



VelesWater

WATER THOUGHTS

Article 1 in a Bimonthly series:

THE COMPLEXITIES OF WATER POLICY

- **A Surge In Interest In ESG Investing; Water May Be Next.**
- **The Worlds of Academia and Finance in Alignment .**
- **Do Markets Contribute towards the Achievement of Sustainability Objectives?**
- **An Intensification of Water Cycles →Increased Demand for Hedging and for Water Futures.**
- **Water Shortages.**
- **Fauna and Flora get Thirsty too.**
- **Pricing Mechanisms and the Law of the Jungle.**
- **Water Rights and California Groundwater Supplies.**
- **The Effect of Water Pricing on Incentives.**
- **Water a mere Sideshow to Global Economic Outcomes?**
- **The Economics of Renewable Energy – Parallels with Water.**



A Surge In Interest In ESG Investing; Water May Be Next

This is the first in a planned sequence of notes with a focus on the broader economics and policy discussion surrounding the management of water resources, and the relationship to innovations in the financial markets. The burgeoning discussion draws on the experiences of a range of countries which have attempted a variety of solutions to the management of water resources, and has a cross-border dimension to it in that many of the issues involved invoke the competing interests of two or even multiple countries. Therefore, these articles will not be confined to a single country focus, but will seek to articulate global perspectives. The purpose of this note, the first in the series, is to serve as a scene setter.

Interest in the economics of water has recently exploded, with some leading academic environmental economists turning their attention to the field of water specifically. A review article indicative of this interest is amongst listed in the references listed below (Garrick, Hanemann, and Hepburn (2020)).

The Worlds of Academia and Finance in Alignment

In this respect, the worlds of academia and of finance are in alignment: The spark for soaring environmentally themed stock values was arguably lit by the change of administration following the November 2020 presidential election. Under President Trump, the US government had, for the purposes of estimating the costs and benefits of public sector projects, reverted to costing CO₂ at 1\$ per tonne, compared with the \$46 per tonne price of carbon the Obama administration had used for its internal deliberations (Gillingham and Stock, 2018). Ever alert to a shift in the direction of the wind, investors re-priced ESG (environmental, social and governmental) stocks with a vengeance. Many companies are striving to position themselves to be the next Tesla and garner the seemingly abundant investment flows such firms with the green stamp of approval attract.

One of our favourite reports depicting the fresh wind blowing through the investment climate, by the *Wall Street Journal*, was released in the form of a video; it is not behind the Journal's paywall, so can be watched by anyone. Although for any active investors in the field the content covers familiar ground, the video is entertaining and worth a few minutes of your time: [Money Flowing into Green Energy](#)

A particularly valuable resource for scholars of globalisation, especially those tracking global patterns of foreign direct investment (flows that result in the creation of real businesses

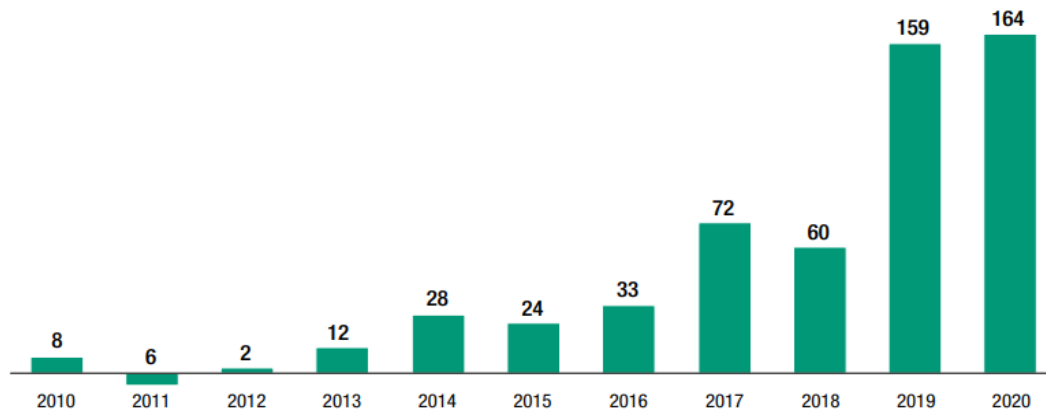
that are actively managed, in contrast to portfolio investment), are the reports produced under the auspices of the United Nations, the United Nations Centre for Trade and Development, UNCTAD. The most recent of the annual reports, running to 245 pages, is, in keeping with the spirit of the age, entitled "*Investing in Sustainable Recovery*"; it was released in June, 2021. The recovery of which the UNCTAD speaks is, of course, recovery from the global slump induced by the necessary policy responses to curb the spread of the Covid-19 virus.



Amongst other topics the report covers, it chronicles the surge in interest in environmentally themed investments amongst the ranks of those investing in mainstream asset classes:

Figure 1

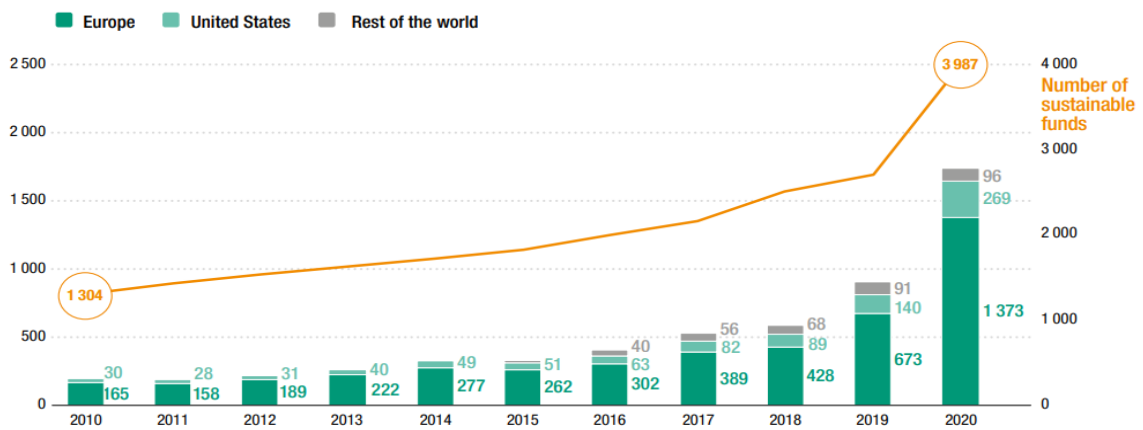
Figure V.2. Net inflows to sustainability-themed funds, 2010–2020 (Billions of dollars)



Source: UNCTAD, based on Morningstar and TrackInsight data.
Note: Flows for 2020 are as of 30 June.

Figure 2

Figure V.1. Number of sustainable funds and assets under management, 2010–2020 (Billions of dollars)



Source: UNCTAD, based on Morningstar and TrackInsight data.
Note: Numbers of funds do not include funds that were liquidated; the numbers for 2020 are as of 30 June.

Figure 1 above depicts the extent of investor interest in sustainability themed investments: The extent to which the asset management industry has responded to these developments by making available a raft of new funds to investors can be seen in Figure 2, reproduced from the UNCTAD report, pg. 209.

Do Markets Contribute towards the Achievement of Sustainability Objectives?

In a radio interview on BBC Radio 4's Today programme on 7 September 2021, an interviewee from BlackRock expressed scepticism as to whether ESG funds do much if any good in advancing the objective of sustainability. As he pointed out, if one investor sells out of a company that has a high carbon business model, by definition another investor purchases the shares and bonds that were sold. The idea that consumers seeking to buy products that can be marketed as "green" and investors selling out of "brown" companies, resulting in markets making an appreciable difference to achieving sustainability objectives via self-regulation is a myth he claimed. Government regulation will be needed. To suggest that important societal objectives can be achieved sans government regulation is akin to claiming that sports matches can go ahead on the basis of players self-regulating, without the intervention of a referee. Players will discover that they can win matches by playing dirty, and in any situation, in which rewards accrue to the winner, will do so in the absence of a referee. A topic we will explore at a later date; regulation by government is an aspect of *any* policy or trading arrangement designed in part or wholly to achieve a sustainability objective.

The UNCTAD report does not quite share the scepticism of the radio interviewee regarding what sustainability initiatives at the level of markets can achieve. What stands out about the report is that although trading in futures and derivatives in relation to ESG themed asset classes is the subject of heated controversy in some quarters, not least amongst the ranks of environmental activists, the authors of the report stand squarely behind such activity as contributing to ESG values and materially beneficial outcomes. The authors are categorical in their view that:

"Between 2019 and 2020, the topic of sustainability has gone from virtually unconsidered in derivatives markets to the subject of multiple papers by the exchange industry, relevant regulators and international organisations. Exchanges, market participants and regulators looked at sustainability topics from various angles, from the potential impact on markets to the role derivatives markets can play in contributing to the SDGs. The sustainability challenges of the modern world are such that addressing them requires concerted effort from all actors, including all elements of the finance sector. Derivatives exchanges can be an important part of the overall solution, whether as providers of relevant products and services, contributors to greater data availability and transparency or conveners of the market to address barriers to change." UNCTAD, 2021, pg. 233

In this context, the new iteration of the IPCC report, the IPCC AR6, the 6th assessment report of the IPCC, provides an important backdrop. The previous iteration was issued in 2013; therefore a new report is a significant event.

The key message of the report in relation to water can be encapsulated as follows:
"There is strengthened evidence since AR5 that the global water cycle will continue to intensify as global temperatures rise ... with precipitation and surface water flows projected to become more variable over most land regions within seasons ... and from year to year."



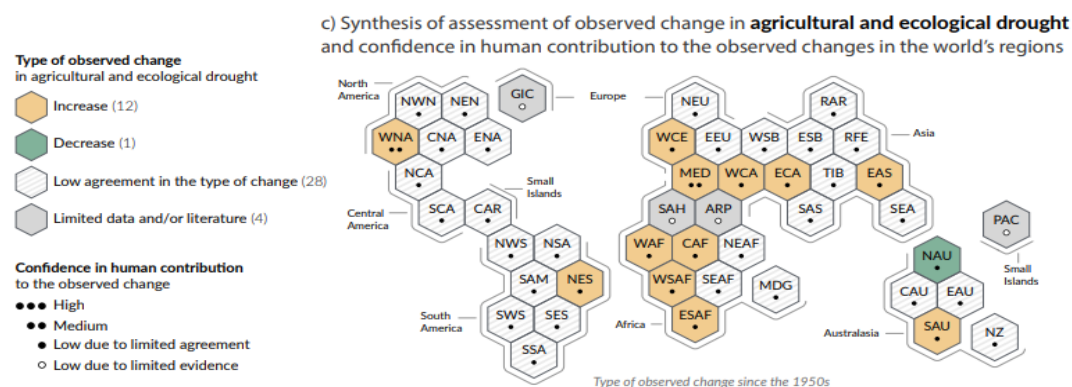
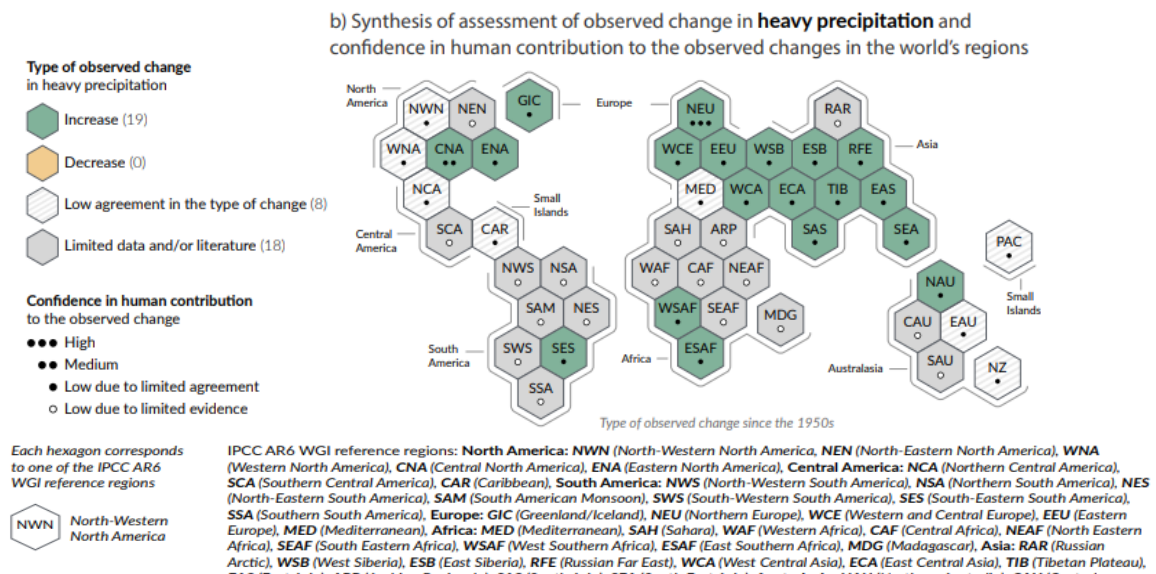
The report goes on to note that “A warmer climate will intensify very wet and very dry weather and climate events and seasons, with implications for flooding or drought... but the location and frequency of these events depend on projected changes in regional atmospheric circulation, including monsoons and mid-latitude storm tracks”.

An Intensification of Water Cycles → Increased Demand for Hedging and for Water Futures

In essence, the global collective of scientists projects an amplification of events, cycles, and trends related to water, compared to past experience. Our initial contention is therefore that with an intensification of the global water cycle the demand for the hedging of water exposure will increase, as will the range of organisations seeking to hedge. One point to note is that although the report states that globally averaged precipitation over land has likely increased since 1950, with a faster rate of increase since the 1980s, this does not necessarily mean that *surface* water is necessarily more abundant relative to the human population, since the human population has also increased dramatically over the period (estimated at 7.7bn currently, compared to 2.5 bn in 1950). Moreover, a warmer climate entails a faster rate of evaporation of surface water supplies.

The report charts the geographical distribution of the increased incidence of both heavy precipitation events, as well as more severe droughts:

Figure 3





Water Shortages

In this context, although the IPCC report does not address this point specifically, a recent academic paper by scholars with ties to the University of Oxford contains some sobering observations in relation to the world-wide availability of water. Dustin E. Garrick, Michael Hanemann, and Cameron Hepburn writing in the *Oxford Review of Economic Policy* (2020) point to the sobering reality that “(a)lready 4 billion people are affected by water scarcity for at least one month per year”, and the article also notes the number of people that are estimated to lack access to safe drinking water in the home (in excess of 2 billion); which may be as much a consequence of inadequate water supply infrastructure as of an actual scarcity of available water itself.

For a sobering account of water shortages, particularly the dire situation looming in India, see Nagourney (2019). As the former Lehman Bros Global Strategist notes, access to safe drinking water and sanitation is acknowledged by the UN as a fundamental human right, “as they are indispensable to sustaining healthy livelihoods and fundamental in maintaining the dignity of all human beings”. It is this aspect of water that leads to the visceral opposition of some people to the whole notion of water pricing, for whom the pricing of a basic human right is an anathema. Yet we have markets for food, and prices of food signal to farmers the pattern of consumer demands; of which crops to grow more, and those crops where production should be scaled back. In most countries we have structures in place for distributing food to the poor and the needy who cannot afford to purchase sufficient food at market prices.

Fauna and Flora get Thirsty too

The right to sufficient water arguably applies to wildlife as well as people. Some years ago I was involved in a consultancy project to investigate the role water pricing could play in resolving a glaring inequity that had arisen in relation to the access to water enjoyed by heavy agricultural and industrial (paper) interests, in relation to the wildlife in South Africa’s justly famous Kruger National Park (a land area about the same size as Israel). Intensive irrigation drawn from rivers in the area resulted in very little downstream flow getting through to the hot and dry nature reserve. Pricing of water was seen to form part of a solution that would incentivise agricultural and industrial users to use water more efficiently and grow crops that are more hardy and drought resistant, resulting in an increased through flow of water to the National Park. As part of an integrated policy solution, water pricing therefore has an important role to play in the preservation of valued biodiversity.

Who Pays?

The initial response of many countries to the constrained availability of water resources tended to be massively costly engineering projects such as the construction of dams and enhanced intensive irrigation for agriculture; projects to access groundwater reserves, amongst other solutions. Yet, even in the case of what are apparently engineering as opposed to economic solutions, economics is involved because somebody ultimately pays. If the projects are funded by the state, the revenue must come from tax receipts. Or, if this involves an unacceptable diversion of tax revenue from other worthwhile policy objectives,



such as health care and spending on education, some of the money spent can be recouped via user charges. A popular structure for the funding of infrastructural projects is public private partnerships. Yet the private partner must earn a return on equity, and the public partner must recoup the investment from tax receipts or user charges.

Pricing Mechanisms and the Law of the Jungle

According to Garrick, et al (2020), the result of pressure on water supplies has been the emergence of two mostly distinct distribution systems for water. These are the orderly distribution of surface water supplies, mainly via the provision of public infrastructure, versus the increasing numbers of people who respond to water scarcity by tapping in to ground water supplies. Surface water is renewable and distributed centrally; ground water is often non-renewable within a reasonable time frame, and the distribution of the water is decentralised. In some countries, contend the authors, access to ground water has descended into anarchy.

Pricing mechanisms play very different roles therefore in the distribution of surface water versus ground water supplies. In the case of ground water supplies in many countries it is the law of the jungle, grab what you can, that prevails. Water sourced from ground water supplies is sometimes sold from a water tanker at the side of the road, at substantially higher prices than would be charged by a public authority for the provision of water provided by public infrastructure. What is lacking in the decentralised distribution of water supplies is economies of scale, which has the effect of dramatically lowering the costs of supply.

Water Rights and California Groundwater Supplies

Of particular interest, especially in California, is the role of decentralised non-networked water distribution systems with ground water as the source. These can be far easier to finance than massive public infrastructure projects, although the cost per unit of water delivered tends to be higher.

In this state, where periodic droughts have always constituted an aspect of climate variability, but the latest mega-drought has introduced an additional layer of stress and complexity, the Golden State enacted the Sustainable Groundwater Management Act in 2014. Hastings (2021) is aligned with Garrick et al (2021), in noting the consequences of unregulated access to groundwater. Prior to the enactment of the legislation, “groundwater basins were unregulated and in many cases unmanaged”, she notes, resulting in harmful outcomes “such as subsidence, seawater intrusion, and long-term supply depletion”.

In California the deep underlying tension is that between efforts to achieve sustainability in respect of groundwater reserves, and entrenched water rights of users. Measures to achieve sustainability implemented by agents of the state government referred to as water agencies may involve as part of the solution a requirement that some agricultural land be left fallow during dry years. This is likely to come into direct conflict with the established and pre-existing water rights of farmers, giving rise to lawsuits with the potential to overturn the entire policy (Hastings (2021)). At issue are the “grandfathered” rights of existing users. Yet,



as was found in the design of the EU emissions trading scheme, arguably the best way to minimise political opposition to necessary sustainability initiatives is to respect the existing or grandfathered rights (in this case to CO₂ emissions) and use these as the starting point, rather than to follow a blank slate approach in which rights are allocated from scratch according to pure policy objectives. An upcoming crucial date for the Californian scheme is January 2022, as plans have been implemented to date commencing in 2020 in respect of 19 of the highest priority basins, with plans to be set in motion for the remaining 75 highest priority basins in January 2022.

The Effect of Water Pricing on Incentives

An aspect of the distribution of water that is an active research agenda is the role of water pricing in both incentivising the efficient and economical use of water, as well as the protection of surface water sources, thereby contributing to an increase in the effective supply of water that is useable in a variety of applications, from recreation, to agriculture, to consumption. Garrick et al (2020) suggest that few users have a clear quantitative idea of the volume of water they consume, hence some ingenuity and innovation may be required by policy makers to ensure that water pricing in tandem with a suite of regulatory measures achieves desired outcomes in respect of the protection and supply of bodies of water, and exerts some sway over consumption levels. What's more, one can plausibly argue that the fact that users have little idea of the quantity of water they consume is a consequence of an absence of effective price signals in respect of water usage in the past.

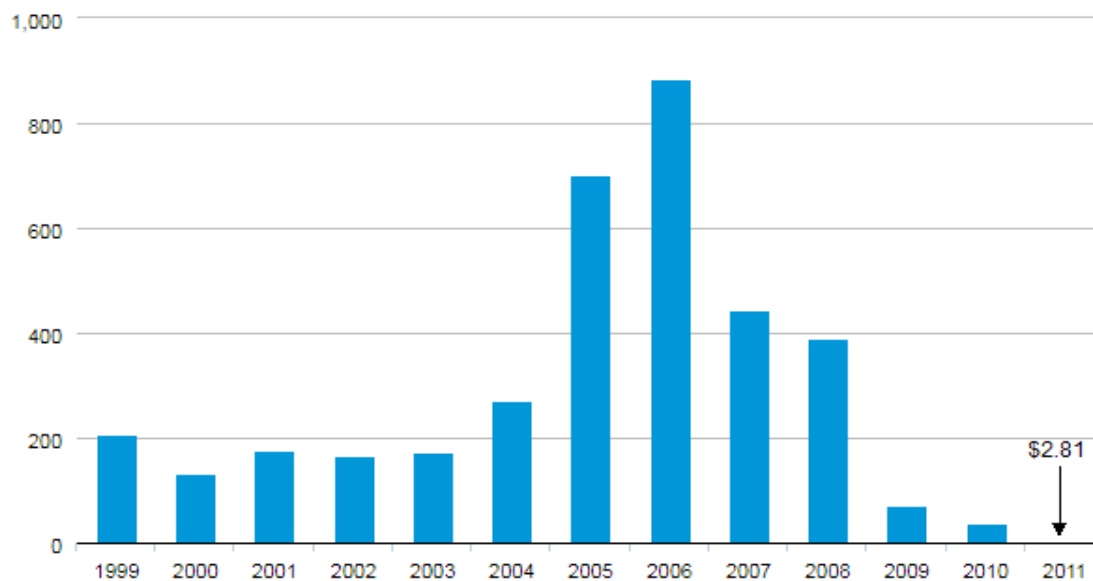
MAY 11, 2011

Average prices for spot sulfur dioxide emissions allowances at EPA auction set new lows

Weighted average price of spot sulfur dioxide for winning bids

(dollars per ton)

interactive



Source: U.S. Energy Information Administration based on Environmental Protection Agency data.

Note: Represents quantity weighted average price paid by winning bidders in the annual spot auction for emissions allowances.



Moreover, scepticism of what pricing can achieve in incentivising socially desirable outcomes in relation to water is not borne out by the experience of other initiatives designed to achieve an environmental objective, in which pricing has played a key role. The rule of thumb that seems to apply is that where pricing is introduced, desired environmental outcomes tend to be achieved at roughly half of the anticipated initial cost based on prior rigorous studies which do not however fully account for supplier and consumer responses to prices. One example of this is sulphur dioxide pricing to curb emissions. This is what happened to prices of sulphur dioxide:

The SO_x and NO_x market as it is known is acknowledged to be the most successful example of the achievement of an environmental objective via a cap-and-trade scheme. In similar vein, prices of CO₂ allowances within the EUETS slid and then languished at inconsequential levels from 2012 through to 2015. This is not, though, principally, because the scheme was failure. When regulators devised the scheme, they substantially overestimated the costs of abatement of CO₂ emissions, and, not wishing to deal a crippling blow to energy intensive industry within the EU, over-allocated permits to a marked extent. The emissions cap had been set at too high a level. As soon as a pricing system was introduced, companies quickly innovated and discovered cheap and effective means of abating CO₂ emissions, and the price of EUETS allowances reflected this. Pricing is likely to play an important role in the economically efficient use of water, and the conservation and provision of water supplies.

The above examples pertain to the reduction and elimination of a harmful by-product of economic activity. Whereas in respect of water the idea is to conserve and make the best use possible of available water resources, distributed equitably amongst the various users.

Water a mere Sideshow to Global Economic Outcomes?

Water is certainly not a peripheral sideshow in relation to core economic outcomes. Once again drawing on the paper by Garrick, et al, (2020) the authors refer to a study by the World Bank, which concluded in 2016 that if water is mismanaged along “business as usual” lines, economic growth by 2050 will be constrained by water shortages and will be 6 percent lower than would otherwise have been the case, whereas “ regions with better water resource management stand to ‘see growth accelerate as much as 6 per cent’ if they adopt ‘efficient water policies’ that centre on improved water allocation and pricing”. The economic sectors most affected by water scarcity are agriculture, energy, apparel and manufacturing (Nagourney, 2019).

The authors of the paper see three key aspects of policy in relation to water that are all intertwined. These are “financing and managing water infrastructure; pricing water; and reforming property rights”. In this note we have touched on the financing of water infrastructure, and noted very briefly in respect of Californian groundwater, issues that arise in relation to property rights, with our main focus centred on the pricing of water. There is an overlap between water rights and property rights, but the overlap is not complete; in some specific situations there is also some separation between the two. A property right does not always necessarily confer an associated right to the water, or the water rights may be curtailed by legislation.



Gains from Trade apply to Trading in Water too

In the course I teach at the University of Warwick to MSc students, I emphasise that the concept of gains from trade and the many ramifications thereof, is at the heart of the learning outcomes they are expected to master. Gains from trade occur at multiple levels; when countries trade with one another; when a business from one country undertakes foreign direct investment to replicate that business in another country; when an enterprise outsources non-core activities to another enterprise in the home or a foreign country; when a company such as Apple boosts its profitability and international competitiveness by importing component parts manufactured more cheaply in China than it would be able to make them itself; when companies transfer technology in the process of establishing joint ventures. In all cases gains from trade involve doing things in such a way that more is created out of existing resources, doing more from less, increasing the size of the overall pie. Specialisation and Exchange is the key principle.

Consistent with the findings of the World Bank study, sizeable gains from trade have been found to arise from the establishment of water markets and ensuing trading. In Australia, gains from trading in water have been estimated to be worth AU\$2.5bn annually. The authors state rather colourfully that “the potential gains from trade have motivated reforms (in water markets) from Chile to China”. Of course, for trade to be viable, property rights need to be clearly established and transparent; however in the case of water in many countries this is not always the case. Reform at the political level will then be needed to establish and clarify water rights; efforts along these lines typically encounter resistance from vested interests. Achieving a fair and efficient distribution of the allocation of water rights is often a battle that is never entirely won.

The Economics of Renewable Energy – Parallels with Water

There is some overlap between the economics of renewable energy and the delivery of water. As with the provision of water infrastructure, where the upfront costs are daunting, renewable energy generation in contrast to fossil fuel generation is associated with higher upfront costs per mw of capacity than conventional fossil fuel generation, and although the marginal costs are lower, approaching zero apart from some maintenance costs, payback periods tend to be long. Storage is an issue with renewable energy too, as a result of the intermittency of generation using renewable energy technologies. As with solar where a major aspect of its appeal lies in its scalability, and potential application to the satisfaction of small, localised, demands, the appeal of non-networked distribution is its alignment with smaller scale solutions (although with less opportunity to take advantage of economies of scale).

Nevertheless, as in the case of renewable energy, there is a compelling economic case to be made in favour of investment in water. Nagourney (2019) cites the World Health Organization, which contends that “every \$1 invested in water and sanitation provides an economic return of \$4.30 through lower medical costs, greater productivity and fewer premature deaths”.



Nagourney waxes lyrical but ultimately truthfully thereby illuminating the broader context of water; “(there are) communities who would rather pay a higher price for water and rely on local resources than connect to a bigger supply that provides water at a cheaper rate. It’s an emotional thing, where you get your water from, as water is weaved into traditions and belief systems. Water is clearly not a standalone issue, but must be considered in relation to commerce, land use, human rights, environmental protection and climate change”.

In this article we have merely skated over the surface of some deep and complex topics, by way of an introduction. We hope to delve into individual topics in greater depth in subsequent issues. What is clear from all of this is that “free” is the wrong price for water. “Free” in the minds of many people equates to valueless; of no account; not a commodity which needs to be conserved. Nothing could be further from the reality of the situation as it pertains to water.

Graham Boyd

References Cited

Dustin E. Garrick, Michael Hanemann, and Cameron Hepburn (2020), “Rethinking the economics of water: an assessment”, in *Oxford Review of Economic Policy*, Volume 36, Issue 1, Spring 2020, Pages 1–23, <https://doi.org/10.1093/oxrep/grz035>

Kenneth Gillingham and James H. Stock (2018), The Cost of Reducing Greenhouse Gas Emissions, *Journal Of Economic Perspectives*, Vol. 32, No. 4, Fall 2018, (pp. 53-72).
<https://www.aeaweb.org/articles?id=10.1257/jep.32.4.53>

Stephanie Osler Hastings (7th Sept 2021), “A Test for California’s Groundwater Regulations in the Megadrought”, *Bloomberglaw.com*. [California's Groundwater Regulations](https://www.bloomberglaw.com/california-groundwater-regulations)

IPCC_AR6. “Climate Change 2021. The Physical Science Basis. Summary for Policy Makers”
https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

Steven H. Nagourney, (31 August, 2019) “Water Scarcity”, posted at *No Quiescence without Authenticity* blog posts by Steven Nagourney <https://noquiescencewithoutauthenticity.blogspot.com/2019/08/water-scarcity.html>

UNCTAD (June, 2021), “Investing in Sustainable Recovery” https://unctad.org/system/files/official-document/wir2021_en.pdf



VelesWater



VelesWater

CONTACT

Veles Water Limited

33 St James Square

London SW1X 4JS, UK.

+44 (0)20 77540342

research@veleswater.com

VelesWater does not give investment advice and the above document is for information purposes only.