



Landwasher: Guardian of the Blue Earth

**Leveraging business solutions for
environmental impact in China**

Tao Zhang, Tim Yin and Christine Yip, China Impact Fund (CIF), Dao Ventures

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Recognizing the severity of the environmental challenges facing China, investor-turned-entrepreneur Hao Wu set up an environmental enterprise for waterless toilet solutions to directly address issues of water scarcity, sanitation and hygiene.

In the 1990s, there was a growing understanding of the seriousness of the environmental problems facing a fast-industrializing China, and the implications this would have for the population in coming decades. One such challenge was access to clean water, which was exacerbated by climactic factors and supply issues. The scourge of water shortages across China had implications not only for industrial and agricultural activities, but households also, where a lack of clean water affected health and hygiene – particularly in the remote rural areas.

NEW GROWTH, NEW CHALLENGES

“Henry” Hao Wu was among many people increasingly alarmed by the scope of the environmental challenges facing China from the 1990s, especially those related to water supply. “In China, the water shortage is even more challenging than issues with power supply, seeing as we have renewable energy



Eco-friendly toilets installed at the top of Wutai Mountain in Shanxi Province. (Landwasher)

to take advantage of,” said Wu. “But it is very difficult to transform polluted water into clean water.” The enormity of the challenge did not deter this Peking University physics graduate because, he said, technology provided the solution.

In 1999, Wu, a well-paid securities investor at the time, was contemplating further studies in the United States. Instead, he formed Landwasher Science and Technology Development Co Ltd, a social enterprise that has developed an environmentally friendly toilet allowing users to maintain good standards of sanitation and hygiene – even where water is not readily available. Under his leadership, Landwasher has become China’s top waterless toilet-solution provider, growing from a team of three to a RMB 60 million (around US\$10 million) company employing some 160 people by 2013. Landwasher has so far installed more than 10,000 of its toilets across the country, posting average annual revenues of RMB 40 million (around US\$7 million), making it China’s market leader in environmental toilets.

That year, along with technology giants Apple and Microsoft, Landwasher was selected by *Fast Company*, a leading US technology, business and design magazine, as one of the world’s 50 most innovative companies. This recognition, alongside some of the world’s largest and most established technology companies, came as a surprise for founder and chief executive officer Wu – but not necessarily for those familiar with Landwasher’s unique approach that incorporates care for the environment into its business model.

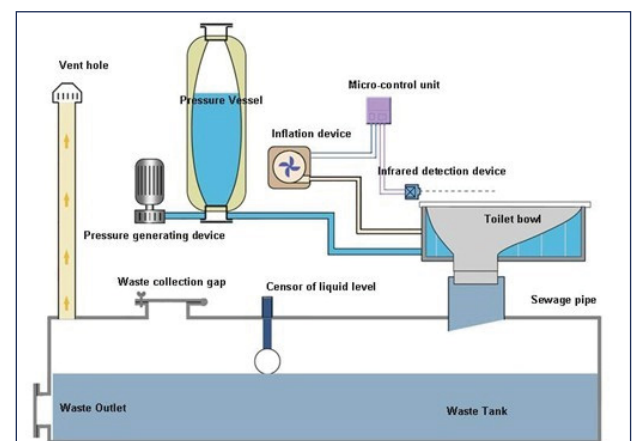
TOILET TECHNOLOGY

As someone who grew up in rural 1970s China, Wu remembers how human waste was used as fertilizer for farming. “In the old days, it was much less costly to collect and use that to farm with,” he said. The memory was still with him some two decades later, when he visited the Palace Museum at the Forbidden City in Beijing. Wu was shocked by the poor hygiene of the toilet facilities at one of the country’s cultural landmarks, and it was part of the

reason he began looking for solutions to sanitation problems across China.

He realized that the poor availability of latrines, particularly in areas and situations where flush water was not readily accessible, was compounding the problem. So in August of 1999, he officially registered the Landwasher Science and Technology Development Co Ltd in Zhongguancun, China’s “Silicon Valley” in Beijing. Four years later, in November of 2003, Landwasher moved its headquarters to Yanjiao City, Langfang Municipality in Hebei Province, a 40-minute drive from the capital, to give the growing company access to more affordable production facilities.

The journey to creating Landwasher’s toilet solution was one of experimentation, with Wu and his team developing the product through numerous rounds of trial and error. The company’s flagship toilet, in Wu’s words, works by “making use of number one to flush number two,” thereby eliminating the need for flush water and allowing users in water-scarce areas to maintain good hygiene. A patented technology that utilizes a special-purpose chemical agent and sterilization means that no external source of water is required. In addition, only minimal power is required to flush a Landwasher toilet – making it suitable for use in areas where water and electricity are not necessarily available on demand.



Chemical and mechanical framework for Landwasher’s patented waterless toilet solution. (Landwasher)

Fast Company noted that one of the most innovative aspects of the toilet is a built-in computer that tracks how long the user spends in the stall and assumes that the elimination of solid waste takes longer. Based on this calculation, the computer controls valves that separate urine and solid fecal matter accordingly. Urine is stored in a tank under the toilet while solid waste is broken down with an engine-driven blade, using the stored urine water to flush. As a result, only 0.4 liters of urine water is required to flush the toilet, compared up to an estimated 6 liters of fresh water required by conventional latrines. Moreover, because the special-purpose agent used within the toilets is free of heavy metals and phosphorous, discharge from the toilet quickly turns into compost which minimizes harm to the surrounding environment, according to Landwasher.

Perhaps what distinguishes the company most from its competitors is this emphasis on the environmental impact of its products. Compared to a traditional water-based toilet, a Landwasher toilet can save an estimated 2.2 tons of water per year. And while ordinary portable toilets consume around 20 kilowatt hours of electricity per day, a Landwasher toilet consumes less than 0.5 kilowatt hours per day, meaning electricity savings of around 7,300 kilowatt hours in a year. These design elements reflect the ethos of founder Wu, whose concerns about large-scale waste and damage caused by industrialization and construction in China continue to drive him today.

GUARDIAN OF THE BLUE EARTH

The company name – *Lan Jie Shi* 蓝洁士 in simplified Chinese – also reflects the company’s environmental roots. “*Lan* 蓝”, meaning blue, is traditionally a color associated with environmental protection in China, while “*Jie* 洁” refers to taking action or cleaning and preserving. Meanwhile, “*Shi* 士” implies a guardian and protector. *Lan Jie Shi* adds up to “guardian, protecting the blue earth” – Landwasher.

Having researched the market for environmentally friendly toilets and finding a business

opportunity that linked his values and interests, it was a relatively easy decision for Wu to resign from his position at the securities firm. After a stint at another waterless toilet company, he started his own business. His initial enthusiasm was not shared by many, with the exception of his father, who gave him a loan and a used car for his new venture.

In the first year, Wu spent more than two-thirds of the seed money on product development, but had a tricky time getting the prototype to function properly. He stretched the loan over another two years until he achieved a breakthrough in product development and applied for a patent. He was frustrated during that time by the growing number of voices decrying the declining quality of air and water in China, but with few seeing companies such as Landwasher as being part of the solution. At that point, the potential of social enterprises to help solve China’s environmental problems was not widely recognized.

From Landwasher’s inception, Wu had integrated environmental considerations into its objectives, but saw the virtue of an enterprise model as a means of creating sustainable impact. “Making money is not our top goal,” he said. “But to contribute to environmental protection in a sustainable way, customer satisfaction plays an important part.” The model provided the market discipline needed to improve products in response to client demand. This approach is captured in the company’s business objectives: to create intelligent, environmentally friendly products and to continue to lead the green toilet industry.

Even so, Wu shies away from labelling Landwasher as a social enterprise. He said that the concept is oftentimes confusing to the domestic Chinese market, where it can be associated with non-profit activities. Instead, he prefers to call his company an “environmental enterprise”, which has helped him to open doors to some key clients. These include government agencies, such as tourism bureaus or local development departments. The company’s first client, a tourism agency from Henan Province in central China, replied to a

letter sent by Landwasher to solicit new business in 2001.

Such organizations would become core to Landwasher's client base, with its current focus on placing mobile toilets in remote tourist areas and those municipal areas that urban sanitation and sewer systems are unable to reach. Starting at US\$5,000, Landwasher products can be found anywhere from parks to construction sites. The company hopes to expand its product range for rural China, leveraging its technology to be able to address water, sanitation and hygiene challenges in the countryside, and potentially develop solutions where human waste can be recycled for use in farming.

DOING WELL BY DOING GOOD

Growing by triple digits in its first five years of operations, Landwasher has set up six sales outlets across China covering 27 provinces, and grown into a business worth over RMB 60 million at its peak (around US\$10 million today). Its big breakthrough came in 2008, when it was selected from over 200 bidders to supply some 120 water-free toilets for the 29th Olympic Games in Beijing. Each toilet operated for 12 hours a day and was used by an estimated 145 people. Compared to conventional portable toilets, Landwasher's saved an estimated 1,000 metric tons of water during the two-week

long Olympic competition. In addition, the company provided more than 80 wheelchair accessible toilets for the 13th Paralympic Games.

From there on, it has been the supplier of choice for other premium large-scale events in China, such as the 60th Anniversary Celebration of the People's Republic of China for which it provided 350 movable toilets, and the 2011 International Horticultural Exposition in Xi'an where Landwasher supplied over 150 solar-powered toilets. Government contracts remain the bread and butter of its business, mainly because environmental protection work is primarily conducted for and in collaboration with the government in China. This is true for Landwasher to the extent that Wu categorizes it as being in the "business-to-government" sector.

The sanitation bureau of Beijing's East District was an early adopter of Landwasher's toilet solutions. It chose Landwasher as a supplier after evaluating several other competitors based on technology, price, geographic convenience, and aesthetics, according to Qun Dong, a bureau official. He said the bureau also was impressed by the company's capacity to install and operate toilet solutions at big events. "They are able to operate such toilet solutions for a month without any issues," said Dong. By the end of 2014, the bureau



Eco-friendly toilets from Landwasher commissioned for the 2008 Beijing Olympic Games. (Landwasher)

had replaced its remaining installed toilets with Landwasher products.

Another satisfied client is Yun-Long Zhang, secretary-general of the Beijing Tourism Association Scenic Area Branch. Having purchased Landwasher products for more than eight years, Zhang said that organizations such as his have received significant financial support in environmental areas since China began emphasizing the development of its green economy as part of the 12th Five-Year Plan. As a result, Zhang said SMEs focused on saving water or reusing waste water are natural beneficiaries.

The Chaoyang District government in Beijing also recognized the environmental and financial benefits of Landwasher's products compared to conventional mobile latrines. It contracted Landwasher to retrofit over 160 of the districts mobile toilets with its technology, resulting in estimated annual savings of between 9,400-12,600 metric tons of water for Chaoyang.

HELPING HANDS

As well as forming its client base, local government agencies have also played an important role in supporting Landwasher's development and growth. According to Minxue Zhao, director of Langfang Technology Bureau of the municipal

government of Langfang, where the company is headquartered, Landwasher was identified as a high-tech enterprise. That made it eligible for tax and financing benefits and other forms of government support, which Langfang authorities contributed in the form of capacity building and technology services. For instance, they provided training for Landwasher to improve its system for intellectual property protection. Both the Economic Development Bureau of the Yanjiao Development Zone and the Langfang Technology Bureau remain key stakeholders that regularly interact with Landwasher.

Aside from local government, Landwasher has received support from other organizations, including two entities under the umbrella of the Dao Venture Group, a China-focused and impact-oriented group of companies and affiliates. Set up by the Washington DC-headquartered think tank World Resources Institute (WRI) in collaboration with the Beijing-based Institute for Environment and Development, the now independent New Ventures China (NVC) has been a source of support for Landwasher from 2003 when its non-profit accelerator program was established. So too has the China Impact Fund (CIF), an impact investor that is also an equity shareholder in the company.

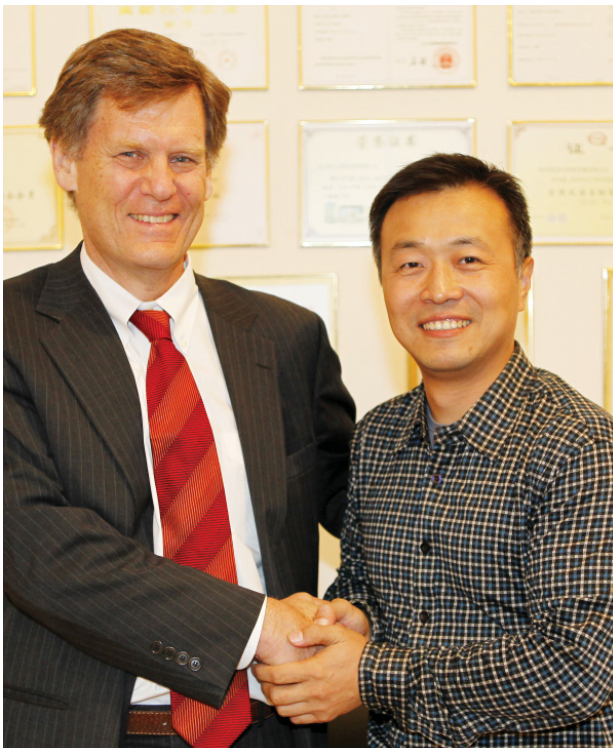


CEO Hao Wu (centre, in yellow) with Landwasher employees. (Wang Xuezhen, Landwasher)

These entities have provided advice to Wu in his efforts to grow internationally. He signed a distributor agreement with a Kenyan company in 2014, and aspires to collaborate with water-related industry players from the United States. Exploring new channels for accessing finance, Wu has worked with CIF to consider listing on the New Third Board, a national over-the-counter share transfer system for small- and medium-sized enterprises which would also bolster his efforts to improve Landwasher's financial and governance systems. Currently, Landwasher's board comprises four members, including one from CIF, although Wu plans to appoint more external board members to garner more independent input into the company's strategic decisions.

LESSONS AND CHALLENGES

The environmental value of its waterless toilets has been at the heart of Landwasher's mission from its inception, which according to Wu, has helped to differentiate the product from the competition. Recruiting talent in what is a relatively nascent sector in China has also been key to its development: giv-



CEO "Henry" Hao Wu and Jonathan Lash, then President of the World Resources Institute visiting Landwasher in 2009. (New Ventures China)

en the limited pool of available expertise, Wu and his management team have focused on attracting people with transferable skills and work experience who are able to learn on the job. The prominence placed on the company's environmental credentials naturally draws those of a similar mindset. "We expect our employees to identify with our values and mission, which are environmental," said Wu.

With these goals comes a style of management that is highly decentralized. Avoiding a traditional top-down management structure, common in Chinese business culture, authority and responsibility is devolved to senior managers and employees to encourage independent working and inventiveness. The attention paid by the company to create a proprietary product has also been a factor in its success. This has been bolstered by international recognition from the likes of *Fast Company*, the World Resources Institute and the social entrepreneur website *NextBillion.net*, which has helped to build confidence among its client base.

OUTLOOK

As a domestic Chinese company, Landwasher has steadily developed its brand, which is symbolized by the official government awards it has received, such as the "Best Brands for the Government Procurement Program" and the "National High Quality Brand". While its focus on the environment has been a point of differentiation, Wu is aware that this is no guarantee of the company's continued success. "Our leading position could easily be threatened by disruptive technology or competitors in this space," he said, adding that Landwasher will need to continue to distinguish itself and keep competitors at bay. A related challenge is for the company to protect its intellectual property, which it has attempted to do through filing patents in China and nine other countries, including the US, Japan, India and Mexico.

So far, the company has built much of its success from working actively with stakeholders in government and the industry. Landwasher serves as an executive director of the Chinese Association of Urban Environmental Sanitation, and

is a deputy director of the Beijing Association of Environmental Sanitation. It is one of a few enterprise members of the China Association of Tourism and Scenic Spots and works with the Beijing Institute of Environmental Sanitation Science to develop and retrofit luxury coaches with special toilets. Wu continues to cultivate Landwasher's profile by regularly attending workshops or conferences to speak about the company's vision and technology. However, industry associations are only one kind of stakeholder. If Landwasher is to diversify its customer base, it will need to raise its profile with potential new clients. Further exposure to local communities, non-governmental organizations, and the media could help in gain more traction. There are applications of Landwasher's model for conserving water and reducing discharge and waste that have yet to be fully explored.

The commercial sector is one such area. As consumers become more interested in greener lifestyles, Landwasher has the opportunity to meet new demand – for example from hotel chains seeking to appeal to environmentally conscious travelers, or to improve their own green credentials. To tap into this potential, the company has assembled a team of professional sales staff across a national network, with branches in Lanzhou, Shenzhen, Shanghai and Chengdu and Tianjin. In the next few years, the company expects to have one resident representative in each province, enabling responsiveness to local demand and opportunity.

NEW CHINA, OLD CHALLENGES

Water scarcity and its deteriorating quality continues to be among the top environmental threats facing China today. According to *The Diplomat*, a current affairs magazine, the Chinese government has reported that nearly 60 percent of China's groundwater is polluted. Related to this, availability of fresh water continues to be a severe problem for the country, tied up with complex resource challenges that are emerging from increased energy consumption, urbanization, and modernization.

As these challenges loom large, there is scope for Landwasher to do more. Currently three-quarters of the solid waste produced by a Landwasher toilet is discharged into the surroundings. True to Wu's observations during his childhood spent in rural China, there is an opportunity for this waste to be recycled and used as a fertilizer in agricultural production applications to improve the environmental benefits of Landwasher products even further.

According to the World Health Organization, an estimated 14 million people continue to openly defecate in China – either due to lack of access to toilet facilities or water shortages. Issues related to water, sanitation and hygiene are most prevalent in the dry inland provinces of northern China. To date, the relatively high cost of a Landwasher toilet means that it remains unaffordable for many communities, small-hold farms and households in rural China – where the solution is likely to be most useful and beneficial, and make the greatest social impact. To meet that challenge, Landwasher must continue to research and develop new solutions to achieve Wu's original vision of substantially improving hygiene, sanitation and health across China. "Indeed, this is what the board collectively thinks is the real challenge lying in front of us in years ahead," he said. To do this, Landwasher must make the leap from servicing the public sector to getting its products into rural communities.

For now, Wu and his team can take some satisfaction in the improved levels of hygiene and sanitation at the Forbidden City, where Wu was first struck by a wish to do something to make a difference. Through Landwasher he has done so, at one of China's most culturally important landmarks. The Forbidden City now houses 23 Landwasher water-free toilets, saving an estimated 7.3 metric tons of water a day, almost 2,700 metric tons per year compared to conventional latrines. 🌍

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QUANTITATIVE INDICATORS

Financial

Planned budget or income versus actual expenditure for the fiscal year*	Budget: RMB 35 million (US\$5.6 million) Expenditure: RMB 34.25 million (US\$5.5 million)
Income composition by source: individuals, corporations, events, trusts, other	Enterprise: 30% Government: 60% Management organisations for scenic venues: 10%
Income composition: domestic versus international	Domestic: 99.9% International: 0.01%

Personnel

Staff retention rate	78.5% (123) staff retained in 2014
Turnover rate	21.5% (34) staff left in 2014
What is the board composition?	Occupation: R&D, sales and marketing, operations and engineering, investment advisory and consulting (4) Gender: men, 4
How many meetings does the board hold per year?	2
How many staff members are there?	157
How many staff members have attended some non-profit or management training course?	Training includes: <ul style="list-style-type: none"> • Departmental training sessions every six months • Orientation workshops to new hires • External training for some employees in areas such as human resources, finance and safe production, primarily organized by relevant government agencies or associations such as the Intellectual Property Bureau of Hebei Province, Langfang Technology Bureau, and the Sanhe Safe Production Administration Authority

Quantitative Indicators Continued

Organizational

Do you publish an annual report?	No
How many sites/locations do you currently operate in?	Nine cities: Yanjiao (Hebei), Beijing, Lanzhou (Gansu), Chengdu, Shanghai, Shenyang, Tianjin, Changsha, Shenzhen
Do you measure results?	<p>Performance Management</p> <p>At the beginning of the year, company goals are set and progress tracked on a weekly basis. The performance of each department is measured and evaluated annually based on this system</p> <p>Environmental and Social Impact</p> <p>Indicators developed by China Impact Fund and New Ventures China are tracked including: tons of water saved, amount of energy saved, number of jobs created, reduction of prevalence of ill-health from use of Landwasher products</p>
What types of outreach?	Search engines (Baidu, 360, Sogou), e-commerce platforms (Alibaba, Taobao), industry association events and exhibitions, print brochures, and magazine advertising
Do you regularly meet with government representatives?	Yes
If yes, on a scale of 1-3 how close is the relationship with government? 1 = not close; 2 = somewhat close; 3 = very close	<p>Closeness of relationship = 3</p> <p>Majority of clients are government entities. Landwasher benefits from government subsidies for its environmental SME and high-tech enterprise status</p>

* All figures for 2014 fiscal year. Exchange rate: \$1= RMB6.2, as of 31 December 2014.