AllianceBernstein®

From the Ground Up

Sowing the Seeds of Biodiversity Investment

Biodiversity is taking on increasing importance as a consumer concern, but it isn't always top of mind for investors. We think that could soon change. Beyond the obvious environmental benefits, there's an economic case to be made for protecting biodiversity. New, innovative technologies are disrupting age-old systems that are both lower-yielding and environmentally destructive. We believe the next wave of innovation will be fueled by secular growth trends that could reshape the way we think about the world's ecosystems, particularly in agriculture. Ultimately, we believe protecting and maintaining biodiversity is an attractive financial proposition for growers, consumers and investors alike.

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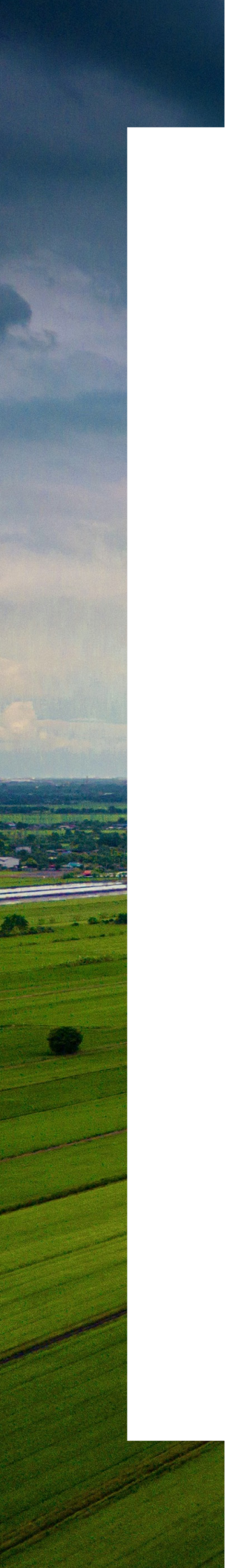

Just outside Gibson City, Illinois, a modern-day farmer named Greg is tasked with the responsibility of helping to feed America. Back when Greg's father managed their farm, it took a full day to harvest just one bushel of corn by hand. Over the years, the introduction of innovative farm tools and equipment significantly enhanced production speed and efficiency, and when Greg eventually took over the farm, he benefited from the improved machinery and industrial chemicals. As a result, the farm's yield and productivity experienced exponential growth.

But as Greg transitions the family's assets to his son, their multigenerational farm faces the global challenge of biodiversity loss. Across the North American corn belt and beyond, a decline in soil health from years of excessive agrochemicals has impaired growers' ability to deliver higher yields to feed the world's expanding population.

Biodiversity Is Often Misunderstood

Greg's story highlights the power of technology in addressing farm productivity. But technology can also help us understand the dangerous loss of biodiversity in the ground beneath our feet—the very soil that feeds the world. Across every industry, we must look to technology to solve the challenges of declining marginal yields and the loss of ecosystem services.

Biodiversity is often thought of in terms of rainforests or exotic animal species like whales or orangutans. But it is more fundamental than that. At its core, biodiversity represents all the plant, animal and microorganism species in a given ecosystem.

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As biodiversity awareness grows, companies that provide effective solutions to biodiversity loss are enjoying substantial growth potential. When science and industry combine to address sustainable development issues, exciting opportunities arise for investors. In recent decades, we've seen the decoding of the human genome open new markets in biotech and pharmaceuticals. Today, the nascent synthetic biology revolution is building on those developments to create new products in areas ranging from consumer goods to industrials.

In the late 18th century, English economist Thomas Malthus famously predicted that population growth would outstrip food production, leading to mass starvation. Ironically, the industrial and green revolutions that enabled the world to escape the Malthusian trap also sowed the seeds of today's biodiversity crisis. The good news is that today we are on the cusp of a new agricultural revolution that can harness the power of science to address these invisible threats to human sustenance.

Addressing Biodiversity Issues Creates Significant Market Potential

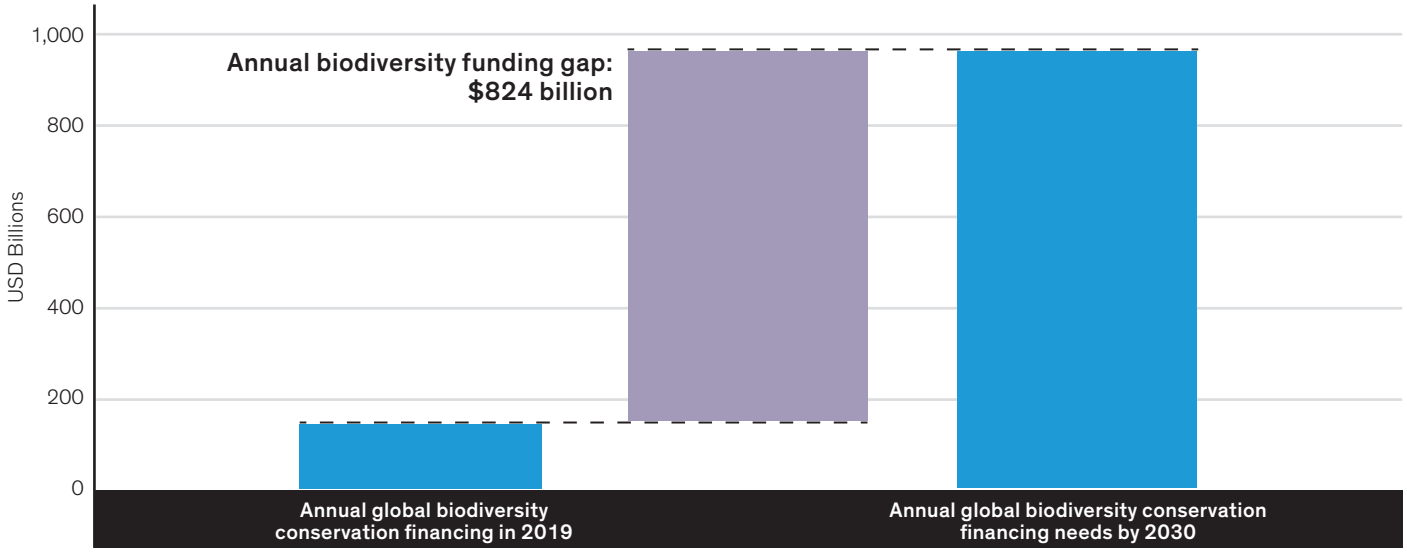
It's not too soon for investors to start discovering the opportunities that can be created by addressing the growing biodiversity funding gap. The market could be sizable. By some estimates, more than $800 billion annually will be required to bridge current funding levels with what's needed to reverse biodiversity loss (*Display 1*). That could add up to roughly $8 trillion by 2030.

This largely reflects the costs of shifting agriculture, infrastructure and other high-impact sectors to more sustainable practices. Without making these changes to industries that degrade nature, it will be difficult to stem biodiversity declines.

But finding companies at the forefront in addressing biodiversity challenges requires careful, fundamental research. A blueprint for disciplined equity investment includes analyzing thousands of global firms to identify those with skilled management teams and nascent or proven cutting-edge technologies. It then requires disciplined financial analysis to ensure that target companies possess attractive fundamental characteristics and powerful secular drivers. Because the need for advanced agricultural science is so great, investing in these companies is critical.

DISPLAY 1: MIND THE FUNDING GAP

Reversing Global Biodiversity Loss Will Require Nearly $1 Trillion Annually by 2030



As of December 31, 2019 | **Source:** Paulson Institute and AB

Ecosystem services:

The benefits that people obtain from ecosystems and nature. These include provisioning services such as food and water; regulating services such as climate and flood control; cultural services such as spiritual, recreational and cultural benefits; and supporting services such as the nutrient cycle that maintains the conditions for life on earth.

The World's Ecosystem Is Varied

Our basic needs for survival are food, water and air. Humans will effectively fail to survive if any of these needs are not met. Fortunately, our planet offers a varied ecosystem that enables us to consume nutritious food, drink clean water and breathe fresh air, including:

- **Pollinators.** Much of our food exists because of pollinators. Roughly 85% of all flowering plants on earth require pollination. Honeybees alone contribute $24 billion to US agriculture annually.[1]
- **Water.** Clean water is obtained through the process of transpiration—the movement of water through vegetation and soil—which filters out heavy metals and excess nutrients. Transpiration provides 62% of the annual renewable fresh water on our planet.[2]
- **Photosynthesis.** Through photosynthesis, plants combine carbon dioxide, sunlight and water to create energy and release oxygen. In turn, humans and animals inhale oxygen and exhale carbon dioxide to complete the cycle. Trees and other plants also absorb harmful greenhouse gases like carbon monoxide and sulfur dioxide.

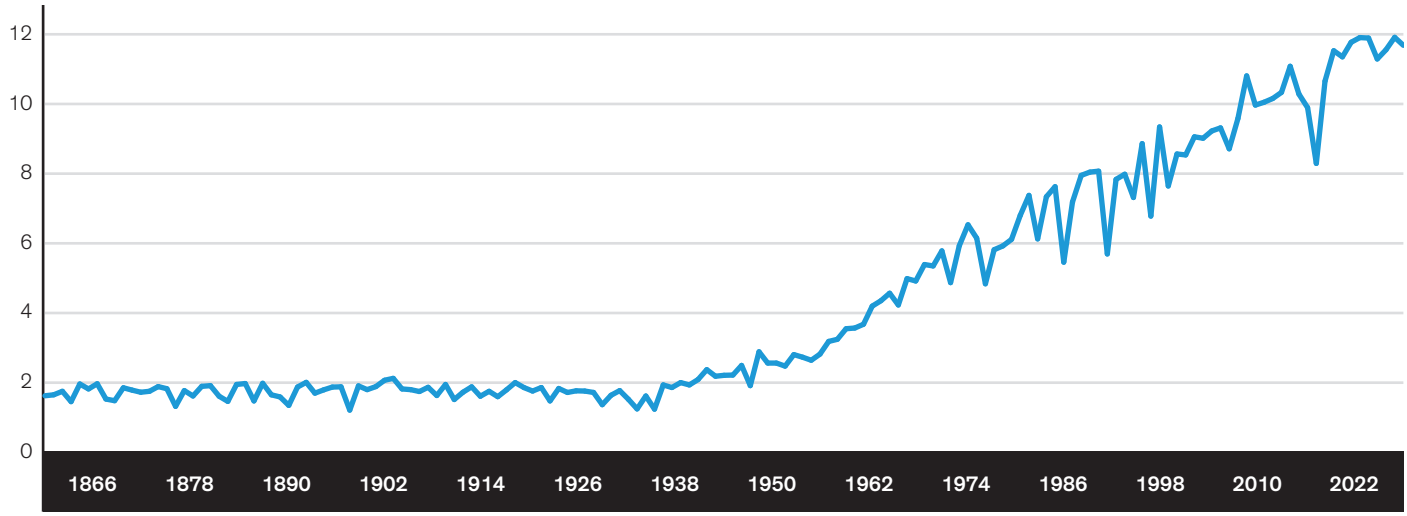
Humanity relies heavily on various ecosystem services to survive, and the earth's natural biodiversity serves as the foundation. From the microscopic organisms in our soil to the tallest trees in our forests, biodiversity is critical to sustaining human life. Paradoxically, despite its dependence on biodiversity, food production has been the key driver of biodiversity loss over the past 70 years.[3]

According to the United Nations, the global population reached 8 billion people in 2022.[4] As the population continues to grow, so does demand for food. To address this challenge, humans have converted more natural land to arable land while industrializing the production and application of synthetic chemicals and drawing down natural resources at an alarming rate.

1 Casey C. Keel, *The Buzz About Pollinators*, US Department of Agriculture, June 22, 2022.
2 UNESCO, *The United Nations World Water Development Report*, 2006.
3 Tim G. Benton et al., *Food System Impacts on Biodiversity Loss*, Chatham House Report, 2021.
4 United Nations, *Day of 8 Billion*, November 15, 2022.

DISPLAY 2: AGRICULTURAL FOOD PRODUCTION HAS INCREASED ENORMOUSLY

US Corn Yields, 1866–2023 (Tons per Hectare)



Through December 31, 2022 | **Source:** USDA National Agricultural Statistics Service

Growers have been able to increase yields for major crops like corn through the application of fertilizers and other synthetic agrochemicals (*Display 2*), but this has greatly harmed the earth's biodiversity. In addition to soil degradation, farmland expansion accounts for 90% of global deforestation.[5]

While plants require nutrients like nitrogen, potassium and phosphorus to grow, excessive fertilizer use causes soil degradation, which diminishes the quality of the soil and its capacity to support future growth. Similarly, extensive use of synthetic herbicides and pesticides reduces soil health by killing off critical organisms needed for plant growth and sustainability.

It took 300,000 years for the earth to reach a global population of 1 billion. According to the United Nations, it will take just 15 years to grow from 8 to 9 billion, with long-term estimates of 10 billion inhabitants by 2050.[6] While land use is the primary driver of biodiversity loss, we can't ignore global food insecurity challenges. And clearing more land only to spray more synthetic chemicals is not a viable long-term solution. We must learn to do more with less, improving on existing agricultural practices and adopting new technology.

5 Florence Pendrill et al., "Disentangling the Numbers Behind Agriculture-Driven Tropical Deforestation," *Science* 377, no. 6611 (September 9, 2022).
6 United Nations, *Day of 8 Billion*, November 15, 2022.

> **If a farmer from Old Testament times could have visited an American farm in the year 1900, he would have recognized—and had the skill to use—most of the tools he saw: the hoe, the plow, the harrow, the rake. If he were to visit an American farm today, he might think he was on a different planet.[7]**
>
> —Don and Philip Paarlberg

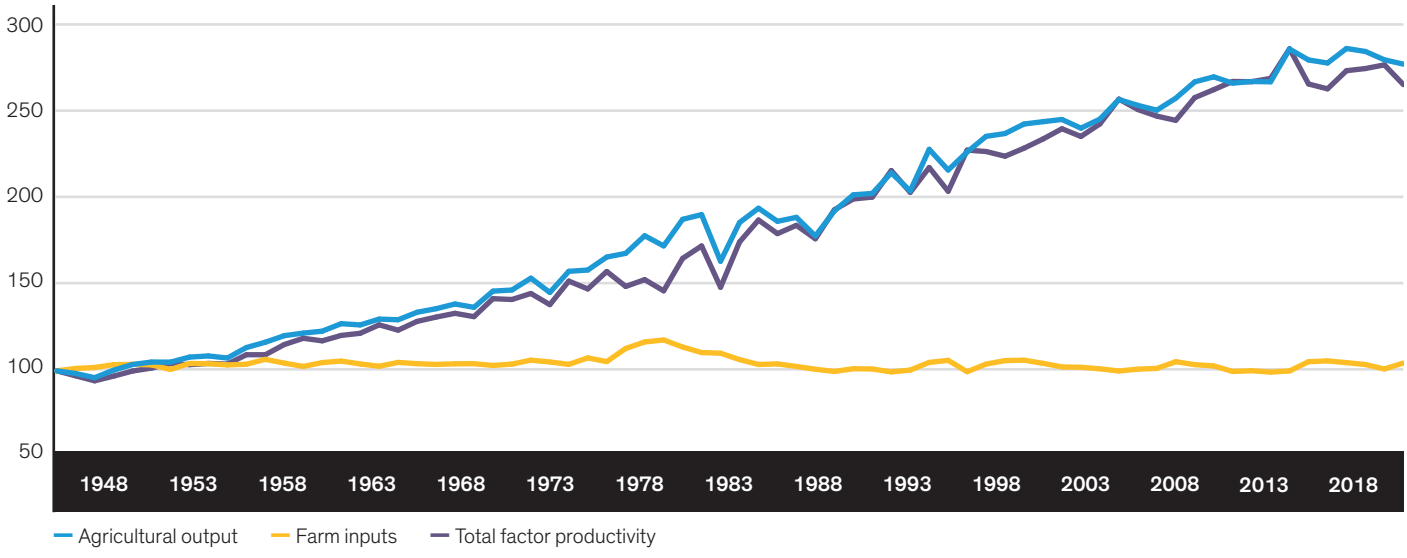
New Technology Can Address Biodiversity Challenges

Over the past century, new technology has been developed to address the needs of a rapidly growing population. Now, it's time for agricultural producers to take the next step in innovation by solving a familiar issue—this time with an eye toward protecting and maintaining the biodiversity on which farming depends.

Technology has been the key driver of total factor productivity in the agricultural space over the past 70 years. During this same period, farm inputs like capital and labor have remained essentially flat, underscoring the fact that higher crop yields have been born out of innovation (*Display 3*).

DISPLAY 3: AGRICULTURAL OUTPUT IS BEING DRIVEN BY TECHNOLOGY

US Agricultural Output, Farm Inputs and Total Factor Productivity

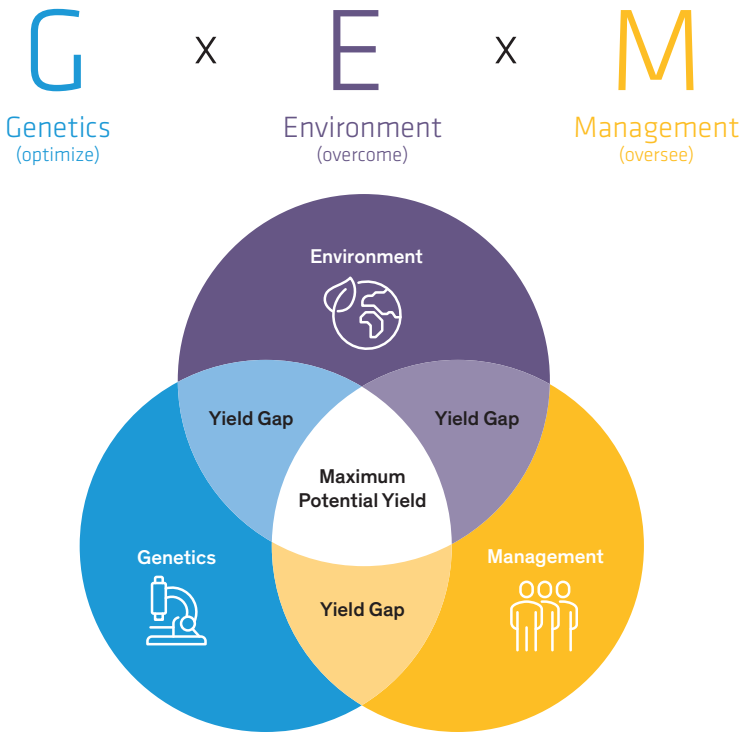


1948 = 100

Through January 6, 2022 | **Source:** US Department of Agriculture

7 Don and Philip Paarlberg, *The Agricultural Revolution of the 20th Century* (Ames, IA: Iowa State University Press, 2000).

DISPLAY 4: OVERCOMING VARIABILITY FOR MAXIMUM YIELD (GEM)



Source: AB

Genomic sequencing has enabled us to treat both infectious and noncommunicable diseases.

In today's agricultural market, several new and exciting innovations are bridging the gap between protecting biodiversity and addressing food insecurity. To better understand the mosaic of applications, we've distilled the various technologies into the acronym GEM—genetics, environment and management (*Display 4*).

Genetics: Harnessing a Plant's Genetic Diversity

Genomic sequencing has enabled us to treat both infectious and noncommunicable diseases. The sequencing process allows scientists to analyze the full genetic makeup of a particular organism or cell type and make edits using its natural DNA.

This process differs from that used to create genetically modified organisms (GMO), which contain foreign DNA from another organism—anathema for many investors with an environmental, social and governance (ESG) focus.

AB's Sustainable Thematic Equity team does not invest in GMOs. We are, however, supporters of companies and technologies that enable positive sustainable outcomes through the expression of an organism's natural DNA—whether that's increasing the nutritional profile of foods or reducing natural resource consumption.

As a result of Moore's Law (the doubling of transistors on a silicon chip every two years) and the advent of cloud computing, human genomic sequencing costs per unit have fallen dramatically, from approximately $100 million in 2001 to less than $1,000 today. In the last decade alone, they've fallen more than 90% (*Display 5, page 7*). Given the attractive economics of solving for diseases and illnesses, we're beginning to see the applications of genomic sequencing in the agricultural sciences space.

Today, several companies are leveraging this technology to explore plant genomics. Food technology company Benson Hill, based in St. Louis, Missouri, leverages the power of gene editing and predictive breeding to solve complex challenges. For example, the company's CropOS technology platform has allowed it to create a soybean that requires 70% less water compared with traditional soybean varieties. The company has also enhanced the nutritional profile of soybeans by increasing the protein content and reduced antinutrients by expressing the plant's natural genetic diversity.

In this same vein, Inari, based in Cambridge, Massachusetts, leverages gene-editing technology to solve biodiversity challenges. The company's SEEDesign platform allows it to design corn, soybean and wheat seeds that deliver 10%–20% higher yields and require 40% less water and fertilizer than traditional soybeans.

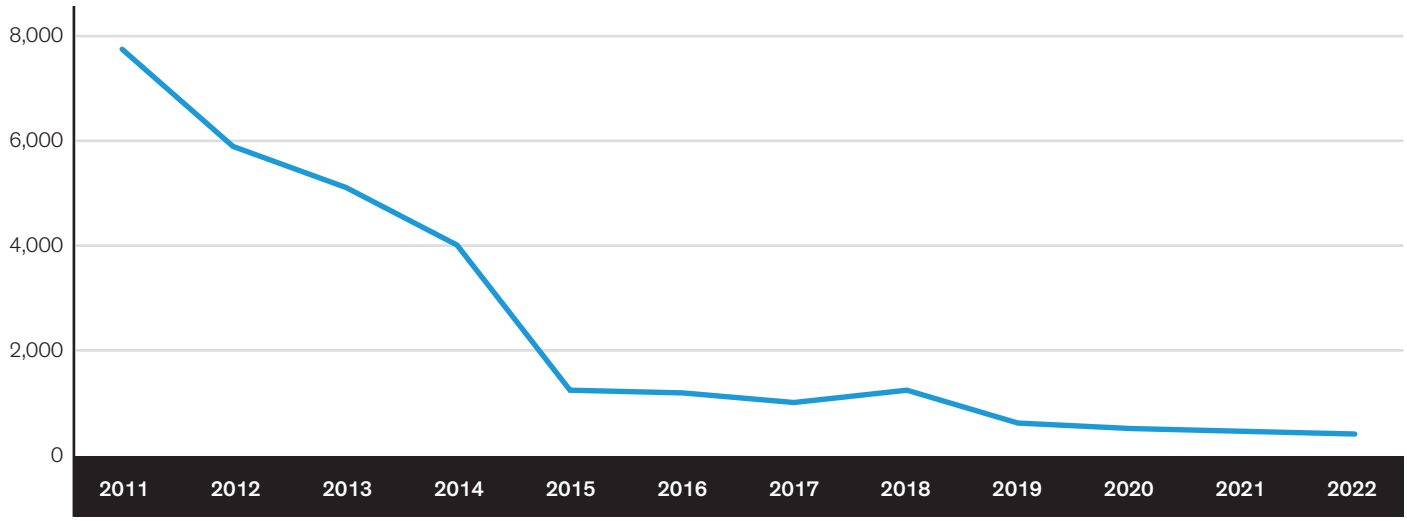
These technologies allow growers to express or block certain genetic traits to solve for desired outcomes such as higher yields, increased drought resistance and less reliance on fertilizer.

The power of gene editing enables companies to design seeds with higher nutritional profiles that require less water for germination. Leveraging practices like no-till farming and bio-based fertilizers can meaningfully improve soil health. And adopting the latest precision agricultural equipment can empower growers to make production decisions that save on costs and protect the earth's biodiversity at the same time.

These new methods could drive the next step in agricultural production—feeding the earth's population, with biodiversity at the forefront of technology.

DISPLAY 5: DNA SEQUENCING COSTS ARE DECLINING

Human Genomic Sequencing Costs (USD per Unit)



Through December 31, 2022 | **Source:** National Human Genome Research Institute and AB

Environment: The Importance of Soil Health and Regenerative Practices

Over the past 50 years, the total area of cultivated land worldwide has increased more than 500%, resulting in 700% more fertilizer use, a severalfold increase in pesticide use and a decline in soil health.[8]

While there is no perfect measurement for healthy soil, most experts agree that higher levels of organic matter are desirable. Soil organic matter refers to all the living and dead organisms in the soil that provide essential nutrients, retain water and moisture, and fight off pests and diseases. One teaspoon of soil can contain more than 9 billion organisms. Regenerative agriculture practices such as reduced tillage, cover crops and the use of bio-based fertilizers can help repair degraded soils.

Agricultural equipment manufacturer Deere & Co. offers both no-till and strip-till machines, enabling growers to effectively prepare soil for planting while reducing erosion and conserving moisture. This can improve soil health compared with traditional tilling practices.

Innovative soil health solutions draw on cutting-edge biological technology. For example, Phoenix-based MyLand delivers native microalgae to crops through its irrigation systems. These microscopic algae release a variety of biomolecules like proteins, carbohydrates and vitamins that are critical for maintaining high levels of organic matter and promoting plant growth.

This regenerative process of enhancing biodiversity has replaced the use of synthetic fertilizers and pesticides in some use cases.

One of the biggest takeaways from our research is that soil health serves as the starting point for plant-based dependencies like forestry and agriculture. Investors looking for companies that deliver positive biodiversity outcomes should therefore focus on firms that improve soil health through carbon sequestration, nitrogen fixation, moisture retention, nutrient delivery and/or recycling. The results of healthy soil can be seen in both flora and fauna. Researchers at Wageningen University & Research in the Netherlands were able to show a clear connection between increased biodiversity and regenerative agriculture practices.

Controlled Environment Agriculture (CEA) helps address the need for higher levels of food production while also accounting for the limited availability of arable land across the globe. CEA, colloquially known as indoor farming, sidesteps several environmental challenges by operating within indoor facilities. Land use is minimal, while variables like light, moisture and temperature can be controlled.

Through its patented stack and flow process, Local Bounti, based in Hamilton, Montana, has engineered indoor facilities across the US that deliver up to 50 times more crop turns in loose-leaf greens compared with traditional outdoor field planting.

Regenerative agriculture:

A farming practice that focuses on restoring soil health using methods such as minimizing plowing and rotating crops. These methods can help keep CO_2 in the soil and increase the soil's water absorbency, organic matter content and ultimately crop yields.

Cover crops:

Crops planted to cover the soil rather than for harvesting. These crops help manage agricultural soil erosion, soil fertility, soil quality, water, weeds, pests, diseases, biodiversity and wildlife. Examples of cover crops include mustard, alfalfa, rye, clover, buckwheat and radish.

Tillage systems:

These operations have traditionally been used as methods to prepare land for planting, control weeds, remove plant residue and loosen compacted surface soil. While tillage can be a critical component in a successful agricultural enterprise, reducing tillage and soil disturbance in a field can lead to benefits such as reduced soil erosion and compaction, decreased air and water pollution, and lower fuel expenditures and production costs. Tillage reduction can also promote biological activity and increase soil water-holding capacity and infiltration rates.

8 Praysun Ray et al., "Microbe to Microbiome: A Paradigm Shift in the Application of Microorganisms of Sustainable Agriculture," *Frontiers in Microbiology* 11 (December 21, 2020); M. G. Kibblewhite, K. Ritz and M. J. Swift, "Soil Health in Agricultural Systems," *Philosophical Transactions of the Royal Society B* 363, no. 1492 (September 4, 2007): 685–701, https://doi.org/10.1098/rstb.2007.2178; R. Lal, "Soil Carbon Sequestration Impacts on Global Climate Change and Food Security," *Science* 304, no. 5677 (June 11, 2004): 1623–1627, DOI: 10.1126/science.1097396.

Precision agriculture:

The science of improving crop yields using high technology sensors and analysis tools. It gives farmers the ability to more effectively use crop inputs including fertilizers, pesticides, tillage and irrigation water. More effective use of inputs means higher crop yield and (potentially) quality, without environmental pollution.

Management: Precision Agriculture Is Key to Reducing Chemical Use

The adoption of precision agriculture has gained momentum in recent years as agricultural practices have caught the tailwinds of data science, advanced sensing and artificial intelligence. Farmers have added yield-monitoring systems, precision spraying and application, GPS guidance and data analysis to their farm management toolbox over the years.

Deere & Co. has taken a big step forward in empowering growers to make more informed decisions that incorporate both yield and biodiversity implications. The company's ExactShot technology allows farmers to reduce the amount of starter fertilizer needed during planting by more than 60%. The technology uses sensors and robotics to precisely apply starter fertilizer onto seeds as they're planted, rather than apply a continuous flow of fertilizer to an entire row of seeds.

Deere & Co.'s ExactShot system. Photo courtesy of Deere & Co.

The John Deere Operations Center has also become a powerful tool in today's growing environment. This online farm-management system provides real-time data that producers can use to monitor changes in yield moisture content and even the amount of fuel their machines consume. In turn, farmers can analyze long-term production decisions and opt into practices that deliver both attractive yields and desired biodiversity outcomes.

John Deere Operations Center. Photo courtesy of Deere & Co.

Technology Gives Farmers Better Tools to Manage Production

These real-time data captured from tillage equipment or planters highlight the powerful capabilities of data science and technology in modern food production. These data can be translated into other advances in practice management. Examples include spraying less fertilizer, planting different varieties of seed and using fewer pesticides.

A major impediment to faster adoption of sustainable farming practices revolves around the unknown impact to a farmer's yield and profitability. Growers are less willing to make wholesale changes to their practices given their narrow production windows.

The first step in supporting change is to provide growers with the necessary tools to economically test sustainable practices. Having these data readily accessible on mobile devices is an important building block in facilitating more sustainable practices and behaviors. Digital farm management tools allow farmers to test new practices in concentrated areas that won't put entire harvests at risk. Over time, the captured data can enable broader adoption as sustainable practices prove their financial worth.

A New Crop of Less Harmful Fertilizers

The widespread use of industrial chemicals has been a key driver of significant increases in food production over the last 50 years. But there's a downside: Excessive use of agrochemicals harms soil health, water sources and pollinators (*Display 6*). In fact, the worldwide loss of pollinators would lead to a drop of $217 billion in annual agricultural output.

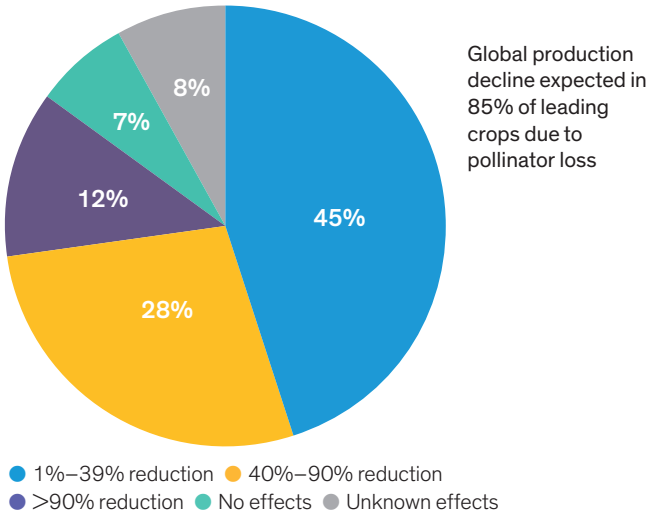
As we approach peak diminishing marginal returns, innovation has returned to the forefront of food production. Today, advances in technology have enabled less toxic chemicals to target pests while leaving both the surrounding soil and other organisms unharmed.

Vestaron, based in Kalamazoo, Michigan, has designed a bio-based insecticide that targets major crop pests while preserving the well-being of bees. Using naturally occurring peptides, the insecticide targets the gut wall and nervous system of pests but is harmless to humans, animals and pollinators. These peptides help balance the need for crop protection with the need to maintain biodiversity. The peptides remain effective for up to two weeks before breaking down into simple nutrients for the surrounding soil. This peptide platform can be expanded to other use cases, potentially including herbicides and fungicides.

Another alternative to traditional agrochemicals comes from GreenLight Biosciences, based in Medford, Massachusetts. The company provides sustainable food production solutions using messenger RNA (mRNA) delivery. The mRNA is designed to target destructive organisms while sparing beneficial insects. The RNA breaks down quickly and is undetectable after four days.

DISPLAY 6: POLLINATOR LOSS COULD DEVASTATE AGRICULTURAL OUTPUT

Global Production Declines from Pollinator Loss



As of October 27, 2006 | **Source:** A.M. Klein et al., "Importance of Pollinators in Changing Landscapes for World Crops," *Proceedings of the Royal Society B* 264, no. 1608 (October 27, 2006).

Bio-Based Products

These are commercial or industrial goods (other than food or feed) composed mostly or wholly of biological products, forestry materials or renewable domestic agricultural materials, including plant, animal or marine materials. Examples of bio-based products include:

- **Adhesives**
- **Construction materials and composites**
- **Fibers, paper and packaging**
- **Fuel additives**
- **Landscaping materials, compost and fertilizer**
- **Lubricants and functional fluids**
- **Paints and coatings**
- **Plastics**

10 Questions for Investors to Consider

1
How is your company exposed to biodiversity loss?

2
What is your company's policy on biodiversity?

3
How do you assess biodiversity risk across the organization?

4
What goals or targets have you set to reduce negative impacts on biodiversity?

5
What progress have you made on these goals?

6
What metrics do you use to track your progress toward your biodiversity goals?

7
What is the biggest impediment to reaching your goals on biodiversity?

8
What are the necessary investments and spending required to achieve your biodiversity goals?

9
Which senior executives are responsible for managing biodiversity risk?

10
Who on the board is responsible for oversight of biodiversity risk?

Agricultural Sustainability: Consumer and Investor Needs Coalesce

Increasingly, farmers, consumers and investors are united in the need to protect and maintain biodiversity. Beyond the obvious environmental benefits, there's an economic case to be made that aligns with both consumer and producer needs.

Consumer needs primarily revolve around affordability and health. In recent years, environmental sustainability has risen on the list of consumer concerns. In response, producers must embrace new technologies and farm management practices. Doing so will not only drive higher yields and output but also save on costs and time, increasing profit margins.

From an investor's perspective, this opens the door to an entirely new set of nature-related opportunities. New, innovative technologies are displacing and disrupting age-old systems that are lower-yielding and environmentally destructive. The next wave of innovation will be fueled by secular growth trends such as population growth, food insecurity and supportive regulation. It doesn't have to be an either-or scenario. Protecting and maintaining biodiversity are attractive financial propositions for growers, consumers and investors alike.

The Benefits of Thematic Investing

Major sustainability issues didn't arise overnight. Climate change, water scarcity and biodiversity loss have taken decades to pose meaningful challenges. Solving these challenges will also take time.

Thematic perspectives can help uncover both the catalysts and beneficiaries of long-term sustainability, while fundamental research allows investors to identify the companies that are providing solutions to some of the world's most pressing challenges. Researching potential solutions pushes them out into the mainstream, and we believe investors can benefit from compounding returns as our investment theses play out over multiple years (*Display 7, page 12*).

The key is to conduct fundamental research early on. Once technologies have matured, investors can pick investment entry points with more precision. It's not always optimal to own the outright technology, but rather the "picks and shovels" that go into developing it. For example, rather than owning big food companies, it could make more sense to focus on the equipment and inputs used to grow the corn and wheat required to make packaged food products in an environmentally responsible manner.

That could mean speaking with private companies, government officials, researchers and academic experts—not just the public companies involved in positive biodiversity practices once they've become mainstream. Relatively few investors do the work to understand the value chain's nuances, but that can sometimes be where the most compelling investment opportunities lie. Thematic research helps uncover the necessary tools and technologies that should see the lion's share of that multibillion-dollar biodiversity funding gap.

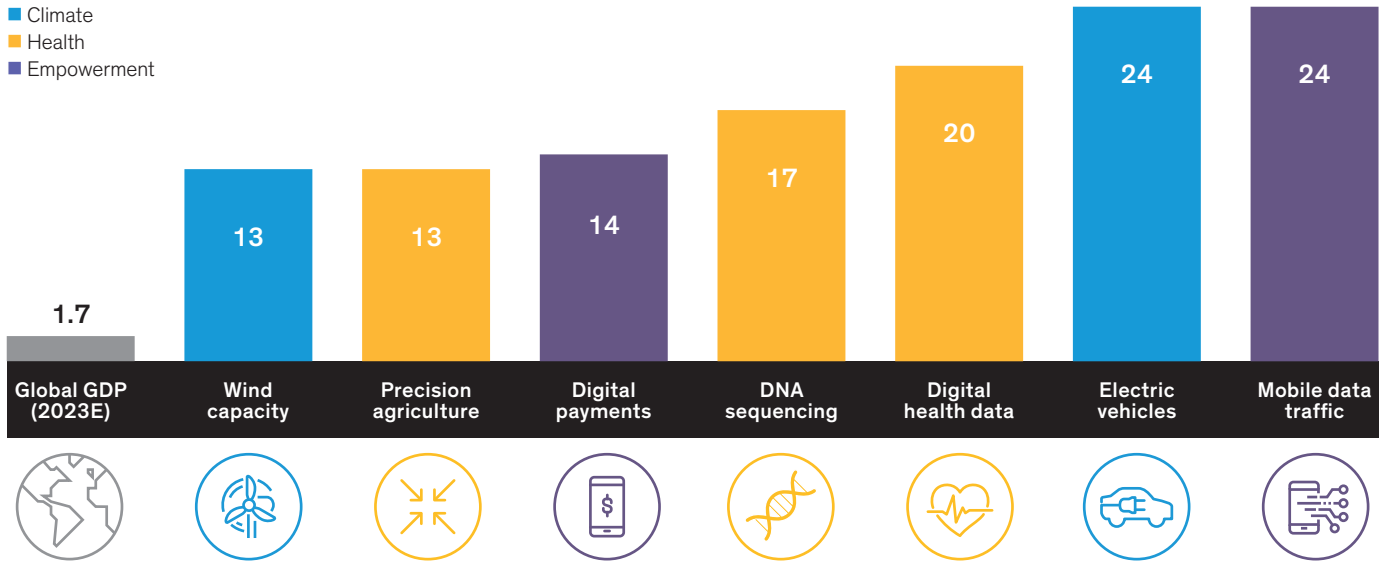
There is evidence that biodiversity risks affect equity prices, although market participants don't perceive the pricing of biodiversity risks in equity markets to be adequate.[9] Our Sustainable Thematic Equity team is able to exploit this market inefficiency by combining top-down thematic research on sustainability-oriented themes with in-depth fundamental research. As part of our research process, we engage with management teams to dig into issues like biodiversity and assess each company's efforts to mitigate this risk.

From our work exploring biodiversity loss, we developed a set of questions (*see* "10 Questions for Investors to Consider," *left*) that investors can use to identify both risks and opportunities. This engagement guide can not only inform investors of the growth opportunities aligned with protecting biodiversity but can also be used as a risk analysis tool to identify biodiversity challenges in a company's operations.

9 Stefano Giglio et al., "Biodiversity Risk" (working paper, National Bureau of Economic Research, April 2023).

DISPLAY 7: SUSTAINABLE THEMES OFFER DIFFERENTIATED OPPORTUNITIES FOR SECULAR GROWTH

Compound Annual Growth Rates (Percent)



Current forecasts do not guarantee future results.

Global GDP estimate is ex Russia, from AB economists as of December 31, 2022; wind capacity 2020–2030; precision agriculture market size 2022–2030; global digital payments 2022–2030; global DNA sequencing 2022–2030; digital health data 2018–2025; electric vehicle units 2022–2025; and global mobile data traffic 2022–2028.

As of December 31, 2022

Source: BCC Research, BloombergNEF, Ericsson, Flex, Global Wind Energy Council, Morgan Stanley, SkyQuest Technology Consulting, Statista, Strategic Market Research and AB

A Closer Look at Biodiversity Funds

The growth in sustainable and ESG investing has taken the asset-management industry by storm over the last few years, with biodiversity-specific funds gaining momentum. There are currently 15 biodiversity-focused funds in the marketplace, representing about $2 billion in assets under management. Our investment team has spent a great deal of time learning what biodiversity really is, while gleaning insights about what it isn't. Investors would be well served to conduct their own due diligence to make sure that the holdings in their ESG-focused portfolios are truly living up to their name.

To maximize positive biodiversity outcomes, we would encourage investors to focus on companies that provide products and services that are directly aligned with protecting and maintaining biodiversity. While an apparel company making clothes with less water is certainly delivering a positive ecological impact, we believe owning a precision agriculture equipment- or bio-based fertilizer company is more representative of investing in biodiversity.

A quick scan of biodiversity funds shows that roughly one-third of fund managers own names like Kering (the parent company of luxury brands like Gucci and Saint Laurent), Levi Strauss & Co. and Alphabet Inc. You will also find sporting goods retailer Dick's Sporting Goods and VF Corporation (owners of The North Face, Timberland and Vans) scattered across a handful of biodiversity funds. These don't align with our view of biodiversity-focused holdings.

We would prefer names like Deere & Co., Tetra Tech or Waste Management Inc., as their products and services are directly aligned with promoting positive biodiversity outcomes. Sound ideas might also include agricultural equipment, indoor farming, gene-editing technology and soil health firms. Our research suggests that developments in these areas could offer important sustainable solutions to biodiversity challenges, as well as solid long-term growth potential.

Nature-positive:
A term used to describe a world where nature's species and ecosystems are being restored and are regenerating rather than declining.

Population Growth Is Increasing the Urgency of Preserving Biodiversity

The world will require 70% more food to feed a global population of 10 billion by 2050.[10] While this ambitious goal requires innovative tools and technology, we must be mindful of the negative externalities that humans impose on the earth's biodiversity. As sustainable thematic investors, it is our responsibility to invest in companies that are delivering products and services aimed at protecting and restoring biodiversity.

History has shown that innovation often comes with disruptive threats to incumbent technologies. This latest chapter of the green revolution is no different. We would expect companies that fail to embrace new nature-positive products and actions to see meaningful challenges to their long-term business models.

We've already reached peak use of synthetic chemicals and fertilizers, with diminishing returns on yields. As this trend picks up steam, growers will be required to do what they've done in the past—namely, embrace new and effective technologies, with higher yields, cost savings and positive biodiversity practices all in alignment.

Greg took over his family farming business several decades ago. Today, he is passing the torch to his son with precision planters, soil-health monitors and the latest developments in seed genomics. Rural farming businesses often seem far removed from the financial markets. But as a new breed of agricultural producers like Greg increasingly incorporate exciting, eco-friendly technologies, investors should take note. Companies that change the way we produce food will help protect the planet, while helping farmers like Greg increase their yields and profits. For investors, these advancements could also offer attractive long-term return potential.

10 *World Must Sustainably Produce 70 Percent More Food by Mid-Century*, United Nations, December 3, 2013.

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