

Introduction to Part II

The second part of this special issue spans two decades of unprecedented change in society and the global economy that the water sector and water science have accommodated through a greatly increased role of the private sector and evolution of the concept, practice and politics of the water-energy-food nexus. Tony Allan's response was to engage with a broader and broader spectrum of people and institutions that, looking back, we can only describe as trans-disciplinary. There was no letup in his activism but he deliberately shifted his stance from mainstream consideration of water resources to investigation of the food system, far and away the principal consumer of water. This shift was marked by publication of the *Oxford handbook of food, water and society* (Allan *et al.* 2019).

Here, the introductory commentary by Carl Hausmann, CEO of the commodity trader Cereol when he first encountered Tony Allan, underscores two essential issues that Tony Allan's evangelism carried to global decision makers: 1) trading a commodity means trading all the inputs, not only virtual water but virtual environment, and 2) appreciation of the linkages between land, water, people and production requires both sound science and humility. In *The role of the private sector in sustainable development*, Rabi Mohtar reflects that the private sector supplies most of our basic needs in the water, energy and food chains. They are our lifelines but they are also responsible for most greenhouse gas emissions and pollution. Achieving a new business model for the sustainable development requires concerned scientists and politicians to engage and work with the private sector - which requires a better understanding of the challenges and constraints on commodity flow along these supply chains. David Lloyd-Owen discusses the pros and cons of *The private sector and water services* which remains very much a live political and practical issue. Brendan Bromwich, Damien Crilly and Jyoti Banerjee, respectively engineer, public administrator and academic, draw on cultural theory to consider *Water governance and coordination across diverse risk-management cultures* and advocate layered, collaborative governance at regional and catchment levels that draws on the strengths of the public, private and voluntary-sector.

The four following research papers consider the economic mobility of water, local and global responses to unsustainable groundwater consumption, virtual water and the new geopolitics of food, and virtual-water decoupling in Egypt. In *Chronic crisis: 30 years on from the Dublin Principles and still no market to value water*, Martin Keulertz and Phil Riddell think outside of the box to propose ways to establish regulated water markets that will enable water to flow to its greatest economic, societal and environmental value. In *Local and global responses to unsustainable groundwater consumption*, Iman Haqiqi, Chris Perry and Thomas Hertel grapple with unsustainable use of groundwater for irrigation. They evaluate the impact of future restrictions on exploitation of groundwater on local and global food production, prices, local and distant land use and management. Optimistically, they conclude that local-to-global linkages and market responses will surely lessen the impact on food security. In *Virtual water and the new geopolitics of food*, Eckart Woertz traces the evolution of global food politics from dumping of agricultural commodities from North America and Europe to today's asymmetric interdependence. In the aftermath of the second world war, nobody thought of the food imports as mitigating water scarcity – which they did – but the virtual water paradigm switched attention from conflicting claims over water resources and critically questioned countries' aspirations of self-sufficiency that flew in the face of resource endowments. The global food trade has transmogrified; trade, processing, distribution, and the provision of inputs to the food system are now dominated by a handful of international corporations; an increasing share of exports now comes from tropical countries,

and Russia has regained its historic position as a grain exporter. Attempts to secure food supplies by investment in farmland abroad, commonly in countries with insecure land rights and problematic governance, brought a political backlash; decades after investments were announced, imports continued to come from established suppliers and, when states actually put money on the table, it was further up the value chain in food processing and distribution, rather than in politically controversial farmland acquisitions. Food security and virtual water considerations continue to play out in the new geopolitics of food: after the global financial-food crisis of 2007/8, imports suddenly seemed tenuous and globalization created asymmetric trade interdependence that can be weaponized. Almost thirty years after Tony Allan first introduced the virtual water paradigm, it continues to surprise us. Tony Allan's unfinished paper on *Virtual-water decoupling in Egypt, 1962-2013* is completed here by Ahmed Tayia, Alexandra Collins and Michael Gilmont, tracing Egypt's struggles to feed its burgeoning population by making the best use it can of Nile water while importing increasing amounts of staple commodities – which means raising foreign exchange.

This section concludes with commentary by Nate Matthews, Bart Schoonbaert and Elizabeth Burlon: *Unexpected bright spots: how the pandemic, climate change and biodiversity loss are shaping the evolution of the water-energy-food-climate nexus*. The concept emerged early in the millennium and has been extended to embrace the unlikely bedfellows of ecosystems and finance. Fossil fuels might appear the least-cost option to meet burgeoning energy needs but they are very water intensive as well as generating greenhouse gas emissions; these aspects are accounted for by switching from pure-cost assessments to System Value frameworks based on the water-energy-food nexus. Virtual water unassumingly contributes to food and water security but, also, allows potentially detrimental impacts on the environment to be offshored by importers and consumers to producers and exporters. Covid-19 perturbed these arrangements but virtual water thinking doesn't seem to have informed the immediate responses to the pandemic. There is growing awareness that water is the primary medium through which we will feel the effects of climate change - water is finding a voice.

Tony Allan's final years of service focused in the issue of 'under-priced food for under-paid people' embracing water accounting and governance in the food system; all unfinished business. This section is introduced by Francesca Greco's *Never-ending quest*. Tony Allan was always seeking a more all-encompassing theoretical framework within which to explore the fundamental role of water in the environment and in society. But his most troubling thoughts were always about communication of these issues, in particular to journalists who carry messages to society.

Four contrasting commentaries take some of Tony Allan contentions as their starting point: Andrew Ross's *Accountants will save the world* points out that all things have a cost and, if that cost is not accounted for in the ultimate price of goods, all manner of decisions will be flawed. This is certainly the case in the food system which consumes more than 90 per cent of global freshwater and, in the absence of such accounting, we have a grotesquely distorted market that squanders land and water resources. Sixty per cent of the world's largest public companies have now committed to reach Net Zero but how are they going to do it? The availability of money is not a problem: the problem is the lack of propositions at institutional investment grade and scale of >\$1 billion. On the other hand, Bruce Lankford argues that accountants will not save the world. *Irrigated agriculture is more than big water* and he argues that irrigation is poorly served when its hydrology is seen solely as *big*, or via accounts. Brian Chatterton would certainly agree with Tony Allan that *Farmers will save the world* – if they are given the chance! He points out striking differences between conventional top-down research and extension and farmers' hands-on, pragmatic approach, and the rifts between ministries and mindsets. And Peter Newborne

scrutinises the words and actions of major food retailers in *Crossed wires: public regulation and private action for water stewardship and sustainable farming*. Farmers need support if they are to farm sustainably. Whether major food retailers intend to use their power in the food chain to give that support is not clear from the public reports and websites of eleven major retailers; the goal of alignment of price signals with environment seems remote. Meanwhile, the local planning regime operates separately from the national regulator.

If we have to fall back on politicians to save the world, then Tony (AJ) Colman's *How politicians make decisions* is germane. Politicians want certainty, not models, not probabilities. How, then can we influence politicians to change course and act on what may be good research outcomes but, yet, are not conclusive? Advocacy Coalition Theory sees changes in the beliefs of decision makers at three levels: *Deep Core Beliefs*, the normal attitude and behaviour of Society; *Policy Core Beliefs*, which can be changed by evidence and can lead to coalition formation; and *Secondary Beliefs*, subject to change over time, leading to fine-tuning of reforms. Out of these beliefs, come systems to support change to new coalitions in support of a policy.

Finally, Mark Mulligan's *The problem with water footprints outside of irrigated drylands* fires a shot across the bows of quantitative certainty that has been taken for granted, at least by politicians, in extending the water footprint analogy worldwide. The fact is that outside of irrigated drylands, agriculture uses a good deal less water than the wild vegetation it has replaced. Now, read on.

Martin Keulertz, David Dent and Michael Gilmont

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