Water replenishment: Our learnings on the journey to water positive

Microsoft

Purpose

This paper shares our learnings as we developed our global corporate water replenishment program. This is not meant to be a single "source of truth" to guide corporate replenishment decisions, but we hope that, in combination with other existing guidance documents and resources, it will help leaders in this space better understand the complexities involved. We still have a lot to learn, and we hope this encourages others to share their own insights as well. We look forward to publishing updates as we continue to evolve our strategy and grow our project portfolio. For additional guidance on water replenishment, please see Appendix A for a list of useful resources.

Target audience

- CEOs, chief sustainability officers (CSOs), and other sustainability managers in the private sector
- Nongovernmental organizations (NGOs) and other water-related project implementers
- Startups and other innovative businesses developing water-related solutions
- Public officials engaged in developing water-related public policy

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Foreword

In 2017, Johannesburg in the Limpopo River basin area in South Africa experienced severe drought and regional water shortages, affecting millions of people as part of a deepening global water crisis. Although Microsoft's 88,000-square-foot office experienced site closures over six months, we were fortunate that our employees were able to work from home, and we installed a greywater treatment plant and began harvesting rainwater on the site as a long-term measure to directly reduce our water needs. However, the situation put a spotlight on just how vital water is to our business, as well as the responsibility we have to ensure that our operations do not harm the communities and ecosystems where we do business.

It was not long after this that we set a bigger goal, to become a water positive company by 2030. Our water replenishment program grew out of this ambition and has come a long way in the past three years. Although we know we still have plenty to learn, some overriding themes have emerged:

- **Technology will play a vital role.** Technology, in particular AI, will be key to managing water risk, addressing water challenges, and scaling replenishment solutions (essential to meet demand and need). It will also be important for monitoring progress over time. However, if individual companies with water replenishment targets need to invest to build technological solutions on their own, that will come at the expense of funds available for replenishment projects. Everyone involved in this space will need to work together to drive technological progress.
- **Water challenges are not just about water.** They relate to greenhouse gas (GHG) emissions, biodiversity impacts, impacts on human health, and people's livelihoods. Companies need to consider the quality of projects and volumes that can be tracked against their replenishment targets, but they also need to consider overall basin health and its value to the surrounding community. This comes down to understanding the combined impact of all activities within the basin, to ensure that collectively we are really protecting the freshwater resources we all depend on.
- **We need to innovate and move beyond the status quo.** The world cannot overcome the water issues it faces by simply doing more of what is already being done. Everyone within the replenishment space will need to be creative about the types of projects we are investing in, searching for novel approaches that will deliver scale and impact under the umbrella of "replenishment."

Water is a collective challenge that requires a shared approach. To meet global water needs and fulfill corporate commitments, the replenishment market requires new ideas, new technologies, and new approaches. We hope that this paper, if nothing else, supports others (whether new to replenishment or not) in creating solutions and driving meaningful progress on water replenishment.

Melanie Nakagawa
Chief Sustainability Officer
Microsoft Corporation

Eliza Roberts
Water Lead
Microsoft Corporation

Executive summary

In 2020, Microsoft announced a bold set of goals, including that we would be working to become water positive by 2030. A key component of our water positive goal is to replenish more water than we consume across our global operations. We believe that Microsoft has an important role to play in helping to address water stress in the areas where we have operations. We recognize that reducing our water consumption alone would not be sufficient to address the physical risk to watersheds in these areas, and so we view replenishment as an important way to do our part in restoring and protecting the water basins that we all depend on.

Water replenishment is a relatively nascent area, and our path forward has not been without challenges. There is guidance but no standards to align with and only a limited supply of eligible projects. The projects that are available can be expensive and are without guarantees: the expected returns can be fluid as projected timelines, volumes, and outcomes shift. And with truly positive large-scale results as the primary objective, achieving measurable impact that is also locally relevant can be complex.

To guide our strategy and help ensure that our replenishment program delivers maximum value, we established four guiding principles (see table). These principles have helped us to build a replenishment portfolio that puts us on track to meet our 2030 goal. As of July 2023, our portfolio included 49 projects around the world, representing more than 61 million m^3 of potential volumetric water benefits (the equivalent volume of more than 24,000 Olympic size swimming pools) over the lifetime of the projects.

Our guiding principles	
1.	Prioritize investment in areas with high water stress and high operational water consumption.
2.	Don't just count drops: invest in locally relevant projects that offer co-benefits.
3.	Keep community needs and impact at the forefront.
4.	Focus on innovation with an aim to build project supply and scale.

This paper provides an overview of our strategy and the context that underlies it, a summary of our process for building and managing our replenishment portfolio, and highlights of the types of projects within our portfolio, which span the seven Volumetric Water Benefit Accounting (VWBA) categories: (1) land conservation and restoration, (2) water supply reliability, (3) water access, (4) water quality, (5) aquatic habitat restoration, (6) water governance, and (7) catalytic activities. We also present our view of how the replenishment market needs to evolve to meet future demand and have maximum impact, including broader perspectives on what "replenishment" means, more implementing partners and matchmakers in the market, global standards that build on existing guidance, support from public policy and governance, and robust monitoring and tracking.

Our goal in publishing this paper is threefold: (1) provide an overview of our approach to replenishment and an update on our progress to date; (2) share our lessons learned so far, in the hopes of helping others with

their own replenishment work (or even with larger nature-based solutions or climate adaptation work); and (3) inspire action and investment by other parties (including corporations, nongovernmental organizations [NGOs], project implementers, and policymakers) in innovative new approaches to replenishment, to help build and scale the market to meet demand.

We expect ongoing development and evolution as the replenishment landscape matures. Water is a collective challenge, and the more that we all share our learnings and insights, the greater the potential for everyone to have meaningful impact.

Introduction

On September 21, 2020, Microsoft announced that our company would be working to become water positive by 2030. This goal reflects how vital water is not just to our organization but to life itself. We believe that Microsoft has an important role to play in helping to address water stress[1] in the areas where we have operations by investing in projects that support local communities and improve and protect affected ecosystems.

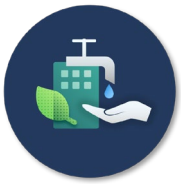
Water positive goals are becoming increasingly common for organizations, and yet what "water positive" means is not universally understood or defined. For Microsoft, being water positive means that we will:

Reduce

Reduce water use intensity across our global operations

Replenish

Replenish more water than we consume across our global operations



Increase access

Increase access to water and sanitation services for people across the globe

Innovate

Drive innovation to scale water solutions

Advocate

Advocate for effective and innovative water policy

Although we categorize our efforts under these five pillars, they can interrelate; for example, we support innovative approaches and advocate for public policies that will make replenishment and access projects easier to get off the ground.

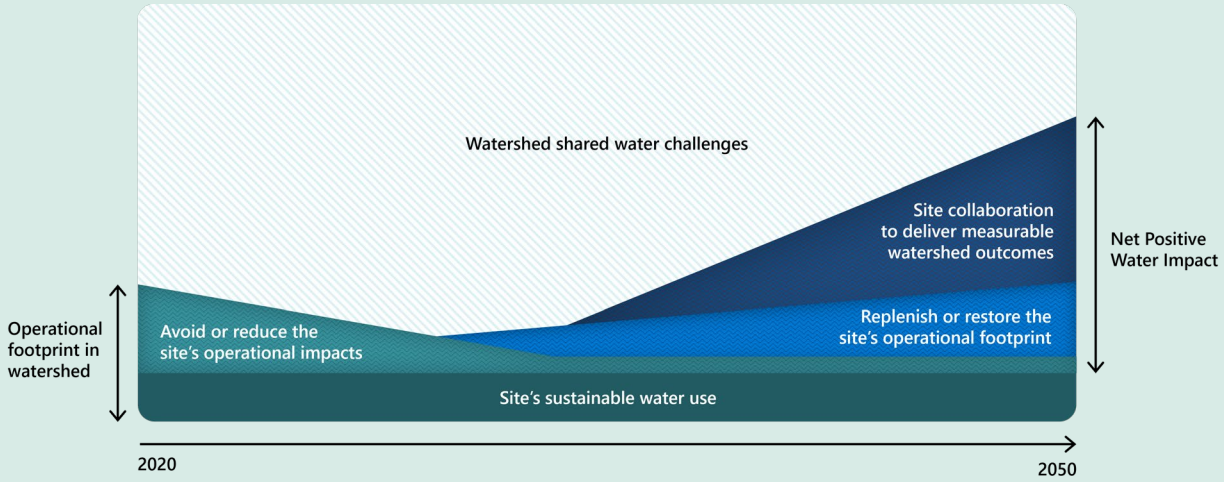
Our water positive pillars align with the concept of Net Positive Water Impact (NPWI), a core ambition onto which companies must sign when joining the Water Resilience Coalition (WRC). NPWI "contributes toward reducing water stress in its three dimensions: availability (quantity), quality, and access. It ensures that the company's contributions exceed [their] impacts on water stress in the same region." [2] NPWI recognizes that collective action is central to addressing shared water challenges and the delivery of meaningful and

[1] Water stress refers to the ability (or lack of ability) to meet human and ecological demand for freshwater in a given location, whether because of insufficient supply or inadequate quality.

[2] The WRC acknowledges that this concept will evolve over time and be different for every organization. Microsoft is a founding member of the WRC and has participated in the development of an NPWI guidance document (scheduled for publication in early 2024), to help define and standardize the concept of "Net Positive Water Impact."

measurable watershed outcomes. As a founding member of the WRC, Microsoft has pledged to maintain a continuous focus on measurable watershed outcomes through collaboration and collective action.[3]

Water Resilience Coalition: Components of Net Positive Water Impact



Replenishment is an important pillar of Net Positive Water Impact (NPWI). Note that the Water Resilience Coalition sets an expectation of NPWI by 2050, but Microsoft (and many other corporations) have set goals for 2030. Source: Water Resilience Coalition. (2023). Net Positive Water Impact. Working Draft. Pacific Institute and CEO Water Mandate.

In this paper, we focus specifically on *water replenishment*,[4] including our strategy, process, progress so far, and key learnings, in the hope that by sharing our experiences, we will help others to address some of the challenges that we have faced. This includes corporations setting their own replenishment targets, startup businesses developing innovative water technologies, nonprofits looking to partner on replenishment projects, and anyone else with an interest in the replenishment space.

The big picture: State of water resources

Water is essential to life. In fact, the United Nations included clean water and sanitation as one of its Sustainable Development Goals (SDGs), focused on ensuring the availability and sustainable management of water and sanitation for all. And yet water challenges—whether from too much water, too little water, or water that is too dirty—are intensifying globally. Current water challenges are significant enough, but these are only projected to become more extreme in the coming years, with increasing pressure from a growing global population, expanding economic development, and the impacts of climate change:

[3] The WRC pledge covers NPWI, water-resilient value chain, and global leadership. This white paper focuses on our replenishment target and program, which aligns with the NPWI component of the WRC pledge and is specific to our direct operations. Please see the Prioritize investment in areas with high water stress and high operational water consumption section for more information on the boundaries for our replenishment work.
[4] Microsoft explicitly distinguishes between water replenishment and water access, and we have set distinct targets for each. This white paper explores our approach to water replenishment, but we are also investing in water access projects.

Less than 7 years

Today		2030 and beyond
2.2 billion people—or more than one-quarter of the world's population—lacked access to safely managed drinking water services in 2022.[5]	>	At the current rate of progress, more than 1 billion people will remain without safely managed drinking water in 2030.[6]
2 billion people live in countries facing extremely high water stress.[7]	>	By 2050, an additional 1 billion people are expected to live with extremely high water stress.[8]
10 percent of global gross domestic product (GDP) comes from regions of high water risk.[9]	>	By 2050, 46 percent of global GDP could come from regions of high water risk.[10]
Floods affect 72 million people, with annual urban property damage costing $174 billion.[11]	>	By 2030, the number of people affected by floods worldwide could double to 147 million, with expected annual urban property damage costing $712 billion.[12]

Water is also a critical input to every company, regardless of industry or sector. Beyond the basic need to supply employees with safe water, sanitation, and hygiene (WASH), which applies to all businesses, IT businesses like Microsoft that operate datacenters must keep those datacenters cool, and cooling technologies often rely on water. Water security issues can have a direct impact on business risks, including potential supply disruptions, reputational risk (particularly for businesses withdrawing large volumes in areas with high water stress), and increased costs. Companies are increasingly expected to manage and report water risk (such as through the Ceres Valuing Water Finance Initiative), and there are growing regulatory requirements for water-related disclosure by corporations. Notably, "water and marine resources" is among six environmental factors included under the new Corporate Sustainability Reporting Directive (CSRD) disclosure requirements in the EU, as is the closely related environmental factor "biodiversity and ecosystems."

[5] "Drinking-water." World Health Organization, September 2023. License: CC BY-NC-SA 3.0 IGO.
[6] MacAlister, C., Baggio, G., Perera, D., Qadir, M., Taing, L., and Smakhtin, V. *Global Water Security 2023 Assessment*. Hamilton, Canada: United Nations University Institute for Water, Environment and Health, 2023.
[7] Kuzma, S., Saccoccia, L., and Chertock, M. "25 Countries, Housing One-quarter of the Population, Face Extremely High Water Stress." World Resources Institute, August 2023.
[8] Ibid.
[9] *High Cost of Cheap Water: The True Value of Water and Freshwater Ecosystems to People and Planet*. WWF, October 2023.
[10] Ibid.
[11] Data compiled from: "The Number of People Affected by Floods Will Double Between 2010 and 2030." World Resources Institute, April 2020.
[12] Ibid.

Conversely, water security issues present companies with new opportunities. In 2022, respondents to CDP's water security questionnaire reported more than 2,700 water-related opportunities—including increasing efficiency, tapping into new markets, and helping alleviate operational and reputational risk—worth an anticipated $436 billion.[13] Corporate initiatives and investments in water-related projects can contribute to restoring local ecosystem health, fostering climate adaptation, and improving water availability, access, and quality.

Why replenishment matters

Water action on the part of the private sector will be pivotal in addressing global water stress, and water replenishment plays an important role in this. At a high level, water replenishment—also known as water balancing or sometimes water neutrality—means restoring a volume of water to local watersheds and communities. Replenishment activities typically address water quantity (availability) or quality by reducing water use, recharging local aquifers, restoring aquatic ecosystems, or conserving land (see the Our portfolio to date section for an overview of different project types). A wide range of activities can contribute to replenishment, including those that detect and repair water leaks; treat wastewater; change agricultural practices to reduce water contamination; protect land from industrial development; capture rainwater; and restore wetlands, lakes, ponds, rivers, streams, and mangroves.

Water replenishment targets—whereby a company develops or supports replenishment projects outside of the company's direct operational footprint that restore an amount of water equal to some portion of the company's direct, supply chain, and/or indirect water use—give companies a specific global metric that can be tracked. They also provide companies with an incentive to further reduce water use within their own operations and scale support for water conservation efforts in the local communities in which they operate. Progress toward these targets is typically measured in terms of a project's annual volumetric water benefits (in cubic meters, gallons, or liters per year).

At Microsoft, we see replenishment as a way for our company to help restore and protect the water basins where we operate, something that we could not achieve by just reducing our water consumption. Water availability and water quality challenges are a collective problem that require collective efforts to address. By setting a water replenishment target, we are aiming to do our part to not just reduce our water use but also play a role in protecting the high water stress basins that we all depend on.

Challenges of replenishment today

Despite the increasing popularity of setting replenishment targets, this is a nascent, rapidly evolving area. In some ways, Microsoft's engagement in the water replenishment market is similar to how we have worked to advance the carbon removal market over the last few years. However, what makes the water replenishment market distinct from the carbon removal market is that, currently, there is virtually no pipeline of "shovel-ready" projects (that is, pre-designed projects ready for investment and implementation) available to support corporate water replenishment programs. At the same time, it is important to note that although there are

[13] *Riding the Wave: How the private sector is seizing opportunities to accelerate progress on water security*. CDP, March 2023.

ample watershed restoration projects, many have not been developed with volumetric drivers (typically a corporate requirement for measuring replenishment). The path from target setting to project realization presents some fundamental challenges that can prevent or slow meaningful progress, including the following:

Lack of protocols and standards
There is no equivalent to the Greenhouse Gas (GHG) Protocol for water measurement and no standard for what "replenishment" means. Without established standards, the onus is on companies to make decisions on the quality of any given replenishment project. For example, can water discharges from a site be used untreated for farming or park irrigation and still count towards replenishment? Would the project happen anyway without the company's support? The Volumetric Water Benefit Accounting (VWBA) working paper[14] provides methodologies and guidance for quantifying the volumetric water benefits of water stewardship activities across more than 20 different project types. For Microsoft, we believe it is crucial that we actively participate in the enhancement of guidance and development of standards for replenishment and share our own experiences and lessons learned, to help everyone account for impacts in a consistent and reliable manner. The next iteration of VWBA—funded in part by Microsoft and other organizations engaged in water replenishment—is currently under development.[15] The update will introduce the concept of "enabled volumetric water benefits (VWBs)" as an alternative pathway to direct volumetric benefits. These types of projects can incentivize companies towards more transformational solutions that enable additional benefits in the future or catalyze new opportunities.

High demand, limited supply
Based on our research and guidance from partners, upwards of 40 Fortune 500 companies have now set water replenishment targets and are actively seeking appropriate projects that will help them meet those targets. This has led to increased demand for the already limited number of readily available projects. Project supply is particularly low in high water stress basins where many companies have operations and in areas where replenishment is a newer concept (in some parts of the United States and generally outside the US market). In some regions, few to no shovel-ready projects are available. Companies supporting a replenishment project often need to pay for the entire project upfront (including construction) to provide the project implementer (typically a nongovernmental organization [NGO]) with the necessary cash flow to get started. In some cases, an initial investment in an enabling activity (feasibility study or pilot project) may help pave the way for full project implementation with clear volumetric benefits.

Identifying and aligning with local needs
Limited supply exacerbates another challenge: finding the right type of project to align with the needs of a specific location. For example, capturing rainwater and recharging it into the aquifer is

[14] Reig, P., Larson, W., Vionnet, S., and Bayart, J.B. *Volumetric Water Benefit Accounting (VWBA): A Method for Implementing and Valuing Water Stewardship Activities* [working paper]. Washington, DC: World Resources Institute, 2019.
[15] VWBA 2.0 will establish methodologies that will help achieve the scale needed to address global water challenges. VWBA 2.0 will also refine the existing guidance related to project selection and volumetric water benefit quantification; provide principles to guide companies in making credible volumetric water benefit quantification claims; provide guidance for collecting, tracking, and reporting information to substantiate claims; and refine some quantification methodologies.

one common replenishment project type, yet it is not feasible in all locations. Every basin is different, and often even the local government has not yet defined requirements or targets. In places where corporations don't have access to existing basin-level diagnostics, those looking to invest in replenishment work must do their own analysis, partner with an NGO with local expertise, or hire a third-party consulting firm, potentially at significant cost. Where local water information and expertise are limited or do not exist, the pathway for a company to achieve impact on the ground is unclear.

Unpredictability in benefits and high risk of delay

Many implementing partners need funds to begin the design and development phases of a water replenishment project. Corporate funding is often structured as upfront payments for projects that will be operational in one to three years, at which point the project will begin providing reportable volumetric water benefits. This can be challenging for companies looking for projects with "bankable" benefits that they can report against a replenishment target immediately. Furthermore, volumetric benefits—initially estimated before the project is operational—may shift over time, which adds uncertainty for companies that are planning and reporting progress against a specific and time-bound volumetric target. And some projects will take longer to get up and running than planned or even be cancelled altogether, for example as a result of regulatory shifts, changing climate conditions, permitting, or funding shortfalls linked to inflation or other factors (which could lead to insufficient funds to complete projects). So far, roughly 16 percent of the replenishment projects we have invested in have had major changes in their volumetric benefits, been delayed from the original timeline, or been cancelled altogether. Thus, companies that invest in replenishment will need sophistication, patience, and a strategy that reflects the time needed for projects to develop and mature and the risk that the delayed benefits will not align with original expectations (including a contingency plan or funds). Furthermore, investment pools may need to be set up to accommodate slippage from project delays or cancellations.

High cost and potentially complex procurement process

Another hurdle for corporations is cost, which can be higher than most companies anticipate. Costs also have the potential to rise further with increasing demand, limited supply, and rising costs of material and labor. The high risk of delay and cancellation makes the cost implications even more significant. The simplest—and likely the most common—approach to investing in replenishment projects is through philanthropic funding mechanisms, like grants. Other companies route it through their procurement process, with the goal of managing potential risks through formal contracts. There are pros and cons with both approaches, and the choice of the best approach will depend on the type of project and the investing company's own internal policies and risk tolerance.

Limited verification and challenges with tracking and reporting

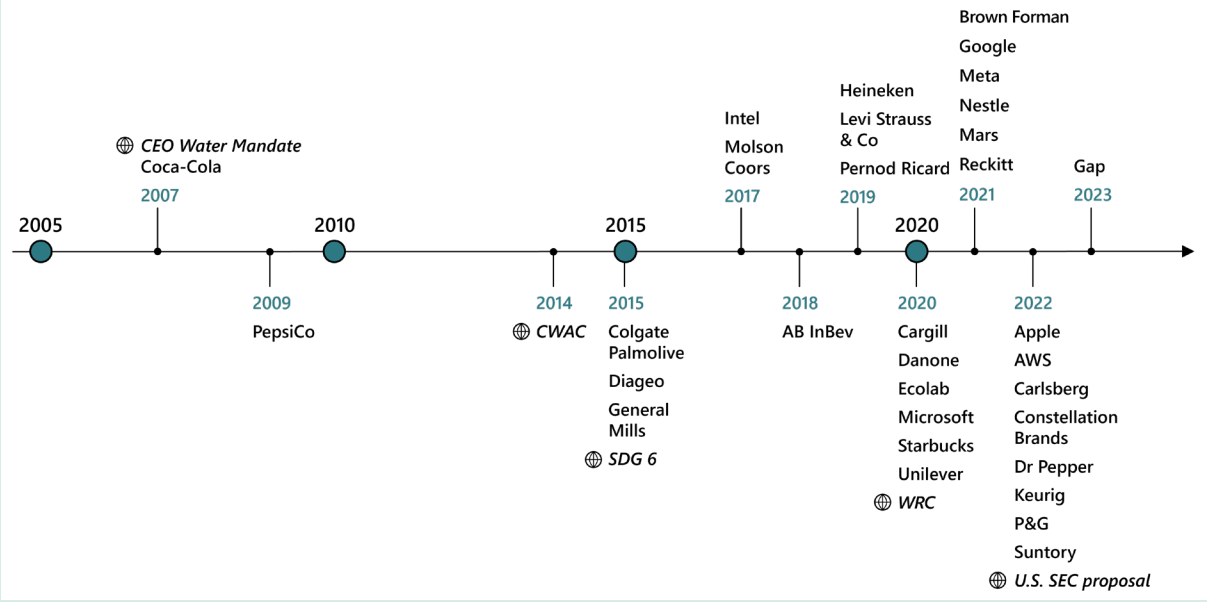
Project monitoring is critical to ensure the validity of volumetric benefit claims. It is also time consuming and can add additional cost (particularly for real-time monitoring, which can require installing physical sensors for the lifetime of the project). An unintended consequence of this can be that there is less funding in a company's replenishment budget available for other projects. Given these limitations, most projects today lack capacity and funding for long-term monitoring and rarely have access to real-time monitoring. In some cases, there may be no cost-effective or practical way to "verify" the volumetric benefits of a project. The current best practice is to have a third party quantify the benefits by updating the initial estimate using the best available

datasets combined with data or reports provided by the implementing partners. We are increasingly looking for projects that have real-time monitoring embedded in them where possible (such as with FIDO Tech) and engaging with organizations that we procure projects from to tackle this.

Growing corporate momentum

Despite its challenges, replenishment is a vital component of corporate water stewardship. The Coca-Cola Company was one of the first to establish a water replenishment target (in 2007). Since then, an increasing number of companies, particularly from the food & beverage and technology sectors, have begun investing in water replenishment, often as part of larger water positive/stewardship goals. Today, upwards of 40 Fortune 500 companies have committed to water replenishment, including Diageo, Gap, Google, P&G, PepsiCo, and Starbucks. As the following timeline shows, announcements of corporate water replenishment targets in general have accelerated in recent years.

Timeline for key milestones and the announcement of corporate water replenishment targets



Italicized names with a globe icon indicate non-corporate milestones, such as the formation of nonprofit organizations related to water. This timeline reflects public information readily available at the time of publication and is intended only to show the significant increase in water replenishment targets over the last 10 years. It is not intended to be a comprehensive list, and actual efforts by these organizations may have begun earlier than listed. **AWS** = Amazon Web Services; **CWAC** = California Water Action Collaborative; **P&G** = Procter & Gamble; **SDG** = Sustainable Development Goal; **U.S. SEC** = U.S. Securities & Exchange Commission (refers to proposed requirements for companies to disclose impact due to climate change, including drought and water availability); **WRC** = Water Resilience Coalition.

The WRC, established by the UN Global Compact CEO Water Mandate, is helping to drive this corporate momentum through collective action: bringing organizations from around the world together to address the global water crisis. The WRC seeks to reduce water stress by 2050. Part of the WRC roadmap is a commitment to act in 100 priority basins, which "represent the highest level of opportunity for collective action from an economic and shared water risk perspective." [16] The WRC initiative was co-founded in 2020 by seven companies, including Microsoft, and has since grown to more than 35 companies.

The focus of corporate replenishment work has evolved over time. Early corporate replenishment targets focused more on volume and less on impact; they committed to replenishing more than a company uses by investing in projects in locations across the company's entire operations. Over time, the focus has changed to investing in projects primarily in the locations across a company's operations that have high water stress, as well as those that provide additional multi-benefit value (such as benefits to water quality, ecosystem health, or social or economic conditions). This helps ensure that replenishment work is concentrated in the areas that need it most.

[16] "100 Priority Basins." Water Action Hub | UN Global Compact | CEO Water Mandate.

Developing our replenishment strategy

As we set out to develop our replenishment strategy, we knew that it was vitally important to be clear on the scope, from the priority locations where we will focus our support to the volumes we plan to replenish. However, establishing the strategy turned out to be quite a bit more nuanced than simply defining the scope, given the challenges detailed earlier. This section outlines the guiding principles that became the foundation of our strategy as well as the process that we adopted to build and manage our portfolio.

Our guiding principles

As there is limited publicly available research and learnings on replenishment, we developed a set of core principles to guide our replenishment strategy. To do this, we sought advice from experts and directly engaged with project implementers, project scoping partners (organizations that work with multiple water replenishment projects and connect corporate buyers with those projects), and communities, spending more than two years learning what works (and what doesn't). Today, four principles guide our direction:

1. Prioritize investment in areas with high water stress and high operational water consumption.
2. Don't just count drops: invest in locally relevant projects that offer co-benefits.
3. Keep community needs and impact at the forefront.
4. Focus on innovation with an aim to build project supply and scale.

Prioritize investment in areas with high water stress and high operational water consumption

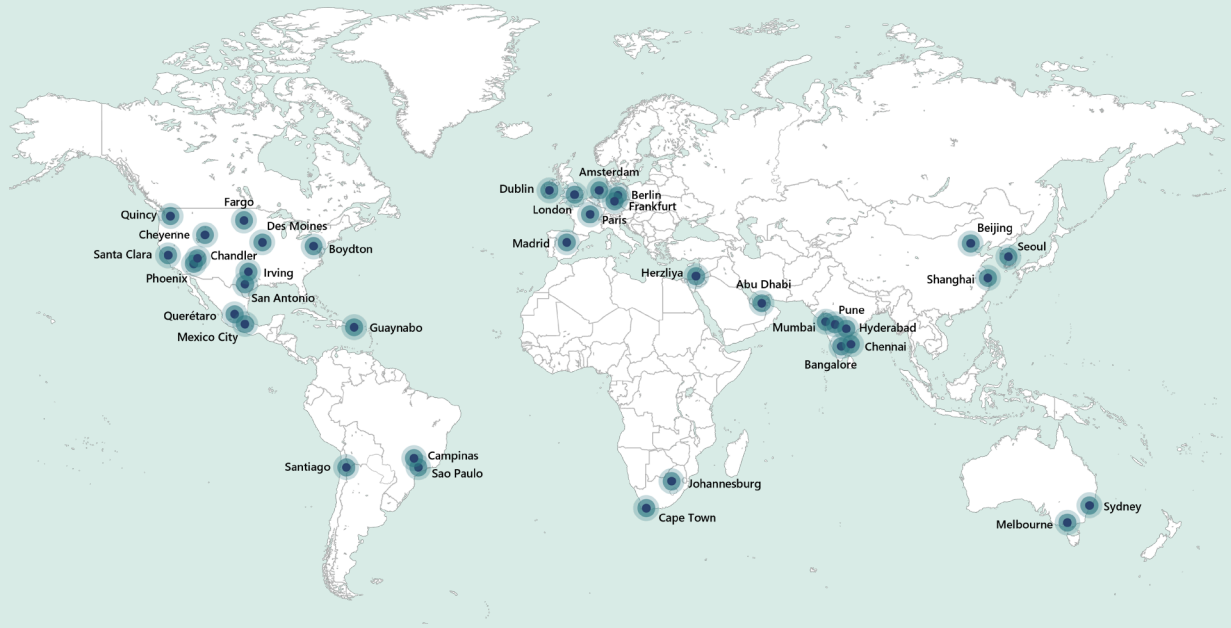
First and foremost, we needed to establish the volume of water we will replenish, the source of water that we will replenish, and where we are going to replenish it. We defined the following boundaries:

- **Volume:** By calendar year 2030, the volume of water we replenish will exceed the volume of water that we consume across our entire direct operations, including Microsoft leased and owned datacenters, campuses, and other facilities worldwide. Our target does not include water consumed indirectly, for example through our supply chain or for power generation.
- **Source:** We will replenish all freshwater that we consume except water from three alternative sources: (1) recycled or reclaimed wastewater procured from a utility, (2) harvested rainwater, and (3) water produced through air-to-water generation. Our replenishment work is funded through an

internal water fee charged to business groups based on annual water consumption. By subtracting the volume of water procured through these alternative sources from the total projected annual consumption volumes that each business group is charged for, we are incentivizing business groups across the company to increase their procurement of water from these alternative sources and decrease consumption from surface water and groundwater sources.

- **Location:** We will focus the entirety of our replenishment work in approximately 40 priority high water stress locations where we operate. We identified these locations using the results of a water risk assessment conducted by the World Resources Institute (WRI), which considered level of water stress and our own operational water dependency across the globe. Although we have targeted replenishing a volume of water more than we consume across our global operations, not everywhere that we operate needs to have (or will benefit from having) water replenished. By replenishing *only* in our priority locations (but replenishing more than our total consumption globally), we anticipate that we will replenish more water in these priority water-stressed locations than we consume in them.

Microsoft priority water-stressed locations worldwide



Map showing Microsoft priority locations (37 cities where we have operations in basins of high water stress). These locations were identified using World Resources Institute's Aqueduct 3.0, and we are in the process of re-assessing them with the recently released Aqueduct 4.0.

Water issues shift over time, as do Microsoft locations. We recognize that our approach will need to be fluid, factoring in changing levels of water stress and operational demand.[17] We use an ongoing water risk assessment process to validate that we have the right locations and make updates as needed. Furthermore,

[17] In recognition of the need for future water projections to be based on the latest available data, Microsoft became one of the inaugural WRI Aqueduct Pro Sponsors, providing support for the most recent WRI Aqueduct tool. Aqueduct 4.0, which is free to the public and available online, helps companies, organizations, and investors across the globe understand risks, with new projections on water stress, demand, and supply. The tool uses the latest CMIP6 climate forcings from the IPCC Climate Change 2022: Impacts, Adaptation and Vulnerability report.

we have conducted detailed assessments for each priority location using local data to better understand the local context, as the available global tools do not provide a full picture of risks at the local level.

Funding replenishment through our internal water fee

Our internal water fee, modeled after our carbon fee, plays a critical role in enabling progress against our water positive goal. The fee was established in fiscal year (FY) 2020 and is used to fund replenishment and access projects around the globe. It is charged to business groups based on annual water consumption projections at a rate that was determined with historical data and guidance from experts on the cost of replenishment projects. The objectives of the fee are to incentivize business groups across Microsoft to take steps to reduce water use and to raise internal awareness of our water positive goal.

Don't just count drops: Invest in locally relevant projects that offer co-benefits

It can be tempting to seek out projects with large replenishment volumes, as these make the fastest contribution to meeting our target, but in the long run a strategy based on volume only will not have the same ability to meet highly localized needs. We prioritize both volume and local relevance. As our detailed water risk assessments have shown, each location is unique in its water challenges. To achieve measurable watershed outcomes, we will need to be thoughtful in our approach to ensure that our replenishment investments align directly with the local context, support projects that would not otherwise move forward, address shared water challenges, and have social and environmental co-benefits. For example:

- In the Colorado River basin, United States, where drought and water stress are the major issues, we focus on urban water efficiency projects (such as leak detection and repair) and projects that reduce agricultural water demand, conserve water, and increase infiltration in the basin.
- In the Maipo River basin, Chile, where a multi-year drought has stressed water resources to the point of limiting water supply to Santiago's residents, we focus on projects that reduce water demand in agriculture and projects that increase water infiltration and storage in the basin.
- In Shanghai, China, where the quality of the main water supply source faces pollution risks due to agricultural runoff and insufficient treatment of domestic wastewater from surrounding rural communities, we focus on projects that strengthen water stewardship practices while restoring and constructing wetlands to improve water quality (by retaining nitrogen and phosphorus and promoting sedimentation).

To help ensure that we approach replenishment investments based on local requirements, we try to assess opportunities through the lens of a basin's needs first (based on local watershed assessments and plans) and then identify where potential replenishment projects could help address those broader basin needs. Wherever possible, we will invest at the minor basin level, not the major basin level, as water challenges can vary by individual location even within a major basin. Oftentimes a local approach will mean looking at multiple smaller projects representing a diverse range of project types.

Aligning with SDG 6.6: protecting and restoring water-related ecosystems

When we set our water positive goal, we did so in the spirit of SDG 6: to ensure availability and sustainable management of water and sanitation for all. For our water replenishment target, this meant aligning with SDG 6.6, which focuses on protecting and restoring water-related ecosystems, including mountains, forests, rivers, aquifers, and lakes. Where it makes sense given the local context, ecosystem-focused projects are strongly represented in our portfolio.

Keep community needs and impact at the forefront

Just as we believe it is essential that we align our replenishment investments with the needs of the local watershed, we also aim to align with the needs and desires of the local communities. In particular, we are intentional about integrating environmental justice into our replenishment investments. We support initiatives that nurture equitable and Indigenous-led conservation, such as collaborating with The Nature Conservancy (TNC) and the Jicarilla Apache Nation to advance Tribal self-determination in the management of Tribal water resources and attainment of sustainable communities on the San Juan River in New Mexico, Colorado, and Utah (United States). We are guided by the principle to do no harm in the communities we work with and avoid potential consequences of projects that are not reciprocally beneficial.

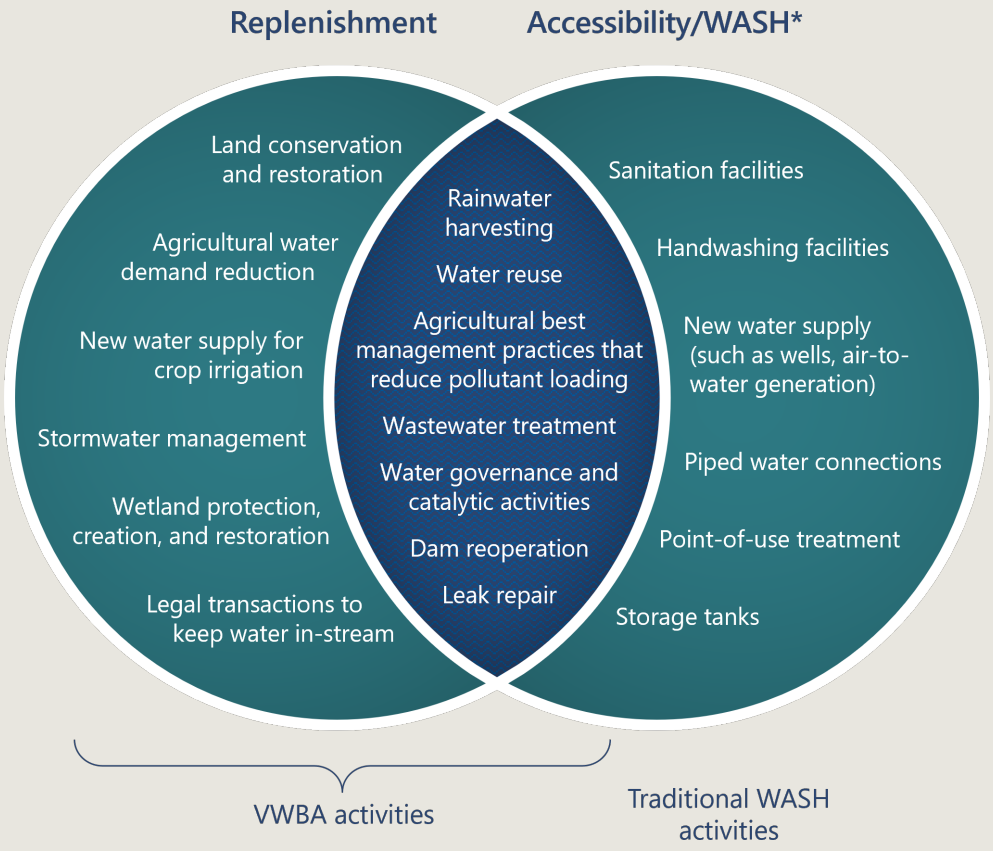
We expect our approach in this area to evolve over time. As a first step, we have developed preliminary criteria that we aim to assess replenishment projects against:

1. Projects should not pose any potential health impacts on local communities.
2. Community members should be involved in the decision-making process for projects that directly affect their communities.
3. A process to address community concerns should exist for projects that directly affect those communities.
4. Projects should consider the cultural and historical significance of the area and work to ensure that there are no impacts on cultural resources.

By partnering with credible organizations that have an in-depth understanding of local community needs, we have the best likelihood of ensuring that we keep community impact at the forefront. One example is our project with WaterAid in Karnataka, India. WaterAid engaged in a participatory assessment to understand on-the-ground realities of water vulnerabilities, water supply dynamics, and groundwater availability. During the first phase of the project, the communities were supported with preliminary restoration of critical infrastructure, thus helping to build rapport. As the project progressed, WaterAid adopted a multi-level system of engagement with the communities while creating Village Water Sanitation Committees as the key engagement platform for design, delivery, redressal, and operations and maintenance of the interventions.

Drawing the line between replenishment and access

Increasing access to water and sanitation services (or WASH), particularly for those in marginalized communities, is a vital part of corporate water stewardship and a key pillar within our water positive goal. Some companies count water access projects against their replenishment targets. At Microsoft, we have a separate access target: to provide more than 1.5 million people with access to water and sanitation services by 2030.[1] We count projects that are purely focused on water access and sanitation against this access target. However, the line between what counts as a water access versus water replenishment project can be blurry, and companies use different approaches. Some projects provide both access and replenishment benefits (for example, an ancient Indian stepwell that collects rainwater and then provides the local community with drinking water while also replenishing water back into the environment), while some provide access but do not restore water to the basin (for example, digging a borewell or installing toilets). For a project that overlaps both categories, we evaluate the nuances of the project and seek expert third-party guidance. If third-party experts confirm that there are credible claims for a volume that can count toward replenishment while also providing people with access, then we will consider counting it against both targets.



* Microsoft only includes direct beneficiaries from WASH interventions when accounting for our water access target; we have not listed education/hygiene behavior change, climate resilience, gender-informed programming, and systems strengthening in this figure, as although these can be important components of WASH projects and we consider them during project selection, they may not directly provide access to improved water and sanitation.
VWBA = Volumetric Water Benefit Accounting; **WASH** = water, sanitation, and hygiene.

Focus on innovation with an aim to build project supply and scale

Over the past 15 or so years, the bulk of replenishment projects have focused on land conservation, land cover or aquatic habitat restoration, water supply reliability, and water quality. These projects are typically led by an NGO and currently represent the bulk of our portfolio. These types of projects are foundational in our portfolio and will continue to play an important role going forward.

However, given the high (and increasing) demand for replenishment investment opportunities and the limited number of shovel-ready projects, there is a pressing need to build supply and quickly scale. We believe the best way to do this is to support new project implementers, whether that means NGOs, private sector entities, or a collaboration between the two. In many cases, these project implementers won't (yet) have a focus on replenishment, but they will have water expertise or experience with water solutions that can be enhanced with a replenishment angle. In particular, we see working with the private sector—especially startups—as a strategic way to build supply and drive scale and impact at a pace the world needs.

Our goal is to develop a broad, balanced portfolio of diverse solutions, with an increasing emphasis on innovative approaches, as we believe these represent a tremendous opportunity to scale supply (for Microsoft, our customers, and the world) and provide the support and funding to get critical water solutions up and running. Examples include using AI to track agricultural water use reductions and performance over time; applying technology to detect leaks in municipal pipes; building green infrastructure, such as an urban roof system to collect and recharge rainwater and reduce stormwater runoff; and offering innovative financing mechanisms to utilities to build wastewater treatment plants. Examples of projects like these that we have invested in so far include:

- **Leak detection in London**—Using FIDO's AI-enabled leak acoustic analysis to identify and track water leaks in aging water distribution networks. The initial project in the Thames Water network, England, has since spawned two new projects in Phoenix, Arizona, and Querétaro, Mexico.
- **Phoenix hospital cooling project**—A partnership with the Bonneville Environmental Foundation, BlueCommons, and the City of Phoenix to provide revolving loans to hospitals in Phoenix, Arizona, to cover the cost of retrofitting industrial cooling systems to maximize water efficiency. As loans are paid back, the funds are then re-loaned to other hospitals in the region.

Our focus on innovation in water replenishment aligns with our company's commitment to technological innovation more broadly: we believe that technology can and should be a force for good and that meaningful innovation can and will contribute to a brighter world in big and small ways.

How we build and manage our portfolio

The process for building and managing our replenishment portfolio begins with determining the volume we need to replenish and continues right through to ongoing benefit quantification and tracking for the duration of the projects we support. In this section, we share the process that we use at Microsoft, including the many stakeholders we work with along the way.

We find it essential to have a comprehensive replenishment tracker database to capture details about all potential and committed projects, including project descriptions, due diligence, and metrics like cost, volumes contracted, third-party quantification, duration, operational timeframe, basin, completion date and timelines, and potential risks to project volumetric outcomes. Our tracker also captures all correspondence with project scoping partners, third-party quantifiers, project implementers, procurement teams, and so on, to track all important steps and updates. This is invaluable when planning for annual purchases, evaluating potential projects, and conducting due diligence, as well as for ongoing monitoring.

Making the business case for replenishment

Water replenishment is about so much more than chasing drops. Replenishment projects, when properly aligned to the local context, can offer vital co-benefits to both local communities and local ecosystems. However, the projects with the most to offer don't necessarily come with the lowest cost per cubic meter. We have found it critical to have executive support for a comprehensive program that prioritizes ecosystems and biodiversity, environmental justice, and community benefits. We go beyond tracking potential volumetric benefits and include these additional considerations to help build the business case and secure the necessary budget.

Establishing our annual contract volume

Our target is to replenish more water than we consume by 2030. We have set annual volumetric targets to ensure that we are on track. The annual volume we seek to contract each year is based on our projected water consumption for that year. We initially developed a set of linear annual targets that would require us to procure a progressively larger volume of water each year through 2030. In fiscal year (FY) 2023, we decided to ramp up our investments in the short term and procure the volume that we project needing for 2030 by 2027/2028, to ensure that we have sufficient time to have a third party quantify those volumes before 2030.

Identifying and evaluating potential projects

With our guiding principles as the foundation to our selection process, we proactively search for potential projects. We work with project scoping partners to identify existing replenishment projects in our priority locations to determine if there are any that align with our principles. Working with the project implementers (usually NGOs), the scoping partners provide project summaries, as well as the estimated volumetric benefit for each project.

We also proactively network with other actors in this space—project implementers, capital investors with water funds, startups developing water solutions, and even local Microsoft employees and other local contacts who can connect us with possible leads—to build the capacity of potential project owners and implementers to develop projects or even build out our own projects. We look for new ideas and innovative approaches. In some cases, when "replenishment" isn't part of the original concept behind a project, there is an opportunity to expand or adjust the focus enough to deliver replenishment benefits.

Our goal is to build a diverse portfolio, one that reflects a variety of project types from multiple, credible project scoping partners and implementers and covers all of our priority locations in a manner that addresses shared local water challenges.

Before we begin our formal selection process, we hire a third party to complete an independent estimation of the volumetric benefits (that is, third-party quantification) for potential projects, particularly where there is uncertainty about the methodology or if the project implementer is new to replenishment. A growing number of organizations offer third-party quantification services.

Following third-party quantification, we assess every potential project against the considerations outlined in the following table to better understand each project's alignment with our priorities, as well as anticipated benefits and potential risks or unintended consequences. It can take time to gather this information, but sufficient due diligence is key to doing an "apples to apples" comparison of each project and fully assessing its alignment with our priorities. Given how few projects are in an implementation-ready state and the value represented by innovative thinking, we recognize the importance of staying flexible and adaptive in our approach while holding steady to our commitment to quality and equitable community impact.

Project considerations[18]	Details
Volumetric benefits	
Volumetric benefit we can claim*	• All projects need to have a volumetric benefit that we can claim against our target.
Transparent benefit calculation aligned with VWBA guidance	• For partners new to replenishment, we factor in the need for us to vet their methodology (by connecting them with a third-party quantifier) to confirm that we are quantifying volumes in the same way and ensure alignment with VWBA. • For innovative projects that do not have a quantification method in the VWBA guidance, we engage with a third-party quantifier to develop a credible methodology to quantify volumetric benefit.
Location	
Proximity to Microsoft priority basin* (proximity to Microsoft site is optional provided it is in the basin)	• The basin should be hydrologically connected to a Microsoft water source. • We prioritize projects at the minor basin level.
Locally relevant and addresses shared water challenges in the watershed*	• Project type should align with the local context.

[18] This table reflects some of Microsoft's own defined considerations; VWBA 2.0 will include guidance on recommended criteria and considerations.

Project considerations[18]	Details
New location for a Microsoft replenishment investment	• We give preference to locations where there is a limited supply of projects and where we do not yet have other projects.
Project assurance/risk	
Credibility of partner organization*	• We consider the experience of the project implementer. • For startups, we consider their leadership, business model, and technology solution to gauge whether it would be a strategic investment.
Level of confidence that the project will deliver the intended benefits	• We evaluate the risk of delay or cancellation.
Low risk of negative impact on local communities*	• We assess potential impacts on the community (for example, whether a change in water flow could limit access for local stakeholders who depend on that water).
Potential for risk	• What are the potential business and associated risks of the project overall?
Other	
Social, environmental, and environmental justice co-benefits	• We assess what co-benefits the project offers, such as greenhouse gas (GHG) reduction, water access, water quality improvement, creation of recreational areas, biodiversity protection, and education/capacity building.
Additionality	• Would the project happen without our support? • Does the project provide benefits to existing basin conditions that would not have happened without the project activity?
Timeline to implementation	• Ideally, this should be two years or less.
Cost per cubic meter	• Cost is an important factor but considered alongside many other criteria, including innovation and co-benefits.
Duration	• We give priority to projects with longer time horizons (they must at least count towards our 2030 annual target).
Innovation	• We look for projects with potential to help accelerate global development of innovative, scalable water technologies.
Monitoring	• Ideally the project will include credible, cost-effective, data-driven monitoring systems that accurately evaluate the annual hydrologic benefits generated. • Real-time monitoring is not essential but an increasing priority where practical/applicable.

** Indicates that this is a requirement.*

To help us accurately and comprehensively assess each prospective project against our priorities, we have a set of questions that we ask each project implementer. The following questions are a sample from our standard list (note that this is not a comprehensive list and is updated periodically as market conditions change):

- Project details
  - What methodology was used to calculate the anticipated total annual volumetric benefit?
  - Can you provide data for the baseline conditions?
  - Will anyone else be claiming the water benefits? (This is especially important for innovative projects where a hospital, school, or water utility is sharing capital costs.)
- Ongoing project management
  - How are benefits monitored (for example, in a leak detection project, how do you track and ensure that leaks were repaired)?
  - What is the exit strategy (that is, what will happen when the project stops functioning or when the project is handed over to local communities or beneficiaries)?
- Risks
  - What are the potential known risks and/or unintended consequences of the project (for example, risk of water interruptions or poor-quality water discharge)?
- Environmental justice
  - Has the community been involved in the process? Does the project involve community perspectives and leaders in project planning and decision making? *(when applicable)*
  - How do you ensure that the project does not pose any potential water-related health impacts on local communities or the environment (for example, from wastewater discharges)?
- Human rights
  - Are WASH facilities and services adequate for employees/clients?
  - Can you provide information on labor and employment practices and policies, as well as for any contractor/partner that will be a part of the project?

Contracting new projects

We route all contracts through the same procurement process that we use with all vendors. To streamline this process, we worked with our legal and procurement teams to create a replenishment contract template that could meet the unique needs of project partners and outputs across all replenishment suppliers. Each year, once we have identified the projects that best align with our principles, we work with the project scoping partners and/or implementers to complete the procurement process. We bring in procurement and legal support on both sides, as needed.

Monitoring and tracking our portfolio

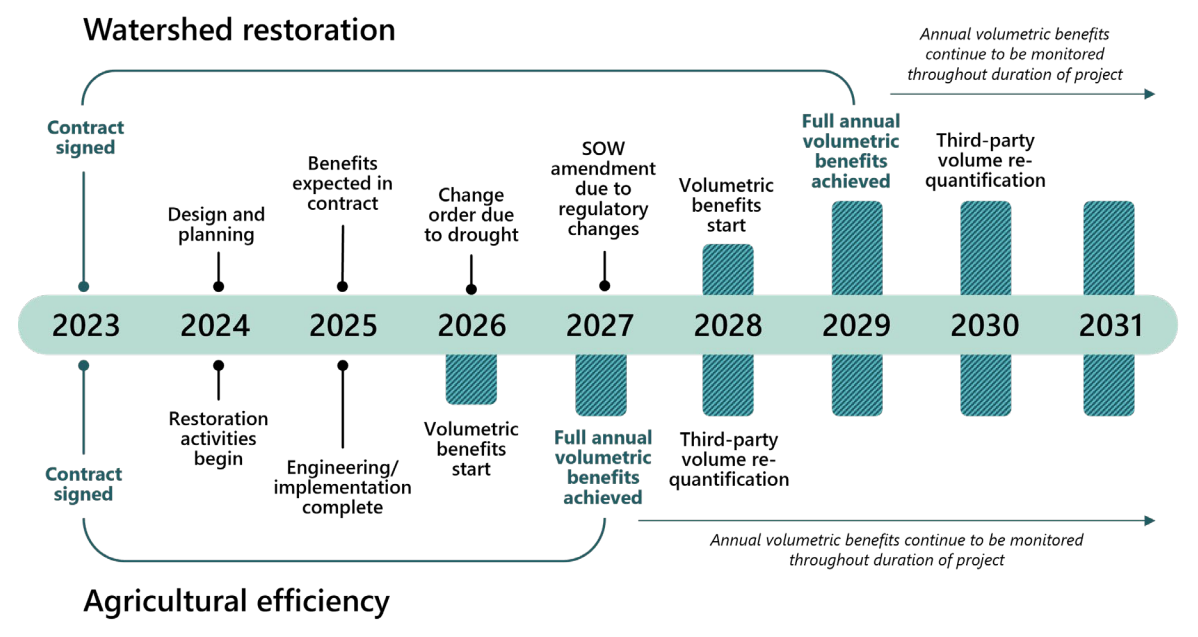
As mentioned in the Challenges of replenishment today section, not all projects proceed as expected. Volumes and durations can shift, and projects can be delayed or cancelled because of regulatory or climatic conditions. To be truly accountable to meeting our replenishment target, we track every project from initial consideration through to completion (when the contract comes to an end, the project no longer delivers volumetric replenishment benefits, or the project is handed off to another entity, such as a park district).

To help us with this tracking, we require that project implementers annually complete a form to provide status updates on their project, including volumetric benefits, any project changes or challenges, and photos

or videos. (See Appendix B for details on the information we request through this form.) One to two years following the implementation of a project, we also use third-party quantification to re-assess the original volumetric benefit estimation based on actual project data. We make any necessary reconciliations—to the timeline, duration, volumetric benefits, or other factors—in our replenishment tracker database and use these to update our projections and strategy.

The following figure shows an example timeline for two different types of projects, including how unanticipated changes in conditions (weather, regulatory) can affect the course of the project and the volumetric benefits delivered.

Example timelines for different replenishment projects



SOW = statement of work

An important note about ongoing monitoring is that most replenishment projects do not use real-time monitoring (one exception in our portfolio is the FIDO London project). Third-party quantification of replenishment volumes is often based on project data (provided by the project implementer) and estimates using long-term averages and water and climate models, rather than actual measurement. Given this, volumetric benefits are based on estimates, and actual volumes could be more or less. We take a conservative approach and use only minimum estimated volumes to help ensure that we do not overclaim.

Real-time monitoring doesn't work for all project types, but where it makes sense, we would like to see it integrated. We're currently exploring opportunities to establish real-time water replenishment monitoring systems. Options include using satellite imagery to confirm that protected land hasn't been built on and precipitation data to confirm annual rainfall volumes.

Our portfolio to date

As of July 2023, we have invested more than $16 million in 49 replenishment projects around the world, for more than 61 million m^3 of potential volumetric water benefits (the equivalent volume of 24,000 Olympic size swimming pools) over the lifetime of the projects. These projects have taken on average approximately 1.4 years from the time of investment until they start generating volumetric benefits; they have an average duration of 8 years (though most have a duration of 10 years).

Our portfolio consists of 22 different project activities across the seven Volumetric Water Benefit Accounting (VWBA) categories:[19]

- Land conservation and restoration
- Water supply reliability
- Water access
- Water quality
- Aquatic habitat restoration
- Water governance
- Catalytic activities

The following sections provide a closer look at each of these categories, the types of activities that they include, and some examples of the projects that we have invested in in each one. For a full overview of our water replenishment portfolio, please see https://aka.ms/MicrosoftWaterReplenishmentProjects.

Land conservation and restoration

This category includes two project activity types: (1) land conservation and (2) land cover restoration. Projects focused on protecting the native cover provided by grassland and forests help prevent runoff and erosion associated with land uses such as agriculture, grazing, and development. Land conservation (including both protection and preservation) can involve legal mechanisms to protect land from development or conversion to a more degraded use. Land cover restoration activities focus on improving vegetative health and cover, for example through reforestation or agroforestry. These projects are typically measured by the volume of reduced or avoided runoff.

[19] Reig, P., Larson, W., Vionnet, S., and Bayart, J.B. *Volumetric Water Benefit Accounting (VWBA): A Method for Implementing and Valuing Water Stewardship Activities* [working paper]. Washington, DC: World Resources Institute, 2019.

To date, Microsoft has invested in seven land conservation and restoration projects, including:

- **Prairie site restoration in Fargo, North Dakota**—A partnership (called the Urban Woods and Prairies [UWP] initiative) between Audubon Dakota and multiple local landowning entities aimed at restoring and enhancing riparian grassland, wetland, and woodland habitats.
- **Invasive species removal in Cape Town, South Africa**—A multi-partner collective action initiative involving The Nature Conservancy (TNC), CapeNature, and the City of Cape Town (Greater Cape Town Water Fund) that will restore land by clearing invasive species on 150 hectares in priority sub-catchments of the Theewaterskloof Dam in the Western Cape Water Supply System.
- **Land easement for conservation in Comal County, Texas**—In partnership with Edwards Aquifer Conservancy, targeted acquisition of conservation easements in the Edwards Aquifer—with an emphasis on lands that are the most likely to be threatened by rapid development or negative management practices—to help protect, on average, 0.6 acre-feet of recharge per acre.

Water supply reliability

The water supply reliability category includes seven different types of project activities:

1. Agricultural water demand reduction measures, such as converting from flood to drip irrigation, implementing variable rate irrigation, employing advanced irrigation scheduling, making improvements to the soil, and reducing the need for irrigation through crop conversion and fallowing (measured by reduced withdrawal or consumption volume).
2. Operational efficiency measures that reduce direct water use (measured by reduced withdrawal volume).
3. Leak repair, by detecting and repairing leaks in distribution systems or buildings (measured by reduced withdrawal volume).
4. Consumer use efficiency measures that reduce water use associated with the use of products, appliances, and fixtures in homes and businesses (measured by reduced withdrawal volume).
5. Water reuse, whether that means replacing the supply of fresh water with reused water or providing a new water source that supports economic development or benefits the environment (measured by reduced withdrawal volume).
6. New water supply for crop irrigation by building pipes, canals, and other infrastructure to deliver water, including reused water (measured by the volume provided).
7. Rainwater harvesting, by building infrastructure to both capture and retain water during the wet season and enhance water availability (measured by the increased volume of recharge).

To date, Microsoft has invested in 18 water supply reliability projects (some projects span more than one of these activities). Examples include:

- **Precision agriculture in Santiago, Chile**—In partnership with Kilimo, using AI and site-specific data to improve irrigation management on 200 hectares of private family farms in the Maipo River basin to decrease groundwater pumping and diversion of surface water.
- **Leak detection in London, England**—Identifying and tracking leaks over 350 kilometers within the Thames Water network using FIDO's AI-enabled acoustic leak analysis software; this project has since spawned two new projects in Phoenix, Arizona, and Querétaro, Mexico.

- **Rainwater harvesting and aquifer recharge in Karnataka, India**—Harvesting rainwater and enhancing the availability of groundwater in water-stressed regions through artificial groundwater recharge in the Hyderabad district of Telangana state and the Raichur and Gulbarga districts of North Karnataka, through a three-year program in partnership with WaterAid.

Water access

Water access projects focus specifically on increasing access to drinking water supply—through well construction or rehabilitation, water distribution, water treatment, or rainwater harvesting. Volumetric benefits are measured by the volume of water provided.

Although water access is a VWBA category, for Microsoft, projects that are exclusively focused on access to water and/or sanitation and do not replenish or restore water in a basin where we operate (for example, those that involve installing a faucet in someone's home, installing a toilet, or digging a well) are part of our water access program and are not included in our replenishment portfolio. However, some of our replenishment projects have water access co-benefits. One example:

- **Clean water distribution in Karnataka, India**—In addition to harvesting and recharging groundwater through pond restorations and enhancing groundwater recharge with point injection wells, our project with WaterAid in Karnataka reached more than 11,000 people with increased access to water, including through restoration of community and school-based water points and enhanced storage facilities in the community.

To learn more about our progress against our water access target—including our work with Water.org to fund micro-loans to cover water access solutions in Brazil, India, Indonesia, and Mexico—please see page 34 of our 2022 Environmental Sustainability Report.

Water quality

The VWBA guidance[20] identifies four types of water quality projects:

1. Agricultural best management practices, including conservation tillage, laser leveling, cover crops, and agrochemical management (4Rs) (measured by the volume of reduced runoff).
2. Stormwater management through green infrastructure, including detention ponds, bio-swales, permeable pavement, rain gardens, and other measures that reduce impervious areas (measured by the volume captured).
3. Constructed wetland treatment systems placed on agricultural landscapes and in urban areas (measured by the volume treated).
4. Wastewater treatment plants, specifically facilities designed to remove pollutants from wastewater discharge (measured by the volume treated).

[20] Water Quality Benefit Accounting (WQBA) guidance is currently under development and will be an important resource for companies investing in this area once it is publicly available.

Microsoft has several water quality projects in our portfolio to date, including:

- **Agricultural best management practices in Shanghai, China**—Collaborating with the local community, NGOs, and research institutes through the TNC Qiandao Lake Water Fund to establish inlet-lake wetland restoration pilot sites and explore nature-modelling restoration methods. This project promotes agricultural best management practices that target non–point source pollution and soil erosion through hickory, tea, and citrus crops, laying the foundation for large-scale application.
- **Wastewater treatment plant rehabilitation in Santiago, Chile**—Through our partnership with Fundación Chile, rehabilitating an existing wastewater treatment plant in Curacaví to improve the quality of the effluent that is used by small farmers, ranchers, and the ecosystem of the Puangue Estuary.
- **Lake and wetland restoration in Chennai, India**—Through our project with TNC, establishing an in-situ nature-based wastewater treatment system at Sembakkam Lake (using a constructed wetland system) that will treat nearly 6 to 7 million liters of wastewater entering the lake per day, helping improve its water quality, storage capacity, and groundwater recharge potential, which will, in turn, improve groundwater quality and quantity in the surrounding areas.

Aquatic habitat restoration

The aquatic habitat restoration category includes six types of project activities:

1. Wetland protection, using legal mechanisms to prevent draining or alteration (measured by the volume of maintained recharge).
2. Wetland restoration and creation, which can include the rewetting of a historical wetland, invasive species removal, tile drain removal, or wetland creation (measured by the volume of increased recharge).
3. Legal transactions to keep water in-stream, such as through the acquisition or leasing of water rights, source switch, and seasonal forbearance agreements (measured by reduced withdrawal volumes).
4. In-stream barrier removal, including dam and culvert removal (measured by improved flow regime).
5. Dam reoperation, moving toward a more natural flow regime and banking and credit storage (measured by improved flow regime).
6. Floodplain inundation/reestablishing hydrologic connections, including natural stream channel design, grade control structures, log deflectors, floodplain reconnection, and side channel reconnection/restoration (measurement approach varies based on specific objective).

Microsoft has invested in 25 aquatic habitat restoration projects to date, including:

- **Wetland restoration in Mexico City, Mexico**—Implementing a model called Chinampa-Refugio, which has been designed to protect the Xochimilco Lake ecosystem through various conservation measures, such as restoring chinampas (artificial islands built on the lake for growing crops), planting native species, and using biofilters to improve water quality, through our partnership with Conservation International. The Xochimilco wetland is home to 11 percent of Mexico's biodiversity—including the Mexican axolotl salamander, an emblematic amphibian species that is critically endangered. Axolotls function as environmental biomarkers, since an increase in their population is a sign of improved water quality.

- **Watershed oxbow restorations in Des Moines, Iowa**—Restoration of the many oxbows (meanders of a stream that have been cut off from the present flow of water) in the Boone River watershed to improve water quality and reduce flooding, in collaboration with TNC.
- **Groundwater leasing in San Antonio, Texas**—Leasing of groundwater rights in the Edwards Aquifer for forbearance purposes to reduce groundwater depletion and enhance spring discharge through our project with Edwards Aquifer Conservancy. This project will improve San Antonio's water resilience by improving spring flow and aquifer storage.

Water governance

Water governance projects involve direct engagement in water governance and public water management. This includes participating in coordination and collaboration among stakeholders, advocacy, improving water policy and planning, increasing resilience and reliance on public water infrastructure systems, and developing sustainable governance and financial mechanisms to set the stage for the protection and restoration of water supply catchments (for example, water funds). A few examples from our portfolio include:

- **Cooling efficiency in hospitals in Phoenix, Arizona**—In collaboration with Bonneville Environmental Foundation (BEF), BlueCommons, and the City of Phoenix, providing revolving loans to hospitals in Phoenix through the Phoenix Hospital Cooling Project to cover the cost of retrofitting industrial cooling systems that will help conserve water; as loans are paid back, BlueCommons will provide the funds to other hospitals in the region.
- **Water conservation and resilience in Arizona**—Through our project with BEF and other partners (including BlueCommons and Restauremos El Colorado), bringing together water leasing (from water rights holders), habitat restoration, environmental flows, and private and public sector investment to increase water resilience in the lower Colorado River through the Lower Colorado Resilience Project.
- **Water sharing agreement in New Mexico**—A first-of-its-kind water sharing agreement between the Jicarilla Apache Nation, the New Mexico Interstate Stream Commission (NMISC), and TNC, which allows the NMISC to lease up to 20,000 acre-feet (approximately 24,669,600 cubic meters) of water per year from the Jicarilla Apache Nation to benefit threatened, endangered, and sensitive fish species and increase water security for New Mexico. This agreement demonstrates how Tribal Nations and state governments can work together on a sovereign-to-sovereign basis, with support from conservation organizations, to find collaborative solutions.

Water policy is a key pillar for our water positive goal and an area that we are actively working on. However, all projects that we invest in as part of our replenishment program must have a volumetric benefit that we can count against our replenishment target. Governance is therefore never the primary category for us, but the aforementioned projects provide governance co-benefits alongside volumetric water benefits from another VWBA category.

Catalytic activities

Catalytic project activities (which will be re-labelled "enabling activities" once VWBA 2.0 installments are published) include those that pave the way for longer term water stewardship outcomes. Examples include

data collection/monitoring, assessment, hydrological modeling/development of modeling tools, management plans, training, information sharing, education and awareness, and collective action convening. There are different definitions of "catalytic" for water replenishment, and so we haven't classified any of our projects in this category until there is greater clarity (our work with FIDO *could* be an example of a qualifying project, but without more guidance on estimating enabled benefits, we currently categorize it as a water supply reliability project). However, catalytic activities are important to us, which is reflected in our emphasis on building scalable, innovative projects.

Leak detection with FIDO

Across the Thames Water network in London, England, 24 percent of the input water volume is currently lost to leakage. Quickly identifying leaks and launching repair measures has historically been challenging to accomplish. Our new 10-year partnership with FIDO Tech will help overcome this, by supporting leak identification measures throughout the Thames Water distribution network and beyond.

FIDO uses network-embedded AI acoustic sensors to report data on leaks throughout the network. These sensors can identify and determine the size of leaks, providing valuable information on where, when, and how much water loss is happening. The sensors continue reporting data after repairs have been made, showing whether the repairs are valid and how much water is saved.

When the Microsoft water team first learned about the FIDO solution, we realized its potential as a replenishment tool—as an innovative and scalable technological approach to reducing water loss. Our partnership with FIDO represents our vision for widening the scope of water replenishment and investing in long-term solutions. Since the launch of FIDO's leak detection solution in London, we have announced support for deployment of the technology in Phoenix, Arizona, and Querétaro, Mexico.

Looking ahead

Demand for cloud services and AI is growing across the globe. To meet that demand, the tech sector will need to grow—and with it, the world's datacenter footprint. Our focus first and foremost when it comes to water is to reduce our water use by building for efficiency and exploring alternatives to using water for cooling in our datacenters. From there, we will continue to work to replenish more than we consume across our entire global operations.

We already have a substantial replenishment program, and yet we need to do more. What has become abundantly clear is (1) the need to scale the market to meet demand and (2) the need to focus corporate resources where they can generate the greatest impact—not just for us, but for the world. The question is, how? We see a need for:

- **Broadening perspectives on what "replenishment" means.** This is about identifying, catalyzing, and advancing new, innovative approaches. About understanding that replenishment isn't just about counting volumes but also about basin health, with benefits for people and ecosystems. About systems thinking: considering where replenishment fits within the wider sustainability puzzle and how it can contribute to other sustainability objectives, such as GHG reduction and biodiversity conservation. About ensuring that it goes beyond the sustainability paradigm by helping to build long-term economic, social, environmental, and political resilience.
- **More implementing partners and matchmakers in the market.** It is inefficient for individual companies to build their own replenishment projects. To gain momentum, the world needs more project scoping partners and project implementers. More corporations to invest in startups to support them to grow and scale. Increased awareness of replenishment across sectors among professionals at utilities, governments, consulting firms, and NGOs (which may lead to new opportunities for financing/co-financing water projects). And collaboration across industries and collective action (in alignment with WRC) to drive momentum and broaden the focus beyond volumes to outcomes.
- **Global standards that build on existing guidance.** VWBA guidance has played a critical role in helping projects to measure volumetric benefits and corporations to report against replenishment targets consistently. The next step will be to develop standards that build on these guidelines to formalize requirements and establish expectations that companies will have to follow. Standards will also be key to avoid "bluewashing," by putting guardrails around what counts as replenishment (to avoid situations where, for example, untreated or tainted water is "replenished" into an aquifer, causing more harm than good).
- **Support from public policy and governance.** Financial incentives (for example, to collect rainwater from buildings and contribute it to local agriculture) could help decrease the cost of replenishment. Federal funding could help increase the supply of available projects, while reforming regulations could incentivize water reuse or lift unnecessary regulations that prevent water reuse. Furthermore, initiatives that help foster collective action could give replenishment projects a significant push (for

example, the creation of a basin-level water innovation fund that companies pay into to collectively fund progress).

- **Robust monitoring and tracking.** To really understand the value and impact of replenishment work requires better monitoring, not just of individual projects but of overall basin health. At the project level, as a first step there needs to be a definition of key indicators to measure watershed outcomes for different types of projects (volume may not be possible for all projects), so companies do not need to define these for themselves. At the basin level, there is a strong need for public information on basin risks, basin health, and all replenishment activities underway within the basin, to truly understand what impact those projects are having.

Appendix A:
Resources

The following resources provide information on water replenishment and may be useful for those looking for additional depth:

Publisher	Title
Beverage Industry Environmental Roundtable (BIER)	A Decade in Review: Practical Perspectives and Experience in Driving Impactful Water Replenishment Initiatives
Bluerisk, Valuing Nature, and CEO Water Mandate	Volumetric Water Benefit Accounting (VWBA): A Practical Guide to Implementing Water Replenishment Targets
UN Global Compact	Water Action Hub: Connect to water stewardship tools & opportunities around the world
World Resources Institute (WRI)	Volumetric Water Benefit Accounting (VWBA): A Method for Implementing and Valuing Water Stewardship Activities
World Water Week	Water Replenishment Targets: The good, the bad and the ugly (YouTube)
WWF	Water Balance Targets

Appendix B:
Annual project update form

Milestones achieved/tasks completed	Please provide a summary of completed tasks/milestones achieved in the reporting period. <start typing here>
Volumetric benefits realized in reporting year	Please enter the volumetric benefits in cubic meters (m^3) realized (allocated to Microsoft) in the reporting period. <start typing here>
Benefit quantification/ monitoring method	Please describe how you are monitoring and quantifying the volumetric benefits. If the project is under implementation, please answer "not applicable." <start typing here>
Total volumetric benefits realized to end of reporting year	Please enter the volumetric benefits in cubic meters (m^3) that have been realized since the project started. <start typing here>
Co-benefits	Please describe any co-benefits that the project produced in the reporting period. If you have any quantitative metrics, please include them (for example, # of people benefited). <start typing here>

Any damage to the project in reporting year?	Was there any event in the reporting period that affected the project's performance/viability/integrity (for example, extreme weather events such as floods and droughts, major structural changes, regulatory changes, vandalism)? If yes, please describe. <start typing here> If the answer to the previous question is yes, what corrective measures, if applicable/feasible, were or will be implemented? <start typing here>
Special maintenance	If applicable, was any special maintenance required in the reporting period? If yes, please provide details. <start typing here>
Media appearance	Any media appearances/mentions (positive or negative) of your project in the reporting period? If yes, please provide links. <start typing here>

Appendix C:
Glossary

The following definitions represent how Microsoft uses these terms for the purposes of our water replenishment work. It is important to note that there is no equivalent to the GHG Protocol for water and no standard definitions for common water-related terms. As such, many organizations, datasets, disclosure platforms, and government sources use different definitions. To ensure that we are consistent in our use of water-related terminology across the company, we developed the following definitions. These were developed after completing an intensive review of water-related terminology from key platforms including CDP, the Global Reporting Initiative (GRI), and government sources.

Additionality: An activity is additional if it will produce "extra good" relative to a baseline scenario.[21] A water replenishment project is additional if the measurable benefits caused by the project would not have been realized without the project's implementation.

Alternative water sources: Those that can be used to help offset the use of fresh surface water and groundwater. Examples include harvested rainwater from roofs, captured condensate from air handling units, reclaimed wastewater.

Baseline water stress (BWS): A physical water risk indicator that measures the ratio of total water withdrawals to available renewable surface and groundwater supplies. Water withdrawals include domestic, industrial, irrigation, and livestock consumptive and non-consumptive uses. Available renewable water supplies include surface and groundwater supplies and the impact of upstream consumptive water use and large dams on downstream water availability. These ratios are converted to water risk scores between 0 and 5 based on the following thresholds:[22]

- Low (0-1): <10%
- Low to medium (1-2): 10-20%
- Medium to high (2-3): 20-40%
- High (3-4): 40-80%
- Extremely high (4-5): >80%
- Arid and low water use (5)

Basin: An area of land that is drained by a river and its tributaries, usually reaching the sea. A basin can consist of smaller watersheds (refer to watershed definition). Note: *basin* and *watershed* are sometimes used synonymously in North America, while in European countries the term *catchment* can also refer to a basin. Refer to *catchment* and *watershed* definitions.

Catchment: An area of land from which all surface runoff and subsurface water flows through a sequence of streams, rivers, aquifers, and lakes into the sea or another outlet at a single river mouth,

[21] Gillenwater, M. *What is additionality? Part 1: A long standing problem* [discussion paper (version 03)]. GHG Institute, January 2012.
[22] *Aqueduct 4.0: Updated Decision-Relevant Global Water Risk Indicators*. WRI, August 2023.

estuary, or delta. Catchments can be basins or watersheds, depending on their size and final outlet. Refer to basin and watershed definitions.

Consumption: The amount of water drawn into the boundaries of the organization/facility and not discharged back to the water environment or a third party. (Consumption = withdrawals – discharge)

Discharge: The effluents and other water leaving the boundaries of an organization/facility and released to surface water, groundwater, or third parties.

Domestic water: Water used for indoor and outdoor household purposes.

Environmental justice: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This is achieved when all people have (1) the same degree of protection from environmental and health hazards and (2) equal access to the decision-making process to have a healthy environment in which to live, learn, and work.[23] Environmental justice begins with acknowledging past and present harms to communities on the frontlines of the climate crisis. Frontline communities are the populations most affected by multiple and cumulative sources of pollution and climate impacts, often without access to clean air, clean drinking water, or public investment. People who experience oppression because of race, income, gender, sexual orientation, disability, or other factors often lack access to resources and protections in society in general, as well as from climate-related threats. Environmental justice redirects leadership, resources, and decision making into these communities that are most affected and were previously excluded.

Freshwater: Water that occurs naturally on the Earth's surface in ice sheets, ice caps, glaciers, icebergs, bogs, ponds, lakes, rivers, streams, and aquifers.

Groundwater (non-renewable): Water being held in, and that can be recovered from, an underground formation. Non-renewable groundwater has a negligible rate of natural recharge on the human timescale (more than 50 years) and is generally located at deeper depths than renewable groundwater. This is sometimes referred to as "fossil" water.

Groundwater (renewable): Water being held in, and that can be recovered from, an underground formation. Renewable groundwater sources can be replenished within 50 years and are usually located at shallow depths.

Major basin: For the delineation of major basins, we align with HydroBASINS level 3,[24] which is the closest approximation to the Food and Agriculture Organization of the United Nations (FAO) major basins.[25]

Minor basin: For the delineation of minor basins, we align with HydroBASINS level 6,[26] which is the hydrological boundary used for minor basins in the World Resources Institute (WRI) Aqueduct tool.[27]

[23] "Environmental Justice." US EPA.
[24] "HydroBASINS." HydroSheds.
[25] "Hydrological basins of the world" [dataset]. FAO catalog. FAO of the United Nations, June 2022.
[26] "HydroBASINS." HydroSheds.
[27] *Aqueduct 4.0: Updated Decision-Relevant Global Water Risk Indicators*. WRI, August 2023.

Rainwater harvesting: The collection of rainwater from rooftops or other covered surfaces to divert and store for later use. Harvested rainwater is commonly used for non-potable applications, such as irrigation for landscaping, toilets, and evaporative cooling.

Reclaimed wastewater: Water that is discharged from buildings and processes, treated at a wastewater treatment facility (on-site or purchased from the water utility/third-party water provider), and then reused in applications such as irrigation and industrial processes. Reclaimed wastewater sources include greywater and blackwater.

Recycled/reused water: Water (from any source) that has already been used in a process and that is treated before it is used again in a task. Can be sourced from greywater, blowdown water, or others.

Replenishment: Restoring a volume of water to local watersheds; replenishment activities typically address water quantity (availability) or quality by reducing water use, recharging local aquifers, restoring aquatic ecosystems, or conserving land.

Volumetric water benefit: The volumetric outputs resulting from water stewardship activities that modify the hydrology in a positive way and result in a certain volume of water improvements in the watershed.[28]

WASH: Acronym used in international development that stands for water access, sanitation, and hygiene; WASH includes safe drinking water, adequate sanitation, and hygiene education.

Wastewater: Used water from any combination of domestic, industrial, commercial, or agricultural activities and any sewer inflow or sewer infiltration. Can contain physical, chemical, and biological pollutants. Wastewater can be discharged through the sewerage system or be treated on site. The main types of wastewater are greywater, blackwater, and industrial wastewater.

Water positive: For Microsoft, being water positive means we will reduce water use intensity across our global operations, replenish more water than we consume, increase access to water and sanitation services for people across the globe, drive innovation to scale water solutions, and advocate for effective and innovative water policy.

Water scarcity: The volumetric abundance, or lack thereof, of freshwater resources.

Water stress: The ability, or lack thereof, to meet human and ecological demand for freshwater. Water stress is a more inclusive and broader concept than water scarcity; it accounts for both demand (like scarcity) and where supply is compromised from water quality impairment.

Withdrawal: All water drawn into the boundaries of an organization/facility from all sources for any use.

Watershed: An area of land/catchment from which surface runoff and subsurface water flow into a single outlet such as a stream, wetland, or tributary of a major river. A basin can be formed by multiple watersheds. Refer to catchment and basin definitions.

[28] "Volumetric Benefit Accounting (VBA): A Method for Implementing and Valuing Water Stewardship Activities." CEO Water Mandate, February 2019.