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Nobel Sustainability Award Speech

November 20, 2024 Nobel Sustainability Trust - Annual Summit University of California, Berkeley

Ladies and Gentlemen,

Good afternoon,

It is a great honor to receive this prestigious Award. I would like to sincerely thank the Award Committee for bestowing this honor upon me, my deep gratitude to all the committee members for their recognition. My special thanks to Nobel sustainable development trust, for your visionary leadership in water sustainability and your great love for humanity.

Facing the combined challenges of population, pollution, and climate change, there is no doubt that water is the most crucial element for a sustainable tomorrow. Therefore, the honor of this award truly belongs to water.

Talking about water, I believe everyone here has been touched by water and its stories. It is well-known that water makes more than 60% of our bodies. It sustains our lives in its unique way. If there was no water, there would be no human, no such colorful and wonderful world, of course, nor the issue of sustainability development, nor this special ceremony today.

Our daily lives rely on water. It seems so common, and so simple. But, do we truly understand it? Water may seem simple but full of mystery and wonder. For example, although we know water molecules consist of just two atoms of hydrogen and oxygen, their chemical structure has remained a puzzle for centuries.

We may have never realized that water molecules exhibit amazing and magical effects, such as the quantum phenomena due to the vibrations of hydrogen atoms. This is essential to human life, since it allows biological reactions to occur in our bodies. Besides, water molecules also exhibit associative effects, meaning that liquid water consists of clusters of several or more molecules. In other words, we never drink single-molecule water. These molecular properties of water create its colorful and enigmatic image.

However, today, we are facing a serious water crisis. Because this marvelous and pure substance has been polluted and overexploited by humans. Deeply rethinking what we have done wrong is urgently needed, as well as correcting the mistakes and making the polluted water clean again. Over the past two decades, my team have made some achievements, which has been used and solved a series of critical problems in drinking water, wastewater, and water environments.

We developed theories and technologies ensuring the safety of drinking water for nearly half of China's population. This was awarded the First Prize of National Science and Technology Progress of China, earlier this year.

As you know, there are huge spatial variations in quantity, quality, and accessibility of

water sources across China, challenging the safety of drinking water supply.

Overcoming all kinds of difficulties, our work supported the early achievement of SDG 6.1 by 2015 in China.

For urban areas, we have developed source-to-tap technologies system. The main achievements including, for source water, micro-polluted water sources remediation, harmful algae in situ inhibition, and emerging pollution quick response and prevention.

For micro-polluted water source, we developed a series of key technologies to improve the quality of source water, which realized the ecological restoration. For example, we integrated technology system based on wetlands and plant communities for the construction of ecological water source. The very first ecological water source engineering was reconstructed on a high-salinity polluted reservoir 20 years ago in Tianjin, China, which was 500,000 cubic meters per day.

Furthermore, we identified active biological zones for pollutant purification in water sources and developed ecological restoration technologies for high-throughput polluted water in river network areas. An ecological restoration project for micro-polluted water was implemented in the first engineering with a capacity of 300,000 cubic meters per day in Zhejiang. This technology has been widely applied in China.

For drinking water treatments, we developed systematical technologies for addressing critical water quality issue.

For example, we invented the new complex-coagulation technology to promote the water treatment efficiency, to avoid the formation of toxic and harmful byproducts during disinfection, while solving the problem of aluminum residue in drinking water, ensured the safety of treated water.

Besides, we develop the new membrane filtration process, and constructed the first super-large “Beijing-Guo Gong Zhuang” drinking water plant based on ultrafiltration. The plant has a capability of 500,000 cubic meters per day. Especially, it uses the water that transported over 1400 kilometers to Beijing by South-to-North Water diversion project as source water.

For distribution system, we solved the yellow water events and water quality deterioration problems.

While solving the drinking water issues in cities, we have been also highly concerning about the drinking water safety of rural areas. The rural areas are even more complex. There are 500 million people living in 670,000 villages in China, facing As, F, Fe, Mn, and Salty water problems, with health risks and outdated facilities. We have developed new principles and techniques for rural water treatments, new equipment, and new integration water purification processes.

This has not only addressed the drinking water safety issues in rural areas of China, but also transfer to the developing counties. For example, in Sri Lanka, we donated a prefabricated, easy-to-main water plant to provide clean drinking water for villagers in Metihakka. I was there with my team in June last year. It is truly inspiring to see how science and technology can improve the quality of life.

Along the way of solving urban and rural area drinking water quality issues, I have also carried on the drinking water standards development. The latest version was released two years ago in 2022. By collaborating with industry partners, we have accomplished 1400 projects, with capacity of more than 70 million cubic meter per day, benefiting more than 0.2 billion people in China and other countries.

As you may see the progress is really good so far, but it can be even better, particularly for the global drinking water related Arsenic and Fluorine issue. There were 20 million people influenced by As and 80 million by F in China. We have developed the so-called one-step As removal technology, and solved the problem in China very successfully. Compared to other methods, it is much cheaper in cost and easier in use. Here are two examples of our projects in Beijing and Inner Mongolia.

I discovered a deep satisfaction of solving this problem for millions of people in China, but when looking globally, I have been hoping that it can solve this problem elsewhere in the world. From the perspective of a shared future for humanity, I hope this may happen one day, not far away. Personally, I think this is also the core of the Nobel Sustainable Development Award, if Peter and the committee agree. Science and technology should benefit everyone everywhere.

For wastewater, we proposed and established new conceptual wastewater treatment plants in China, with the goals of achieving “sustainable water quality, resource recovery, energy self-sufficiency, and environmental friendliness.” This won the International Water Association Grand Award at Toronto, Canada, last August. Here, the picture shows the beautiful view of the Yixing concept wastewater treatment plant.

This marks a revolutionary shift in the image of wastewater treatment plants. It is no longer messy and dirty, but pretty and lovely. It consists water purification center, organic matter transformation center, research and development center. To date, the conceptual wastewater plant has achieved full energy self-sufficiency, providing water, nutrients, and energy to both the plant and its surrounding area. Also, it has become the modal of wastewater treatment in China.

Furthermore, we have overcome numerous technical challenges in water body ecological restoration with wide applications. Such as Qingcaosha reservoir in Shanghai, largest drinking water source in Yangzi River, with a volume of half billion cubic meters, we solved the problem of serious odor-produced algae pollution. Another example is the application of Baiyangdian lake in Xiong'an New District with a number of 140 connected lakes and an area of 370 square kilometers.

In the pursuit of human and nature harmonization, these achievements may be big nothing. However, we have learned and applied the core of ancient Chinese philosopher's thought of “Tao” in water conservation, which is exactly "following the way of nature".

Indeed, water is great, selfless, and the source of all living beings. It is a fundamental and strategic resource for human survival and development.

In the future, humanity's crisis may not arise from a lack of oil, but from a lack of water.

The establishment of this award to water reflects their foresight, as well as their profound understanding and strategic grasp of water as a key resource. It shows their deep concern on water and provides immense motivation and encouragement to those of us dedicated to water. For this, please allow me to express my most sincere gratitude one more time.

Not only for research, but also for life, it is water that has given me wisdom, strength, and courage. To finish my words, I want to quote Bruce Lee. His statement of China Tao's philosophy on water is very famous. An even more remarkable coincidence is that he was born here in San Francisco. The hard translation can be the "supreme goodness is like water". But, as Bruce Lee said, water is formless, shapeless, can flow and can crash, the softest but can penetrate the hardest rock.

So, please, For Water, and Be water, my friend.  
Thank you all.