Laudatio for Prof. Jiuhui Qu, for Outstanding Research & Development in Water

by Prof. Dr. Slav Hermanowicz

Distinguished guests, esteemed colleagues, and members of the Nobel family,

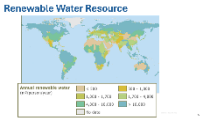
It is an honor to be here today to celebrate the remarkable achievements in sustainability and environmental stewardship. As we gather to recognize the leaders who have made significant contributions to our planet's future, it is my privilege to introduce one such visionary in the field of water treatment technology, Professor Jiuhui Qu.

But before I describe the achievements of this year's prize recipient a few words about the category of the prize – water. Water is a substance that we all know. However, there are many facts that are not widely appreciated about water.

First of all, there is no substitute for water. You cannot use anything else for washing. You cannot use anything else for cooking. You cannot use anything else for growing plants, therefore growing food. There is no easy substitute for water in many industrial processes, both for technical and

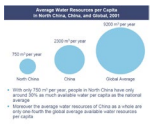
economic reasons. So once again, there is no substitute for water.

The second fact, perhaps not widely appreciated, is that water is the ultimate renewable resource. Water exists in many different forms and locations but its total amount has not changed over geological times. Essentially, the amount of water that was present in the beginning of civilization is the same as we have now. So, water undergoes constant recycling renovation through a process that is known as hydrologic cycle that is driven by solar energy. Essentially mother nature uses free solar energy to move water around and make it available in the form that we can use, really free of charge.

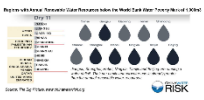


The problem is that Mother Nature is a capricious mother and does not distribute these water resources where it is needed and when it is needed. Precipitation is truly 100% of water resources that we can use, and therefore it matters how we use those resources, both in terms of quantity and quality. We often have very important and water demanding activities where and when Mother Nature does not provide us with enough water.

And this is where the contributions of the laureate Professor Qu are very, very important.



One final element, specifically, because Professor Qu works in the People's Republic of China, is realization that China is not a very rich place in terms of water resources. On average, global water resources per person per year, those truly renewable water resources are on the order of 9000 cubic meters. That includes the areas where water is abundant, the tropics, the Amazon, the Niger. But if we compare that global average with what China has in its territory and given its population, it is a much more modest number, 2300 cubic meters per person per year.



And then if we look at more details, if we look at particularly the northern part of China, the so called northern 11 provinces, this is where the lot of industrial and economic activity happens, and where there is a large fraction of the population, that region is exceptionally insufficiently provided in water resources. In those areas, the available renewable water resource per capita is about the same as in the areas that we normally associate with dry regions, such as Jordan, Saudi Arabia or Egypt.

So that really requires very specific, very concrete, and very sophisticated solutions to make water available for all human needs, agricultural needs, industrial needs, and environmental needs.

And here, I would like to introduce the achievements of Professor Qu.

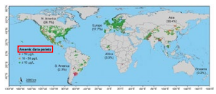
Professor Jiuhui Qu

Professor Qu, former Director of the Research Center for Eco-Environmental Sciences at the Chinese Academy of Sciences and Distinguished Professor at Tsinghua University, has dedicated his career to ensuring safe drinking water for millions. His pioneering work has led to the development of a comprehensive "from source to tap" technical system, addressing water risk recognition and management across both urban and rural areas. This system includes groundbreaking low-cost technologies for the removal of arsenic and fluoride from groundwater, positively impacting over 200 million individuals in China and globally.

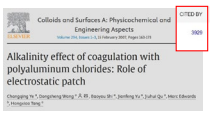
For over two decades, Professor Qu has been at the forefront of China's Water Science and Technology Innovation Plans. His contributions to ecological and environmental restoration projects, such as those in the Yangtze River basin and the Baiyangdian wetland region, have been

instrumental in improving water quality and ensuring sustainable water management. His leadership in developing China's first wastewater resource factory in Yixing, Jiangsu Province, exemplifies his commitment to integrating innovative solutions with large-scale infrastructure projects.

As an Advisor to the UN Environment Program (UNEP), Professor Qu has fostered international collaboration, sharing and adapting water treatment technologies with developing nations such as Sri Lanka and Nepal. His efforts have not only enhanced water safety in China but have also provided essential technical support to communities worldwide, addressing one of the most pressing global challenges—access to safe drinking water.



Professor Qu's illustrious career is marked by his roles as Professor and Director of the Center for Water and Ecology at Tsinghua University. His research has led to significant advancements in water purification, which have been implemented in numerous large-scale water treatment plants. One of his papers was cited 3900 times.



Professor Qu's active zone purification technology has been instrumental in China's major water source restoration projects, notably in Tianjin and Jiaxing water sources. His morphology matching coagulation technology has effectively controlled disinfection by-products in over 20 large-scale water treatment plants. He also developed a multistage coagulation ultrafiltration technique, cutting construction footprint and costs by 30%, and innovated an end-of-pipe technology crucial for the Beijing 2008 Olympic Games' water supply.

Professor Jiuhui Qu

Professor Qu's contributions extend beyond technical innovations. His leadership in fostering public-private partnerships has been crucial in translating scientific research into practical applications. By collaborating with industry partners, he has ensured that cutting-edge technologies are implemented effectively, benefiting both urban and rural communities. His work has not only addressed immediate water safety concerns but has also laid the groundwork for sustainable water management practices that will benefit future generations.

In recognition of his monumental contributions to water treatment technology and his unwavering

dedication to ensuring safe drinking water for all, it is my great honor to present the Sustainability Award to Professor Jiuhui Qu. His work is a shining example of the transformative power of science and innovation in creating a more sustainable and hopeful future for our planet.

Please join me in welcoming and congratulating Professor Jiuhui Qu.

The Sustainability Award 2024

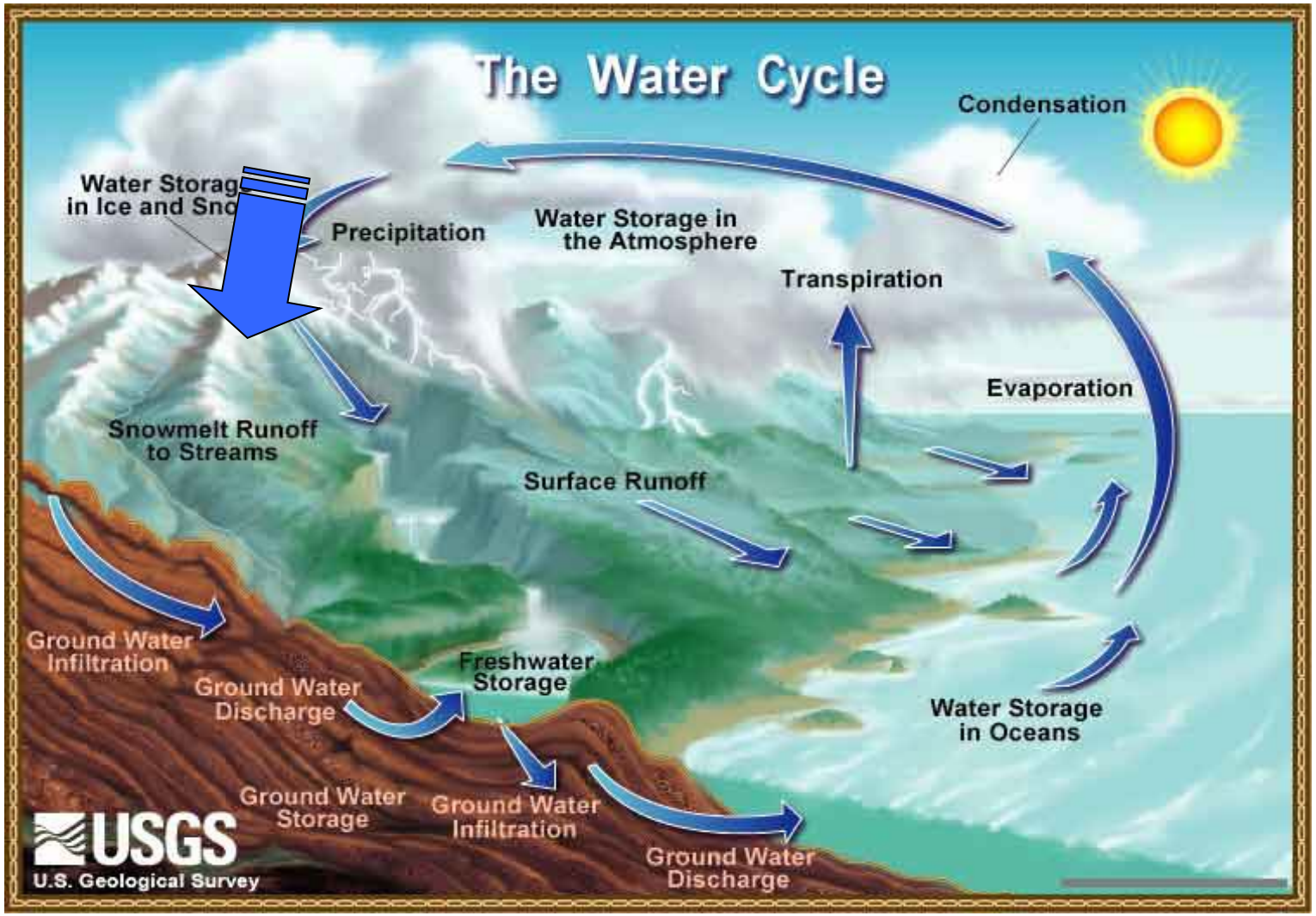
Water

Nobel Sustainability Trust

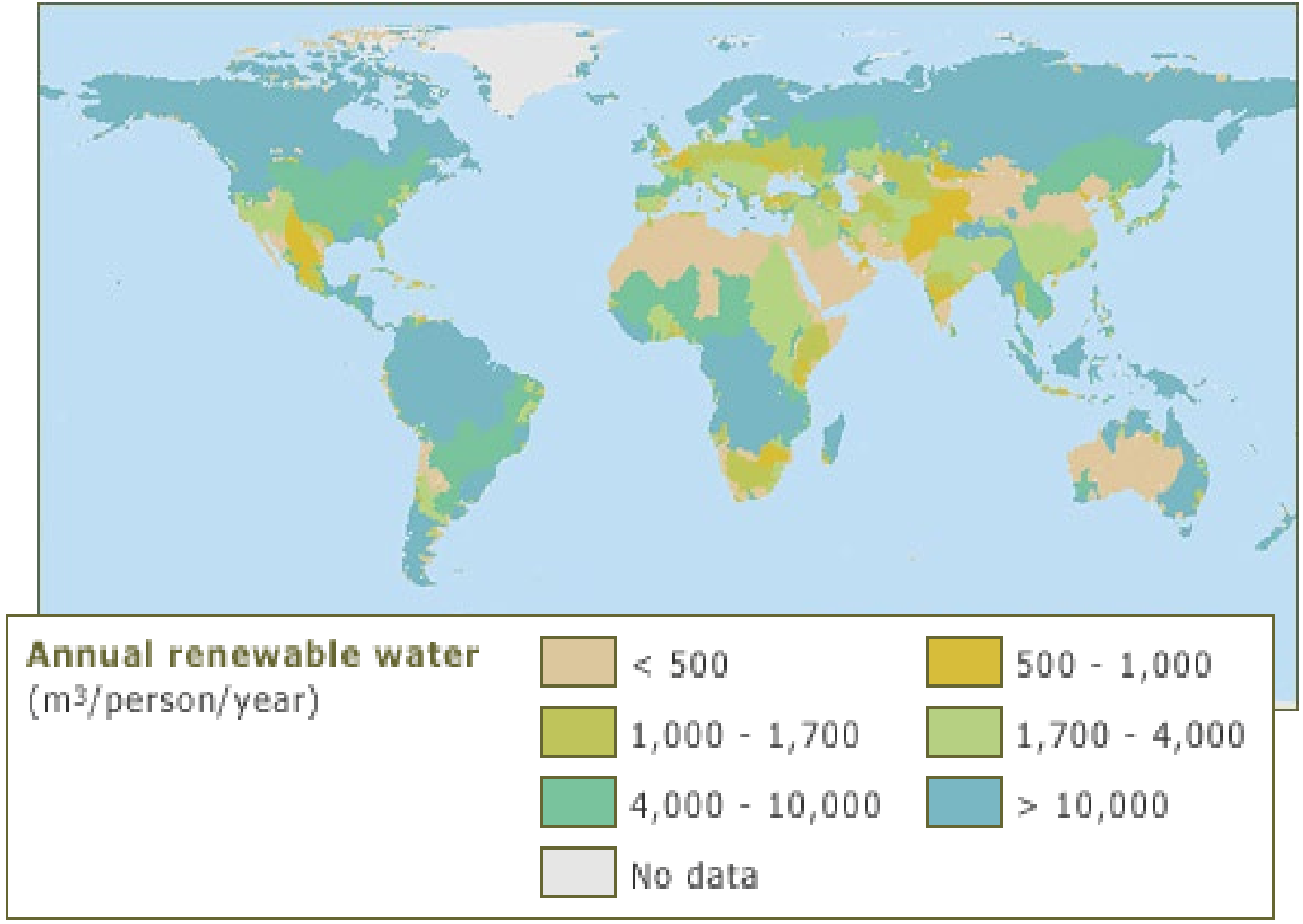
Water cannot be replaced

- drinking
- hygiene
- agriculture
- industry
  - effective solvent
  - desired additive
  - cheap coolant
  - energy production
- society

Hydrologic Cycle

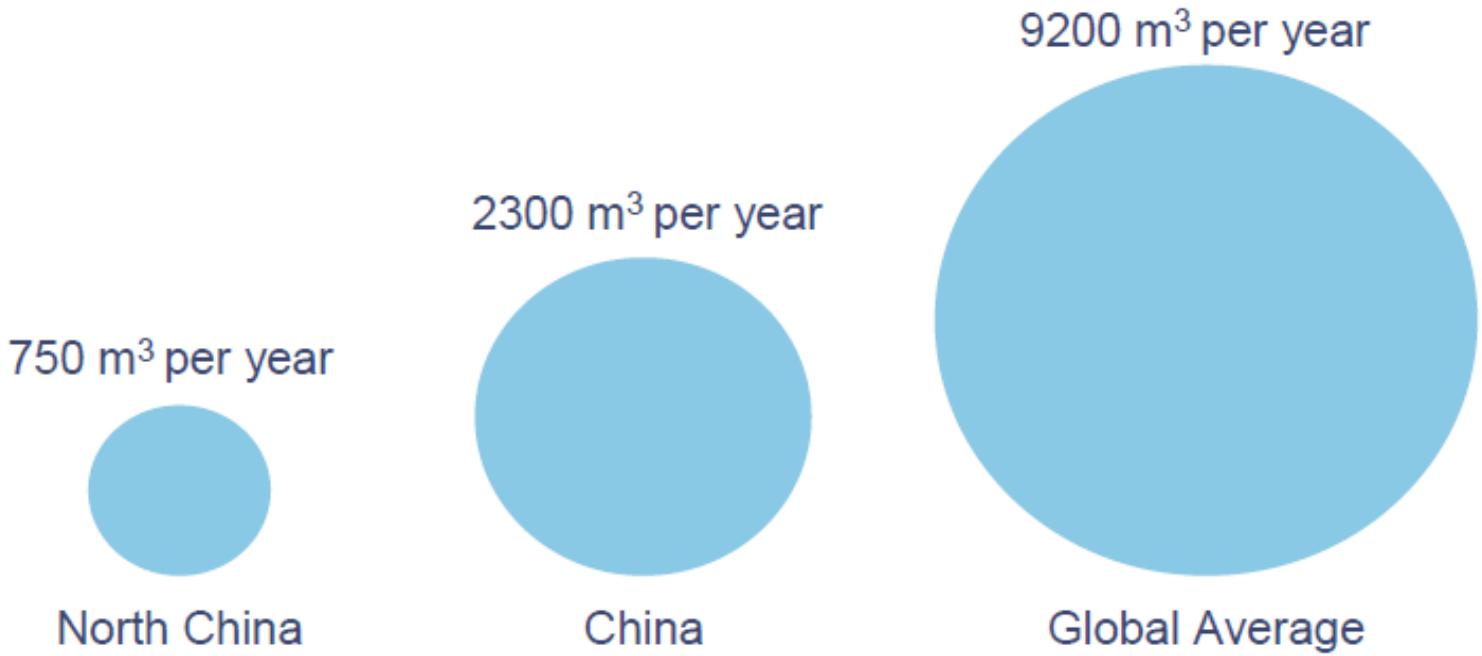


Renewable Water Resource



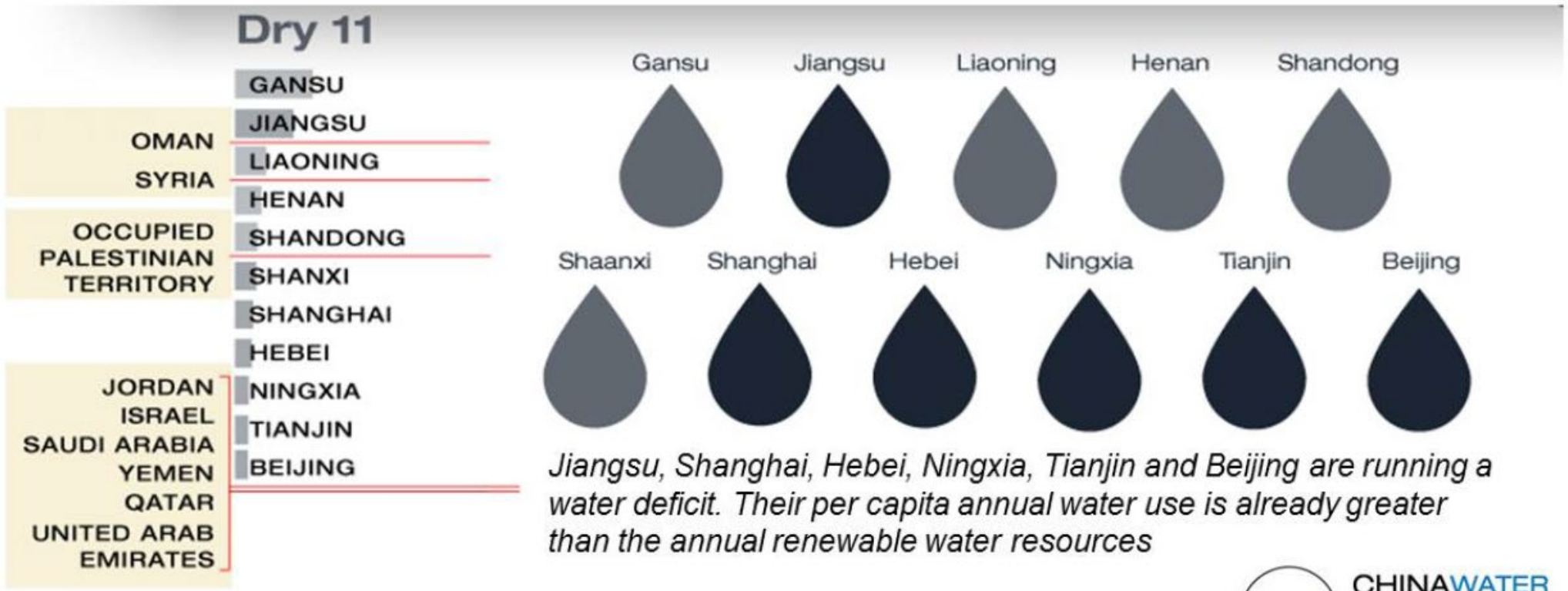
earthtrends.wri.org

Average Water Resources per Capita in North China, China, and Global, 2001



- With only 750 m^3 per year, people in North China have only around 30% as much available water per capita as the national average
- Moreover the average water resources of China as a whole are only one-fourth the global average available water resources per capita

Regions with Annual Renewable Water Resources below the World Bank Water Poverty Mark of 1,000m3

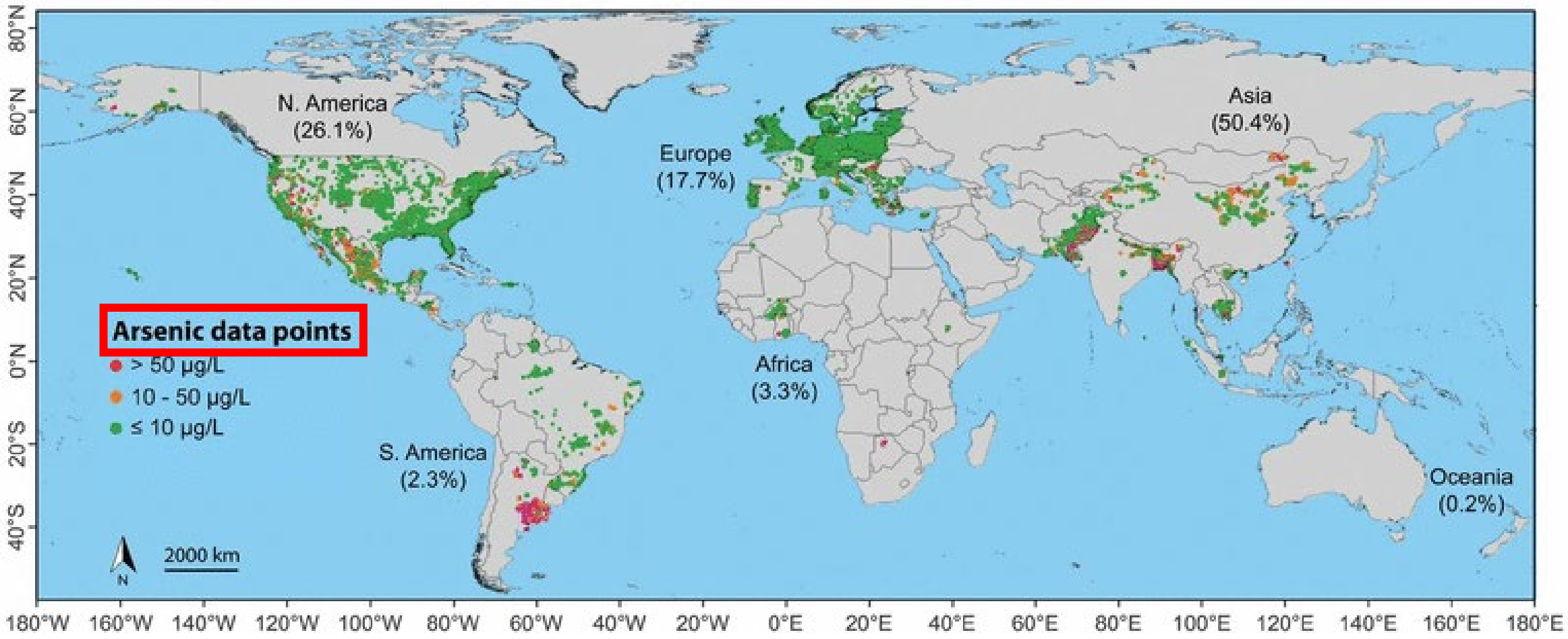


Jiangsu, Shanghai, Hebei, Ningxia, Tianjin and Beijing are running a water deficit. Their per capita annual water use is already greater than the annual renewable water resources

Source: The Big Picture, www.chinawaterrisk.org

CHINAWATER RISK

Professor Jiuhui Qu


N. America
(26.1%)
Europe
(17.7%)
Asia
(50.4%)
Africa
(3.3%)
S. America
(2.3%)
Oceania
(0.2%)
Arsenic data points
> 50 µg/L
10 - 50 µg/L
≤ 10 µg/L
2000 km
N
80°N
60°N
40°N
20°N
0°N
20°S
40°S
180°W
160°W
140°W
120°W
100°W
80°W
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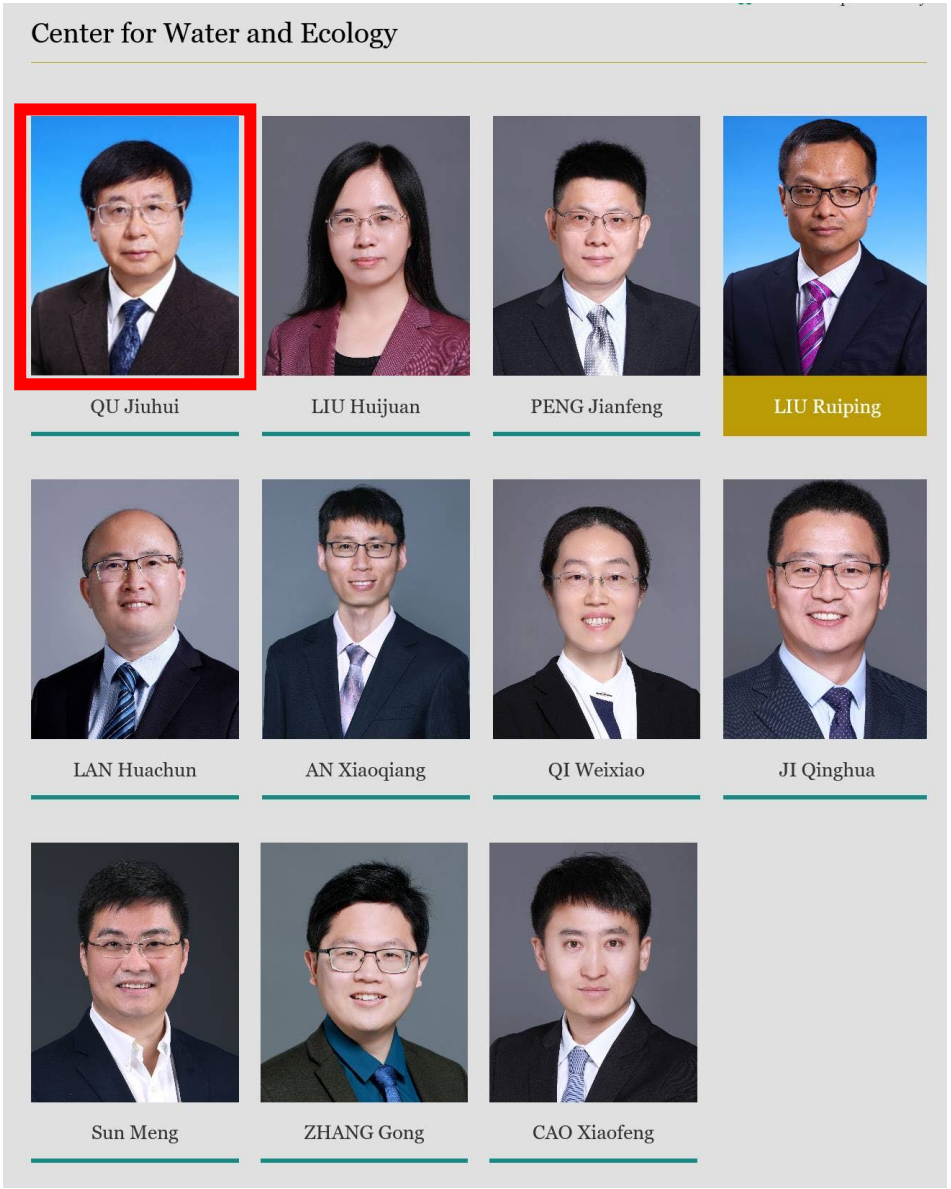
清華大學环境学院
School of Environment, Tsinghua University



Colloids and Surfaces A: Physicochemical and Engineering Aspects

Volume 294, Issues 1–3, 15 February 2007, Pages 163-173

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Alkalinity effect of coagulation with polyaluminum chlorides: Role of electrostatic patch

Changqing Ye [a], Dongsheng Wang [a], Baoyou Shi [a], Jianfeng Yu [a], Jiuhui Qu [a], Marc Edwards [b], Hongxiao Tang [a]