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The Importance of Biodiversity Risks

Initial Position Paper

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Abstract

This paper highlights the urgent need for actuaries to take into account the importance, perils and impacts of global biodiversity risks. The Biodiversity and Natural Capital Working Party has been set up to take forward a series of activities including think pieces, webinars and external engagement to ensure our proactive engagement with these risks.

Keywords

Biodiversity; Natural Capital; Public interest; Professional duty

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Introduction

The aims of this paper is to introduce key issues relating to biodiversity loss and how they may impact actuarial advice. This is intended to serve as a discussion point to set up further work where deeper investigation into specific issues can be undertaken.

Biodiversity is defined by the Convention on Biological Diversity as diversity of species, variation of genes and different ecosystems (CBD, 2018). There are more than 10 million different species of animals, plants, fungi and microorganisms on earth (WWF/pwc, 2020), and humanity depends on this biodiversity to survive and thrive.

In its Global Risks Report 2020, the World Economic Forum (2020) ranked biodiversity loss and ecosystem collapse as one of its top five global risks in terms of both likelihood and impact. Recent studies have suggested that the mass degradation of natural habitats has led to a significant proportion of original biodiversity being lost worldwide (IPBES, 2019), with global wildlife populations declining by as much as 60% in the last 50 years (WWF/pwc, 2020).

The loss of biodiversity threatens the health of ecosystems that provide services to the economy, including animal pollination of food crops, natural water treatment and fertile soil. The WWF has gone one step further and attempted to quantify the economic impact of biodiversity loss in its Global Futures Report (WWF, 2020). It suggests that if biodiversity loss continues at its current trajectory it will result in a total loss of US\$10 trillion in global GDP by 2050 (WWF, 2020).

Looking beyond services to the economy, the loss of biodiversity and healthy ecosystems also contributes to the acceleration of climate change. Deforestation, for example, is responsible for as much as 30% of global greenhouse gas emissions each year and has the second order effect of reducing future natural carbon capture capabilities.

It is important to also reflect upon how the health of our planet plays an important role in the emergence and spread of infectious diseases. The Dasgupta Review (HM Treasury, 2021) suggests that biodiversity loss, land use change and increased contact points between people and wildlife which carry zoonotic pathogens, ultimately leads to spill-over infections where pathogens are transmitted from animals to human hosts. Our experience with COVID-19 further emphasises the importance of biodiversity for our health and that of the global economy.

One way in which biodiversity could be protected is by measuring its economic value. Nature has been described in terms of “natural capital”, whereby nature is valued based on the natural resources it contains and the ecosystem services it provides for economic and social well-being. There are however merits and limitations with this approach, and there is no emerging consensus at present as to whether this is the best way to frame the issue (Anderson, 2018).

Biodiversity loss has also been gaining an increasing amount of publicity in mainstream and social media in recent months. Recent examples include coverage of the 2020 UN Biodiversity Summit and communications from influential public figures such as David Attenborough on the issue.

Case study – Dutch Nitrogen crisis

The Netherlands is currently facing a “stikstofcrisis” (nitrogen crisis). The Netherlands is one of the most highly polluting countries in the EU and needs to cut down its greenhouse gas emissions significantly to align to the goals of the Paris Agreement. One of the key drivers of nitrogen emission rules in the Netherlands is the protection of biodiversity. Nitrogen is contained in fertilizers which are used significantly in a country which is heavily dependent on agriculture, however not all fertilizers are absorbed by the crops and wash into the surrounding areas.

This promotes the growth of plants such as algae which ultimately limits biodiversity. Furthermore, algal blooms affect the quality of surface water used for drinking water production, due to the by-products of dying algae and the loss of self-restoration of the rivers. Disruption to surface water also affects certain factories which use the surface water for their processes (such as power plants for cooling), as well as having a detrimental impact on the food supply of crop pollinators such as bees.

This crisis has put 14 billion Euros of construction projects at risk with the high court suspending permits for projects that contribute further to nitrogen pollution (Stokstad, 2019).

Political and regulatory context

There is a growing recognition amongst governments, policymakers, institutions and society of the risks posed by biodiversity loss. For example:

- The 2021 UN Convention on Biological Diversity (CBD) is being held in Kunming, China, and sets out to conserve global biological diversity, the sustainable use of its components and the fair and equitable sharing of its benefits.
- The European Green Deal includes a new biodiversity strategy (EC, 2020), which aims to ensure the European economy functions within planetary boundaries.
- As part of the European Green Deal the European Commission is proposing a revision to the Regulation on European Environmental Economic Accounts to include natural capital accounting and have launched a statistical framework to include biodiversity (DG Env, 2021).
- In 2021, the UK Treasury published The Dasgupta Review, a global review on the economics of biodiversity (HM Treasury, 2021).
- An informal working group has been set up to establish a Task Force on Nature-Related Financial Disclosures (TNFD) to address data gaps in nature related risks (UNEP FI, 2020).
- The CRO Forum, which has members representing some of the largest insurers in the world, identified the following five areas relating to biodiversity in its 2020 Emerging Risk Radar (CRO Forum, 2020) as medium risk: Resource scarcity; New frontiers for resource extraction; Environment pollution; Food and water supply; Plastics and microplastics.

Implications for actuaries' work

The risks associated with destruction of the environment and loss of biodiversity are hard to quantify due to their long-term, uncertain and intangible nature. The management and measurement of these risks is a field where actuaries are well placed to contribute. These risks will also have a material effect on the principal areas of actuarial work and so should be taken into account when we carry out our work. Biodiversity risks will also have economy wide impact on a number of different stakeholders. A key role actuaries have traditionally played is in ensuring fairness between different groups of stakeholders (e.g. policyholders/shareholders or scheme members/sponsors). These skills make us well placed to inform and influence the public debate on this important topic.

Another viewpoint is that past economic growth has relied on running down natural capital, and therefore measurement of economic growth has been overstated by not taking this impact into account (Brandt, Schreyer & Zipperer, 2017; England, 2000). This implies extrapolating past growth trends into the future may be unreliable. Therefore, biodiversity risk, alongside climate risk, could represent a systemic risk to the economy.

Material financial risk

The consequences of biodiversity loss can be classified in a similar way to that commonly used for climate change (PRA, 2019):

- **Physical risks** – are direct effects on businesses and assets. For example, industries dependant on pollination will be exposed to lower yields and higher production costs. More dramatically, biodiversity loss can worsen the losses caused by natural disasters. The devastating tsunami that hit South East Asia in 2004 led to greater damage to areas with depleted coastal mangrove cover, due to the loss of the natural defence (WWF/pwc, 2020).
- **Transition risks** – are the indirect impacts of a transition to an economy that conserves and restores biodiversity. The political initiatives above show that momentum is building towards stricter regulation, which could make some current business practices more costly or unviable. This also encompasses reputational risks for companies exposed to poor environmental practices, such as the overuse of palm oil, as well as opportunities for companies able to innovate quickly.

Some commentators also cite **litigation risk** (claims for compensation for biodiversity-related losses) and **systemic risk** (to the smooth functioning of the wider financial system) as further categories.

Example: A study on the Dutch financial sector (DeNederlandscheBank, 2020) found that, of investments by Dutch financial institutions, a total of EUR 510 billion was highly or very highly dependent on one or more ecosystem services. This represented 36% of the portfolio of more than EUR 1,400 billion.

Professional duty

Given the risks highlighted above, actuaries have a professional duty to take account of it in their advice, where relevant and material. Some areas of actuarial work that could be affected include:

- **Insurance** - Increased severity of natural disasters facilitated by the loss of biodiversity leading to an increase in claims across a range of business lines including liability, home and motor. Increased business interruption claims due to supply chain disruption (e.g. crop failures).
- **Pensions** – Weaker covenant for scheme sponsors exposed to biodiversity loss or whose business model relies on natural capital. Asset return models based on past rates of economic growth may be invalid, impacting valuation discount rates
- **Mortality & Morbidity** – Long term mortality and morbidity trends could be affected, for example through increased air pollution, increased possibility of pandemics or a more constrained and less varied food supply as well as changes to access to nature which could have a detrimental effect on mental health.

- **Investment** - Biodiversity loss may result in a reduction in asset value for particular investments and may lead to increased stranded asset risk.

While climate change risk is often referred to explicitly in law or has been added to additional guidance and clarification by regulators, biodiversity loss does not yet have this profile. However, institutional investors are required to take account of Environmental, Social and Governance (ESG) issues (for example, the new requirements for a pension scheme's Statement of Investment Principles). Biodiversity loss, as a key environmental risk, would be covered by these requirements.

Public interest

Serving the public interest is a key duty of the Institute & Faculty of Actuaries (IfOA, 2020), and the issues raised in this paper are clearly relevant to the public interest. Therefore, the actuarial profession has a responsibility to support the development of a sector approach to the issue of biodiversity loss.

Next Steps

We recommend that actuaries further enhance their knowledge in the area of biodiversity through engaging with the further reading list on the Institute & Faculty of Actuaries webpages, as well as the further papers that accompany this overview and others that will emerge from the Biodiversity and Natural Capital Working party over time.

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References

- Anderson, V., (eds) (2018), *Debating Nature's Value: The Concept of 'Natural Capital'*, Palgrave MacMillan, London, UK
- Brandt, N., Schreyer, P. & Zipperer, V. (2017), *Productivity Measurement with Natural Capital*, *Review of Income and Wealth*, 63, S7– S21
- CBD, (2018), *Biodiversity is essential for sustainable development and human well-being*, *Convention on Biological Diversity*, Available online: <https://www.cbd.int/article/biodiversityforSDGs> [Accessed 7 April 2021]
- CRO Forum, (2020), *Emerging Risk Initiative – Major Trends and Emerging Risk Radar – 2020 update*, CRO Forum, The Netherlands, Available online: <https://www.thecroforum.org/2020/06/30/emerging-risk-initiative-major-trends-and-emerging-risk-radar-2020-update/> [Accessed 7 April 2021]
- DeNederlandscheBank, (2020), *Indebted to nature. Exploring biodiversity risks for the Dutch financial sector*, DeNederlandscheBank, The Netherlands, Available online: <https://www.pbl.nl/en/publications/indebted-to-nature> [Accessed 7 April 2021]
- DG Env, (2021), *Biodiversity: ground-breaking change to economic reporting accounting for nature's contribution to economy*, Directorate-General for Environment, European Commission, Brussels, Belgium. Available online: https://ec.europa.eu/environment/news/biodiversity-ground-breaking-change-economic-reporting-accounting-natures-contribution-economy_en [Accessed 7 April 2021]
- EC, (2020), *EU Biodiversity Strategy for 2030: Bringing nature back into our lives*, European Commission, Brussels, Belgium, Available online: <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590574123338&uri=CELEX:52020DC0380> [Accessed 16 April 2021]

England, R.W., (2000), Natural capital and the theory of economic growth, *Ecological Economics*, 34 (3), 425-431,

HM Treasury (2021), *The Economics of Biodiversity: The Dasgupta Review*, HM Treasury, London, UK

IfoA, (2020), *Institute and Faculty of Actuaries: Strategy 2020-2024*, Institute & Faculty of Actuaries, London, UK, Available online: <https://www.actuaries.org.uk/system/files/field/document/IFoA-strategy-2020.PDF> [Accessed 7 April 2021]

IPBES, (2019), *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany.

PRA, (2019), *Enhancing banks' and insurers' approaches to managing the financial risks from climate change*, Bank of England: Prudential Regulation Authority, Supervisory Statement SS3/19, London, UK, Available online: <https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2019/ss319> [Accessed 7 April 2021]

Stokstad, E., Nitrogen crisis threatens Dutch environment – and economy, *Science*, 366 (6470), 1180-1181

UNEP FI, (2020), *Taskforce on Nature-related Financial Disclosures (TNFD) gathers momentum*, UN Environment Programme Finance Initiative, Geneva, Available online: <https://www.unepfi.org/news/themes/ecosystems/tnfd-informal-working-group/> [Accessed 7 April 2021]

World Economic Forum, (2020), *The Global Risks Report 2020*, World Economic Forum, Davos, Switzerland, Available online: <https://www.weforum.org/reports/the-global-risks-report-2020> [Accessed 7 April 2021]

WWF/pwc, (2020), *Nature is too Big to Fail*, PwC Switzerland & WWF Switzerland, Available online: https://wwfeu.awsassets.panda.org/downloads/nature_is_too_big_to_fail_en_web.pdf [Accessed 7 April 2021]

WWF (2020), *Global Futures: modelling the global economic impacts of environmental change to support policy-making*, WWF, Global Trade Analysis Project & Natural Capital Project, Available online: https://www.wwf.org.uk/sites/default/files/2020-02/Global_Futures_Technical_Report.pdf [Accessed 7 April 2021]



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