Big Tech, Small Planet:

Assessing Microsoft and Sony's Environmental Policies and Impacts

By Tiffany Gibert, University of Edinburgh

Figure 1 Projected Microsoft and Sony logos (Reuters, 2019)

I. Introduction

As humans progress into and through the Digital Revolution and the Information Age, the ways and means by which we interact with and affect the environment inevitably shift (Bojanova, 2014). The current Anthropocene epoch is characterized by humanity's vast impact on the biosphere (Ruddiman, 2013); technological progress is at once innovating solutions to these impacts and affecting the world in new ways.

During the twentieth century, technology companies boomed. In Tokyo, Japan, in 1946, Masaru Ibuka founded Tokyo Tsushin Kogyo K.K., now known as Sony Corporation (Sony, n.d.). In 1975, Bill Gates and Paul Allen founded the now iconic Microsoft Corporation (Microsoft, 2018b).

As both corporations have matured, they have explicitly incorporated sustainability and environmental concerns into company priorities. This case study assesses those priorities, how well the companies are delivering on their promises, and to what extent the company policies may benefit global ecosystems.

II. Environmental values in the technology industry

Sony's approach to environmental responsibility encompasses: influencing partners in the supply chain; implementing company initiatives; and appealing to consumers (Sony, 2017). Similarly, Microsoft focuses on reducing operational impacts; reducing partners' ecological footprints; and supporting innovation and policies for sustainability (Microsoft, 2019).

To document these aims and remain accountable, both companies publish annual social responsibility reports, aligned with the Global Reporting Initiative (GRI) standards and other indicators, including the Sustainable Development Goals. Sony follows specific goals outlined in two environmental plans: Road to Zero and Green Management 2020 (Sony, 2015). Microsoft has not published a comprehensive environmental plan but instead outlines principles across thematic areas on its Environment website. As outlined in Table 1, Microsoft's softer principles do not include as many measurable goals as Sony's roadmap, though the two companies do overlap on the majority of focus areas.

With high profiles in the global marketplace, Sony and Microsoft report thoroughly and regularly on activities and detail the reporting process each year. Using OECD's indicators of content and scope for environmental reporting (2003), we find that Microsoft consistently shares quantitative

Table 1: Sony and Microsoft Environmental Goals

Focus Area	Sony	Microsoft
General Goals	Reduce the environmental footprint of Sony's business activities and products throughout their life cycle to zero by FY2050[1]	Empower every person and organization on the planet to thrive in a resource-constrained world[3]
Carbon Emissions	Reduce absolute GHG emissions at Sony sites by 5% by FY2020 (equivalent to 42% reduction vs. FY2000)[2]	Reduce operational carbon emissions 75% by 2030[4]
Water Use	Reduce absolute water usage at Sony Sites by 5% by FY2020 (equivalent to 45% reduction vs. FY2000)[2]	Enable the creation of tools and services to help address the world's water challenges, including scarcity, pollution, and ocean health[4]
Energy Use	Reduce energy consumption of AC powered devices by 30% by FY2020[2]	Grow the percent of wind, solar, and hydropower energy purchased directly and through the grid to 50 percent by 2018, 60 percent early in the next decade, and to an ongoing and higher percentage in future years beyond that[3]
Waste reduction	Aim at the high-level return of waste to a form in which it can be used as a resource by acquiring a clear grasp of recycling key resources[2]	Divert at least 90 percent of operational waste from landfills[3]

[1] Sony, 2018a; [2] Sony, 2015; [3] Microsoft, 2017b; [4] Microsoft, 2019a

data (Microsoft, 2017b; Microsoft, 2019), while Sony reports quantitative data, compares performance with targets, and relies on third-party verification (Sony, 2017; Sony 2018a). Both companies are members of numerous collectives that provide external audits, regulations, and recognition for environmental service, e.g., the Responsible Minerals Initiative, and both have also acquired ISO 14001 certification, the global standards for environmental management (Sony, 2017; Microsoft, 2018a).

Microsoft frequently highlights the AI for Earth initiative, which is awarding $50 million in grants to projects that use artificial intelligence to address issues of climate, agriculture, biodiversity, and water (Microsoft, 2019b). Conversely, Sony frames its sustainability efforts as reducing "the impact of its business activities," with fewer references to innovation and partnership (Sony, 2018a).

The language of the company's core environmental statements reflect these differences. Whereas Sony "strives to achieve a zero environmental footprint throughout the lifecycle of our products and business activities" (Sony, 2018a) Microsoft " is committed to leveraging technology to solve some of the world's most urgent environmental issues—focusing on areas where we can have the most positive impact" (Microsoft, 2019a).

As corporate environmental stewards, Microsoft leverages its staff and resources to solve *external* problems, and Sony strives to improve *itself* as a company to the greatest degree.

III. Sony and Microsoft's national and global environmental impacts

To assess company impact, this case study focuses on two environmental priorities: waste and greenhouse gas (GHG) emissions. As manufacturers, Microsoft and Sony have the burden of waste, including electronic waste, packaging, and extractive waste from source materials. The United Nations Environment Programme reports that e-waste is the fastest-growing waste stream due to "increased consumer demand, perceived obsolesce, and rapid changes in technology" (Wilson *et al.*, 2015). Regarding emissions, both the manufacturing and operation of the companies' consumer electronics (e.g., cell phones, computers, gaming consoles) require energy use that is expanding with the industries (Malmodin, 2010; Suckling & Lee, 2015; Belkhir & Elmeligi, 2018). A recent analysis of information and communication technologies predicts that, if unchecked, the sector will grow to contribute 14% of GHG emissions by 2040 (Belkhir & Elmeligi, 2018).

Greenhouse gas emissions

Microsoft and Sony are both multinational companies, with various regulations that affect their business practices. In the United States, the national government plans to withdraw from the Paris Agreement and eliminate other climate-related policies, such as the Clean Power Plan (Eshraghi, de Queiroz, and DeCarolis, 2018). In reaction, a group of state governors has committed to the country's Paris Agreement contribution: reducing GHG emissions to 26−28% below 2005 levels by 2025 (United States Climate Alliance, 2019). The national government of Japan aims to achieve its Paris Agreement target of 25.4% reduction of 2005 emission levels by 2030 (Ministry of Foreign Affairs Japan, 2016).

Both Microsoft and Sony have received recognition for their initiatives to reduce GHG emissions, including "A" ratings for climate change from CDP, a global network for environmental data (2019). But despite professed commitment, neither company has made

significant progress in decreasing emissions—both average a year-to-year increase in GHG emissions (Table 2). Unsurprisingly, these increases are not highlighted in any reporting. Microsoft, instead, consistently reports that its global operations have been “carbon neutral" since 2012 and has pledged to reduce carbon emissions by 75% against a 2013 baseline (2019a). Similarly, in 2017 reporting, Sony highlights its achievement of reducing GHG emissions *cumulatively* since 2015, without mentioning the increase from 2016 to 2017 (Sony, 2018a).

Table 2: GHG Emission Changes (from previous year)

	2014	2015	2016	2017	Cumulative change from 2013
Japan	-3%[1]	-3%[1]	-0.2%[1]	-1.2%[1]	-7.2%
Sony	-3.2%[2]	+28%[2]	-13.8%[2]	+4.8%[2]	+11.9%
United States	+0.7%[3]	-2.0%[3]	-1.9%[3]	-0.5%[3]	-2.7%
Microsoft	+21.3%[4]	-2.8%[4]	+1.4%[4]	+3%[4]	+23.1%

[1] Ministry of the Environment of Japan, n.d.; [2] Sony, 2018; [3] United States Environmental Protection Agency, n.d.; [4] Microsoft, 2017a

These facts do not suggest that either company is not committed to its environmental goals, only that honest communication about setbacks and challenges has not been achieved.

Waste

Containing both hazardous waste and valuable metals, often still functioning but obsolete, e-waste poses new problems to global waste management. As Figure 2 highlights, due to lack of infrastructure, the majority of e-waste flows without oversight into landfills and low-income countries (Baldé *et al.*, 2015). In a dump in Ghana, that amounts to 192,000 annual tonnes of e-waste, which pollutes the water, air, and soil and impairs local workers (Wilson *et al.*, 2015).

In Japan, Sony falls under national regulations for “Extended Producer Responsibility,” a program in which the manufacturer is responsible for managing the end-of-life-cycle product waste (Baldé *et al.*, 2015). Microsoft also manages return and recycle of its products and refurbishes some devices, without federal regulation (Microsoft, 2018a).

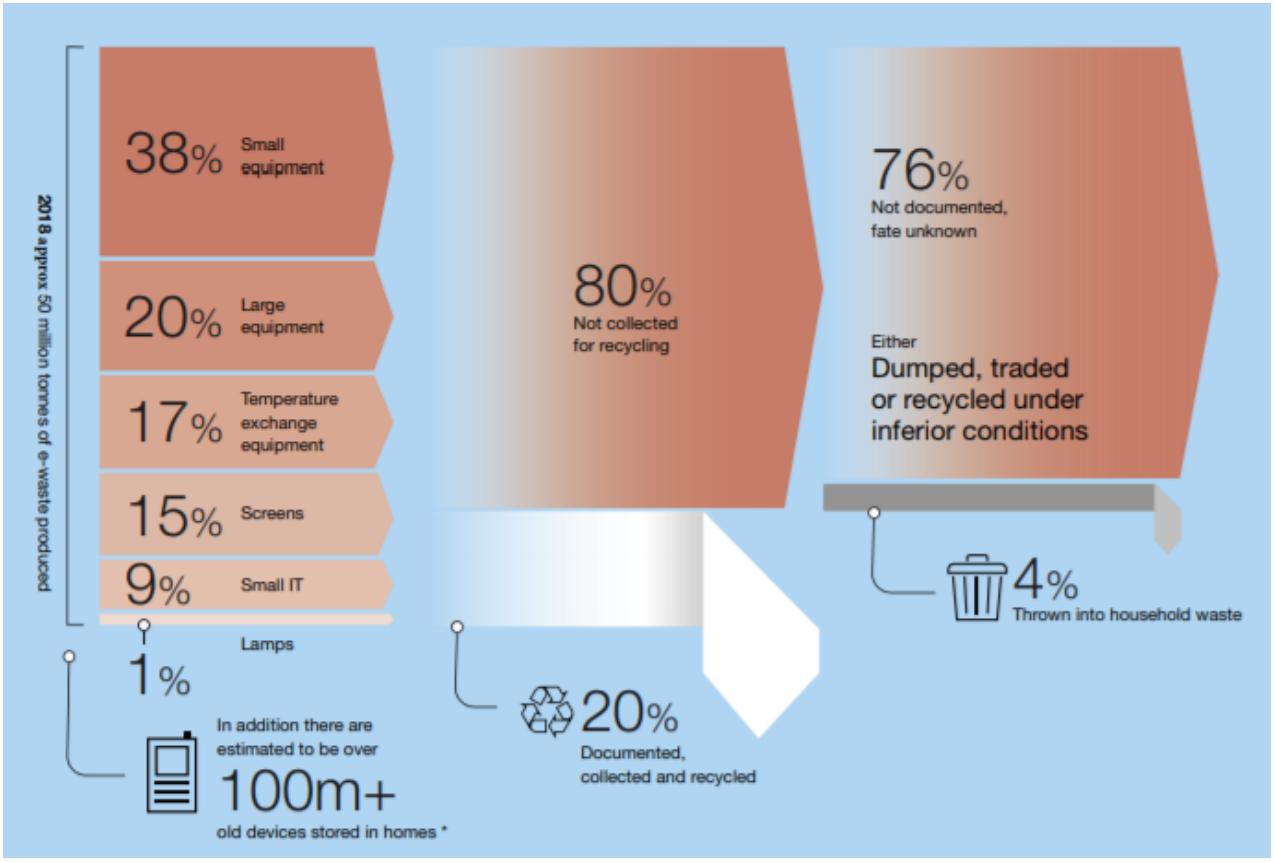

Figure 2 Global e-waste flows (World Economic Forum, 2019)

Microsoft reports yearly increases in recycled e-waste volume, while Sony's data reflects more fluctuations in collection (Table 3). However, these reported numbers do not account for the simultaneous increased rates of *production.* Microsoft, for example, shipped 192.7 million devices in 2018 (Microsoft, 2018a). In sharing this information, Microsoft juxtaposes the divide between business revenue and environmental considerations. Sony, in comparison, shipped 39.2 million items of electronics in 2018 (Sony, 2018b), while consistently collecting six to eight times as much e-waste as Microsoft.

Table 3: Recycled E-waste (in metric tons)

	2013	2014	2015	2016	2017
Sony[1]	66,000	74,000	68,000	77,000	75,000
Microsoft[2]	8,021	9,302	10,008	11,848	12,038

[1] All data from Sony, 2018a.; [2] All data from Microsoft, 2018a

IV. The ecological future of big tech

These companies can provide new pathways toward sustainability—Microsoft, for example, partnered to create a Water Risk Monetizer tool that helps organizations make responsible water management decisions (Microsoft, 2017b). However, as multinational companies that manufacture, transport materials, and host about 258,000 employees, the policies they implement affect ecosystems across the globe (Sony, 2018a; Microsoft, 2018b).

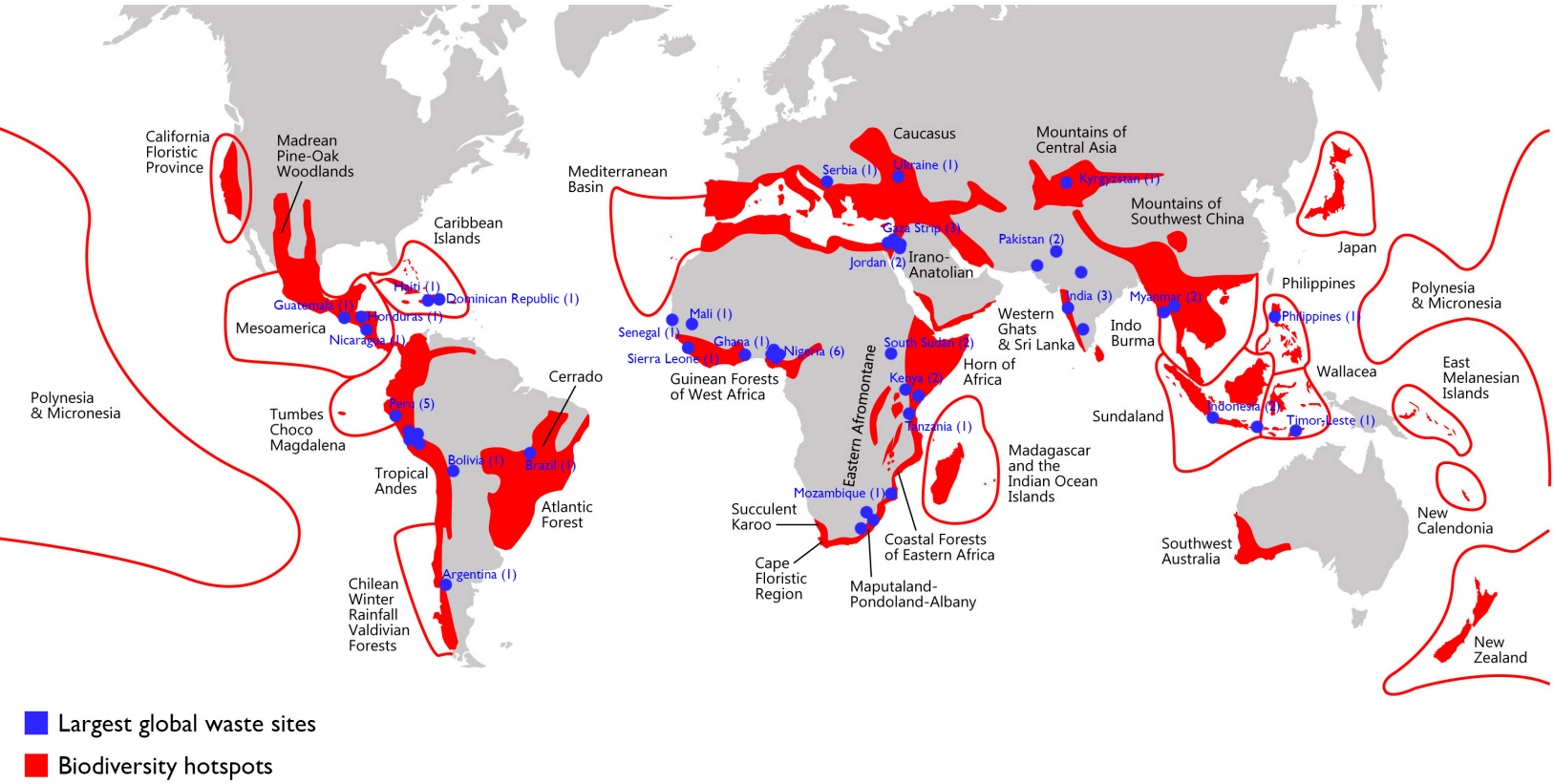

Figure 3 Map of biodiversity hotspots and global dump sites (Developed from UNEP, 2015)

By overlaying the world's biggest dump sites onto biodiversity hotspots (Figure 3), the overlap of waste and biodiversity is visualized (UNEP, 2015). As contributors to the fastest growing waste stream, Microsoft and Sony's commitments to recycle and refurbish can affect human and environmental health. Without proper processing, e-waste is likely to leach pollutants into terrestrial and marine ecosystems (Baldé, *et al.,* 2017). Consequently, heavy metals can degrade groundwater and accumulate in plant life (Awasthi, Zeng, and Li, 2016). Additional studies have

found evidence that e-waste dumps negatively affect bird species richness, density, and diversity (Zhang *et al.*, 2015) and may contribute to amphibian declines (Wu *et al.*, 2009).

The effects of GHG emissions on ecosystem health are enumerated in countless studies. The Intergovernmental Panel on Climate Changes provides an overview of highly likely events, including: extreme temperatures; regional increases in droughts and/or precipitation; spread of invasive species; increased extinction rates; marine ecosystem degradation; ocean acidification, and much more (2018). Though Microsoft and Sony have committed to transitioning to renewable energy and to limiting GHG emissions, Table 2 data reveal that these shifts are not happening quickly enough to combat the urgency of climate change.

This case study highlights the need for better understanding of technology's environmental impacts; though often posed as the "solution" to many problems, the industry affects the biosphere and global systems in complex ways. In the face of global consumerism, the environmental governance of manufacturers can change the paradigm, from technology for short-lived satisfaction to design for repair and reuse.

References

Awasthi, A. K., Zeng X., & Li, J. (2016). Environmental pollution of electronic waste recycling in India: A critical review. *Environmental Pollution*, 211, pp. 259–270.

Baldé, C.P., *et al.* (2015). The global e-waste monitor – 2014. United Nations University, IAS – SCYCLE, Bonn, Germany.

Baldé, C.P., *et al.* (2017). The Global E-waste Monitor – 2017. United Nations University (UNU), International Telecommunication Union (ITU) & International Solid Waste Association (ISWA), Bonn/Geneva/Vienna.

Belkhir L., & Elmeligi, A. (2018). Assessing ICT global emissions footprint: Trends to 2040 & recommendations. *Journal of Cleaner Production*, 177, pp. 448–463.

Bojanova, I. (2014). The digital revolution: What's on the horizon? *IT Professional*, 16(1), pp. 8–12.

CDP (2019). U.S. corporate scores 2018 [online]. Available from: https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/362/original/CDP_US_Scores_2018.pdf?1556008248 [Accessed 10 May 2019]

Eshraghi, H., de Queiroz, A. & DeCarolis, J. (2018). US energy-related greenhouse gas emissions in the absence of federal climate policy. *Environmental Science & Technology*, 52(17), pp. 9595–9604.

IPCC (2018). *Global warming of 1.5°C*. World Meteorological Organization, Geneva, Switzerland, 32 pp.

Malmodin, J. *et al.* (2010). Greenhouse gas emissions and operational electricity use in the ICT and entertainment & media sectors. *Journal of Industrial Ecology*, 14(5), pp. 770–790.

Microsoft (2017a). Data fact sheet: Environmental indicators [online]. Available from: https://www.microsoft.com/en-us/corporate-responsibility/environmental-sustainability [Accessed 5 May 2019]

Microsoft (2017b). 2017 Corporate social responsibility report [online]. Available from: http://download.microsoft.com/download/0/0/6/00604579-134B-4D0E-97C3-D525DFB7890A/Microsoft_2017_CSR_Annual_Report.pdf [Accessed 5 May 2019]

Microsoft (2018a). Devices sustainability at Microsoft: Fiscal Year 2018 report [online]. Available from: https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RWovpA [Accessed 5 May 2019]

Microsoft (2018b). Facts about Microsoft [online]. Available from: https://news.microsoft.com/facts-about-microsoft/ [Accessed 18 May 2019]

Microsoft (2019a). 2018 corporate social responsibility report [online]. Available from: https://www.microsoft.com/en-us/corporate-responsibility [Accessed 5 May 2019]

Microsoft (2019b). AI for Earth grants [online]. Available from: https://www.microsoft.com/en-us/ai/ai-for-earth-grants [Accessed 18 May 2019]

Ministry of the Environment Japan (n.d.). What's new [online]. Available from: https://www.env.go.jp/en/news/index.html [Accessed 11 May 2019]

Ministry of Foreign Affairs Japan (2016). Intended nationally determined contributions (INDC): Greenhouse gas emission reduction target in FY2030 [online]. Available from: https://www.mofa.go.jp/ic/ch/page1we_000104.html [Accessed 11 May 2019]

OECD (2003). An overview of corporate environmental management practices: Joint study by the OECD Secretariat and EIRIS [online]. Available from: https://www.oecd.org/daf/inv/corporateresponsibility/18269204.pdf [Accessed 5 May 2019]

Reuters (2019). Microsoft and Sony logos [online image]. Available from: https://gadgets.ndtv.com/games/news/microsoft-sony-partner-on-streaming-games-chips-and-ai-2038858 [Accessed 18 May 2018]

Ruddiman, W. F. (2013). The Anthropocene. *Annual Review of Earth and Planetary Sciences*, 41(1), pp. 45–68.

Sony (n.d.) Corporate history [online]. Available from: https://www.sony.net/SonyInfo/CorporateInfo/History/history.html [Accessed 11 May 2019]

Sony (2015). Green management 2020 [online]. Available from: https://www.sony.net/SonyInfo/csr/SonyEnvironment/ourvision/GM2020/ [Accessed 11 May 2019]

Sony (2017). CSR report 2017 [online]. Available from: https://www.sony.net/SonyInfo/csr/library/reports/sis4ug000000jyws-att/CSR2017E_PDF_all_e.pdf [Accessed 5 May 2019]

Sony (2018a). Sustainability reporting 2018 [online]. Available from: https://www.sony.net/SonyInfo/csr/library/reports/sis4ug000000jyws-att/CSR2018E_PDF_all.pdf [Accessed 4 May 2019]

Sony (2018b). Supplemental information for the consolidated financial results for the fourth quarter 2018 [online]. Available from: https://www.sony.net/SonyInfo/IR/library/presen/er/pdf/18q4_supplement.pdf [Accessed 11 May 2019]

Suckling, J. & Lee, J. (2015). Redefining scope: the true environmental impact of smartphones? *The International Journal of Life Cycle Assessment*, 20(8), pp.1181–1196.

United Nations Environment Programme (2015). World's 50 biggest dump sites [image]. In *The global e-waste monitor – 2014*.

United States Climate Alliance (2019). About: Governors [online]. Available from: https://www.usclimatealliance.org/governors-1 [Accessed 11 May 2019]

United States Environmental Protection Agency (n.d.). Greenhouse gas inventory data explorer [online]. Available from: https://cfpub.epa.gov/ghgdata/inventoryexplorer/ [Accessed 5 May 2019]

Wilson, D. C. *et al.* (2015). *Global Waste Management Outlook.* United Nations Environment Programme: Kenya.

World Economic Forum (2019). Global e-waste flows [image]. Available from: https://www.weforum.org/agenda/2019/01/how-a-circular-approach-can-turn-e-waste-into-a-golden-opportunity/ [Accessed 18 May 2019]

Wu, J.-P. *et al.* (2009). Residues of polybrominated diphenyl ethers in frogs (*Rana limnocharis*) from a contaminated site, South China: Tissue distribution, biomagnification, and maternal transfer. *Environmental Science & Technology*, 43(14), pp. 5212–7.

Zhang, Q., *et al*. (2015). Do bird assemblages predict susceptibility by e-waste pollution? A comparative study based on species- and guild-dependent responses in China agroecosystems. *PLoS ONE*, 10(3), p.e0122264.