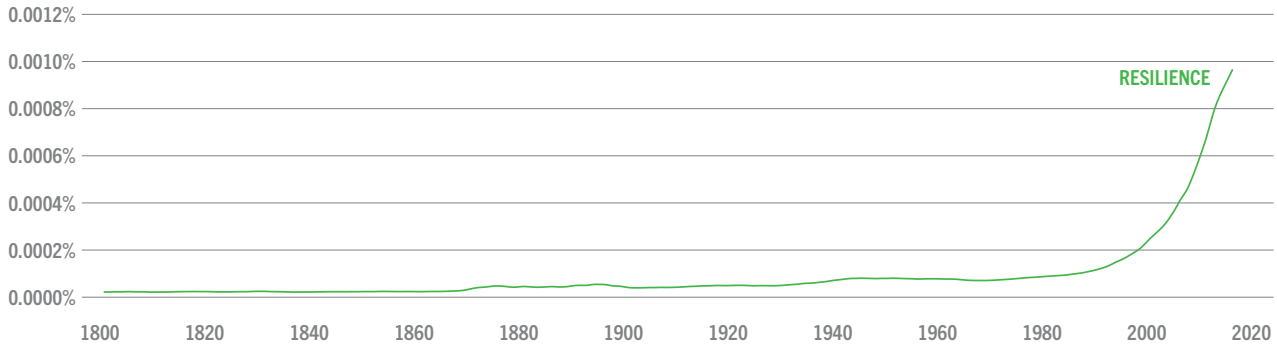
Investing for Resilience

Use of the term '**resilience**' in global literature has risen exponentially in recent decades.[1]



SOURCE: GOOGLE BOOKS NGRAM VIEWER, OCTOBER 2020

Today, the concept of resilience is applied in a range of contexts from ecology and disaster management to cyber security, mental health and engineering. Resilience is also at the forefront of discussions about the global post Covid-19 recovery and our collective efforts to build back better. In this paper, we explore the evolution of resilience as a concept, why it's essential today, and how it can be applied as a lens for impact investing.

WHAT IS RESILIENCE?

In academia, the earliest references to resilience can be traced back to the 1800s within the field of civil engineering. The term was originally used by Thomas Tredgold and Robert Mallet to describe the amount of disturbance or stress a given material can sustain before reaching breaking point.[2] This is resilience in terms of robustness, as opposed to fragility. The ability of something **to resist change and retain its form and structural integrity in the face of pressure and disturbance.**

> "Robustness is a core element of climate resilience within the human-made built environment, for example, given the extreme weather-related risks posed by climate change."

Since then, ideas about resilience have evolved significantly. During the 1970s, psychologists and ecologists began exploring resilience in relation to the capacity for both people and ecosystems not only to resist, but **to absorb and recover from the effects of stress and disturbance**. The word resilience derives from the Latin verb resilire, which means "to jump back" or "to recoil".[3] This idea of elasticity and flexibility has come to define modern day concepts of resilience. The ability to absorb stress and bounce back into shape, much like a stress ball, can be translated into many different contexts.

> "As an example, mental health and the capacity for emotional and/or spiritual resilience. This refers to our ability as humans to endure stress or trauma without significantly diminishing our cognitive and emotional function. To withstand and bounce back from the daily pressures modern life can throw at us."

If we move beyond the individual, we can also think of resilience in terms of systemic resilience: the capacity of a system, whether an economy or an ecosystem, **to withstand multiple pressure points and to retain or recover its essential structure and functionality**. In this context it's important to consider factors like relationships, dependencies and intersectionality which are embedded in complex adaptive systems, which can cause an issue in one

1 books.google.com/ngrams/graph?content=resilience&year_start=1500&year_end=2019&corpus=26&smoothing=3
2 www.frontiersin.org/articles/10.3389/fmars.2018.00034/full
3 www.merriam-webster.com/dictionary/resilience

area of a system and create a cascade of changes throughout the whole system.

> "The subprime housing crisis of 2007/08 is a good example of this, in so much that it destabilised the entire financial system."

While the idea of bouncing back into shape is a reassuring one, there are many scenarios where this might not be possible. In the 1970s, Canadian ecologist C. S. Holling drew attention to the existence of non-linear processes and tipping points within ecological systems: **when a system is disturbed beyond a given threshold or tipping point, it can flip towards an entirely new equilibrium in what is known as a 'regime shift'.**[4] These shifts can occur abruptly and prove difficult or impossible to reverse within human timescales.

> "Coastal marine eutrophication in the Baltic Sea,[5] is an example, where the marine environment has become highly polluted with nutrients from agricultural fertilizers. Rising nutrient levels have stimulated the sudden and rapid growth of plants and algae, starving the wider ecosystem of both sunlight and oxygen and severely inhibiting its ability to support species diversity, fisheries and recreation activities.[6]"

In addition to recognising non-linear system dynamics like these, true resilience needs **to embody flexibility in order to support our changing needs over time**. What is resilient today may not be in the decades to come.

> "A good example is the London Thames Flood Barrier, constructed in the 1970s. As a result of climate change impacts the protective capacity of the barrier may soon be overwhelmed, before its intended end-of-life in 2030, due to increasing storm surge intensity and rising sea levels."

Carl Folke and the Stockholm Resilience Centre suggest a more dynamic definition of resilience as the capacity not only **to persist or recover in the face of disturbance, but also to adapt and/or transform when necessary.**[7] True social-ecological resilience is, therefore, the capacity for a system to deal with change while continuing to develop: either by learning and adapting, to reduce vulnerability, or by transforming and pivoting towards a new status quo which is more tenable in the face of longer-term risks.[8] In this sense, dynamic resilience is about using shocks and disturbances as opportunities for regeneration, innovation and new modes of operation.[9]

> "The best example of this is life itself, which has found a way to persist over billions of years through a constant state of dynamic adaptation and resilience, or as most people would know it *evolution*."

WHY IS RESILIENCE SO CRITICAL, AND WHY NOW?

As humans we are intricately connected to and dependent on the natural environment, and we belong to countless social-ecological systems.[10] However, as our societies have become more industrialised and technologically advanced, our relationship with nature has become increasingly detached and extractive. With the exception of indigenous communities, we have largely forgotten how to live in harmony with our surroundings. As a result, we're now living through what has been termed the 'Anthropocene': a geological era named in recognition of the significant impacts human activities continue to inflict upon the planet, its ecological systems and upon ourselves.

We have breached at least four out of nine critical planetary boundaries.[11] Every year, since 2010, we have reached 'Earth Overshoot Day' (when our consumption exceeds what nature can sustain) in just over seven months.[12] As a result, we're now faced with the twin crises of anthropogenic climate change[13] and unprecedented biodiversity loss (plant and animal life on Earth).[14] Half of the World Economic Forum's "Top 10 Risks" for the coming decade are environmental risks.[15] **Rather than respecting and operating within nature's limits, we've been exceeding them and undermining the resilience and regenerative capacity of the Earth system**.

In tandem with these environmental crises, we face a multitude of social challenges and inequalities both within and between nations. Despite global efforts to improve living standards, widespread poverty and malnutrition still exist

4 www.nap.edu/read/4919/chapter/4#33
5 regimeshifts.org/item/491-coastal-marine-eutrophication
6 www.sei.org/featured/the-baltic-a-sea-of-opportunity/#:~:text=Eutrophication%20%E2%80%93%20the%20excessive%20richness%20of,impacts%2C%20affecting%20fisheries%20and%20recreation.
7 www.ecologyandsociety.org/vol15/iss4/art20/
8 www.stockholmresilience.org/publications/artiklar/2011-01-19-resilience-thinking-integrating-resilience-adaptability-and-transformability.html
9 ibid
10 www.stockholmresilience.org/research/research-news/2015-02-19-what-is-resilience.html
11 www.stockholmresilience.org/research/planetary-boundaries.html
12 www.overshootday.org/newsroom/past-earth-overshoot-days/
13 IPCC, 2018: www.ipcc.ch/sr15/chapter/spm/
14 www.wwf.org.uk/living-planet-report
15 reports.weforum.org/global-risks-report-2020/chapter-one-risks-landscape/

alongside modern slavery and a growing refugee crisis. Huge inequalities in wealth and income, education, healthcare and access to basic services persist often tied to discrimination based on race and ethnicity, religion, gender, sexuality and more. Such inequalities are exacerbated by the climate and ecological crises, and result in the unjust erosion of human wellbeing and resilience. As argued by Joseph Stiglitz, deepening inequality is detrimental to wider planetary and economic resilience.[16]

This year, the Covid-19 pandemic has both exposed and further entrenched social inequalities. We've seen those in zero-hour employment contracts fall through the financial safety net, while the essential workers we've relied on also being some of our lowest paid workers. In the UK, Covid-19 patients from Black, Asian and minority ethnic backgrounds (BAME) account for roughly 34% of critically ill Covid-19 patients while accounting for just 14% of the population.[17]

While causal links are difficult to prove, it has been suggested that BAME patients are more likely to be frontline essential workers, and twice as likely as white patients to live in deprived areas with overcrowded housing and higher levels of air pollution.[18]

Not only has the pandemic highlighted systemic social inequalities, it has also brought attention to the links between human activity and zoonotic disease outbreaks. In recent decades, our continued incursion into nature in the form of widespread deforestation and wildlife trafficking has driven the outbreak of multiple zoonotic diseases, which are spread from animals to humans.[19] **This pandemic is a reminder that we belong to complex and interconnected natural systems, and systemic disruptions can have unintended and far-reaching consequences**.

Systems thinking (considering all interrelated and interdependent structures, patterns and cycles in a system) is crucial when considering our post Covid-19 resilience and recovery: bouncing back to the status quo becomes less appealing when we recognise that the system we created led us to where we are today. We have programmed and perpetuated a model that pursues economic growth at the expense of our planetary, social and emotional resilience. We have created the conditions to enable and increase the prevalence of the famous 'Black Swans' coined by Nassim Taleb. But in this problem lies the solution: capitalism can and must become the catalyst for change. The counter to the Black Swan is the Green Swan,[20] the solution capable of regenerating what has been diminished. These are the kinds of solutions that can drive us to resilience in what is set to be a critical decade for change.

INVESTING FOR RESILIENCE

As a global community we now have an opportunity to build back better. For investors this means directing our capital allocation and stewardship activities towards solutions that can drive systems change and transformation. **Investing to support resilience requires us to identify the solutions in the marketplace that can lay the foundations for longer-term recovery and regeneration, strengthening our social fabric while bringing us back within stable planetary boundaries.**[21] Some of these solutions already exist, many others will emerge in the years to come.

SOURCE: KATE RAWORTH, "DOUGHNUT ECONOMICS, 2017"; TRIBE IMPACT CAPITAL

At Tribe, we focus on many forms of resilience. We divide our range of resilience based investment opportunities into three categories which are integral to facilitating the systems change we want to see: infrastructural, planetary and human resilience:

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1 **Infrastructural Resilience: to strengthen our man-made environment and improve its capacity to withstand the various potential social-ecological disruptions on the horizon.**

DIGITAL INNOVATION Digital technology and software has the unique ability to support the delivery of all 17 UN Sustainable Development Goals (SDGs).[22] From the internet to smart phones and social media, digital technologies increase our capacity to connect and communicate. They enable us to form relationships and share knowledge, as

16 www.pas.va/content/dam/accademia/pdf/es41/es41-stiglitz.pdf
17 www.theguardian.com/world/2020/jul/19/covid-19-impact-on-ethnic-minorities-linked-to-housing-and-air-pollution
18 ibid
19 www.weforum.org/agenda/2020/03/biodiversity-loss-is-hurting-our-ability-to-prepare-for-pandemics/
20 volans.com/project/green-swans/
21 www.kateraworth.com/doughnut/
22 sdg.iisd.org/news/gesi-deloitte-report-analyzes-impacts-of-digital-technology-adoption-on-the-sdgs/

well as engage with political, educational, healthcare, and other welfare-based systems and opportunities. Moreover, digital innovations like Artificial Intelligence (AI) enable us to track, monitor and understand with greater clarity the changes unfolding in the world around us, so that our responses can be more targeted and precise. The rise of smart, connected devices and big data capabilities allow us to analyse and optimise our resource use, bringing significant efficiency benefits.[23] Digital technology and software also play a key role in crisis management, as we have witnessed during the Covid-19 pandemic with the successful shift to remote working for those who are able to. It's important to note that investing in digital innovation often requires careful consideration of data privacy and security risks, given the potential for personal data to be exploited and/or stolen. Companies operating in this space should have robust strategies in place to manage and mitigate these risks.

SUSTAINABLE CONSTRUCTION Our conventional modes of construction need to be reimagined as buildings currently account for roughly 39% of global energy-related carbon emissions[24] as well as significant volumes of water and material consumption. Numerous initiatives have been developed and are being used to promote the delivery of resource efficient buildings and refurbishments including, among others, the Passivhaus standard and the Dutch Energiesprong model. Technologies like high performance insulation, natural ventilation and heat recovery systems, natural daylighting systems, greywater recycling and onsite renewable power generation, to name a few, can be used to significantly reduce the operational resource footprint of buildings. Digital innovation also has a role to play in smart energy and water management systems which can drastically improve resource efficiency.

Beyond their operational impacts, buildings made using cement and concrete account for significant volumes of embodied carbon. A wide range of bio-based, renewable and recyclable materials show promise as alternative building materials, from bamboo,[25] hemp,[26] straw[27] and mycelium[28] to cork,[29] seaweed[30] and sustainably-sourced timber. Many of these are effective at locking in sequestered carbon and supporting biodiversity during their growth.

CLEAN AND RENEWABLE ENERGY & TRANSPORT The infrastructural shifts in support of renewable energy generation and low-carbon transportation will be critical enablers of cross-sectoral decarbonisation, to bring us in line with the 1.5°C warming goal outlined in the Paris Climate Agreement.

Renewable energy generation enables us to move away from pollutive fossil fuels and instead power our lives and economies in a cleaner, more affordable way. Renewable energy sources continue to prove increasingly cost-effective[31] and efficient across a range of technologies, including solar PV, onshore and offshore wind and geothermal power in relevant geographies. Ongoing advances in battery energy storage and smart grid technologies show promise for improving efficiency and balancing out the intermittency issues inherent in harnessing natural elements like sunshine and wind. While these technologies are critical in moving us towards a low-carbon future, as impact investors our due diligence must also pay close attention to the human rights impacts[32] and environmental impacts associated with renewable energy projects and battery supply chains.

The electrification of the transport sector is another essential infrastructural shift, and one that relies on affordable and reliable access to renewable power in order to deliver decarbonisation benefits alongside reductions in ambient air pollution. Electric vehicles will play a central role together with the promotion of walking, cycling and public transport. Innovations in vehicle-to-grid technology highlight the potential for electric vehicle batteries to help balance out power supply and demand while charging, which will enable the integration of more renewable power into the electricity grid. In addition to electrification, innovative fuels like green hydrogen could potentially become viable solutions for the decarbonisation of harder to reduce transport sectors like shipping and aviation. Meanwhile, connected and autonomous vehicles could help to shift us towards a more efficient ride-sharing economy while improving road safety and reducing air pollution.

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2 Planetary Resilience: to strengthen natural systems and their ability to function healthily so that planetary boundaries are respected, and the regenerative capacity of nature is supported.

CIRCULARITY The extractive, 'take-make-waste' model of production and consumption is no longer tenable, and it is now essential that we reconsider the way we design and make things, as well as what we do with materials afterwards. Shifting from a linear system to a more circular economy involves designing out waste in favour of closed loop systems, and extending the lifetime of products and materials so they remain in use for as long as possible.[33]

23 www.wired.com/wiredinsider/2018/07/industrial-iot-how-connected-things-are-changing-manufacturing/
24 www.worldgbc.org/embodied-carbon
25 www.rics.org/uk/news-insight/future-of-surveying/sustainability/natural-building-materials-bamboo/#:~:text=Bamboo%20has%20a%20long%20tradition,Guadua%20among%20the%20most%20common.
26 www.rics.org/uk/news-insight/future-of-surveying/sustainability/natural-building-materials-hemp/
27 www.biobasedpress.eu/2017/09/straw-excellent-construction-material/
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31 www.energynewsbulletin.net/outlook-analysis/news/1388226/renewables-cheaper-than-ever-before-irena
32 www.business-humanrights.org/en/from-us/briefings/renewable-energy-human-rights-benchmark/
33 www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy

This can be achieved using practices like modular product design, which makes it easier to repair and replace components within home appliances and portable electronic devices. The shift away from product ownership towards product-service systems [34] will also play a role in minimising resource use; examples include rental markets for bikes and clothing. Circularity requires focusing, wherever possible, on repairing and refurbishing products, reusing and recycling 'end-of-life' materials and diverting organic waste from landfill in favour of composting. By reducing demand for virgin materials and returning nutrients to soils, these kinds of circular practices can help natural systems to regenerate and recover from overexploitation and degradation. Circular investment opportunities exist within multiple industries. Some include the reclamation and recycling of plastic, metal, paper and food waste, the production of recycled-content and recyclable materials for use in packaging, construction and textiles, and the provision of refurbishment or repair services.

POLLUTION PREVENTION AND CONTROL Closely related to circularity is the need for all industries to reduce and better manage their waste streams in order to minimise the proliferation of pollutants which contaminate our land, air and water. Not only does toxic pollution undermine the resilience of sensitive marine and terrestrial ecosystems, it also has severe health impacts on communities. According to the Lancet, exposure to contaminated air, water and soil resulted in 16% of all global premature deaths in 2015.[35] As investors seeking solutions, we look for companies that offer waste treatment services, environmental remediation and clean-up services and pollution testing services. Other investment opportunities include utilities that provide sewerage services, and pollution control technologies like catalytic converters and scrubber systems which help eliminate harmful air pollution from industrial processes and transportation.

NATURAL CAPITAL PRESERVATION Building on the principles of circularity and pollution control, there's a need for frontline biodiversity protection and stewardship in order for our social-ecological systems (linked systems of people and nature) to regain their resilience. While investment opportunities are slightly harder to find in this sphere, we look for companies operating at the forefront of sustainable land use. Examples include companies involved in sustainable forestry, natural forest restoration and/or regenerative organic agriculture. These activities help to regenerate degraded land, support biodiversity and draw carbon down into trees and soils. In the interests of ecological resilience, these kinds of activities should be conducted with an understanding of local ecological conditions; they should prioritise sustainable land management practices and should involve a diversity of tree and crop species,[36] including those which are adapted to withstand different pests and to tolerate climatic changes like droughts and flooding. In the case of forestry, the end product should be intended to provide long-term carbon sequestration, for example in the construction industry as opposed to the biomass industry.

CLEAN WATER PROVISION Water is the basis of life, yet global water resources for drinking and sanitation are increasingly under threat due to over-abstraction, pollution and climatic changes which are exacerbating physical water scarcity. In 2017, roughly 785 million people around the world lacked access to basic drinking water services, meaning they either had to travel for more than 30 minutes to collect water or were reliant on unprotected wells and springs, or untreated rivers and lakes.[37] Investing for resilience in this sphere means investing to expand access to safe and affordable water that is sustainably managed and conserved. Investment opportunities include the extension and upgrade of global wastewater treatment and water distribution infrastructure, as well as innovative technologies enabling water reuse and water efficiency. In addition to sustainable water utilities, technologies like closed-loop water systems for industrial cooling, micro-irrigation technologies to reduce agricultural water use and water-efficient bathroom and kitchen appliances are all investible solutions.

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3 Human Resilience: to empower individuals and communities so that they're able to access affordable basic services including healthcare, clean water, nutritious food, dignified employment, basic financial services, high-quality education and digital connectivity.

FOOD SECURITY From deforestation-linked monocultures to industrial livestock production, our food systems are largely predicated on carbon-intensive and ecologically harmful production techniques and poor nutritional content. Roughly 2 billion people, or 26% of the global population, experienced moderate or severe food insecurity in 2018.[38] Global food value chains have been disrupted during the Covid-19 pandemic and will continue to be disrupted by the effects of climate change, which will undoubtedly exacerbate hunger and food insecurity into the future. At the same time, poor nutrition manifests in the form of rising levels of obesity and diabetes, with roughly 1 in 3 people considered overweight or obese globally.[39] As impact investors, we're interested in supporting those companies providing access to affordable, healthy and nutritious foods, grown using regenerative organic agricultural practices[40] that improve rather than undermine soil health.

34 www.vlaanderen-circulair.be/en/knowledge/what-is-it/product-service-systems
35 marlin-prod.literatumonline.com/pb-assets/Lancet/stories/commissions/pollution-2017/Pollution_and_Health_Infographic.pdf
36 www.sciencedaily.com/releases/2020/06/200622133012.htm
37 www.who.int/news-room/fact-sheets/detail/drinking-water
38 sdgs.un.org/goals/goal2
39 globalnutritionreport.org/reports/2020-global-nutrition-report/executive-summary/
40 rodaleinstitute.org/why-organic/organic-basics/regenerative-organic-agriculture/

The application of technology for resource-efficient, climate-smart agriculture is also of interest. We continue to focus on the plant-based revolution, from both a nutritional and environmental standpoint, given the many issues embedded in conventional protein and dairy production.

EDUCATIONAL AND ECONOMIC EMPOWERMENT There are significant inequalities, both within and between nations, in terms of access to high quality education, dignified employment and basic financial services. These provisions play a significant role in breaking the cycle of poverty and improving human and emotional resilience, however, many of these inequalities have been exacerbated during the Covid-19 crisis. In 2018, at least 17% or 258 million children and young people between the ages of 6 and 17 were out of school.[41] Meanwhile, 61% of all workers globally were in informal employment in 2016,[42] and in 2019 an estimated 12.8% of young workers were living in extreme poverty.[43] Many workers lack basic employment provisions like fair wages, sick pay, maternity leave, holiday entitlements, freedom of assembly and association and fair grievance mechanisms. At the same time, some 1.7 billion adults don't have access to a bank account to manage their savings and transactions.[44] As impact investors, we pay close attention to the nature and quality of jobs offered by the companies in our universe. We also look for opportunities to support the democratisation of affordable, high quality education and financial services so that everyone can be empowered by access to knowledge, as well as financial literacy and agency. Investment opportunities include banks which offer financial services like microlending and mobile savings accounts, as well as learning materials and digital learning platforms.

HEALTHCARE ACCESS & INNOVATION Our ability to diagnose and treat complex communicable and non-communicable diseases is more advanced than ever, given the accumulation of medical expertise over centuries and our ability to develop new and effective medicines. Recent progress in mental health awareness and support provision is also encouraging. However, global health outcomes remain hugely unequal and these health inequalities have been starkly exposed throughout the Covid-19 pandemic. While medical innovations in the pharmaceutical and biopharmaceutical industries provide hope, concerns remain around the use of animal testing, as well as restrictive price fixing behaviour and product safety within these industries. As impact investors, we remain conscious of these issues and pursue investment opportunities that truly support the expansion of safe and affordable healthcare services and treatments. Examples include the provision of digital health services, the production of life-saving medical devices and equipment used in drugs manufacturing.

RESILIENCE FOR THE FUTURE

Resilience must be central to investment narratives over the next decade and beyond as we address and confront pressing environmental and social challenges. To strengthen infrastructural, planetary and human resilience our focus as impact investors has to be on the systems we inhabit in order to better understand the interventions that are likely to drive the change required. The investment toolkits that have been deployed over the last 45 years need to be reimagined and pivoted towards rigorous impact analysis, monitoring, measurement and engagement to achieve these goals. The investible opportunities that are currently available and will continue to become available are numerous and far-reaching. In order to harness their collective power we must, as investors, work harder to understand the relationship between them by adopting systems thinking. Resilience, therefore, becomes less of a theme and more the lens through which everything needs to be rebuilt.

41 sdgs.un.org/goals/goal4
42 sdgs.un.org/goals/goal8
43 sdgs.un.org/goals/goal1
44 www.worldbank.org/en/news/press-release/2018/04/19/financial-inclusion-on-the-rise-but-gaps-remain-global-findex-database-shows

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