Apple’s Water Strategy

March 2025

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Introduction

Water is one of our most critical resources. Because it's a community resource, we prioritize our stewardship efforts: working toward the most efficient use of freshwater, using alternatives where possible, and managing our discharge responsibly. We also look beyond our facilities to the water basins where we operate. We're working to improve the quality of the water that our communities rely on through collaborations with local partners — including companies, NGOs, and government agencies. We've developed a water footprint that informs the five pillars of our water strategy set out in this paper.

Background

Water stewardship is a global opportunity with local dimensions and solutions. Today global water resource management is being challenged by many factors — including climate change, increasing populations, and industry use — that are making freshwater increasingly scarce, flooding more frequent, and access more vulnerable. Because water is highly local, the scarcity or abundance of water and its pollution levels vary greatly based on location. And the actions of one water user may impact others in the same watershed.

At the same time, responsible water stewardship involves managing more than just the availability of water. Achieving water security means having a reliable quantity and quality of water available for people and ecosystems, as well as equitable access to supply. However, many communities still lack access to clean, safely managed water, despite it being a recognized human right. Addressing these challenges requires a collective approach among business, NGOs, governments, and communities.

Our key principles

As we consider the locations of our water use, three principles inform how we understand water stress and shape our strategy: availability, quality, and equity.

Availability refers to whether freshwater is consistently available to people and ecosystems. With increased water stress, reliable freshwater has dwindled in many locations over time. Our strategy prioritizes avoiding water use, saving water, and reuse and replenishment, which can be measured in gallons per year.

Quality refers to ensuring that water is fit for purpose and clean enough to use. Quality is more nuanced than availability. For example, excess nutrients, salts, dissolved solids, or heavy metal pollution can all lower water quality. Because high-quality freshwater is scarce, the use of alternative water sources helps save high-quality freshwater for potable and ecosystem needs.

Equity refers to the fair distribution of access to freshwater. Two billion people lack access to clean water around the world, and 3.6 billion lack access to sanitation.[1] We aim to invest in community-based clean water and sanitation solutions in places where we've identified access as a key driver of water stress.

Our water strategy

This paper sets out our approach to water stewardship across our value chain. A strong understanding of our footprint shapes how we prioritize actions across the five pillars of our water strategy:

Low-water design. Minimizing water impacts in the design of products, manufacturing processes, Apple-managed services,[2] and sites.

Site efficiency and conservation. Improving performance of existing sites and processes.

Site water stewardship. Demonstrating responsibility beyond our facilities through watershed-level engagement.

Replenishment and nature-based solutions. Improving water availability, quality, and access through regenerative approaches.

Leadership and advocacy. Advancing water management through policy, advocacy, and technology innovation.

Apple Values

Our water strategy is part of our commitment to uphold our values everywhere we operate, support the people and communities across our supply chain, and protect the planet we all share. To learn more and see our latest annual progress reports, visit apple.com/environment and apple.com/supply-chain.

Sharing our approach

We're sharing our approach because we hope others can learn from our experiences. And given the shared nature of water challenges, we invite our peers to collaborate and identify additional ways to overcome them and scale our combined impact. Some of the key learnings outlined in this paper include:

- Water use often differs between direct operations and supply chain, requiring different approaches (see page 6).
- Data-driven approaches are needed to set rigorous replenishment targets; approaches that consider context are needed to deliver results (see page 16).
- Technology supply chains are global and often shared, requiring coordination to achieve goals (see pages 13, 18-19).
- Replenishment and nature-based solutions are necessary to deliver results outside the fence line, but need to be designed with a comprehensive understanding of the local ecological, economic, and governance systems (see page 17).

Taking stock of water across our value chain

Apple has been addressing water impacts for well over a decade. Our efforts include the Supplier Clean Water Program (see page 11) and our corporate water initiatives across site selection, efficiency, alternative sources, and replenishment. As we continued to develop our water strategy, we took steps to better understand how water is used across our value chain.

Our direct operations include owned or operated sites such as corporate facilities, data centers, co-located data centers, offices, labs, retail stores, and distribution centers. Our supply chain spans more than 50 countries and regions, with thousands of companies contributing to the process of building our products and services, including assembly facilities, module manufacturers, component manufacturers, and materials providers.

The evaluation we undertook considered the physical facilities in which we operate, the products and services we provide to our customers, and the supply chain that manufactures our products.

Types of water use in our direct operations and supply chain

In our direct operations, such as a typical corporate campus (see Figure 1), water is used for cooling, domestic use, irrigation, and processing in labs. About half the water used in direct operations is discharged back into a local municipal wastewater treatment system rather than used consumptively, either by evaporation through cooling processes or evapotranspiration in our landscape irrigation. We monitor the water quality at sites where we have an industrial wastewater discharge so that each location meets or exceeds local discharge requirements.

In our supply chain, industrial water users tend to use water differently from our corporate facilities. Typically, a supplier receives freshwater from a municipal source, purifies the water for production purposes, uses the water in a cleaning process, and sends the water to an onsite wastewater treatment facility before discharging it to a municipal wastewater facility for further treatment. This type of water use lends itself to wastewater reuse as a way to reduce freshwater withdrawals.

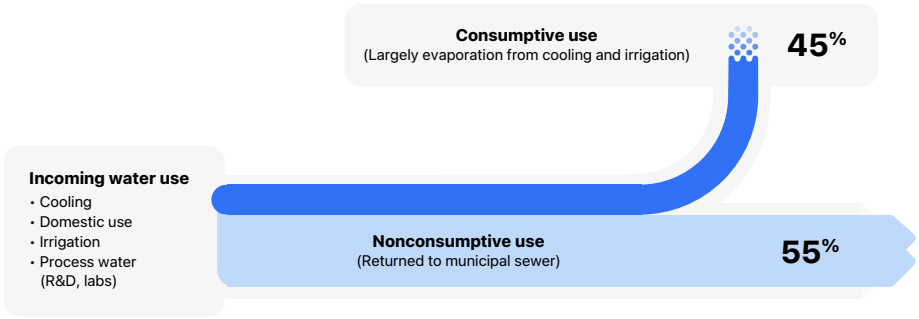

Figure 1. Water balance for a typical corporate campus

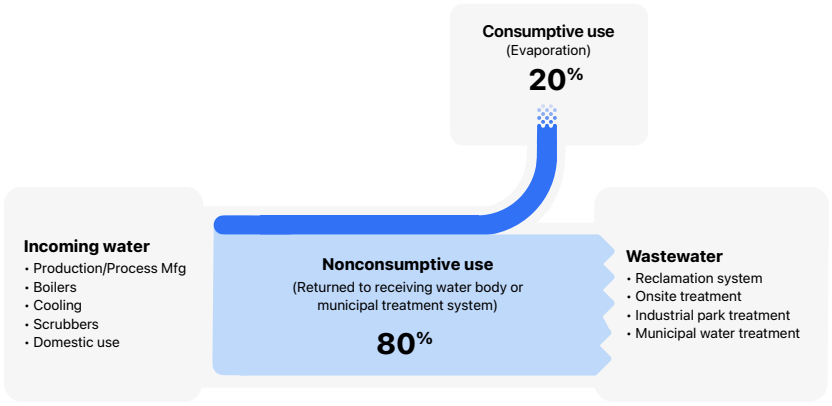

Figure 2. Water use for a typical manufacturing supplier

Understanding our water footprint

Understanding water use across a value chain of Apple's size and scope is complex. We developed a water footprint to better understand the biggest potential areas of impact across our value chain inclusive of the water in direct operations and in the supply chain.

Our water footprint methodology follows a similar approach to Apple's carbon footprint methodology, using a life cycle assessment (LCA) approach to understand the water consumption associated with materials, manufacturing processes, logistics, and use across the value chain. The availability and quality of data may vary, so we take a rigorous approach to improve the representativeness of the LCA. Whenever possible, we rely on primary data, such as metered water data from a corporate campus or water use surveys of our suppliers. Where we don't have primary data, we refer to industry data sets that reflect typical averages for water consumption in various industries, materials, and sectors.

Based on our primary data, we identified Apple-owned data centers and corporate campuses as the largest users of water across our direct operations. In our supply chain, we have identified through our analysis five key areas that account for the most significant part of our water footprint.

For more detail on our water footprint methodology, see the Water Footprint Appendix on page 22.

Mapping water stress and impact

In addition to better understanding our water impacts and dependencies, it's important to consider where in the world that water is used. Because access to freshwater is not distributed equally, the location of our use is critical in determining how we prioritize and undertake actions. By mapping our water use across local conditions, including water scarcity, impaired water quality, and access to water, we can further understand the relative impact of, and to, our locations.

We initially mapped our direct operations and supplier locations against the World Resources Institute (WRI) Aqueduct baseline water stress (BWS) criteria. We further adjusted the BWS to account for local knowledge of conditions and imported water, which can be significant depending on the region and is a more accurate reflection of how water is actually managed. We also consolidated BWS into three tiers (low, medium, high) with high representing a BWS score of 40 percent or greater. This analysis helped us to identify the portion of our direct operations water use that originates from high-stress watersheds.

To understand water stress at our supplier locations, we conducted a similar analysis and drew on findings from "Water Risk in the ICT Sector," a publication we helped develop with partners to analyze water risk in locations across Asia, Europe, and North America (see page 19). Based on this analysis, we set a goal to enroll all high-water-using supplier sites located in high-stress basins into our Supplier Clean Water Program — which helps our suppliers become stewards of the water resources where they operate by conserving water, promoting water reuse, and preventing water pollution within our supply chain (see page 11). The program drives participating suppliers toward an average water reuse rate of 50 percent by 2030.

Water in our Supplier Code of Conduct and Supplier Responsibility Standards

Through the Apple Supplier Code of Conduct and Supplier Responsibility Standards ("Code and Standards"), we require the companies we do business with to abide by rigorous labor, health and safety, and environmental standards, and to respect the fundamental human rights of all people. Our Code and Standards have specific provisions outlining our expectations for suppliers as they relate to water and wastewater management, stormwater management, and resource consumption management. This also includes provisions related to WASH (water supply, sanitation, and hygiene) for supplier dormitories and facilities. Read more on page 20.

Implementing our strategy

Our five-pillar strategy reflects the breadth and depth of activities we're undertaking, which can vary by value chain segment. The way we implement our strategy across our direct operations and supply chain is informed by our mapping of our water intensity against baseline water stress, our level of control or influence over the site, and whether water is used consumptively or not.

For example, low-water design and replenishment are significant opportunities for our direct operations that use water consumptively and in diffuse locations. But those opportunities are less significant for our supply chain, given its scale and the level of control we have over supplier locations.

By contrast, site efficiency and site water stewardship are more important for the supply chain because water is not used consumptively, and suppliers tend to be clustered in industrial parks within watersheds. Finally, there are areas of strong collaboration and shared work across our value chain, such as leadership and advocacy, where we work together to design new manufacturing processes, develop standards, promote water stewardship, and support innovation in our sector.

Low-water design

Low-water design is minimizing water impacts through the design of products, manufacturing processes, services, and sites.

Avoiding using water in the first place is the most sustainable outcome. Whenever possible, we approach low-water design by first focusing on site selection, conducting a water risk evaluation to determine whether a potential site is in a water-stressed area. The results inform our site selection and help inform the mitigation of any impact of our expected water use, either by selecting a different site, designing for waterless processes, using alternative sources, or replenishing water that is used. We also work with site owners, vendors, and other critical partners to design solutions to manage the quality of the wastewater that gets returned to the watershed.

This approach is primarily focused on new products, services, and sites. While water may be a critical factor in location, there can be many factors related to a site selection, such as access to talent, market access, or other conditions like seismic stability for critical manufacturing processes. Any ultimate decision should take into account all of these factors based on the information then known.

While the greatest opportunity is partnering with engineering teams or suppliers when they're in the early design process for a new site, there are still opportunities to identify improvements for facilities that have already been designed or suppliers that already have operations when we begin our relationship. Early engagement and constant monitoring are important because they can lead to better outcomes in site selection, process design, or facility design.

Direct operations

Our corporate low-water design efforts are focused on site selection and efficient design for our new buildings, data centers, and retail stores. For significant projects, our teams with water expertise are involved early in the site due diligence process and then in the design process, to help guide priorities for water stewardship. Major opportunities are identified early on and analyzed for feasibility in collaboration with the project team.

Water remains a consideration throughout the design process to help navigate design challenges and maximize impact. For example, we've designed recent data centers with cooling systems that don't consume water. For smaller projects, we rely on internal design guidelines to specify water efficiency requirements. For example, our retail stores have specifications to meet best-in-class fixture efficiency and use recycled water where available.

Supply chain

When we begin our business relationship with most suppliers, they're operating out of existing facilities. In those cases, our ability to influence site selection and design is limited. Our greatest influence in these situations is in design of the manufacturing processes that require water to operate. We focus on introducing new technology to recycle or reclaim process wastewater or new methodologies for treating wastewater.

Most often, low-water design means working closely with our suppliers in the early stages of engineering validation, before the manufacturing reaches full production. When we're able to collaborate with supplier engineering teams to drive conservation from the beginning, we can scale those water-saving technologies and process optimizations across more production lines.

A good low-water design solution is multifaceted — in that it reduces water use, reduces wastewater discharge, and can provide reduced operational complexity. These types of opportunities have wide-ranging appeal and can scale beyond the prototype to be an instrumental tool across the industry.

Site efficiency and conservation

We continually work to identify process and technology improvements to be more efficient and conserve water at our direct operations and supplier sites. Activities are unique to each type of facility and can include improving site controls, replacing freshwater use with alternative sources, and investing in onsite infrastructure or equipment.

Direct operations water use

Our corporate site efficiency and conservation efforts are focused on reducing potable water use in our existing operations through water efficiency improvements and increased use of alternative water sources, such as recycled wastewater and rainwater. Our approach emphasizes collaboration, data-driven decision-making, and continuous improvement. We focus our efforts across our direct operations portfolio on the following:

- **Benchmarking and monitoring.** It's critical that we directly meter and track water use at our buildings as well as significant end uses, such as landscaping or cooling systems. We continuously monitor our use through centralized dashboards to track major changes over time, respond to unexpected changes, identify opportunities, and assess data accuracy. For corporate facilities, the common metric we use to track progress on this work is water use intensity (WUI) for corporate offices, measured as gallons per square foot of office space. For data centers, the common metric of interest is water use effectiveness (WUE), measured as liters of water use per kWh of IT load.

- **Improving irrigation.** Irrigation for corporate landscaping represents another significant area of water use, and we're committed to ongoing improvements in this domain. For the majority of our sites where we control landscaping, we have implemented comprehensive irrigation efficiency upgrades, including the installation of weather-based and moisture-based smart irrigation controls that optimize water use based on real-time data. We actively monitor irrigation usage, set and monitor water budgets, and leverage extensive metering networks to detect leaks, identify metering errors, and uncover opportunities for further optimization and renovation.
- **Legacy data center cooling.** Many of our conservation efforts are focused on improvements to enable data centers to operate more efficiently — including operational controls, water treatment retrofits, and capital upgrades. Opportunities for improvement are identified through various efforts, including comprehensive assessments conducted by our engineering, facilities, and sustainability teams.

To ensure the effectiveness of these improvements, we employ a phased approach that includes pilot testing, performance monitoring, and iterative refinements. This approach allows us to better tailor potential solutions in a controlled environment before broader deployment. Our process also includes stakeholder engagement at each stage, ensuring buy-in and alignment across teams. Once a successful initiative is implemented at one data center, we evaluate its applicability to other sites and scale the solution where possible.

Supplier Clean Water Program

In our supply chain, our Clean Water Program (CWP) supports suppliers to strengthen water management and performance. These suppliers tend to use most of their water for manufacturing processes and to withdraw water from municipal sources. They then purify the water for use in sensitive processes, treat the wastewater to ensure that it meets local discharge standards, and return the bulk of that water to the municipality for further wastewater treatment.

While the CWP approach can be applied by any type of manufacturing facility, most of the participating suppliers are high water users located in a high-stress basin. We directly engage with suppliers — mostly through onsite visits — to assess them across four areas: water management, water conservation, wastewater management, and wastewater reuse.

We perform a baseline assessment of the supplier and provide an initial assessment of their performance across the four categories. We then focus on measuring and monitoring water conservation achievements and wastewater reuse. We work with CWP participants to help them implement wastewater reuse measures to improve their ability to meet our 50 percent water reuse target. Read more about the CWP in the appendix on page 24.

Wastewater reuse is one of the best ways that a supplier can reduce their water withdrawals. Anytime a supplier can reuse that water instead of discharging it, they directly reduce their withdrawals. Interventions can be as simple as redirecting blowdown from a water purification system to toilets or as complicated as leveraging line-side equipment to close-loop the water used in a production process (see dark gray arrows in Figure 3).

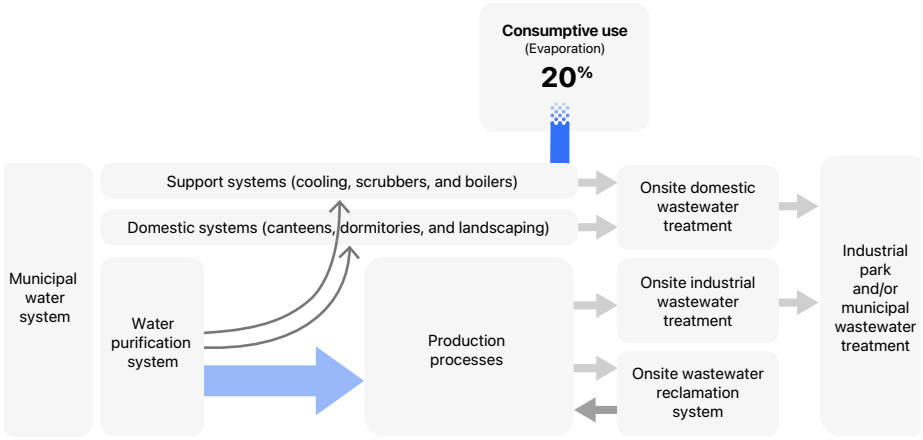

Figure 3. Typical water reuse in a supplier facility

Site water stewardship

Water stewardship, as defined by the Alliance for Water Stewardship (AWS), is the use of water that is socially and culturally equitable, environmentally sustainable, and economically beneficial, achieved through a stakeholder-inclusive process that includes both site- and catchment-based actions.[3]

At Apple, we work to demonstrate responsibility beyond our facilities through watershed-level engagement. While the first two pillars of our strategy fall entirely within our own or our suppliers' facilities, site water stewardship extends to the communities and ecosystems surrounding these facilities. We believe we have a responsibility to manage how our water use affects the communities surrounding Apple-owned facilities, and we have the opportunity to engage our suppliers to advance water stewardship practices in the communities in which they operate.

Direct operations water use

We work directly with the local communities surrounding Apple-owned data centers to better understand the local conditions, engage with stakeholders, and work to ensure that our facilities operate within the constraints of local conditions. Through our water risk analyses and impact assessments, we determined that our owned or operated data centers were good candidates for the AWS process. We committed to certifying all of our owned data centers to the AWS Standard by the end of 2025. The standard signifies that sites have developed and are executing water stewardship plans that address local stakeholders' shared water challenges. A certification will also demonstrate that they're achieving results related to the standard's five desired outcomes — sustainable water balance; good water quality; provision of adequate water access, sanitation, and hygiene; protection of important water-related areas; and good water governance.

We first piloted the AWS process with our Prineville data center, becoming the first data center worldwide to be certified to the AWS Standard in 2021. We've certified a total of seven Apple-owned data centers and are on track to meet our goal. This process has led to deep engagement with the communities in which our data centers operate and has been a catalyst for subsequent collective action to deliver on our replenishment and nature-based solutions.

Supply chain

As illustrated in "Water Risk in the ICT Sector," the bulk of water risk in the electronics manufacturing industry is related to flooding and water quality issues in key manufacturing hubs (see page 19 for more about the publication). Many of our suppliers are located in the areas highlighted by the publication. Since 2018, Apple has been working to facilitate collaboration between our suppliers and local communities by leveraging the AWS stewardship framework.

Where we have a large concentration of suppliers in a single area, we seek to drive our suppliers toward water stewardship. We work with third-party conveners like AWS to train and coordinate stewardship activities in these hubs. Our suppliers and other businesses in the community work to perform a basin assessment — an analysis of local water availability, quality, and access — to learn the local conditions and whether they're operating within those boundaries.

We've provided funding to AWS to help scale the adoption of water stewardship. For example, we collaborated with AWS to create an electronic version of the AWS Standard, translating the standard into multiple languages and providing training to support companies through their water stewardship journey. This collaboration has culminated in working with our suppliers to achieve milestones, including:

- A supplier site achieved the first gold certification in the electronics industry from AWS.[4]
- Three supplier sites earned the first platinum certifications in the electronics industry from AWS.[5]
- The Suzhou Industrial Park, home to Apple suppliers, became the first industrial park to achieve AWS certification.[6]

Suppliers undertake training, perform a gap analysis based on their current site water management, and then work toward certification with the AWS Standard. At the time of writing this paper, Apple suppliers represent a significant portion of all AWS certifications in the information and communications technology (ICT) sector.

Replenishment and nature-based solutions

Many global environmental organizations are working together with governments, companies, and community leaders to take a basin-level approach to watershed management. Having discussed the design, efficiency, and stewardship approaches we take to safeguard healthy watersheds, we turn to actionable approaches focused on direct engagement within the watershed. Replenishment and nature-based solutions help improve the resilience of nature and functioning ecosystems.

Corporate Watershed Resilience Program

Apple's Corporate Watershed Resilience Program (CWRP) delivers improved availability of water at the time, place, and quality needed for people and ecosystems. By building significant, long-term partnerships, we aim to provide quantifiable benefits through projects that save, produce, clean, secure, or reallocate water for the benefit of ecosystems and communities.

We committed to replenishing 100 percent of corporate facilities' freshwater withdrawals in high-stress locations by 2030. The key activities of our program include addressing withdrawals rather than consumption, defining appropriate geographic boundaries for our replenishment work (hydroeconomic basins), developing replenishment targets, identifying watershed resilience projects, and pursuing innovation and excellence in transaction structures.

Addressing withdrawals. We chose to base our restoration efforts on freshwater withdrawals rather than consumption[7] for several reasons. First, water is often imported from great distances, and even if it's not consumed, it's rarely returned to the source watershed. Second, since wastewater discharge is rarely metered, consumptive use must usually be estimated — a time-consuming process prone to error. Finally, there's no guarantee that even if that wastewater discharge is returned to municipal treatment systems, it's reused. Starting with only the portion of water consumed would not accurately reflect the potential impact a company's water use could have on local freshwater resources.[8] Rather, we account for the full volume of water that our facilities receive from water providers or withdraw directly (as from groundwater). Water that comes from alternative sources, such as recycled water, reused water, rainwater capture, or previously recharged water, is not considered a freshwater withdrawal and is therefore not included in the CWRP replenishment efforts.[9]

Withdrawals at corporate facilities include those from offices, retail stores, data centers, co-located data centers, and distribution centers in dozens of countries.

Defining hydroeconomic basins. As described on page 7, we use WRI's Aqueduct water risk tool to assess the projected water availability for our sites in 2030, organizing them by major and minor basins. However, we found that these classifications often don't reflect actual water management practices. Instead of relying solely on hydrologic units, we use the concept of hydroeconomic river basins to better group water usage by considering where water is stored, diverted, and returned. This approach provides a more comprehensive view of the water system, allowing us to set effective water management targets even when a site's water source falls outside traditional basin boundaries. As shown in Figure 4, the source watershed is automatically included in the hydroeconomic basin for a site.

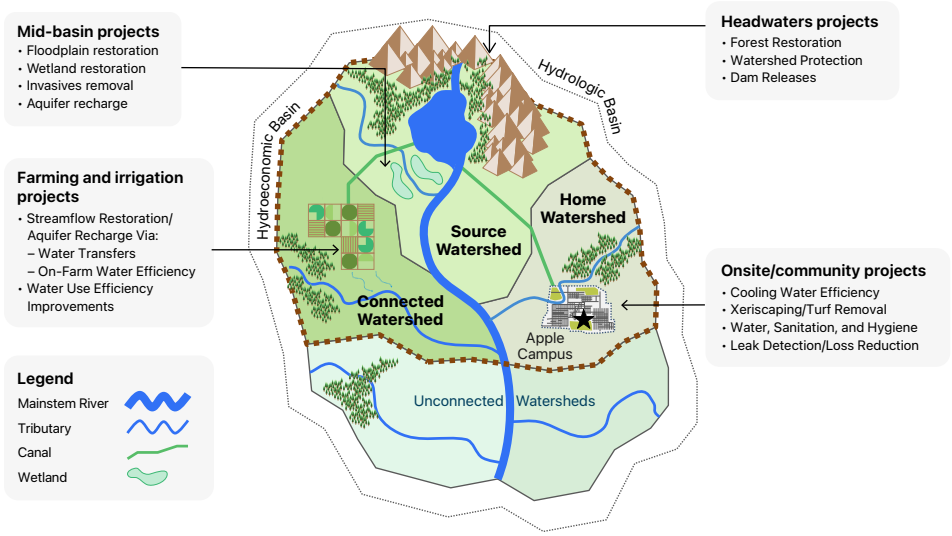

Figure 4. Illustrative hydroeconomic basin concept with local replenishment projects

Developing replenishment targets. We've focused our watershed resilience efforts in a limited number of geographies — about 20 watersheds worldwide — in order to have the greatest impact. The watersheds were targeted by reviewing projected water withdrawals for our sites against hydroeconomic models (CWRP basins), and factoring for issues like co-located demand, density, and basin suitability for viable replenishment.

Identifying watershed resilience projects. With CWRP basins defined and 2030 replenishment targets set, we use available global and local data on water stress to prioritize our efforts across these basins. We don't rely on a purely quantity-based stress measure, but rather employ the guiding principles of water availability, quality, and equity in the assessment of water stress. Research and stakeholder engagement are then deployed to better understand the drivers of stress and limiting factors as understood by relevant river basin organizations, water managers, and civil society. For major sites that are also undergoing AWS certification (see "Site water stewardship" section on page 13), the AWS process is critical to the identification of shared water challenges, as well as potential solutions.

We seek to improve watershed resilience by strengthening communities and ecosystems. We consider a wide range of potential solutions, which generally fall into two categories:

- Ecosystem restoration, management, and protection projects that restore, enhance, and preserve watershed health and function and provide water quantity and quality improvements to ecosystems, rivers, aquifers, and other water bodies, along with biodiversity, carbon, and ecosystem service co-benefits
- Water supply, sanitation, and hygiene (WASH) projects that provide access to clean, safe, and affordable water and sanitation for communities to deliver on the human right to water, foster human dignity, and unlock community economic potential

Pursuing innovation and excellence in transaction structures. We run RFPs by CWRP basin, and contract with counterparties that specify the delivery of project water and water-related benefits over time. In accounting for water benefits against replenishment targets, we use relevant guidance on principles and methods for volumetric water benefits (VWB), water quality benefits (WQB), and WASH benefit accounting.[10] We seek to deploy the best available science, data, and models to the evaluation of project benefits — not just at evaluation, but also throughout implementation.

Replenishment projects criteria include:

- **Proximate.** We consider projects located in the hydroeconomic basin of the site(s).
- **Lasting.** We prioritize projects with benefits lasting 10 years or more.
- **Accountable.** We prioritize projects that generate water benefits in accordance with WRI's Volumetric Water Benefits Accounting methodology.
- **Quality.** We prioritize projects that deliver innovation and results, transforming water stewardship from input oriented to output and outcome oriented.
- **Financially competitive.** We use a levelized cost of water (LCOW) analysis to benchmark projects across typologies and basins and select cost-effective projects.[11]
- **Co-benefits.** All other things being equal, we prioritize projects with carbon, community, biodiversity, or other co-benefits.

Additionally, our contracts typically include funding for monitoring and evaluation over time, to validate benefits and also evaluate lessons learned.

Finally, we evaluate not just the amount of benefits generated by a project, but also who (e.g., the public, downstream users, or the environment) is receiving the benefits, whether the benefits are coming at a seasonally important time, and whether there are further downstream benefits. It's important not just to deploy the VWB Accounting methodology, but to evaluate the "who, when, where, and how long" of those benefits.

Supply chain replenishment and nature-based solutions

As an extension of our site water stewardship, we work with suppliers to train and raise awareness of replenishment and nature-based solutions. Raising awareness involves bringing our NGO partners together with our suppliers to learn about or visit local wetland restoration or nature-based solutions and get them thinking about how these projects are adding value to their local communities. An example of this type of work is our partnership with Gravity Water, a climate-resilient rainwater harvesting and filtration technology that was deployed in Hòa Bình province in Vietnam.

Leadership and advocacy

We believe we have a responsibility to lead by example and influence the public sector and other industries through implementing best practices and solutions, and sharing our progress.

Driving high standards through the Apple Supplier Code of Conduct and Supplier Responsibility Standards. Our overall approach to supplier engagement is grounded in upholding high standards through our Supplier Code of Conduct and Supplier Responsibility Standards ("Code and Standards"), as described on page 20. Implementing the Code and Standards drives water improvements and raises the minimum requirements for our large number of suppliers that also support others across the industry.

Sharing progress. We're committed to sharing our coordinated, strategic approach to water across our entire value chain — whether that's in how we're discharging wastewater, what level of performance is achievable in different types of facilities, or how our efforts are bringing other industries along with us.

We communicate progress through our public disclosures, including our Environmental Progress Report and our People and Environment in Our Supply Chain report.[12]

Sharing open source tools. As the Supplier Clean Water Program has grown, expanded, and improved since 2013, we've developed tools to scale the work and increase its reach. For example, we created a series of training programs and guidebooks for our suppliers on best practices related to:

- Developing a site water balance
- Wastewater stream analysis for reuse and treatment
- Sampling and analysis plans
- Wastewater treatment technology
- Best practices for water savings and reclamation

We partnered with AWS to make these trainings open source. With our support, AWS transformed these trainings into a generic series of videos and guidebooks that could be widely used by others. These resources are now available via the Tools Hub for AWS members and have been shared with the Responsible Business Alliance (RBA) and members of SEMI.

Shaping standards and guidance. We've contributed inputs and feedback to the development of multiple industry standards and guidance that affect water security, including the AWS Standard, which we've supported since 2018 as the single global water stewardship standard. We've also supported the WRI Volumetric Water Benefits Accounting (v. 2) methodology, which expanded and clarified guidance quantifying benefits from water stewardship projects, and the Pacific Institute's development of "Evaluating the Cost-Effectiveness of Corporate Water Stewardship Projects," which highlighted the application of a Levelized Cost of Water (LCOW) methodology for cost-benefit analysis.

We've co-developed a number of other papers and informative resources with AWS around water stewardship in the ICT sector, supply chain, and data centers. As one example, in 2021 we collaborated with WWF, AWS, and RBA to develop "Water Risk in the ICT Sector." In that paper we focused on the supply chain portion of the value chain — from sourcing of primary materials to final assembly — to explore the impacts of water on the electronics manufacturing sector. The paper found that 80 percent of locations in the electronics manufacturing supply chain are in areas with a very high or high risk of flooding, 68 percent of locations are in areas with a very high or high risk to water quality, and about 15 percent of locations are in areas with medium to high levels of water scarcity risks. In 2025, we supported a paper developed by AWS on "Water Stewardship in Data Centres," highlighting water-related challenges in the data center sector, and Apple's experience as the first company to certify its data centers to the AWS Standard.

In 2024, we contributed to the briefing paper "Reducing uncertainty in corporate water impact: The role of Results-Based Contracting for drinking water supply," which explains the efficiency and effectiveness of these contracts in delivering corporate funding to augment drinking water supply in developing regions.[13]

Driving impact through the Apple Supplier Code of Conduct and Supplier Responsibility Standards

Across our supply chain, we're committed to upholding our Code and Standards. To understand how our Code and Standards are improving outcomes across our suppliers, and in turn our industry, we monitor certain key metrics across wastewater management, stormwater management, and WASH-related drinking water monitoring. From our baseline year in 2018 through 2024,* we've seen a reduction in findings to be remediated, showing that the Code and Standards are driving stronger practices on water across our supply chain.

All suppliers must adhere to the water and wastewater management provisions outlined in our Code and Standards, which require that suppliers have the appropriate permitting for water use and wastewater discharge depending on their local requirements. Suppliers are also required to identify and characterize all process wastewater streams to ensure that wastewater flows to the appropriate onsite wastewater treatment facilities. Systems for wastewater management must be capable of meeting or exceeding the local discharge limits. We also provide a wastewater discharge limit that suppliers can use in the absence of local requirements. Suppliers must also have emergency response systems in place in case the wastewater treatment plant exceeds its capacity.

With regard to stormwater management, the Code and Standards require suppliers to manage runoff. They must identify potential pollutant sources and prepare a facility map that shows both drainage and onsite bodies of water. They must also have a stormwater control system, a stormwater evaluation and monitoring system, and an emergency response system in place.

The "Dormitories and Dining" section of the Code and Standards addresses water supply, sanitation, and hygiene (WASH), establishing clear requirements for toilets and bathrooms both at manufacturing facilities and dormitories. There are requirements for free availability of drinking water at all times and quality monitoring for safety.

As suppliers have taken steps to meet our requirements, from 2018 to 2024* we have seen an over 60 percent reduction in findings related to topics like the management and operation of supplier wastewater systems, management of emergency preparedness, operation of stormwater management systems, and water quality monitoring and measurement systems.

We evaluate and update our Code and Standards regularly to address emerging risks and feedback from stakeholders and to reflect industry best practices. Through these requirements, which are applied globally to all suppliers, as well as our capability-building efforts, we're able to drive best practices across our entire supply chain, effectively raising the bar and establishing new business norms for the industry.

** From 2018 to 2021 we tracked this information on a calendar year basis, and we began to track it on a fiscal year basis in 2023.*

Conclusion

Water is multidimensional, and navigating the freshwater challenge for a company like Apple requires a well-reasoned approach. We're committed to improving the availability, quality, and equity of water access around our facilities and supplier locations globally. We've shared our approach in this paper to help stakeholders understand our work and learn from our experiences.

Our approach allows us to:

- Differentiate our tactics based on how water is used across our value chain.
- Drive immediate action in places where we have the most influence or control.
- Communicate our efforts across our entire value chain.
- Strategically invest in building and process technology.
- Raise awareness both within our company and within the industry about global water risks.
- Drive water stewardship and collective action in the communities in which we operate.

We hope that this work will inspire others to undertake a value chain approach to understanding their water footprint and join us in our work across the world to reduce the impacts of data centers, corporate facilities, and the global electronics manufacturing sector.

Appendix

1. Footprint methodology

As outlined on page 7, we developed a water footprint to better understand the biggest potential areas of impact across our value chain. Our footprint methodology is aligned with the methods proposed by Hoekstra et al. (2011) in *The Water Footprint Assessment Manual* for estimating the water footprint of a business.

We began with a life cycle assessment (LCA) approach using data sets with industry averages. Because there were some differences between the models and primary data from our suppliers, we applied additional criteria to better reconcile them:

- Boundaries of the footprint
- A methodology to merge modeled and primary data sets
- Allocating supplier water use to Apple

Boundaries of the footprint

We focused on five key areas of the value chain: materials, manufacturing, logistics and distribution, the product use phase, and product end of life. In line with *The Water Footprint Assessment Manual,* we were intentional to scope the sections of the value chain that have significant contributions to the footprint and could be improved with interventions. We also focused on parts of the footprint not already being mitigated by another Apple program.

Energy-embedded water — the water used for hydroelectric dams or the water consumed to generate steam to push turbines — was excluded from our analysis for materials, manufacturing, and the product use phase of our life cycle. It was excluded because of Apple's other programs that reduce this type of energy usage; for example, prioritizing recycled content, transitioning our supply chain to renewable energy, and commitments we've made to address product energy use.[14]

We fully rely on LCA modeled data for the materials, logistics and distribution, and end-of-life portions of the value chain. For the manufacturing supply chain, we use a blend of LCA data and supplier data. And for the product use phase and retail, we use primary data where we have it from our direct operations.

A methodology to merge modeled and primary data sets

In direct operations, water use data is available from municipal water bills, landlords, property management companies, and even submetered data. As a result, we use metered data for more than 85 percent of our water use and estimate the remainder based on square footage and building use type. This allowed us to identify data centers and corporate campuses as the largest users of water across our direct operations, enabling us to prioritize our work. Corporate wastewater discharge is largely estimated, as it is rarely metered.

In our supply chain, the LCA is a valuable starting point to inform our approach, and whenever possible, we combine its findings with primary data to enhance its relevance. Across the supply chain, water data availability is different than in our own operations because we don't own or operate the organizations that make up our vast network of suppliers. We work with our suppliers to collect data on their water usage in several ways and look for ways to address challenges that may arise. Apple production may be only a portion of each supplier factory's water use. In addition, access to metered or reported data can be affected by site ownership and regulations. In some parts of the supply chain, we're able to obtain high-quality primary data from water meters, while for others, we use the industry-average data from the LCA to estimate our portion of water use.

When assessing the potential impact of water use in our supply chain, we looked at the functionality and importance of the supplier's activity rather than using other metrics, such as spend, to drive action. To that end, in 2019 we began conducting an annual water survey that we send to more than 1300 suppliers across the world. This survey data is a helpful bridge between industry-average LCA data and the primary data we get from suppliers.

Allocating supplier water use to Apple

In an electronics manufacturing supply chain, a supplier or manufacturer typically specializes in making a particular component or performing a specialized task, which they then provide to a large number of end customers. The most challenging aspect of water footprint accounting is allocating water use at a facility to a specific customer. To address this challenge, we include guidance to our suppliers on the following four methods to allocate data:

1. Submetered water meters for Apple production
2. Proportional allocation based on the related sales/revenue of Apple business
3. Estimated proportional allocation based on related sales/revenue of Apple business
4. Proportion of employees related to Apple business (for domestic water only)

Conclusion

Our footprint methodology is aligned with the approach proposed by Hoekstra et al. in *The Water Footprint Assessment Manual* for estimating the water footprint of a business. While our approach is focused on finding hot-spots, we do prioritize using metered primary data where possible and merge that data with information from supplier surveys and the LCA to build out a full value-chain footprint. We've excluded elements of the LCA or the footprint only in areas where we can address the water use through some other method — such as transitioning to renewable energy to reduce the potential impact of energy-embedded water.

2. Supplier Clean Water Program

While the CWP approach can be applied by any type of manufacturing facility, we prioritize the engagement of supplier sites that have high water use (>300 m^3/week for production purposes) and are located in a basin of high or very high water stress. The scope of the CWP baseline assessment comprises the following four categories:

- **Water management** considers a supplier's local water conditions; whether a supplier has a water policy, a water management plan, formal targets, or target performance management plans; the appropriate resources to achieve their goals; stormwater management, and pollution prevention plans; and whether they disclose water-related information publicly.
- **Water conservation** looks at whether a supplier has created a comprehensive water balance; control measures to reduce water usage and flow rates; plans to increase water conservation and water savings for domestic water usage; a defined operations and maintenance (O&M) plan for water purification systems; and a program of adequate training and support for the staff responsible for managing onsite equipment.
- **Wastewater management** entails mapping of wastewater streams to identify pollutants, appropriate permitting for all pollutant discharge, plans for how wastewater streams are separated for treatment/pretreatment, and treatment plans for each stream. This process also involves assessing discharge quality, a defined O&M plan for the onsite wastewater treatment system, and whether the facility provides adequate training/support for the staff managing the wastewater treatment facility.
- **Wastewater reuse** is an important method by which manufacturers in the supply chain can drive water conservation through recirculating water that is fit for purpose for additional processes. By understanding places where potable water is not necessary to use, it's possible to drastically reduce freshwater withdrawals through wastewater recycling.

A qualified water expert reviews the supplier documentation across these four categories after reviewing appropriate documentation and evidence from the supplier. In addition, we work with the supplier to build a water balance that maps how water flows through their operations — from water purification systems, to production lines, to domestic uses such as canteens or toilets, and to support services such as cooling towers or wet scrubbers.

Any preexisting water savings and wastewater reuse measures that the site implemented prior to the CWP baseline assessment are documented in order to differentiate the historical site efficiency compared with the water savings and performance that occur following the assessment.

All of this rolls up into the final scorecard where we grade the supplier on their water management performance. This helps us to provide targeted corrective actions and trainings for the supplier to drive improvements. Our program continues to engage with these sites to both improve their wastewater reuse and to improve their overall score on the scorecard. We request water savings data and updated water balances from the supplier every six months so we can track and verify their performance.

Once a supplier achieves a score of 90 percent across the four categories, we graduate our supplier from the program and hold a graduation ceremony to recognize their achievement in water management. Graduated suppliers still provide their water savings data to our team, and we stay engaged to monitor their performance.

Report notes

References in this paper to information should not be interpreted as an indication of the materiality of such information to Apple's financial results or for purposes of U.S. securities laws, or any other laws or requirements, such as potential upcoming requirements under the EU Corporate Sustainability Reporting Directive (CSRD), the European Sustainability Reporting Standards (ESRS) or the EU Corporate Sustainability Due Diligence Directive (CSDDD). Additionally, certain terminology used in this paper, such as "value chain," "impacts," "risks," and "targets" may differ from the terminology used in legal reporting frameworks, including CSRD and CSDDD. Also, any reference in this paper to sustainable activities should not be interpreted as an indication of the classification of such activity under the EU Taxonomy Regulation, or any other legal classification framework. The classification under EU Taxonomy Regulation, or any other legal classification framework, is subject to specific criteria and requirements, which may differ from the general references made in this paper.

Forward-looking statements

The report is provided voluntarily, and does not cover all information about our business. References in this report to information should not be construed as a characterization regarding the materiality of such information to our financial results or for purposes of the U.S. securities, or any other, laws or requirements. While certain matters discussed in this report may be significant, any significance should not be read as necessarily rising to the level of materiality used for the purposes of complying with the U.S. federal securities, or other, laws and regulations. The information covered by the report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, including statements regarding our environmental or sustainability goals or targets, commitments, and strategies and related business and stakeholder impacts. Forward-looking statements can be identified by words such as "believes," "estimates," "expects," "plans," "predicts," "will," "would," "could," "can," "may," "aim," and similar terms. These statements involve risks and uncertainties, and actual results may differ materially from any future results expressed or implied by the forward-looking statements.

These risks and uncertainties include, without limitation, any failure to meet stated environmental or sustainability targets, goals, and commitments, and execute our strategies in the time frame expected or at all, global sociodemographic, political, and economic trends, changing government regulations or policies, technological innovations, climate-related conditions and weather events, our ability to gather and verify data regarding

environmental impacts, the compliance of various third parties, including our suppliers with our policies and procedures, or their commitments to us, and our expansion into new products, services, technologies, and geographic regions. More information on risks, uncertainties, and other potential factors that could affect our business and performance is included in our filings with the U.S. Securities and Exchange Commission, including in the "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations" sections of the company's most recently filed periodic reports on Form 10-K and Form 10-Q and subsequent filings. Further, from time to time we engage in various initiatives (including voluntary disclosures, policies, and programs), but we cannot guarantee that these initiatives will have the desired effect. We assume no obligation, and expressly disclaim any duty (including in response to new or changed information) to update any forward-looking statements or information, which speak as of their respective dates. Readers should not place undue reliance on the forward-looking statements made in this report. Moreover, many of the assumptions, standards, metrics, and measurements used in preparing this report continue to evolve, are sourced from third parties, and are based on assumptions believed to be reasonable at the time of preparation, but should not be considered guarantees. Given the inherent uncertainty of the estimates, assumptions, and timelines contained in this report, we may not be able to anticipate whether, or the degree to which, we'll be able to meet our plans, targets, or goals in advance.

Endnotes

[1] United Nations, "The United Nations World Water Development Report 2023: Partnerships and Cooperation for Water." UNESCO, Paris.

[2] Apple-managed services include cloud services, payment services, app services, and digital content hosted in Apple-owned or co-located data centers.

[3] Visit a4ws.org/about for more information.

[4] Apple, "Supplier Responsibility Progress Report 2019," p33, s203.q4cdn.com/367071867/files/doc_downloads/PreviousProgressReports/Apple_SR_2019_Progress_Report.pdf.

[5] Apple, "Supplier Responsibility Progress Report 2020," p62, https://s203.q4cdn.com/367071867/files/doc_downloads/PreviousProgressReports/Apple_SR_2020_Progress_Report.pdf.

[6] Apple, "Supplier Responsibility Progress Report 2022," p84, s203.q4cdn.com/367071867/files/doc_downloads/PreviousProgressReports/Apple_SR_2022_Progress_Report.pdf.

[7] By freshwater, we mean water with low salt concentration (typically <1 percent) and naturally occurring in surface or groundwater, or within ice sheets. By withdrawals, we mean water that enters a site. By consumption, we mean water that is not returned to the watershed in which it is used, or its source watershed, in a usable form — typically due to evaporation, evapotranspiration, or degraded quality.

[8] Science Based Targets Network (2023). Technical Guidance: Step 3 Freshwater: Measure, Set & Disclose. Available at: sciencebasedtargetsnetwork.org/wp-content/uploads/2023/05/Technical-Guidance-2023-Step3-Freshwater-v1.pdf.

[9] While rainwater capture is technically freshwater, we categorize it as an alternative source, since it must be legal in the region to capture and use, and by making use of it, there is an additional freshwater withdrawal elsewhere that can be reduced or avoided. With increasing volatility of rain and stormwater, it is a best practice to capture and reuse any water onsite as much as practical before withdrawing from other sources.

[10] 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. Available online at wri.org/publication/volumetric-water-benefit-accounting. Hicks, C., Jacobson, N., Larson, W., Brill, G., and Moreira, G. "WASH Benefits Accounting Framework: A Standardized Approach for Estimating and Valuing the Multiple Benefits of Corporate Investments in Drinking Water, Sanitation and Hygiene Access: Standardized Methods Report." LimnoTech & WASH4Work, 2024.

[11] Kruse, S., Pilz, D., Abraham, S., and Cooley, H. "Evaluating the Cost-Effectiveness of Corporate Water Stewardship Projects." Oakland, California: Pacific Institute, 2025.

[12] Visit apple.com/environment and apple.com/supply-chain to access these reports.

[13] Duncan McNicholl and Rob Hope, "Reducing uncertainty in corporate water impact: The role of Results-Based Contracting for drinking water supply," (Oxford, UK: Uptime Global and Oxford University, 2024).

[14] Read more about our other environmental initiatives at apple.com/environment.