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Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

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Empfohlene Zitierung / Suggested Citation:

Woertz, E. (2022). Virtual water, international relations and the new geopolitics of food. *Water International*, 47(7), 1108-1117. <https://doi.org/10.1080/02508060.2022.2134516>

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Virtual water, international relations and the new geopolitics of food

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ABSTRACT

Food security and virtual water considerations interact in a corporatized third food regime, particularly in the Middle East and North Africa (MENA), the world's largest grain importing region. Globalization has created asymmetric trade interdependence that can be weaponized by states that control global economic hubs, yet countries in the Global South have actively exploited the rivalries of big powers, temporarily capturing chokepoints and entering new alignments. The virtual water paradigm that Tony Allan first coined can be applied creatively to international relations that are increasingly characterized by 'weaponized interdependence'.

ARTICLE HISTORY

Received 24 June 2022
Accepted 6 October 2022

KEYWORDS

Virtual water; food regimes; international relations; food security; geopolitics; Middle East and North Africa (MENA)

Virtual water and MENA food imports

The virtual water paradigm that Tony Allan coined was first rehearsed using the Middle East and North Africa (MENA) as a case study (Allan, 2001). Its scope and policy implications are global, but its relevance to this part of the world continues to be profound. Together with oil and gas exports, the region's water scarcity and resulting dependence on food imports defines its geoeconomic position.

Tony Allan famously observed that the import of virtual water via food trade added a 'second River Nile' to the region's water balance. He offered a new way of thinking about its water dilemmas by pondering the implications of policies pursued by rulers unaware of their practical significance. From the 1950s onwards, the MENA increasingly absorbed structural grain surpluses dumped on markets in the developing world by the United States and, later, the European Economic Community. Export-promotion schemes such as PL 480 – renamed the *Food for Peace* programme under the John F. Kennedy administration – provided food imports at subsidized rates (Wallerstein, 1980). For recipient countries such as Egypt, they constituted cheap inputs (Burns, 1985): they fed the growing urban workforces created by the import-substituting industrialization drives that were prevalent in the developing world at that time. Nobody thought of them as mitigating water scarcity – which in fact they did – but the virtual water paradigm switched attention from conflicting claims over blue water resources to the unexpected remedy of food imports. It critically questioned MENA countries' aspirations of self-sufficiency that flew in the face of resource endowments. From the 1970s onwards, renewable water resources were no longer sufficient to grow the required food; extremely

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water-scarce parts of the region – notably Israel, Palestine and desert Libya – had already reached that point in the 1950s.

With its focus on food trade, the virtual water paradigm was compatible with trade-based notions of food security that called for specialization according to comparative advantage to earn the hard currency needed for food imports. Yet, Tony Allan was keenly aware that markets do not just exist, they are made – and their creation is an eminently political process. In his later work, he explored how the global food system affects the water–energy–food nexus (Allan et al., 2015) and how societies cope with these challenges (Allan et al., 2018).

Agriculture accounts for some 92% of global water consumption (as opposed to water withdrawal, some of which can be used more than once in any one hydrological cycle; Allan et al., 2015). Farmers are the principal stewards of water resources, yet they have little voice in a global food system orientated towards procurement and distribution, and they communicate with agribusiness via contracts that ignore or misprice water and its economic externalities. It is this global agribusiness sector that has provided most of the food imports for the MENA from relatively few exporter nations. And with the global food crisis of 2007/08, these imports suddenly became tenuous.

The global food crisis of 2007/08 and the new geopolitics of food

The surge in global food prices in 2007/08 prompted some exporters (e.g., Argentina, India, Russia and Vietnam) to announce export restrictions out of concern for their own food security. This eroded trust in global food markets and supply chains, and food-importing countries in Asia and the Middle East reacted by investing in farmland abroad to secure privileged bilateral access to commodities. In parallel to this foreign-investment drive, domestic agriculture was downsized in many countries, for example, Saudi Arabia, started to phase out subsidized wheat production, which it had begun to ramp up in the 1980s (Elhadj, 2022 in the first part of this special issue). The connection between food imports and the domestic water balance was explicitly acknowledged in such policies: the virtual water paradigm had moved from academe to the corridors of power. Egypt in fact now incorporates virtual water in its national water balance accounting (Tayia et al., 2022, in this issue).

In comparison with the world food crisis of 1972–75 that prompted the spurious Saudi wheat bonanza and ill-fated plans to develop Sudan as an Arab breadbasket, the global food system had transformed by the time the events of 2007/08 came around. Whereas the production increases of the Green Revolution relied heavily on intensification of inputs in the 1960s–80s, the role of higher total factor productivity via agricultural technology and improved inputs became more important for agricultural production growth since the 1990s, accounting for some three-quarters of it globally in the 2000s, before slightly declining in the 2010s (Fuglie, 2018). The crucial role of productivity growth was reflected in the importance of globally traded input factors such as seeds and fertilizers, two-thirds of which came from foreign suppliers on average – a trade that interacted closely with food trade itself and technology adoption (Farrokhi & Pellegrina, 2022; Hertel et al., 2020). Africa where the Green Revolution was not implemented to any large degree compared with Asia and Latin America became a focus of attention for future global production growth (Thurow, 2010). However, a much-touted boost from

genetically modified organisms was hotly debated in view of false promises and the detrimental ecological effects of industrial agriculture, motivating calls for a Green Revolution 2.0 with better inclusion of smallholders and conservationist concerns (Conway & Barbier, 2009; Pingali, 2012). Most importantly, the value chains of the global food system had become increasingly corporatized, which prompted some to speak of the emergence of a *third food regime* since the 1970s (Burch & Lawrence, 2009). It entailed a supermarket revolution that included developing countries as well, where it was driven by rising incomes of the middle classes and increased refrigerator ownership on the demand side and growing foreign direct investment (FDI) and improved logistics and inventory management on the supply side (Reardon et al., 2003).

In contrast to the second food regime of the post-war years that was characterized by the disposal of surplus production from North America and Europe and their national institutions, new actors had now emerged. International corporations presided over changing diets and the rise of packaged foods; they dominated trade, processing, distribution and the provision of inputs to the food system. Thus, they became crucial actors in the allocation of virtual water. An increasing share of exports now emanated from tropical countries, such as palm oil from Indonesia and Malaysia and corn and soybeans from Brazil (Woertz & Keulertz, 2015). Russia regained its historic position as a net grain exporter, seeking to leverage it by establishing a national grain-trading house. With the breakdown of international commodity agreements in the 1970s, stockpiles of staple crops for price stabilization had diminished; agriculture was included in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1986; and the US and the European Union decoupled farm subsidies from price-support schemes in 1996 and 2003, respectively (Winders, 2011). Food aid was now mainly administered through the World Food Programme (WFP), not by national bodies (Paarlberg, 2010).

In the 1960s and 1970s, the US allotted or withheld food aid depending on political compliance. It contemplated food embargos in retaliation for the Arab oil boycott and the Iranian hostage crisis, and actually implemented one against the Soviet Union in the wake of the latter's invasion of Afghanistan. But the food weapon backfired: it mainly hurt the export interests of American farmers and gave way to a depoliticization of food trade under the Ronald Reagan administration (Woertz, 2013b). The 2007–08 crisis reignited importers' memories of their strategic vulnerability. Many foreign agri-investments in its wake focused on Africa and Latin America, in food-insecure countries with insecure land rights and problematic governance that account for most unused global land banks and have substantial freshwater reserves (Deininger et al., 2011). Even countries with physical water shortages in the MENA, Central Asia and South Asia ranked among target destinations and potential exporters of virtual water.

A political backlash ensued. Non-governmental organizations (NGOs), farmers and holders of customary land rights organized bottom-up resistance. In exporter countries with developed agri-markets such as Australia, Brazil and Thailand, there was a different kind of resistance, driven by governments and parts of the domestic business class: ceilings on foreign land ownership were implemented or discussed to keep a strategic industry in national hands.

There was a considerable implementation gap in Gulf – and also Chinese – agri-investments in developing countries (Brautigam, 2015; Woertz, 2013b). Especially in Africa and for staples, commercial crops such as palm oil, rubber and sugar fared better.

Here the share of large-scale land acquisitions in global production was noticeable (Lay et al., 2021). Concerns about infrastructure, commercial viability, political uncertainties, corruption and the reliability of supplies loomed large. More than a decade after foreign agri-investments in many developing countries had been announced, they still did not show up in trade statistics; food imports continued to come from established agri-exporters. When Gulf states did genuinely put money on the table, it was in such countries and further up the value chain in food processing and distribution, rather than in politically controversial farmland acquisitions. The Saudi Agricultural and Livestock Investment Company (SALIC, owned by the Saudi government) teamed up with international grain-trader Bunge and acquired a majority stake in the privatized Canadian wheat board. In Asia, food-traders such as Chinese Noble or Singapore-based Olam and Wilmar became major global players, challenging the market share of established rivals in the West such as ADM, Bunge, Cargill and Dreyfus (Keulertz & Woertz, 2015).

The crisis of 2007/08 created mistrust in the global food system. Importers sought to circumvent the multilateral trading environment by gaining direct bilateral access via farmland investments yet, when push came to shove, they often settled for muscling their way into the increasingly corporatized global value chains of the third food regime. This raises the question of how food security and virtual water considerations play out in the new geopolitics of food and, thus, interact with international relations.

Virtual water and international relations

The importance of hard-power politics decreased with the end of the Cold War. That of economic statecraft to further geopolitical objectives grew meanwhile (Luttwak, 1990). Besides economic and financial sanctions, this spans trade, investment and monetary policies, energy and commodities, cyber regulation and aid (Blackwill & Harris, 2016) – what might be termed *geoeconomics*: the strategic use of economic power to control spheres of influence, over and above the broader concept of international political economy (Wigell et al., 2019). *Geoconomics* can enrich the three prevalent strands of International Relations (IR) theory. It transcends realism by stressing the importance of economic means in power competition and the impact of geography on policy, liberal institutionalism by insisting that economic interdependence and conflict can co-occur and constructivism by noting that beyond ideological discourses material factors matter. This has implications for the conceptualization of food trade as well, whose weaponization has a long history, ranging from the First World War to the recent Russo-Ukrainian war.

Globalization led to the mushrooming of financial markets and trade interdependence. However, such interdependence has been asymmetric and states have sought to exploit such imbalances more than the hegemonic neoliberal narratives of the 1990s and early years of the new century ever imagined. Farrell and Newman (2019) have argued that *weaponized interdependence* enables states that control global economic hubs to exert power over others. This pertains not only to material flows such as energy but also to financial and information markets; the international payment system SWIFT or the infrastructure of the Internet such as undersea cables are cases in point. Panopticon effects (i.e., they can see what we are doing but we cannot see them) enable states to glean

critical knowledge to be used in negotiations, to counter adversaries and to create political frames; *chokepoint effects* occur when states are in a position to limit or penalize access to the hubs that they control.

Weaponized interdependence effectively grants agency only to those who preside over global economic networks – meaning China, the EU and the US. Yet countries in the Global South have actively sought to take their destinies into their own hands by exploiting the rivalries of big powers, temporarily capturing chokepoints, entering new alignments and creating revised narratives in an attempt to shape prevailing norms and institutions. Brazil managed to capture a larger share of the Chinese market for soybeans in the wake of trade wars between the US and China, Turkey used its geographical position by weaponizing migration flows in its adversarial dealings with the EU. Serbia entered closer health collaboration with China when the EU restricted supplies of hospital goods to non-member states at the beginning of the COVID-19 pandemic. India leveraged its 70% share of global hydroxychloroquine production during the same pandemic to grant preferential access to cooperating countries when a debate arose whether the drug might be effective against COVID-19 (Narlikar, 2021). More recently, Saudi Arabia and the United Arab Emirates were anxious to preserve the OPEC + deal with Russia, maintain a neutral position in the Ukraine conflict and resisted Western calls to raise oil production to calm global markets (Aboudouh, 2022).

Apart from outright military blockade, as in the First and Second World Wars (Collingham, 2011; Schatkowski-Schilcher, 1989, 1992), there are other means to restrict food imports. Secondary sanctions leverage the global financial system to target trading partners of countries that are under direct sanctions. They have had considerable impact on the food imports of countries such as Iran and Syria, even if food and medicine were formally excluded from sanctions regimes. Barred from payment channels and their assets frozen, they struggled to find takers for their grain tenders. The crisis of 2007/08 showed food net importers the perils of asymmetric and potentially weaponized interdependence when they faced food-trade restrictions vis-à-vis exporting countries. In response, they tried to bypass the prevalent liberal trade order by gaining privileged bilateral access to commodities, but they also attempted to use the system to their advantage by buying into the increasingly corporatized value chains of the global food system. They built up national food-trading houses and formed new trading relationships as Russia and tropical countries came to play an increasingly important role in global food exports. When seeking to buy into farmland assets or crucial inputs such as fertilizer they could face strong resistance, as shown by the aborted takeover of the Canadian Potash Corp by Chinese state-owned Sinochem in 2010 (Massot, 2011).

And in seeking to forge new narratives of collaboration, the outsiders had to grapple with counternarratives that accused them of land-grabbing. Qatar tried to instigate a *Global Dryland Alliance* between similarly affected countries and Gulf States backed proposals by Japan and Switzerland to sanction export restrictions at the World Trade Organization (WTO), an institution that had traditionally been preoccupied with reduction of import rather than export barriers (Woertz, 2013a). They might pursue more such initiatives at international organizations in the future, such as the *Net Food Importing Developing Countries* that formed an interest group within the GATT to lobby for affordable food imports during the Uruguay Round (Narlikar, 2003).

With global food trade growing faster than global food production, cross-national virtual water linkages more than doubled between 1986 and 2007 and important shifts occurred towards Asia, where China imported increasing quantities of soy from Brazil (Dalin et al., 2012). Quantifications stemming from the virtual water paradigm, such as the *Water Footprint Network* launched in 2008 by Arjen Hoekstra, have argued for ecologically optimized trade flows based on water endowments and virtual water considerations (Water Footprint Network, 2021). This view has been criticized by economists who have pointed out that the virtual water approach does not factor in local opportunity costs. Comparative advantage is not based solely on one production factor such as water, but several, and water efficiency rather than water abundance is empirically a more decisive factor of water allocation as is the available arable land per capita. Hence decisions on water allocation and their impact are ‘fundamentally local decisions to be determined in the context of local opportunity costs, property rights, political and market power’ (Baylis et al., 2021, p. 16.11; Wichelns, 2015). Virtual water flows are often indeed not correlated with the actual water-resource endowments. Water-scarce countries such as Kazakhstan can be net exporters and water-rich countries such as Finland net importers of virtual water. Whether and to what extent virtual water considerations should inform multilateral trade governance is hence a contentious issue between economic and ecological sets of literature. There is, however, a certain consensus that trade can help adaptation to local water scarcity and mitigate related conflicts.

This is also exemplified in the water conscious food trade initiatives of food net importers in the MENA described above. We see that the virtual water paradigm has entered the political calculations of food net importers, who now explicitly conceptualize food trade as a means of mitigating water scarcity at home, and we may conclude that past concerns that such scarcity might lead to ‘water wars’ were overblown. Water is a unique commodity. It flows and yet is bulky, ill-suited for long-distance transportation. Unlike an oil well or a diamond mine, one cannot take lasting possession of it or it does not make commercial sense to do so; hence, there is no *blood water* that would finance rogue militias.

Water is an unwieldy object of warfare, even though it can still become a target or tool of war. However, the absence of war does not mean the absence of conflict; competing claims of different communities to scarce water resources can lead to local conflict. At a higher level, water can encourage cooperation between states, although such collaboration might become brittle in the future as it is often asymmetric and lacks a firm legal footing in international agreements (Chellaney, 2013, pp. 41–43). Even so, competitions over water hegemony pursued by diplomatic and political means are a more likely scenario than either outright military conflict or peaceful cooperation (Zeitoun & Warner, 2006).

There are significant hurdles for interstate water wars. In comparison international grain trade has played a prominent role in interstate conflict ever since its proliferation in the wake of steam power and steeply declining transportation costs in the 1870s. The naval blockades of the two World Wars or the politicization of food trade in the 1970s are cases in point when the US threatened a grain embargo in retaliation to the Arab oil boycott of 1973 and the Tehran hostage crisis of 1979 and actually implemented one in response to the Soviet Union’s invasion of Afghanistan (Woertz, 2018). The costs for American farmers were substantial as competing suppliers such as Argentina and Australia picked up the

slack. So, the US changed course in the 1980s and sought to re-establish its reputation as a reliable supplier of grains, abjuring the use of food trade in sanctions within the 'Reagan Doctrine of Agricultural Trade' (Woertz, 2013b, ch. 4). Yet, Iraq suffered tremendously from 1990 to 2003 when a multilateral UN embargo curtailed its oil exports and access to foreign assets and finance, severely hampering the import of food and medicine items that were formally excluded from sanctions (Gordon, 2010; Woertz, 2019).

The current Russian war on Ukraine threatens to add another chapter to the MENA's rich experience with the food weapon. If the former Soviet Union was a grain net importer for its livestock programme, some of its successor states have regained their position as major grain exporters to world markets over the past two decades, a position their territory already occupied in the late 19th and early 20th centuries. About half of the Arab world's wheat imports come from Ukraine and Russia. Some countries such as Egypt, Lebanon and Sudan have exposures well above 80% (Woertz, 2022). Saudi Arabia is the world's second largest importer of barley, mostly from the two countries, to use it as feedstock for sheep and other animals. The World Food Programme (WFP) struggles to source supplies to its assistance programmes to most food-insecure countries in the region such as Yemen and Syria (WFP, 2022).

The war has already prompted much feared export restrictions and will limit technology transfer to Russia in the field of agriculture as well. It will affect the harvest of Ukraine whose main export outlet the Black Sea port of Odessa is blocked. Russian exports are affected as well by soaring transaction costs. Transportation costs and insurance premia have increased, and sanctions curtail the access to trade finance. The impact goes beyond the two countries as both are major producers of fertilizers. Soaring costs and limited availability might affect the production elsewhere, limit margins of farmers and put a question mark behind a supply side response to rising food prices (Benton et al., 2022).

There is a debate whether the detrimental impact is a mere derivative of the war or if Russia is intentionally weaponizing food supplies to bring Ukraine to its heels. The G7 even speaks of a 'grain war' of Russia with the intention to create destabilizing food and refugee crises globally as a means of hybrid warfare (Euronews, 2022). A war of narratives emerges with the West blaming Russia's war and the latter Western sanctions and Ukrainian defensive mining of maritime access points for the looming food crisis (Lederer, 2022). For MENA countries this renewed episode of food trade politicization shows that food trade and its implicit virtual water carries promises but also risks as it can be more easily weaponized and interrupted than blue water flows.

Conclusions

Today the MENA is the world's largest grain importer and mitigates its water scarcity via virtual water imports. The large majority of this virtual water trade is based on green water. Agriculture accounts for over 90% of consumptive water use globally and some 70% of global crops are produced with rainfed agriculture. The paradigm that Tony Allan established sheds doubts on the popular talk about interstate 'water wars' and cautions against excessive focus on blue water resources and related allocation conflicts. On the surface it is compatible with a trade-based approach to food security, yet Tony Allan stressed the political nature of such markets.

The food regime in which the virtual water exchange occurs has been transformed since the 1970s with greater corporatization of value chains, growing role of the WFP in the allocation of food aid compared with national bodies and emergence of new export power houses, most notably Brazil for soybeans and corn, Malaysia and Indonesia for palm oil, and Russia and Ukraine for grains and sunflower oil. MENA countries that are dependent on food imports engage with this international food regime and try to influence it to their advantage as the global food crisis 2007–08 has shown. Their perception that the food and virtual water trade entails vulnerabilities beside its benefits is informed by the historic precedents of its politicization. This calls for a better conceptualization of it in IR scholarship.

The weaponization of blue water faces significant hurdles yet has attracted a lot of attention. The food trade that alleviates the MENA's water balance, by the gains of virtual water, at the same time offers opportunities for asymmetric and weaponized interdependence. The implications of virtual water are worth more consideration by national planners, trade negotiators and foreign policy personnel. Almost 30 years after Tony Allan first introduced it, the virtual water paradigm can be applied in new contexts worldwide and can enrich the analysis of international relations and related theories. It will continue to surprise us.

Disclosure statement

No potential conflict of interest was reported by the author.

Funding

This work was supported by the Bundesministerium für Bildung und Forschung, World Order Narratives of the Global South (WONAGO) [01UC2106B].

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