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BUSINESS OPPORTUNITIES IN CONSERVATION AND RESTORATION FOR FRESHWATER SUSTAINABILITY

- FROM ELEMENTAL TECHNOLOGIES TO THE CREATION OF NEW BUSINESSES ACROSS INDUSTRY BOUNDARIES -

> Reina Ogawa Industry Innovation Dept., Technology & Innovation Studies Div. Mitsui & Co. Global Strategic Studies Institute

SUMMARY

- Freshwater is closely linked to environment-related global risks. There is a need for freshwater conservation and restoration initiatives.
- Methods for assessing freshwater sustainability in corporate activities is available to assess corporate activities and products. Both a top-down assessment approach from the management side and a bottomup assessment approach from the product side are possible, and tools have been developed to calculate the amount of damage in monetary terms.
- Corporate activities to restore freshwater sustainability, from the perspectives of (1) assessment, (2) measures, and (3) certification, undertaken in cooperation with stakeholders beyond industry boundaries can be effective in contributing to the diversification of business activities and new development of the business with high continuity.

1. FRESHWATER AND GLOBAL RISKS

While water covers two-thirds of the Earth's surface, only 0.01% of it is available to humans in the form of freshwater, making it a limited resource that needs to be conserved and restored.

1-1. Assessment of freshwater sustainability

In 2023, the Stockholm Resilience Centre published the results of its assessment of the sustainability of our planet¹. The center also evaluated the state of freshwater resources, and its findings showed that the situation is not sustainable and irreversible changes are occurring. Globally, there is a growing sense of urgency about the need for measures to address the situation, including initiatives for the conservation and restoration of freshwater ecosystems.

According to the International Water Management Institute's working paper "Change in Global Freshwater Storage"², global freshwater storage has decreased by 27 trillion cubic meters, from 40,409 trillion cubic meters in 1971 to 40,382 trillion cubic meters in 2020. The amount of freshwater currently used by humans in a year is 24 trillion cubic meters, meaning that over the past 50 years, the volume of freshwater lost was greater than the volume used by humans in a year.

¹ Stockholm Resilience Centre, Planetary boundaries (accessed April 12, 2024)

² International Water Management Institute Working Paper "Change in Global Freshwater Storage" (accessed April 12, 2024)

1-2. Risks identified by the World Economic Forum (WEF)

The Global Risks Report 2024³, published by the WEF, lists six environmental risks, four of which are related to freshwater (Figure 1). In particular, freshwater conservation and restoration efforts are required to address the risk of freshwater supply shortages. In addition, because of the expected loss of freshwater due to climate change, it is important to pursue initiatives in parallel with decarbonization measures.

Figure 1: Environmental risks identified by the World Economic Forum for the year 2024

Environmental risks	Explanation (text in bold refers to freshwater)
Biodiversity loss and ecosystem collapse	Destruction of natural capital will have severe consequences for the environment, humankind, and economic activity. Species extinctions and reductions occur in terrestrial and marine ecosystems.
Critical change to Earth systems (climate tipping points)	The consequences of breaching critical thresholds are long-term, potentially irreversible, and abrupt changes to the entire planet. Specifically, abrupt and severe impacts on planet health or human welfare are expected from a rise in sea levels due to the collapse of ice sheets , release of carbon due to thawing permafrost , and disruption of ocean and atmospheric currents.
Extreme weather events	Extreme weather events cause loss of human life, damage to ecosystems, destruction of property, and economic loss. Specific phenomena are expected to include wildfires, floods , and heat waves.
Natural resource shortages (food, water)	Shortages of food and freshwater supplies for human, industrial, and ecological use will occur. Human overexploitation and mismanagement of critical natural resources, drought and desertification due to climate change, and lack of adequate infrastructure, etc. will become the causes of these problems at the local, regional, and global levels.
Non-weather-related natural disasters	Non-weather-related natural disasters cause loss of human life, damage to ecosystems, destruction of property, and economic loss. Possibility of earthquakes, volcano eruptions, tsunamis, asteroid strikes, geomagnetic storms, etc.
Pollution (air, soil, water)	Introduction of harmful materials into the air, water, and soil resulting from human activities results in impacts to and loss of human life, economic loss, and damage to ecosystems. The causes of pollution include household activities, industrial activities, accidents, oil spills, and radioactive contamination.

Source: Compiled by MGSSI based on Global Risks Report 2024 (World Economic Forum)

2. SUSTAINABILITY ASSESSMENT TOOLS FOR FRESHWATER RESOURCE MANAGEMENT

Database and measurement tools are available for the quantitative assessment of freshwater sustainability related to corporate activities and product life cycles. An overview of two approaches to assessment and the tools for converting freshwater-related risks and damage into monetary values is presented in Figure 2. A database in this context refers to a medium in which letters and numbers are enumerated, and a tool refers to a medium that supports analysis through charts, diagrams, and visualization of information in a database.



Figure 2: Overview of databases and tools for sustainability assessment of freshwater resources

³ World Economic Forum, <u>Global Risks Report 2024</u> (accessed April 12, 2024)

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2-1. Tools for a top-down approach to assessment from the perspectives of management and finance

Tools for a comprehensive assessment of the sustainability of freshwater resources and prioritizing measures from the standpoint of corporate managers, investors, etc. have been developed mainly by international organizations such as the United Nations. An ever-increasing number of tools recommended by organizations promoting corporate disclosure guidelines, such as the Taskforce on Nature-related Financial Disclosures (TNFD) and the CDP, are being used for different purposes of analysis and in various industry sectors. An example workflow is illustrated in Figure 3.

Pre-work preparations	Assessment	Analysis and prioritization	Establishing baselines and targets	Action
 List regions and services for which water risk or water stress seem high (Tools shown in Figure 2 can be used.). Determine the goals and the resources to be allocated to the work, taking into consideration the available resources within the organization (personnel, data, funds, and time). 	 Gather public information using the tools in Figure 2 and other tools, as well as relevant in-house information. Obtain input from supply chain or watershed stakeholders where possible. Identify high water-risk and water-stressed regions by comparing collected data with hypotheses. 	 For each identified water risk or water-stressed region or service, break down the factors of the problems to be resolved and identify those factors needing immediate attention or having a large negative impact. Prioritize the identified factors. 	 Hold dialogue with stakeholders on priority factors to be resolved, and explore what actions can be taken, both within and outside the company. Establish baselines and targets, taking into account the results of sustainability assessments of the Earth and alignment with goals such as social sustainability. 	 Take action to achieve the goals. (Reference) The science-based targets for nature (introduced by the Science-Based Targets Network) categorizes actions into the following five types and recommends that companies take each into consideration: Avoid Reduce Restore Regenerate Transform

Figure 3: Example workflow of a top-down approach

Source: Compiled by MGSSI based on the Ministry of the Environment's <u>explanations on the preparations and steps to be taken for</u> information disclosure and other materials [in Japanese]

2-2. Databases and tools for a bottom-up approach to assessment from the perspectives of products and services

After identifying high-priority water risk targets through a top-down approach, individual specific measures are applied to account for and calculate the freshwater withdrawals and discharges for each process over the entire life cycle of a product or service. The data obtained is then used for life cycle assessment (LCA) to quantitatively evaluate the effectiveness of individual measures. To improve the accuracy of analysis, it would be ideal to collect primary data on all activities in the supply chain, but because of the enormous amount of work involved in the collection of data from primary sources, inventory databases (data on average freshwater use by product or service, etc.) are being developed in Japan and overseas to make this process more efficient. Some databases, such as "GaBi" (now known as Managed LCA Content (MLC)), are practically integrated with analysis support software, but in most cases, analysis is conducted by the entity performing the calculations, which combines data and analysis tools according to their own objectives.

2-3. Risk and damage calculation tools

A new tool has been developed to assess the impact of freshwater resources on corporate activities, regardless of the product or service. This tool allows users to express the risk associated with freshwater resources and the damage caused by a lack of freshwater resources in monetary terms. For an integrated analysis, Ecolab⁴ and S&P Global have collaborated to develop and offer the Water Risk Monetizer. Microsoft is using the tool to calculate the actual value of freshwater, taking into account the risks associated with cooling water in its data centers, and referring to the data to determine the amount of investment that should be made to conserve and restore freshwater. In Japan, a national project by the Ministry of Economy, Trade and Industry (METI), the New Energy and Industrial Technology Development Organization (NEDO), and the Japan Environmental

⁴ Ecolab is a leading US company offering water, sanitation, and energy technologies and services.

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Management Association for Industry (JEMAI) has developed an LCA method for life cycle impact assessment, called Life Cycle Impact Assessment Method Based on Endpoint Modeling (LIME). LIME3, an updated version, provides a cost-benefit analysis tool for environmental impacts. Specifically, for example, costs in monetary units can be calculated by multiplying the volume of freshwater resources used by the coefficients developed in LIME3. Sekisui Chemical, Shiseido, Shinryo⁵, and others have published analyses that include assessments of their freshwater management using LIME3. As seen in the example of Shiseido, if sufficient data on freshwater withdrawal and discharge volumes can be prepared, it is possible to calculate the financial impact of overall corporate activities by using LIME3, which is based on a bottom-up approach.

A summary of each company's analysis is presented in Figure 4.

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Company	ΤοοΙ	Summary of analysis and application		
Microsoft	Water Risk Monetizer	Conducted a re-evaluation of water usage at the company's data center in the US state of Texas and calculated that the true value of the water used in its facility is 11 times higher than current water rates .		
Sekisui Chemical	LIME3	Evaluated processed plastic molding products in a wide range of environmental impact areas, including freshwater consumption, by country of operation. Identified trends and issues in environmental impacts by country.		
Shiseido	LIME3	Conducted analysis aimed at quantifying the overall sense of the magnitude of environmental impacts related to climate and nature associated with business activities and calculated the financial impact of freshwater resources as an external cost related to GHG emissions.		
Shinryo	LIME3	To reduce GHG emissions, the company conducted on-site environmental assessments of the life cycle of conventional septic sedimentation tanks and Japanese <i>jokaso</i> septic tanks installed at wastewater treatment facilities in Indonesia. After converting the environmental impacts into monetary values, it was calculated that the environmental impact of the Japanese <i>jokaso</i> septic tanks is about half that of the conventional septic tanks. For assessment indicators, the main output factor studied was GHG emissions, but the degree of pollution (biochemical oxygen demand: BOD) of the inflow and discharge water during treatment was also considered.		

Figure 4: Examples of companies' use of risk and damage calculation tools related to freshwater

Source: Compiled by MGSSI based on various sources

3. BUSINESS OPPORTUNITIES RELATED TO FRESHWATER SUSTAINABILITY

Internal water pricing⁶ is a method of putting a monetary value on investments that contribute to the conservation and restoration of freshwater sustainability and have a positive impact on business, and a growing number of companies have adopted this method. The first step in turning freshwater sustainability into a business is to attract investments from companies that have already adopted the method or to offer services for companies that are considering doing so.

In Figure 5, specific business opportunities related to freshwater sustainability are organized in terms of (1) assessment, (2) measures, and (3) certification.

⁵ Shinryo is a wholly owned subsidiary of Mitsubishi Chemical Corporation that provides solutions for detoxification and recycling of industrial waste and precision cleaning of semiconductor manufacturing equipment parts.

⁶ Of the approximately 2,800 companies included in the Morgan Stanley Capital International (MSCI) All Country World Index (ACWI), the number of those that have adopted the internal water pricing methodology increased from 68 in 2018, to 120 in 2022. <u>Source</u> (accessed April 22, 2024)





For investment decisions: The internal water pricing method has already been adopted by companies that have high concern on water scarcity. Microsoft (US) and AU Optronics (Taiwan) are using Volumetric Water Benefit Accounting (VWBA: calculation of benefits from water stewardship activities), which is being developed by WRI and others. An extension of this trend is **expected to link financial systems with freshwater sustainability-related data**. Source: Compiled by MGSSI based on various sources

In general, there are a variety of industries and organizations in the watersheds that use freshwater for their business operations. Therefore, the direct and indirect use, conservation, and restoration of freshwater requires ongoing communication with a wide range of stakeholders beyond the traditional boundaries of an industry. Capitalizing on this opportunity could lead to business diversification and a chance to embark on long-lasting businesses.

3-1. Assessment

In addition to the volume of direct and indirect use of freshwater, assessment parameters include the content of nitrogen, phosphorus, and other hazardous chemical substances, groundwater levels, damage to freshwater ecosystems, and many others. Obtaining primary data requires the introduction of new monitoring systems for different purposes, creating a need for elemental technologies such as those for sensors and measuring devices. To promote the acceptance and efficiency of assessments, advances are being made in systems that make it easy and inexpensive for anyone to take measurements, in digital technologies that reduce the cost of measurement, and in the use of secondary data. Companies that have conducted the assessment inhouse as early adopters have an opportunity to offer consulting services and SaaS to support latecomers by leveraging their own experience.

3-2. Measures

In addition to considering more efficient use of freshwater in business operations, the regions and products/services in need of action identified by the assessment will require ongoing collaboration with many stakeholders beyond the value chain, from the source to the reuse of water involved in operations. In regions where freshwater scarcity is unavoidable, the use of desalination technology will be considered if seawater is available for intake. In places where even seawater extraction is difficult, water transportation will be considered. However, both are energy and cost intensive. Therefore, from the perspective of economic rationality, and to avoid a rise in energy consumption, companies are now prioritizing measures to increase the amount of freshwater available by improving the environment of the watershed in cooperation with residents living near the river from which water is withdrawn, agricultural, forestry, and fishery companies, and organizations engaged in water source conservation activities. Measures for buildings, factories, and other facilities include conducting Al-based water-use efficiency analysis and introducing water recycling systems, which are expected to provide economic rationality through lower water costs.

3-3. Certification

For activities involving many stakeholders, third-party certification will be necessary to ensure transparent stakeholder communication and prevent greenwashing. For example, there are several certifications for responsible sourcing of water (water stewardship certifications), but there are variations in their definitions and methods of setting goals, and some argue that an international standard should be established. Due to the uneven distribution of freshwater resources and regional differences in views on the issues, it is unclear at this point whether individual optimization based on regional circumstances or international standardization will become the mainstream. However, it will be important for companies to be involved in these discussions, considering business opportunities, such as developing their internal audit function into third-party audit and certification bodies or providing consulting services to companies seeking certification.

4. CONCLUSION AND OUTLOOK

The following three points are discussed as basic information necessary to consider business opportunities related to conservation and restoration initiatives for freshwater sustainability. Now is an opportune time to consider new operations, as methods and tools for data collection, assessment, and measures are being put in place.

- Freshwater sustainability is closely linked to global risks. As it is particularly linked to climate change risks, measures to protect freshwater sustainability must be considered and implemented in parallel with measures to address greenhouse gas emissions.
- The starting point for turning freshwater sustainability risks into business opportunities is the investment of companies that have been early adopters of internal water pricing. From corporate activities to product lifecycles, understanding quantification methods is useful not only for a company's own risk management, but also for considering new business opportunities. In the future, as with climate action, investor and consumer pressure and tighter regulations in the EU and elsewhere may encourage further investment.
- Businesses with activities related to conservation and restoration for freshwater sustainability are likely to be long-lasting businesses because they require continuous measures. In addition, by understanding the stakeholders who use freshwater either indirectly or directly in existing businesses, connections can be made with stakeholders outside of a particular industry. If new collaborations emerge from such efforts, this could contribute to business diversification.

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