



Leave No Footprint

How Water "Footprinting" Can Change the World

by Alan Horton

In December 2008, a conference on corporate water footprinting in San Francisco centered on the emerging study of corporate impacts on freshwater, taking into account not just the direct water withdrawals for products, but the entirety of a product's supply chain including processing, shipping, retailing and consuming. Corporations attending the conference included Coca-Cola, Nestlé, Miller-Coors, Schweppes and other businesses with massive water footprints. The objective? To discuss strategies for first reducing these footprints and then offsetting the remainder, much in the same way many businesses now offset their residual carbon footprint. Increasingly, businesses view their water footprint as a significant cost that must be managed for long-term business and ecological sustainability, even as consumers adopt increasingly sustainable purchasing habits. At the 2007 World Wildlife Fund annual conference in Beijing, Coca-Cola CEO E. Neville Isdell famously pledged to take their global company water neutral, doing much to popularize the concept.

Arjen Hoekstra, Professor of Multidisciplinary Water Management at the University of Twente in The Netherlands, attended the conference as a featured speaker. He fascinated the crowd with his presentation on the emerging study of water footprints and what it means to "go water neutral." His seminal book on the subject, *Globalization of Water*, co-authored with Ashok Chapagain, and some of his other published works, including "Water Neutral: Reducing and Offsetting the Impacts of Water Footprints," continue to drive this new area of study. Since the beginning of the decade, Hoekstra has worked to refine the art of calculating water footprints and published several papers on methodologies, implications and applications of water footprints for individuals, companies, industries and nations.

What is a water footprint?

As the creator of the water footprint concept and science director at the Water Footprint Network, Hoekstra says that "the water footprint is an indicator of water use that looks at both direct and indirect water use." The water footprint of a product is the volume of water used in

all steps of its production chain. The water footprint of a consumer is the sum of direct water use (laundry, bathing, etc.) and indirect water use (water used to produce goods and services consumed by the individual). The water footprint of a business consists of its direct water use for producing, manufacturing and supporting activities, plus its indirect water use, embedded in its supply chain.

Virtual water defined

In figuring out a consumer or business's water footprint, Hoekstra considers the "virtual water" content of products. "Virtual" refers to the fact that most of the water used in the production is ultimately not contained within the product. Hoekstra says, "In fact, the real-water content of products is generally negligible compared to the virtual water content." For example, the real-water content in an 8-ounce cup of coffee is 8 ounces. But it takes another 36 gallons of virtual water to grow and process the coffee beans to brew that 8-ounce cup of coffee.

Hoekstra further applies the virtual water concept to trade, in that the trade of goods also includes the trade of the virtual water embedded in those goods. Continuing with the coffee example: when Starbucks imports enough coffee from Costa Rica to make an 8-ounce espresso, they are also 'virtually' importing the gallons of water used by the Costa Rican farmer to grow the coffee beans. The total water footprint of the 8 ounce coffee must include all water impacts – direct from brewing (a small amount) and indirect from growing (a larger amount). By assessing trade in this way, nations can better understand the actual impacts on water resources to drive trade policy. Jordan, for example, helps manage its meager domestic water resources by importing rather than producing goods that have large water footprints.

Hoekstra draws another link between global dietary change and water consumption. For example, in China, annual beef consumption has increased from 44 pounds per person in 1985 to 110 pounds per person projected for 2009. The virtual water input of that increase is staggering – roughly equivalent to Europe's total annual water use.

In August, we talked with Professor Hoekstra about his work, summarized on the next pages.

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What does water neutral mean?

Hoekstra defines being water neutral as "reducing the water footprint of a product or activity as much as reasonably possible and then offsetting the remaining negative impacts of the water footprint."

Much like being able to calculate an individual's or business's carbon consumption, resources such as the Water Footprint Network offer online calculators for users to estimate their water footprint. Using these, consumers and businesses can determine their overall water footprint and then choose to support freshwater restoration and other activities to offset the negative environmental impact.

Example of a typical water footprint calculation:

Based on your country of residence and your own consumption pattern, you will have a unique water footprint.

Country:

Sex: Female Male

Dietary habit: Vegetarian Average meat consumer High meat consumer

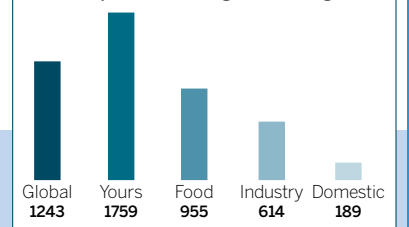
What is your gross yearly income? US\$ per year
(only the part of the family income consumed by yourself)

Your water footprint=

cubic meters per year

This is a general and quick estimate of an individual water footprint based on the average consumption pattern of a woman in the United States. An extended version of the water footprint calculator is available for most countries at www.waterfootprint.org

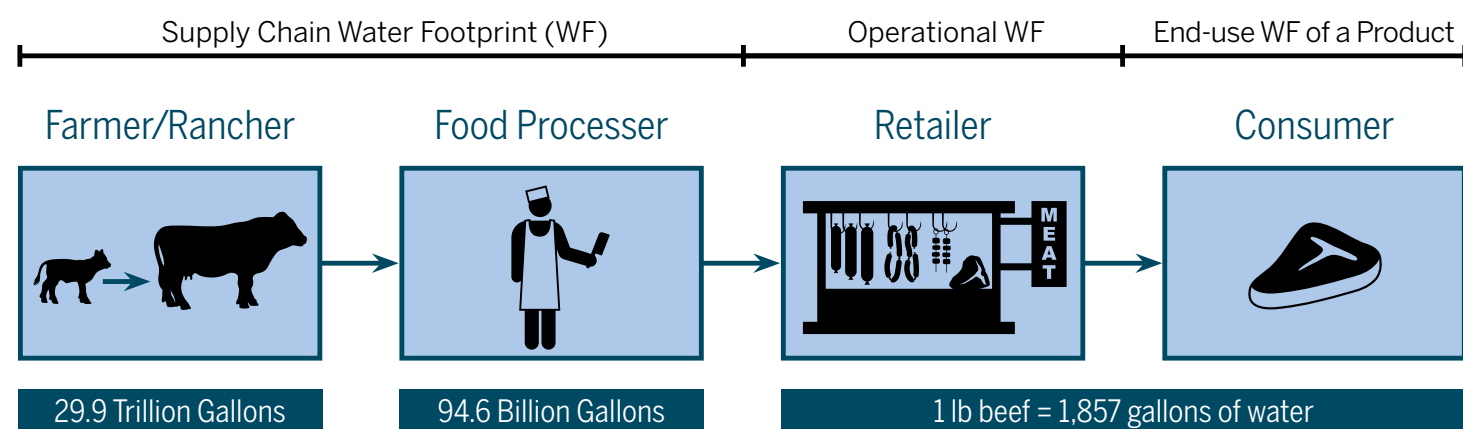
Components of your total water footprint and comparison to the global average



Contribution of individual food categories to your total water footprint



The Virtual Water Chain: Beef



TOTAL U.S. BEEF PRODUCTION REQUIRES 30 TRILLION GALLONS OF WATER

Equivalent to 16% of all U.S. water use, or enough to drain the Colorado River dry 6 times over

Q&A

with Professor Hoekstra



Arjen Hoekstra is a Professor of Multidisciplinary Water Management at the University of Twente in The Netherlands and co-author of *Globalization of Water*

Q: Do you see awareness of virtual water in trade as a positive way in which countries with fewer water resources might better manage those resources?

A: It is too complex to simply say that trade is positive or negative. To start with, often trade has a positive side, because two trade partners decide to trade to benefit both parties. In that sense, trade is always good. But then, there are many more things to say about trade. Sometimes in the exporting country, there are product-related problems such as water depletion or water pollution that are not charged to the product user. So some goods leave the country for a cheap price, but the problems remain behind. So in that case, trade is clearly not so good, at least not for the country as a whole that has to cope with those impacts.

Q: Perhaps we see that in the United States, where many of our exports are agricultural. For example, corn is a key export for the U.S. and a key ingredient in many products. The non-point source pollution from runoff from the production of corn, however, is a consequence that we as a nation have to live with as a consequence of trade. Is that an example of the impacts that are not always included in the pricing of products to consumers?

A: The rest of the world can thank the U.S. for exporting those products without putting the costs on us. The environmental costs remain in the country. It seems attractive, because you have all those exports and receive all that foreign currency, but in the meantime your resources are being depleted and deteriorated.

Q: In your book, you mention the impact of Europe's consumption of rice from Thailand. One of our great challenges in managing water resources is to improve understanding of those nearly invisible impacts from our own consumption. If we consume this rice from Thailand, we would benefit from understanding the impacts of that rice production on Thailand's ecosystems. Do nations have a responsibility to consider the impacts on water in their trade policies?

A: I would advise governments, particularly Western governments, to align trade policy with the sustainability policy of others. Some countries today show increasing interest in 'sustainable consumption,' not just sustainable production. If there is some environmental policy towards sustainable consumption, this could translate to efforts to make sure that the sources of our products, which are sometimes developing countries, adopt better management of water resources. There are ways to link sustainable consumption policy to trade policy. There can be regulations set with respect to imported products that require sustainability for those products. In the book, I compare the consumption of products that cause trouble in their production, such as water depletion or water pollution, to buying a stolen bike. Everyone knows buying a stolen bike is not good, if you know it is stolen. What you should try to do is make sure the stolen bike is returned to its rightful owner. In fact, most countries have laws forbidding the purchase of the stolen bikes. But it is strange that it is not forbidden to buy goods that are depleting resources

without compensation. If there is trouble caused to a third party, the originating country, you should have a responsibility as a consumer to make sure you are not harming others.

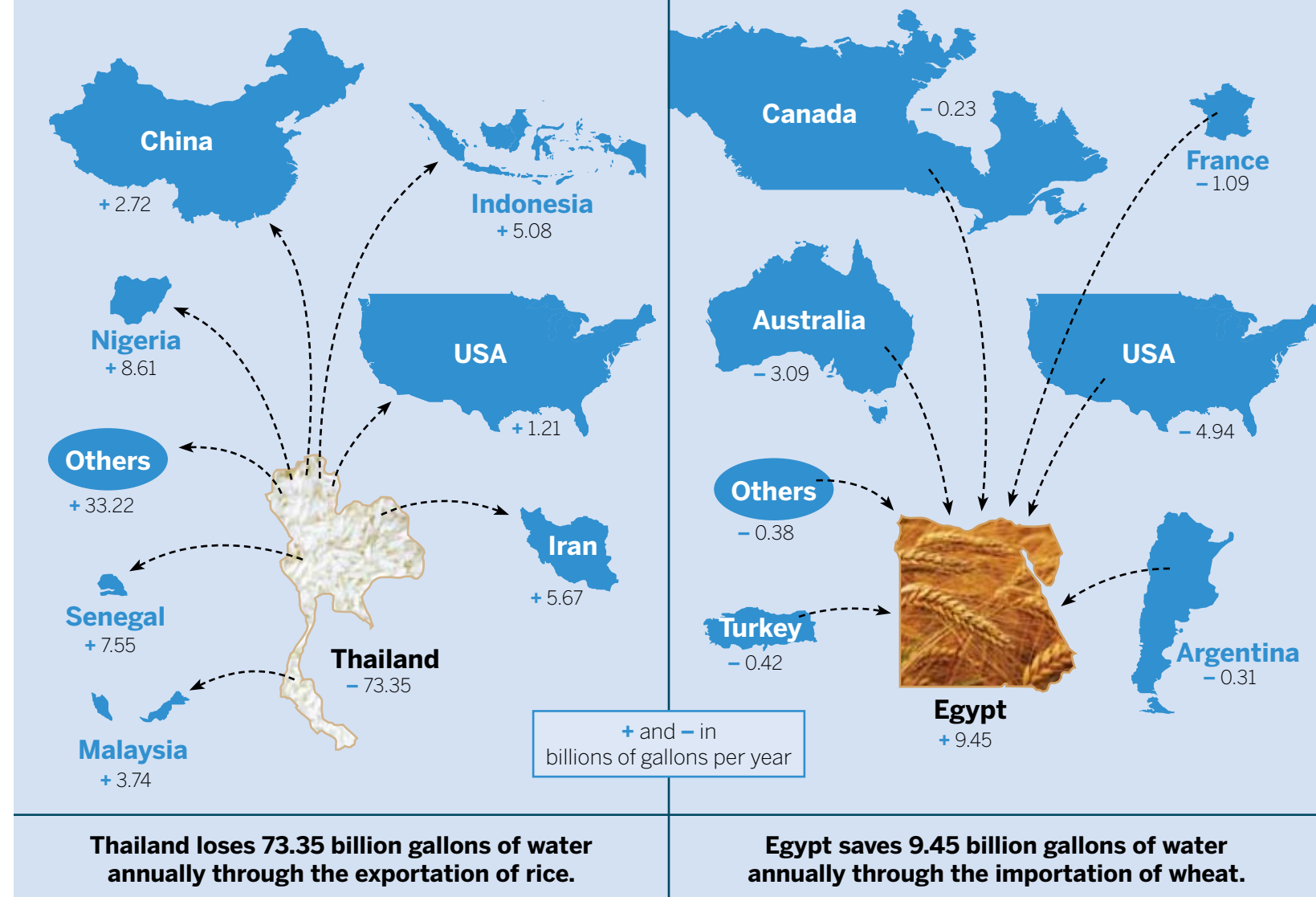
Q: There has been a lot of effort in recent years towards sustainable production. In Oregon, for example, conservation entities work with farmers to improve their irrigation methods, improving farm production practices in general. What you're suggesting is that we need to spend more energy on asking consumers to take responsibility for what they consume. That would require having more information available for consumers so they can make informed decisions.

A: Right. One of the things I promote is product transparency. If you don't have that, you cannot blame consumers for consuming things that are causing problems.

Q: So you developed the Water Footprint Network to help inform consumers and producers about impacts on water?

A: I started to make the web site five years ago. The original idea was to share the research we did have on these impacts. But in 2008, incredible interest arose around the water footprint concept from many different sectors worldwide. Interest in the concept is booming, from governments, non-governmental organizations, businesses, investors and the general public. Once I realized that people were taking the concept seriously, I also realized, along with people at the World Wildlife Fund, that we needed to protect the concept, so that we all speak the same language. Otherwise, we could repeat what happened with the carbon footprint. There are many different methodologies to calculate the carbon footprint, so it is very difficult, if one claims to reduce a carbon footprint, to know what that actually means. Since we realized that the water footprint could face a similar trajectory, we needed a kind of cooperative network, to ensure we had a global standard for water footprint accounting, involving major stakeholders worldwide. We asked the World Business Council for Sustainable Development to join as founding partner, along with UNESCO, International Finance Corporation [part of the World Bank] and my own university as an academic institution. So with these partners and others, we founded the network. It has one major mission: to make sure we have a global standard on water footprint accounting.

Q: There is increasing energy around ecosystem service markets, with a particular focus on water. One of the concerns is that there a lot of people working on this around the world, approaching the calculation of impacts on water resources in a variety of ways. While innovation like this is naturally messy, the underlying concept of trading water credits from those making the impact to those doing something to restore resources, is intriguing. In your book, you note the trading of water resources in a variety of ways. Could you see the methodologies developed by the Water Footprint Network as being useful in facilitating that kind of trade? Do you see that kind of trade as potentially positive for water resources in general?



A: This idea of trading water footprint permits, as I call it in the book, is not a good idea anymore, in my opinion, because it is a bit too complex to try and compare one water footprint unit with another water footprint unit. It's still an option, but another probably more convenient and straightforward way is to ask businesses that have a water footprint, consumers or communities, to set standards and benchmarks to reduce those footprints. That is more straightforward than trading. The idea of trading is that if you have a water footprint, as with a carbon footprint, your money may be more efficiently invested in reducing someone else's footprint, than in reducing your own. But, the whole market that has arisen around carbon footprints and carbon trading seems ineffective. We still don't understand if it is making things better or worse. What's really happening? It's unclear. There are gaps in the system.

We then asked Professor Hoekstra more questions about his specific concerns about water trading. He referred to his publication "Water Neutral," which summarizes his concerns. Basically, Hoekstra argues that it is difficult to effectively measure the positive benefits of offsetting efforts over time, particularly over short periods of time. There is so much variability in the relative quality of the offset efforts. This speaks to the entire regulatory practice of mitigation, to offset impacts on freshwater. Companies and developers facing these requirements naturally seek the easiest course to meet regulatory minimums, rather than the course with greatest ecological benefit.

Hoekstra acknowledges that many hold a contrary view. Proponents of water trading argue that better accounting would improve the efficacy of mitigation and offset efforts, and that pooling of resources from inevitable development impacts, combined with improved regulation that requires offsets be greater than one-to-one with impacts, offer significant potential benefits to natural resources.

Q: You argue that offsets must occur in the same hydrological unit [watershed or basin] as the impacts. How broad a unit do you think is appropriate? Could one offset an impact at one point in the Mississippi-Missouri drainage basin - which drains 40 percent of North America - at any other point in that basin? For example, an impact in Iowa offset by a project in Louisiana?

A: No, it should rather be at a smaller catchment level, but what level must be defined still.

Q: If trading activity grew broad enough, with significant resources moving to the ground in a beneficial way, could you see a loosening of the hydrological unit structure? In other words, at a certain volume of activity, is it possible that the overall benefits of market activity are significant enough that water credit trading could happen at a level more akin to global carbon trading?

A: A greater trading volume will not take away the problem that offsetting somewhere else remains a strange idea. Compare it to many people stealing bikes: in order to neutralize that they can start giving back other goods to other people as a sort of charity. Even if the positive effort equals the original negative effort, it is a bit strange way of getting things right again.

Q: Do you feel that it is acceptable for a different standard to apply to voluntary offsets – say for consumers offsetting their domestic water footprint or businesses doing so for marketing or long-term strategic reasons – versus regulatory requirements? In the United States, we are seeing two standards develop, which concerns some, as the looser standard may be useful to raise funds for charitable purposes, but may not be an accurate offset.

A: As long as things are clear, it's okay. But when you ask for a voluntary small effort, people may have the feeling that they have done enough, so there is the dilemma: do you get people doing at least something, but not enough, or do you get people to make at once the big step by doing what is really needed?

Q: There has been much research in recent years on the impacts of climate change on freshwater, most notably on glaciers and frozen storage of freshwater. How do you see climate change impacting our thinking about water footprints as freshwater grows more precious, in the next 40 to 50 years from now?

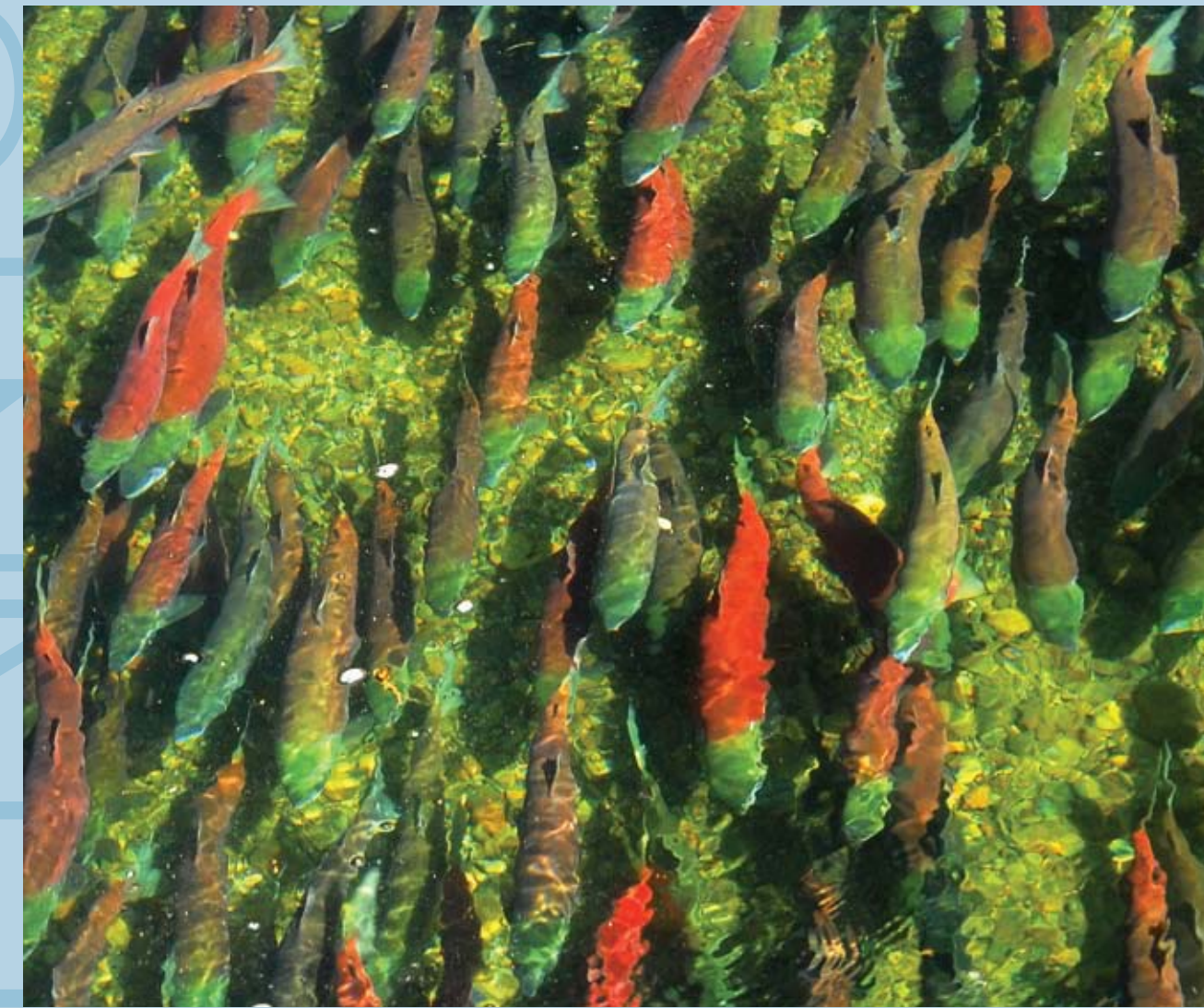
A: The water footprint of humanity is too large and leads to problems without climate change. So in that sense, they are disconnected things. But if the climate changes, that will come on top of the current bad situation, so our water footprint will increase at the same time that water availability will decrease in many spots. Climate change will definitely impact the situation in the sense that the water footprint of humanity becomes more problematic. We will need more water if it is warmer and drier, while at the same time we will have less water available.

Q: The whole thing seems a grand challenge: ballooning population worldwide, the already enormous pressures on freshwater resources, and

the impacts of climate change. Do you have a hopeful outlook on this, or do you feel the challenges may prove calamitous?

A: If you read Jared Diamond's book, *Collapse*, he argues that civilizations collapse because of their lack of response to clear signals. I think that in our case, in our state of civilization, there are many signals. If we respond to those, I think you can be very optimistic about the future. But, if we don't respond, then obviously we run into big problems. So, the issue is really, how will we respond? It often depends on politics, which is difficult to predict. So I am not particularly optimistic, nor pessimistic. I think I am realistic. If we respond well and follow the signals, and stop investing in water – intensive business in places where there is no water, so we don't build our economies on air, then there is reason for hope. If we do not, that is something else.

The study of virtual water and the calculation of water footprints shed needed light on the hidden impacts of agriculture and industrial production on freshwater resources. With climate change projections growing increasingly specific and grim, particularly in relation to water, clarity on water use becomes critical. Hoekstra's work, alongside that of Ashok Chapagain, Peter Gleick and other thinkers on global water, prompts review of our relationship with consumption, with implications for all aspects of the global economy, from trade policy to agricultural subsidies to product labeling. Managing freshwater resources may prove the significant human challenge of the 21st century, far more complex than carbon, with far-reaching social, political and economic implications. Hoekstra's work helps frame the questions. What's next? Developing the answers. 🌱



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