scores amongst the leading EM countries are more or less similar, with the exception of the Business Environment, where Chile performs very well, while Uruguay and especially Brazil lag.

Among the overall laggards in Economic Capital, Ukraine is performing particularly poorly in Energy Transition, as expected; reliance on fossil fuels has historically been very high in many former Soviet States. Tanzania is a particularly poor performer in Competitiveness and Economic Transition. Trinidad and Tobago score poorly in Economic Capital overall, including in Sustainable Trade.





Focus: Trade Sustainability

An important yet frequently-overlooked topic, the sustainability of production and consumption patterns on a global scale are beginning to gain traction.

It is convenient for developed countries to showcase advanced environmental regulation within their borders, but it is only recently that we have begun to see more meaningful environmental rules incorporated in trade relationships. The EU-Mercosur deal is an example, where objections to environmental policies in the Amazon, and deforestation in particular, have often been put on the forefront of negotiations.⁵¹

While a good start, few questions are being asked about the sustainability of consumption patterns, especially in the developed world. Combatting climate change requires not only domestic regulation, but also a major reassessment of consumption and trade patterns. While increasingly clear for single-use plastics and some other pollutants, there have been few concerted efforts to quantify how much change will be needed in overall consumer patterns.

We utilize the information contained in multi-region input-output (MRIO) databases to trace carbon footprints in bilateral trade across the globe. The imports and exports of every country with each of its trading partners are evaluated. A composite score is constructed as a proxy for sustainability of production and consumption patterns. We plan improvements to the methodology as data availability improves.

We identify two inherent Trade Sustainability risks:

- The risk of carbon-heavy products being traded and consumed globally; eg, some countries essentially outsourcing their carbon footprint. This damages the environment globally, and such production and consumption needs to decrease.
- The risk that regulation in each of the trading partners or international trade agreements will prevent such trade going forward, thus potentially damaging a source of income for the producer and a supply source to the importer.

To account for both of these, we construct an Export(import) Sustainability score for each set of trading partners:

$$\text{Export(import) risk} = (\text{carbon footprint per capita of the flow}) / (\text{GHG1} * \text{GHG2})$$

Where GHG1 and GHG2 are the scores for GHG emissions and the Carbon Footprint component of Natural Capital of the two countries involved in the trade flow. This capital component is used to assess the level of greenhouse gas emissions of a country, including the public and private sectors and the overall reliance on fossil fuels, with an emphasis on coal and oil in particular.

The Carbon Footprint of the trade flow is incorporated in the numerator (low footprint = low risk, smaller numerator), while the trade risk is handled in the denominator (carbon-intensive trading partners means smaller denominator, higher overall risk, lower calculated score).

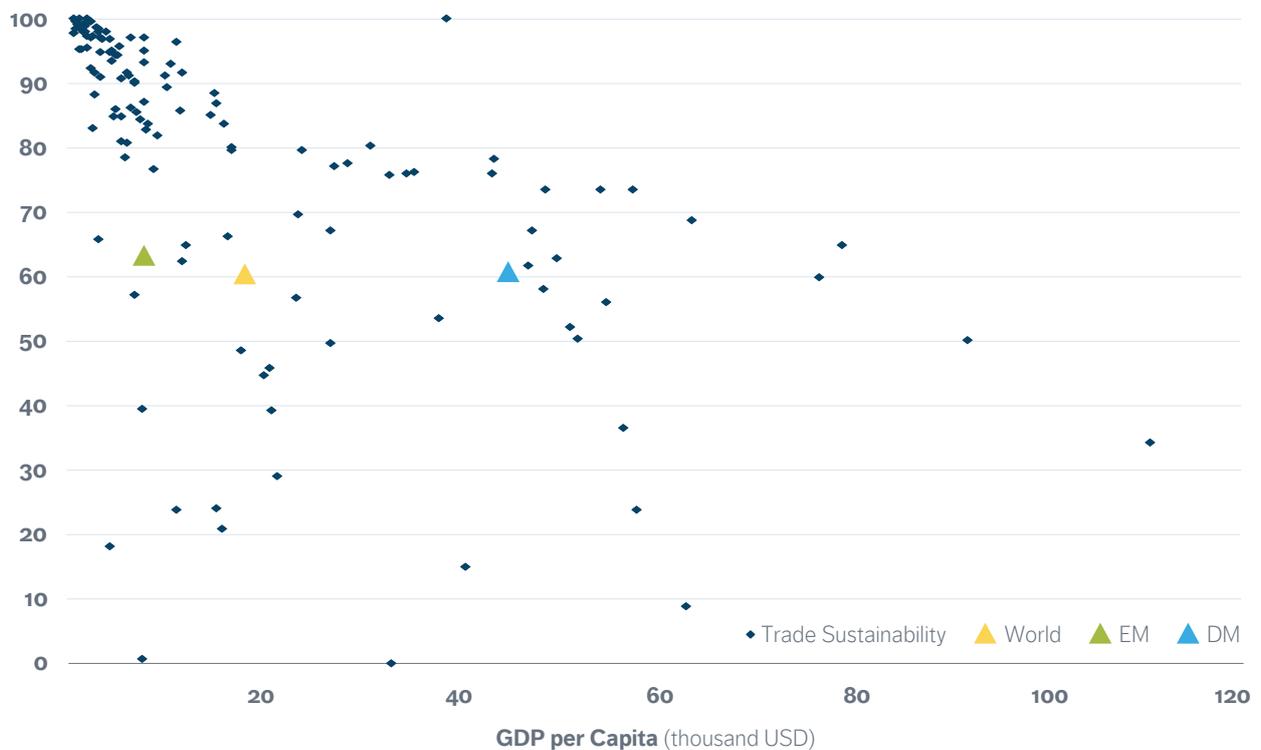
At the extremes, we would have the following scenarios:

- Two carbon-*light* countries trading a carbon-*light* product – low numerator, divided by a denominator closer to 1 (as GHG1 and GHG2 would both be close to 1), so an overall low number, resulting in a high, or good, score.
- Two carbon-*heavy* countries, trading a carbon-*heavy* product - high numerator, divided by a small denominator (as GHG1 and GHG2 would both be closer to 0 than to 1), so a large number, resulting in a low, or poor, score.

Small countries with modest trade per capita will have the highest scores, as their trade and consumption patterns will not need to change materially. Developed countries will need to change both their consumption patterns towards cleaner products, and their trading towards cleaner countries, unless of course their trading partners begin to produce cleaner products.

Some of these changes must be dramatic if we are to combat climate change. This pattern can be seen in the overall score distribution, with the average for Emerging Markets higher than that for developed countries, due to the larger consumption in the developed world:

Figure 14:
Trade Sustainability



We welcome feedback on this effort, as we do on any other part of our framework. We intend to both further evolve the methodology, as well as to put sustainable production and consumption

in the spotlight, in accordance with United Nations' Sustainable Development Goal 12, Responsible Consumption and Production.



Epilogue: Ever Onward

Our upgraded sovereign sustainability framework moves away from what is known as 'Weak Sustainability' towards 'Strong Sustainability'. That is, we move beyond the most-frequently-used country sustainability models, which assume that all forms of capital are perfectly interchangeable, and establish a framework which puts Natural Capital, climate change and environmental preservation at the forefront. We recognize the scientific consensus that this is the greatest crisis that humanity faces today, and reflect that in our sustainability analysis. Our new Sovereign Sustainability model brings us much closer to the Strong Sustainability concept, in that our scoring recognizes that Natural Capital is not freely interchangeable with the other forms of capital.

We introduce several enhancements:

- Much broader array of monitored issues
- Materiality assessment of every issue at every level of development for a country through time
- Materiality-based composition of sustainability scores, adapted to the specifics of each country
- Natural Capital cannot be substituted for another form of capital in the framework
- Environmental preservation and climate change become the cornerstone of our Sovereign Sustainability assessment

Our framework is dynamic and will undergo further development. We are not suggesting that we have found the ultimate solution to sustainable analysis of countries, but we continue to upgrade our analytical framework as academic thought and data availability evolve.

We are fully committed to cooperating with the global community to encourage greater attention to environmental preservation and climate change in finance. This is our main focus of engagement with sovereign issuers, as we are convinced that everyone has a role to play in combatting climate change and averting a mass extinction that would be largely caused by human activity.

Appendix

Country Rankings

E = Environmental Capital, H = Human Capital, S = Social Capital, X = Economic Capital

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
1	Switzerland	100.0	IN	100%	100%	95%	98%
2	Sweden	95.8	IN	99%	86%	98%	98%
3	Denmark	93.8	IN	97%	94%	97%	99%
4	Finland	86.4	IN	92%	88%	98%	89%
5	Austria	85.6	IN	98%	84%	91%	93%
6	France	84.0	IN	98%	91%	85%	91%
7	Luxembourg	83.2	IN	91%	94%	99%	84%
8	Ireland	82.0	IN	95%	82%	89%	92%
9	United Kingdom	81.7	IN	96%	98%	88%	94%
10	Germany	79.7	IN	94%	99%	91%	94%
11	Belgium	79.5	IN	93%	91%	90%	87%
12	Netherlands	79.4	IN	89%	97%	94%	96%
13	Iceland	78.9	IN	94%	96%	93%	75%
14	Canada	78.7	IN	85%	83%	94%	87%
15	Norway	78.4	IN	83%	92%	100%	90%
16	New Zealand	76.9	IN	90%	93%	96%	83%
17	Costa Rica	76.2	IN	74%	66%	80%	80%
18	Uruguay	75.8	IN	87%	56%	83%	74%
19	Malta	75.0	IN	87%	80%	79%	86%
20	Japan	72.6	IN	86%	89%	81%	97%
21	Hong Kong	70.2	IN	80%	98%	86%	100%
22	Singapore	68.8	IN	64%	87%	82%	91%
23	Portugal	68.8	IN	88%	78%	87%	80%
24	United States	67.8	IN	72%	87%	75%	95%
25	Spain	66.0	IN	91%	77%	80%	77%
26	Estonia	65.0	IN	69%	76%	84%	72%

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
27	Lithuania	62.6	IN	76%	65%	78%	64%
28	Australia	62.5	IN	54%	83%	92%	85%
29	South Korea	62.4	IN	71%	90%	74%	76%
30	Israel	61.9	OUT	81%	85%	68%	83%
31	Cyprus	60.3	IN	76%	69%	76%	81%
32	Latvia	60.3	IN	77%	67%	76%	70%
33	Croatia	59.9	IN	73%	64%	72%	67%
34	Czech Republic	59.9	IN	82%	79%	73%	71%
35	Slovenia	59.6	IN	83%	76%	83%	54%
36	Chile	57.1	IN	68%	61%	77%	82%
37	Italy	56.0	IN	84%	81%	69%	59%
38	Panama	55.5	IN	79%	52%	58%	69%
39	Slovak Republic	55.1	IN	75%	75%	72%	49%
40	Hungary	53.1	IN	80%	71%	69%	62%
41	Romania	52.8	IN	72%	57%	63%	56%
42	Argentina	51.7	IN	66%	53%	61%	48%
43	Bulgaria	50.2	IN	57%	59%	65%	47%
44	Brazil	49.9	IN	61%	35%	48%	76%
45	Poland	49.6	IN	70%	72%	70%	69%
46	Dominican Republic	48.0	IN	65%	28%	46%	55%
47	Mexico	47.4	IN	53%	48%	41%	68%
48	Guatemala	46.9	IN	57%	26%	35%	43%
49	Jamaica	46.2	IN	62%	43%	60%	65%
50	Albania	44.4	IN	67%	38%	57%	60%
51	Rwanda	44.0	OUT	45%	15%	39%	33%
52	Moldova	43.4	IN	59%	49%	49%	28%
53	Greece	43.3	IN	56%	62%	65%	50%
54	Thailand	42.1	IN	39%	72%	20%	61%
55	Malaysia	40.7	IN	28%	63%	56%	58%
56	Ecuador	40.6	IN	43%	40%	40%	45%
57	Colombia	40.4	IN	32%	44%	44%	66%
58	Peru	40.3	IN	40%	42%	46%	61%
59	China	40.2	OUT	35%	73%	17%	78%
60	Kenya	40.2	IN	46%	13%	25%	39%
61	Georgia	39.7	IN	55%	32%	57%	65%
62	Côte d'Ivoire	39.3	IN	43%	6%	31%	27%

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
63	Ghana	39.3	IN	27%	16%	67%	41%
64	Armenia	39.1	IN	50%	28%	34%	79%
65	Serbia	39.0	IN	54%	50%	59%	46%
66	Paraguay	38.6	IN	39%	46%	33%	31%
67	Tunisia	38.4	IN	52%	33%	52%	73%
68	Bahamas, The	38.2	IN	63%	39%	71%	54%
69	Morocco	37.9	IN	65%	24%	43%	63%
70	El Salvador	37.7	IN	58%	30%	45%	46%
71	Philippines	37.6	IN	48%	25%	27%	44%
72	Tanzania	37.4	IN	34%	8%	31%	20%
73	Namibia	36.5	IN	50%	14%	66%	43%
74	South Africa	36.1	IN	31%	18%	62%	57%
75	Honduras	35.3	IN	38%	35%	21%	34%
76	India	35.2	IN	30%	17%	30%	36%
77	Senegal	35.2	IN	42%	13%	50%	28%
78	Sri Lanka	35.1	IN	61%	31%	42%	51%
79	Belize	34.6	IN	49%	36%	50%	88%
80	Qatar	34.6	OUT	17%	70%	55%	25%
81	United Arab Emirates	34.3	OUT	33%	80%	54%	24%
82	Ukraine	33.9	IN	36%	47%	22%	17%
83	North Macedonia	33.8	IN	46%	45%	53%	53%
84	Jordan	33.8	IN	69%	27%	32%	50%
85	Trinidad and Tobago	33.4	IN	19%	55%	64%	6%
86	Indonesia	33.4	IN	21%	20%	47%	72%
87	Turkey	32.9	OUT	51%	46%	11%	57%
88	Montenegro	31.7	IN	47%	51%	51%	52%
89	Belarus	31.3	OUT	44%	74%	24%	17%
90	Lebanon	30.8	OUT	60%	41%	7%	42%
91	Vietnam	30.5	OUT	26%	54%	23%	39%
92	Bahrain	28.7	OUT	29%	58%	28%	38%
93	Russia	28.4	OUT	24%	65%	13%	24%
94	Zambia	27.3	IN	20%	9%	38%	16%
95	Nicaragua	26.9	OUT	37%	37%	15%	29%
96	Bosnia and Herzegovina	25.8	IN	41%	43%	43%	32%
97	Uganda	25.7	OUT	24%	4%	19%	23%
98	Oman	25.6	OUT	8%	60%	39%	9%

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
99	Kuwait	25.1	OUT	9%	61%	35%	11%
100	Ethiopia	23.0	OUT	31%	3%	16%	9%
101	Suriname	22.6	OUT	16%	31%	54%	37%
102	Bolivia	21.8	OUT	13%	23%	36%	13%
103	Algeria	21.6	OUT	13%	34%	24%	40%
104	Egypt	21.1	OUT	35%	24%	13%	35%
105	Mongolia	20.6	OUT	2%	20%	61%	3%
106	Cuba	19.9	OUT	25%	69%	37%	31%
107	Azerbaijan	19.7	OUT	6%	50%	17%	26%
108	Papua New Guinea	19.2	OUT	9%	7%	28%	20%
109	Gabon	18.8	OUT	17%	9%	26%	15%
110	Saudi Arabia	18.5	OUT	5%	54%	18%	35%
111	Tajikistan	18.3	OUT	23%	21%	6%	14%
112	Angola	17.8	OUT	6%	0%	20%	13%
113	Kazakhstan	16.8	OUT	7%	68%	29%	10%
114	Mali	16.6	OUT	20%	2%	9%	12%
115	Uzbekistan	16.5	OUT	12%	57%	6%	8%
116	Pakistan	15.7	OUT	28%	11%	4%	22%
117	Nigeria	15.1	OUT	18%	1%	9%	18%
118	Cameroon	14.6	OUT	14%	5%	8%	19%
119	Zimbabwe	13.3	OUT	15%	12%	12%	7%
120	Congo, Rep.	13.3	OUT	3%	6%	10%	5%
121	Sudan	11.0	OUT	22%	10%	1%	1%
122	Iran	8.6	OUT	11%	39%	3%	21%
123	Mozambique	6.2	OUT	4%	2%	14%	2%
124	Venezuela	5.7	OUT	10%	19%	5%	6%
125	Iraq	4.9	OUT	2%	17%	2%	2%
126	Turkmenistan	3.1	OUT	1%	29%	2%	0%
127	Libya	0.0	OUT	0%	22%	0%	4%
*	Bermuda	67.3	IN	78%	95%	87%	30%

Score – reflects the overall sustainability score of a country

E, H, S, X - Capital scores are shown in percentiles, indicating what percentage of the overall universe a country outperforms in the respective capital

* Bermuda does not have full 10-year history for all data, so it is displayed outside of the overall ranking, but the score based on observable data allows us to classify it as eligible for SRI investment.

Alphabetical Rankings

E = Environmental Capital, H = Human Capital, S = Social Capital, X = Economic Capital

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
50	Albania	44.4	IN	67%	38%	57%	60%
103	Algeria	21.6	OUT	13%	34%	24%	40%
112	Angola	17.8	OUT	6%	0%	20%	13%
42	Argentina	51.7	IN	66%	53%	61%	48%
64	Armenia	39.1	IN	50%	28%	34%	79%
28	Australia	62.5	IN	54%	83%	92%	85%
5	Austria	85.6	IN	98%	84%	91%	93%
107	Azerbaijan	19.7	OUT	6%	50%	17%	26%
68	Bahamas, The	38.2	IN	63%	39%	71%	54%
92	Bahrain	28.7	OUT	29%	58%	28%	38%
89	Belarus	31.3	OUT	44%	74%	24%	17%
11	Belgium	79.5	IN	93%	91%	90%	87%
79	Belize	34.6	IN	49%	36%	50%	88%
*	Bermuda	67.3	IN	78%	95%	87%	30%
102	Bolivia	21.8	OUT	13%	23%	36%	13%
96	Bosnia and Herzegovina	25.8	IN	41%	43%	43%	32%
44	Brazil	49.9	IN	61%	35%	48%	76%
43	Bulgaria	50.2	IN	57%	59%	65%	47%
118	Cameroon	14.6	OUT	14%	5%	8%	19%
14	Canada	78.7	IN	85%	83%	94%	87%
36	Chile	57.1	IN	68%	61%	77%	82%
59	China	40.2	OUT	35%	73%	17%	78%
57	Colombia	40.4	IN	32%	44%	44%	66%
120	Congo, Rep.	13.3	OUT	3%	6%	10%	5%
17	Costa Rica	76.2	IN	74%	66%	80%	80%
62	Côte d'Ivoire	39.3	IN	43%	6%	31%	27%
33	Croatia	59.9	IN	73%	64%	72%	67%
106	Cuba	19.9	OUT	25%	69%	37%	31%
31	Cyprus	60.3	IN	76%	69%	76%	81%
34	Czech Republic	59.9	IN	82%	79%	73%	71%
3	Denmark	93.8	IN	97%	94%	97%	99%
46	Dominican Republic	48.0	IN	65%	28%	46%	55%

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
56	Ecuador	40.6	IN	43%	40%	40%	45%
104	Egypt	21.1	OUT	35%	24%	13%	35%
70	El Salvador	37.7	IN	58%	30%	45%	46%
26	Estonia	65.0	IN	69%	76%	84%	72%
100	Ethiopia	23.0	OUT	31%	3%	16%	9%
4	Finland	86.4	IN	92%	88%	98%	89%
6	France	84.0	IN	98%	91%	85%	91%
109	Gabon	18.8	OUT	17%	9%	26%	15%
61	Georgia	39.7	IN	55%	32%	57%	65%
10	Germany	79.7	IN	94%	99%	91%	94%
63	Ghana	39.3	IN	27%	16%	67%	41%
53	Greece	43.3	IN	56%	62%	65%	50%
48	Guatemala	46.9	IN	57%	26%	35%	43%
75	Honduras	35.3	IN	38%	35%	21%	34%
21	Hong Kong	70.2	IN	80%	98%	86%	100%
40	Hungary	53.1	IN	80%	71%	69%	62%
13	Iceland	78.9	IN	94%	96%	93%	75%
76	India	35.2	IN	30%	17%	30%	36%
86	Indonesia	33.4	IN	21%	20%	47%	72%
122	Iran	8.6	OUT	11%	39%	3%	21%
125	Iraq	4.9	OUT	2%	17%	2%	2%
8	Ireland	82.0	IN	95%	82%	89%	92%
30	Israel	61.9	OUT	81%	85%	68%	83%
37	Italy	56.0	IN	84%	81%	69%	59%
49	Jamaica	46.2	IN	62%	43%	60%	65%
20	Japan	72.6	IN	86%	89%	81%	97%
84	Jordan	33.8	IN	69%	27%	32%	50%
113	Kazakhstan	16.8	OUT	7%	68%	29%	10%
60	Kenya	40.2	IN	46%	13%	25%	39%
99	Kuwait	25.1	OUT	9%	61%	35%	11%
32	Latvia	60.3	IN	77%	67%	76%	70%
90	Lebanon	30.8	OUT	60%	41%	7%	42%
127	Libya	0.0	OUT	0%	22%	0%	4%
27	Lithuania	62.6	IN	76%	65%	78%	64%
7	Luxembourg	83.2	IN	91%	94%	99%	84%
55	Malaysia	40.7	IN	28%	63%	56%	58%

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
114	Mali	16.6	OUT	20%	2%	9%	12%
19	Malta	75.0	IN	87%	80%	79%	86%
47	Mexico	47.4	IN	53%	48%	41%	68%
52	Moldova	43.4	IN	59%	49%	49%	28%
105	Mongolia	20.6	OUT	2%	20%	61%	3%
88	Montenegro	31.7	IN	47%	51%	51%	52%
69	Morocco	37.9	IN	65%	24%	43%	63%
123	Mozambique	6.2	OUT	4%	2%	14%	2%
73	Namibia	36.5	IN	50%	14%	66%	43%
12	Netherlands	79.4	IN	89%	97%	94%	96%
16	New Zealand	76.9	IN	90%	93%	96%	83%
95	Nicaragua	26.9	OUT	37%	37%	15%	29%
117	Nigeria	15.1	OUT	18%	1%	9%	18%
83	North Macedonia	33.8	IN	46%	45%	53%	53%
15	Norway	78.4	IN	83%	92%	100%	90%
98	Oman	25.6	OUT	8%	60%	39%	9%
116	Pakistan	15.7	OUT	28%	11%	4%	22%
38	Panama	55.5	IN	79%	52%	58%	69%
108	Papua New Guinea	19.2	OUT	9%	7%	28%	20%
66	Paraguay	38.6	IN	39%	46%	33%	31%
58	Peru	40.3	IN	40%	42%	46%	61%
71	Philippines	37.6	IN	48%	25%	27%	44%
45	Poland	49.6	IN	70%	72%	70%	69%
23	Portugal	68.8	IN	88%	78%	87%	80%
80	Qatar	34.6	OUT	17%	70%	55%	25%
41	Romania	52.8	IN	72%	57%	63%	56%
93	Russia	28.4	OUT	24%	65%	13%	24%
51	Rwanda	44.0	OUT	45%	15%	39%	33%
110	Saudi Arabia	18.5	OUT	5%	54%	18%	35%
77	Senegal	35.2	IN	42%	13%	50%	28%
65	Serbia	39.0	IN	54%	50%	59%	46%
22	Singapore	68.8	IN	64%	87%	82%	91%
39	Slovak Republic	55.1	IN	75%	75%	72%	49%
35	Slovenia	59.6	IN	83%	76%	83%	54%
74	South Africa	36.1	IN	31%	18%	62%	57%
29	South Korea	62.4	IN	71%	90%	74%	76%

Rank	Country	Score	IN/OUT	Percentiles			
				E	H	S	X
25	Spain	66.0	IN	91%	77%	80%	77%
78	Sri Lanka	35.1	IN	61%	31%	42%	51%
121	Sudan	11.0	OUT	22%	10%	1%	1%
101	Suriname	22.6	OUT	16%	31%	54%	37%
2	Sweden	95.8	IN	99%	86%	98%	98%
1	Switzerland	100.0	IN	100%	100%	95%	98%
111	Tajikistan	18.3	OUT	23%	21%	6%	14%
72	Tanzania	37.4	IN	34%	8%	31%	20%
54	Thailand	42.1	IN	39%	72%	20%	61%
85	Trinidad and Tobago	33.4	IN	19%	55%	64%	6%
67	Tunisia	38.4	IN	52%	33%	52%	73%
87	Turkey	32.9	OUT	51%	46%	11%	57%
126	Turkmenistan	3.1	OUT	1%	29%	2%	0%
97	Uganda	25.7	OUT	24%	4%	19%	23%
82	Ukraine	33.9	IN	36%	47%	22%	17%
81	United Arab Emirates	34.3	OUT	33%	80%	54%	24%
9	United Kingdom	81.7	IN	96%	98%	88%	94%
24	United States	67.8	IN	72%	87%	75%	95%
18	Uruguay	75.8	IN	87%	56%	83%	74%
115	Uzbekistan	16.5	OUT	12%	57%	6%	8%
124	Venezuela	5.7	OUT	10%	19%	5%	6%
91	Vietnam	30.5	OUT	26%	54%	23%	39%
94	Zambia	27.3	IN	20%	9%	38%	16%
119	Zimbabwe	13.3	OUT	15%	12%	12%	7%

Case Studies

Sovereign Sustainability Analysis

Brazil

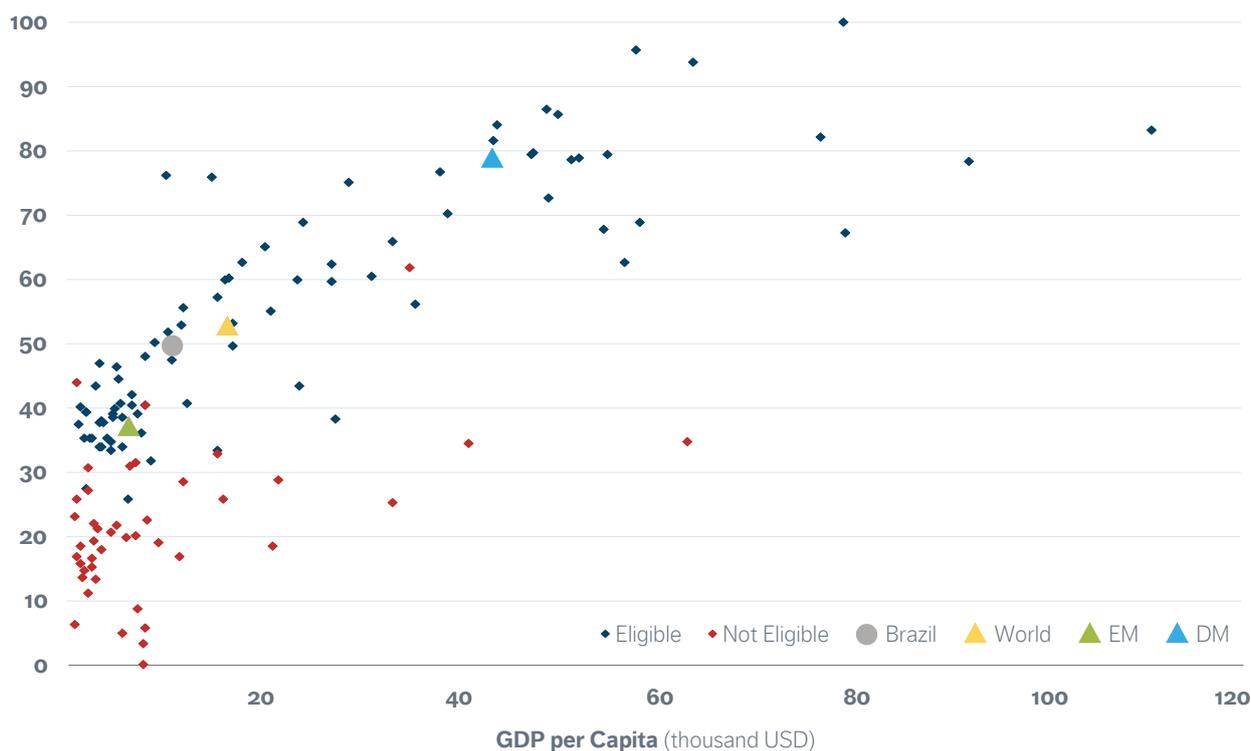
Country	Brazil
Region	EM
Date	17/11/2020
Analyst	Kroum Surov

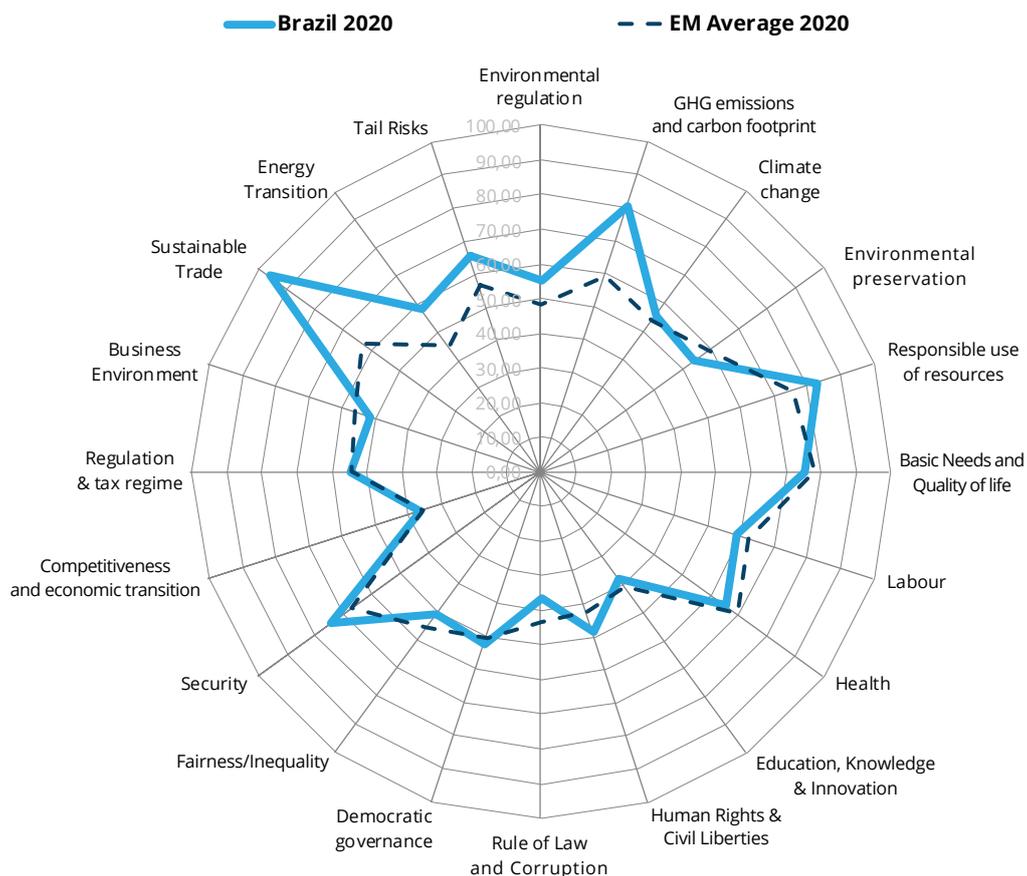
SRI Eligibility Status	Eligible
Sustainability Score	49.9
Overall Rank	47/128

Sustainability Summary

Brazil's overall score has trended modestly upwards, primarily driven by increases in Economic Capital, which is the country's relative strength. Much smaller improvements have been observed in Social Capital and to some extent, in Natural Capital, which is at the core of our framework. Human Capital is a relative weakness for Brazil, and further, the trend is deteriorating, especially in labour conditions. In the medium term, deterioration

in Human Capital may limit the potential for improvements in Economic Capital. We pay special attention to Natural Capital, both because of its central role in our framework, and because Brazil is a nation of global importance to the environment. Our November 2020 Sovereign Sustainability white paper provides additional detail on crucial topics such as Deforestation, where Brazil is a central participant.





Natural Capital	Human Capital
<p>Brazil shows modest improvement in Natural capital, mainly in Climate Change vulnerability and preparedness, as well as Environmental Preservation. It is notable, however, that on the latter the trend is upwards but from a much lower base than we would like to see. Deforestation is a notable weakness for the country, and recent efforts under pressure from the global community are positive, but not nearly sufficient in our view, given the global importance of the Amazon rainforest as a carbon capture area. Much more effort is needed to stop illegal logging and to limit the economic exploitation of the area.</p>	<p>Human capital is a relative weakness for Brazil, with the only bright spot being a modest improvement in Basic Needs and Quality of life, but from a relatively low base, as the country scores below the average for Emerging Markets.</p> <p>We see deterioration in all other components of the capital, especially in Labour working conditions, where the country scores markedly below the EM average. Further source of concern are immunization levels and disease prevention, which is especially salient in the age of global pandemics.</p>
<p>Brazil scores just above the EM average in Social Capital. While its democratic system is healthier than for its peer group, corruption and the rule of law are important and well-publicized weaknesses.</p> <p>Levels of inequality are much worse than the average for Emerging Markets. To a certain extent this may explain the very high criminality in the country, as well as the relatively high levels of civil and political unrest.</p>	<p>Economic Capital is a relative strength for Brazil. Energy transition is a bright spot– the country outperforms its peers both in energy efficiency and installed renewable capacity.</p> <p>While Brazil lags behind other Emerging Markets in economic governance and ease of doing business, it boasts relatively well-developed credit channels and corporate governance that is amongst the better EMs. At the same time, labour relations and market power concentration need significant improvement.</p>

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Sovereign Sustainability Analysis

United Kingdom

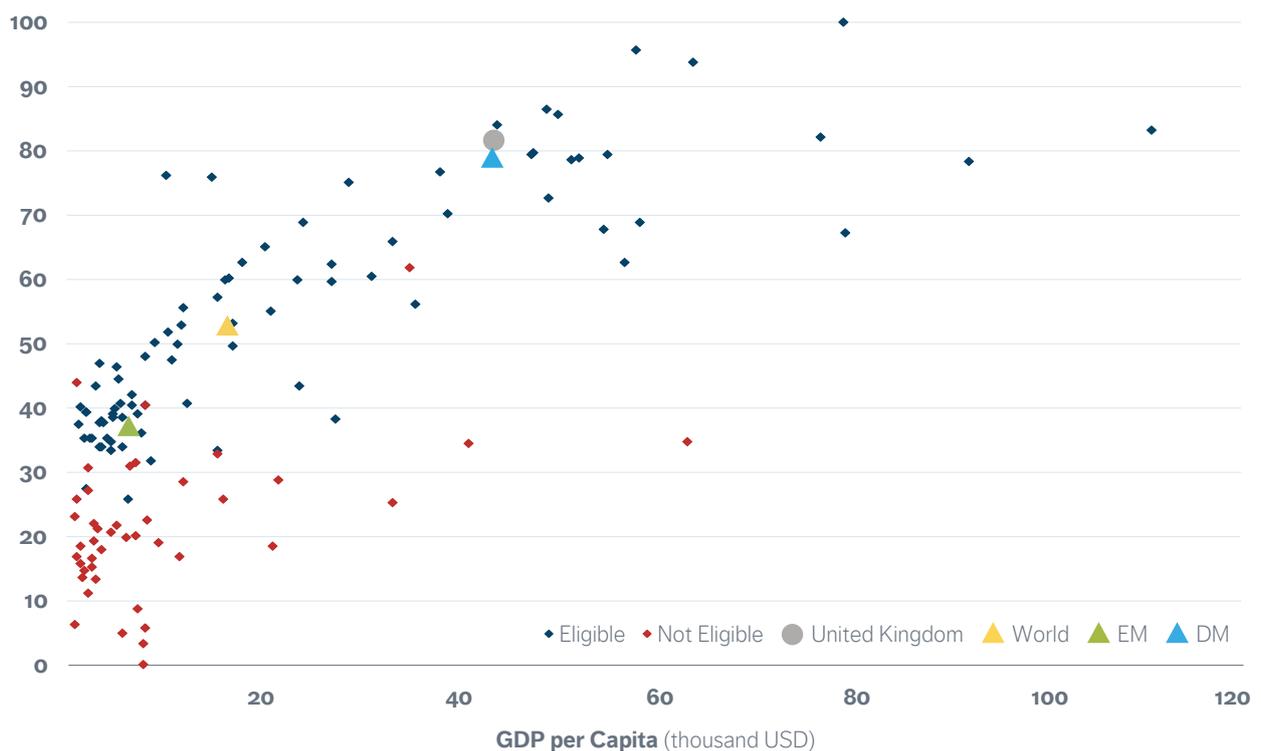
Country	United Kingdom
Region	DM
Date	17/11/2020
Analyst	Kroum Sourov

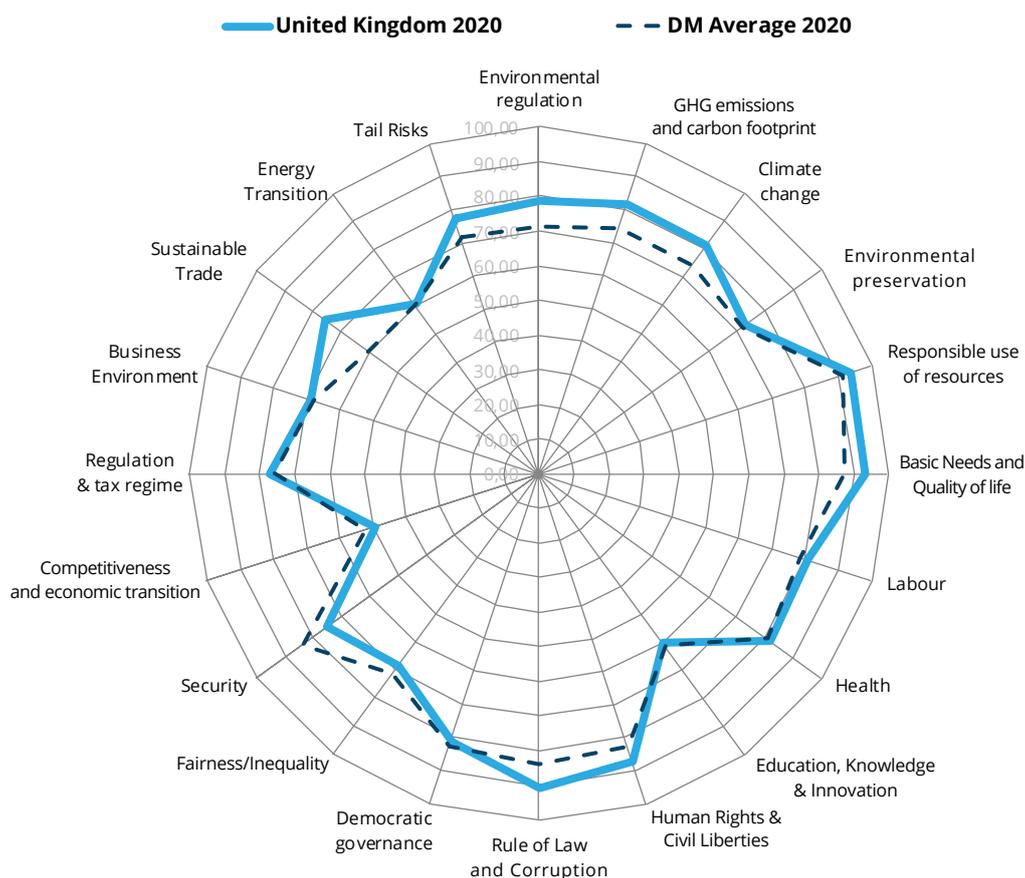
SRI Eligibility Status	Eligible
Sustainability Score	81.7
Overall Rank	9/128

Sustainability Summary

The United Kingdom (UK) scores fairly high across the board, earning a place in the top 10 of most sustainable countries that we analyse. That being said, there are downward trends in three of the four capital component scores, admittedly from a very high starting point. The exception is for Economic Capital, where the trend is modestly upwards, but key

components are pointing to risks to Economic capital in both the short and long term. It is the high absolute score for Natural Capital which allows the UK to enjoy its present high overall ranking. Our main concerns for the future are in Social and Economic Capitals, especially in the context of the end of the EU transition period in January 2021.





Natural Capital	Human Capital
<p>Natural Capital is a strong point for the UK. The nation performs better than developed market averages, especially in GHG emissions and carbon footprint.</p> <p>This stems from a more carbon-efficient public sector as well as from lower reliance on coal versus its peer group. Coal burning is a major source of pollutants, and a focus on reducing coal usage is a bright spot for the UK.</p> <p>While the UK is not significantly outperforming its peer group in deforestation, biodiversity and natural habitat preservation is a relative strength, contributing to its good Natural Capital score.</p>	<p>Human Capital is another strong point for the UK, with an upward trend in Basic Needs, Labour, and Education from an already-high base. Health is the most important component for the country, and we see a downward trend in scores over the past several years.</p> <p>Whereas the National Health Service is a 'crown jewel' for the UK in its Human Capital scores, immunisation and disease prevention are weak points, with the UK underperforming its peer group.</p> <p>Underinvestment in local services has contributed to the underperformance in preventive care, and to an extent, to the high impact of coronavirus on the population.</p>
Social Capital	Economic Capital
<p>The downward trend in Social Capital is the most worrying part of our UK model results. This is driven by a slide in Democratic Governance scores, as well as in the relative scores in the Rule of Law and Corruption.</p> <p>Rule of Law scores are starting from a very high base, and the UK still outperforms its peer group. Democratic Governance scores display a steep deterioration in Democratic Accountability over the last three years.</p> <p>Repeated attempts to circumvent the role of Parliament in major decisions for the country, such as the relationship with the EU and coronavirus restrictions, are a source of concern in this capital pillar.</p>	<p>Economic Capital has been a relative strength for the UK. The difficult negotiations with the EU over a post-transition trade deal spotlights the vulnerabilities in this capital pillar.</p> <p>Domestic demand vulnerability, where the UK underperforms developed market averages, is an area of concern. If exports are threatened by a possible no-deal outcome, hopes that domestic demand can pick up the slack might be misplaced.</p> <p>A 'no-deal' outcome exposes the UK's food supply chain vulnerabilities as well. Prolonged customs checks for perishable goods sourced from the EU could result in significant tail risk events for both Economic and Social Capital.</p>

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Notes & References

- ¹ The Guardian. *Climate crisis: alarm at record-breaking heatwave in Siberia*. 17 June, 2020. <https://www.theguardian.com/environment/2020/jun/17/climate-crisis-alarm-at-record-breaking-heatwave-in-siberia>, accessed 18 November, 2020.
- ² *Ibid.*
- ³ The Guardian. *Scientists shocked by Arctic permafrost thawing 70 years sooner than predicted*. 18 June, 2019. https://www.theguardian.com/environment/2019/jun/18/arctic-permafrost-canada-science-climate-crisis?CMP=Share_iOSApp_Other, accessed 18 November, 2020.
- ⁴ Cable News Network. *Ice Age cave bear remains found perfectly preserved in Russia*. 14 September, 2020. https://trib.al/7D27KWE?fbclid=IwAR16GeHVZmBQsMjeqjvDD6oYtNdb5hKdJwBB7WUoHOVA_g9ctnfgyc-9Qwc, accessed 18 November, 2020.
- ⁵ Lambertini, Marco (Director general, WWF); Elizabeth Maruma Mrema (Executive Secretary, UN Convention on Biological Diversity), and Maria Neira (Director, World Health Organization department of environment, climate change and health). *Op-Ed. Coronavirus is a warning to us to mend our broken relationship with nature*. The Guardian, 17 June 2020. <https://www.theguardian.com/commentisfree/2020/jun/17/coronavirus-warning-broken-relationship-nature>, accessed 18 November, 2020.
- ⁶ Pelence, Jérôme; Jérôme Ballte, and Tom Dedeurwaerdere. *Weak Sustainability versus Strong Sustainability*. United Nations. Brief for GSDR 2015. <https://sustainabledevelopment.un.org/content/documents/6569122-Pelenc-Weak%20Sustainability%20versus%20Strong%20Sustainability.pdf>, accessed 18 November, 2020.
- ⁷ Hardin, Garrett James. *The Tragedy of the Commons*. Science, (1968), 162(3859), pp. 1243–48.
- ⁸ Harvey, Chelsea. *Climate 'Tipping Points' Could Add Trillions to the Costs of Warming*. Scientific American, 24 April 2019. <https://www.scientificamerican.com/article/climate-tipping-points-could-add-trillions-to-the-costs-of-warming/>, accessed 18 November 2020.
- ⁹ Roughgarden, J. and F. Smith. *Why fisheries collapse and what to do about it*. Proceedings of the National Academy of Sciences of the United States of America Vol. 93, No. 10 (May 14, 1996), pp. 5078-5083
- ¹⁰ United Nations. Millennium Ecosystem Assessment. *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC, 2005.
- ¹¹ Newfoundland Heritage. *Cod Moratorium*. 2009. <https://www.heritage.nf.ca/articles/economy/moratorium.php>, accessed 18 November, 2020.
- ¹² Cracolici, M., Cuffaro, M. and Nijkamp, P. *The Measurement of Economic, Social and Environmental Performance of Countries: A Novel Approach*. Social Indicators Research (2010). 95, 339-356
- ¹³ World Wildlife Fund. Living Planet Report 2020 https://www.wwf.org.uk/sites/default/files/2020-09/LPR20_Full_report.pdf, accessed 18 November 2020.
- ¹⁴ The World Economic Forum. *Sweden is a top performer on well-being. Here's why*. 31 May 2019. <https://www.weforum.org/agenda/2019/05/sweden-is-a-top-performer-on-well-being-here-s-why/>, accessed 18 November 2020.
- ¹⁵ The Guardian. *World fails to meet a single target to stop destruction of nature – UN report*. 15 September 2020. https://www.theguardian.com/environment/2020/sep/15/every-global-target-to-stem-destruction-of-nature-by-2020-missed-un-report-aoe?CMP=Share_iOSApp_Other, accessed 18 November 2020.
- ¹⁶ Dietz, T., Rosa, E., and York, R. *Environmentally Efficient Well-Being: Rethinking Sustainability as the Relationship between Human Well-being and Environmental Impacts*. Human Ecology Review, (2009), Vol. 16, No. 1
- ¹⁷ Dietz, T., Rosa, E., and York, R. *Environmentally Efficient Well-Being: Is there a Kuznets Curve?* Applied Geography, (2012), 32, 21-28
- ¹⁸ Most annual data is as of December 2019; some series such as political risk, etc updated as of May.
- ¹⁹ The Guardian. *Trump in final push to open up Alaska's Arctic refuge to oil and gas drilling*. 17 August 2020. <https://www.theguardian.com/us-news/2020/aug/17/trump-alaska-arctic-wildlife-refuge-drilling>, accessed 18 November 2020.
- ²⁰ The Guardian. *Norway plans to drill for oil in untouched Arctic areas*. 26 August 2020. https://www.theguardian.com/environment/2020/aug/26/norway-plans-to-drill-for-oil-in-untouched-arctic-areas-svalbard?CMP=Share_iOSApp_Other, accessed 18 November 2020.

- ²¹ The Northern Times. *Another earthquake hits Friesland, likely caused by gas extraction*. 24 February, 2020. <https://northerntimes.nl/another-earthquake-hits-friesland-likely-caused-by-gas-extraction>, accessed 18 November, 2020.
- ²² Gibb, R., Redding, D.W., Chin, K.Q. et al. Zoonotic host diversity increases in human-dominated ecosystems. *Nature* 584, 398–402 (2020). <https://doi.org/10.1038/s41586-020-2562-8>
- ²³ J.-F. Bastin, Y. Finegold, C. Garcia, D. Mollicone, M. Rezende, D. Routh, C. M. Zohner, T. W. Crowther, “*The Global Tree Restoration Potential*” and Bastin, et al, “*Response to Comments on ‘The global tree restoration potential’*” *Science*, 5 July 2019 and 29 May 2020.
- ²⁴ World Economic Forum. *Ethiopia planted 350 million trees in a day. And its fight against deforestation does not stop there*. 31 July, 2020. <https://www.weforum.org/agenda/2019/07/ethiopia-has-planted-350-million-trees-in-a-day-to-tackle-deforestation-and-its-not-stopping-there/>, accessed 18 November 2020.
- ²⁵ Independent. *India plants 66 million trees in 12 hours as part of record-breaking environmental campaign*. 3 January 2018. <https://www.independent.co.uk/news/world/asia/india-plant-66-million-trees-12-hours-environment-campaign-madhya-pradesh-global-warming-climate-a7820416.html>, accessed 18 November 2020.
- ²⁶ Forbes. *Ireland Commits To Plant 440 Million Trees To Help Tackle Climate Change*. 30 September 2019. <https://www.forbes.com/sites/trevornace/2019/09/30/ireland-commits-to-plant-440-million-trees-to-help-tackle-climate-change/>, accessed 18 November 2020.
- ²⁷ NewScientist. *EU plans to plant 3 billion trees and massively expand organic farming*. 20 May 2020. <https://www.newscientist.com/article/2244115-eu-plans-to-plant-3-billion-trees-and-massively-expand-organic-farming/#ixzz6WJ6TsKtK>, accessed 18 November 2020.
- ²⁸ The Guardian. *Most of 11m trees planted in Turkish project 'may be dead'*. 20 January, 2020. https://www.theguardian.com/world/2020/jan/30/most-of-11m-trees-planted-in-turkish-project-may-be-dead?CMP=Share_iOSApp_Other, accessed 18 November 2020.
- ²⁹ Deutsche Welle. *Brazil's research chief sacked after deforestation row with Bolsonaro*. 2 August 2019. <https://www.dw.com/en/brazils-research-chief-sacked-after-deforestation-row-with-bolsonaro/a-49874119>, accessed 18 November 2020.
- ³⁰ Canadian Parks and Wilderness Society Wildlands League. *Canada under-reporting deforestation and carbon impacts by forestry*. 14 December 2019. <https://wildlandsleague.org/news/loggingscars/>, accessed 18 November 2020.
- ³¹ Researchgate. *Extent of deforestation in Borneo 1950-2005, and projection towards 2020*. Researchgate's sources: PEACE (2007), Indonesia and Climate Change: Current Status and Policies, based on UNEP/GRID-Arendal, 2007. https://www.researchgate.net/figure/Extent-of-deforestation-in-Borneo-1950-2005-and-Projection-Towards-2020-Source-PEACE_fig3_309747458, accessed 18 November 2020.
- ³² Prinz, Dieter. *Contributor and Victim - Indonesia's Role in Global Climate Change with Special Reference to Kalimantan*. *Jurnal Sains and Teknologi Lingkungan* (2009). 1. 138-153. 10.20885/jstl.vol1.iss2.art5. https://www.researchgate.net/publication/309747458_Contributor_and_Victim_-_Indonesia's_Role_in_Global_Climate_Change_with_Special_Reference_to_Kalimantan
- ³³ Human Rights Watch. *Rainforest Mafias - How Violence and Impunity Fuel Deforestation in Brazil's Amazon*. 17 September 2019. <https://www.hrw.org/report/2019/09/17/rainforest-mafias/how-violence-and-impunity-fuel-deforestation-brazils-amazon>, accessed 18 November 2020.
- ³⁴ The New York Times. *Under Pressure, Brazil's Bolsonaro Forced to Fight Deforestation*. 1 August 2020. <https://www.nytimes.com/2020/08/01/world/americas/Brazil-amazon-deforestation-bolsonaro.html>, accessed 18 November 2020.
- ³⁵ I Kathimerini. *Greece leads EU in youth unemployment*. 1 August 2019. <https://www.ekathimerini.com/243213/article/ekathimerini/business/greece-leads-eu-in-youth-unemployment>, accessed 18 November 2020.

- ³⁶ Gibb, R., Redding, D.W., Chin, K.Q. et al. *Zoonotic host diversity increases in human-dominated ecosystems*. *Nature* 584, 398–402 (2020). <https://doi.org/10.1038/s41586-020-2562-8>
- ³⁷ BBC. *Coronavirus: Why so many people are dying in Belgium*. 2 May 2020. <https://www.bbc.com/news/world-europe-52491210>, accessed 18 November 2020.
- ³⁸ Cable News Network. *Hospital Covid data is now going to Washington instead of the CDC. An epidemiologist explains why that's a problem*. 15 July 2020. <https://edition.cnn.com/2020/07/15/politics/covid-hospital-data-cdc-trump-explainer/index.html>, accessed 18 November 2020.
- ³⁹ BBC. *Same-sex marriage now legal in Northern Ireland*. 13 January 2020. <https://www.bbc.com/news/uk-northern-ireland-51086276>, accessed 18 November 2020.
- ⁴⁰ Politico. *Hungary's Viktor Orbán wins vote to rule by decree*. 30 March 2020. <https://www.politico.eu/article/hungary-viktor-orban-rule-by-decree/>, accessed 18 November 2020.
- ⁴¹ The Washington Post. *FBI charges six who it says plotted to kidnap Michigan Gov. Gretchen Whitmer, as seven more who wanted to ignite civil war face state charges*. 9 October 2020. https://www.washingtonpost.com/national-security/michigan-governor-kidnap-plot/2020/10/08/0032e206-0980-11eb-9be6-cf25fb429f1a_story.html, accessed 18 November 2020.
- ⁴² Forbes. *The GSA Head Who Blocks Transition To Biden Presidency Is Partisan And Not Independent*. 10 November 2020. <https://www.forbes.com/sites/charlestiefer/2020/11/10/the-gsa-head-who-blocks-transition-to-biden-presidency-is-partisan-and-not-independent/?sh=2a23c8635e52>, accessed 18 November 2020.
- ⁴³ The Washington Post. *'I just want to find 11,780 votes': In extraordinary hour-long call, Trump pressures Georgia secretary of state to recalculate the vote in his favor*. 4 January 2021. https://www.washingtonpost.com/politics/trump-raffensperger-call-georgia-vote/2021/01/03/d45acb92-4dc4-11eb-bda4-615aaefd0555_story.html, accessed 25 January, 2021.
- ⁴⁴ The Washington Post. *What Trump said before his supporters stormed the Capital, annotated*. 11 January 2021. <https://www.washingtonpost.com/politics/interactive/2021/annotated-trump-speech-jan-6-capitol/>, accessed 25 January, 2021.
- ⁴⁵ The Washington Post. *Pence declares Biden winner of the presidential election after Congress finally counts electoral votes*. 7 January 2021. <https://www.washingtonpost.com/politics/2021/01/06/congress-electoral-college-vote-live-updates/>, accessed 25 January, 2021.
- ⁴⁶ Politico. *Barr OK for election-fraud investigations roils Justice Department*. 9 November 2020. <https://www.politico.com/news/2020/11/09/barr-memo-authorizes-doj-to-open-election-fraud-investigations-435622>, accessed 18 November 2020.
- ⁴⁷ CBS News. *Appeals court rules it can't enforce congressional subpoena of former White House counsel*. 1 September 2020. <https://www.cbsnews.com/news/don-mcgaahn-white-house-counsel-congressional-subpoena-appeals-court/>, accessed 18 November 2020.
- ⁴⁸ CBS News. *The internal watchdogs Trump has fired or replaced*. 19 May 2020. <https://www.cbsnews.com/news/trump-inspectors-general-internal-watchdogs-fired-list/>, accessed 18 November 2020.
- ⁴⁹ Mother Jones. *A Federal Judge Says USPS Delays Were an "Intentional Effort" to Undermine Fair Elections*. 18 September 2020. <https://www.motherjones.com/politics/2020/09/federal-judge-says-usps-delays-were-intentional-effort-to-undermine-fair-elections/>, accessed 18 November 2020.
- ⁵⁰ National Public Radio. *Trump Shatters Ethics Norms By Making Official Acts Part Of GOP Convention*. 26 August 2020. <https://www.npr.org/2020/08/26/906228532/trump-shatters-ethics-norms-by-making-official-acts-part-of-rnc-broadcast?t=1600698533833&t=1605717442133>, accessed 18 November 2020
- ⁵¹ Deutsche Welle. *Merkel: Amazon deforestation threatens EU-Mercosur deal*. 21 August 2020. <https://www.dw.com/en/merkel-amazon-deforestation-threatens-eu-mercosur-deal/a-54651194>, accessed 18 November 2020.



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