The moral hazards of smart water management

Kris Hartley[1] and Glen Kuecker[2]

Abstract

Smart water management (SWM) brings technological sophistication to water governance by providing monitoring, operational and communications capacities through real-time information. SWM's quantification appeals to metric-driven governance but, we argue, also perpetuates a technocratic and instrumental-rationalist mindset. The peril of this mindset is that it sees technology as a solution for sustainability problems caused by deep-seated structural and behavioural faults. This essay reflects on this dynamic by siting the SWM concept within discussions about technocracy, moral hazard and power dynamics. It suggests that SWM's rhetorical positioning undermines its own goals while naively seeking universal applicability, resolvable by embracing the precautionary principle.

Keywords: smart water management, technocracy, public policy, sustainability, South Korea

Introduction: reflecting on Smart Water Management

The increasing sophistication and proliferation of 'smart' technologies for urban, resource, and infrastructure governance not only mark a sunrise moment for Smart Water Management (SWM) but also herald a deeper entrenchment of technocracy's influence on the narratives and practices of the global sustainability project. The influence of SWM is likely to grow as governments implement its principles and declare success based on selected metrics. It is appropriate, however, not to lose a critical theoretical perspective that identifies and challenges technocratic power within SWM. By 'critical,' we do not mean a metric-based evaluation of SWM but an effort to understand the manifestations and exercises of elite interests within SWM. This essay explores these dynamics from the perspective of technocracy and instrumental rationalism and offers recommendations for how SWM can avoid perpetuating a sustainability narrative that compromises its own stated goals.

Smart water management (SWM) is the use of technology-based systems to provide real-time information for efficient, effective, and collaborative or automated water management. Policy

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[1] Assistant Professor, Department of Asian and Policy Studies, Education University of Hong Kong
[2] Professor, Department of History, DePauw University, Indiana, USA

actors, after years of refining it through digital transformation, increasingly embrace SWM as a tool for facilitating integrated water resources management (IWRM) across manifold policy domains including sourcing, delivery, quality, and resilience amidst external threats like floods and droughts. Policy actors see SWM also as a pathway towards broader social, economic, environmental, and governance objectives, as consistent with the visions of the United Nations Sustainable Development Goals (SDGs). South Korea is a leader in the development and rollout of SWM and proponents of SWM are promulgating the country's experience as an example for other countries.

The maturity of the SWM concept and the enthusiasm with which policy actors now embrace it signals an appropriate time for abstract reflection about the political dimensions of SWM. The resulting insights can give greater legitimizing effect to SWM by helping address its limitations. Our provocation is that SWM risks perpetuating a technocratic mindset that is blinded to the origins of the sustainability crisis. We contend that SWM is at the trailhead of the following path: (i) technology buys society more time to luxuriate in convenient and indulgent consumption habits; (ii) technology thereby excuses society from a painful reckoning about the origins and perils of these habits; and (iii) society anticipates that a continuous flow of novel technologies will always offset the negative effects of increasing unsustainability – even as populations grow and lifestyle-based ecological footprints expand.

The actionable corollary is that SWM's underlying logic of efficient optimization undermines its own broader pursuit of sustainability, with remediation possible either through a synthesis of 'hard' (purely mechanical) and 'soft' (behavioral and conceptual) approaches or through a recognition of the limits and hazards of hard approaches and an effort to apply them to only the most technical problems. Either would seek to avoid cooptation of soft approaches by the logical dominance and popularity of hard approaches. In seeking to understand the process by which SWM undermines the conceptualization and pursuit of sustainability, and in proposing a way to address this dilemma, this essay examines the logic of technocratic policymaking, applies it to SWM and the global dissemination of its narrative, and considers how society might reimagine technocracy. Rather than being a purely iconoclastic exercise, this essay aims to inspire policymakers to think reflectively about SWM and their own role in its promotion.

This essay continues by examining the epistemic roots of technocracy and instrumental rationalism and their contribution to moral hazard. Thereafter, we consider how technocratic reasoning in SWM presents itself as a solution to the moral hazard it creates while ignoring the reproduction of power dynamics and underlying determinants of the sustainability crisis. Finally, we interrogate the narrative hegemony and consequent global transferability of SWM and technocracy more generally, critically re-centering the concept without categorically dismissing its objectives. We close with an appeal to the precautionary principle, calling for more disciplined reflection, intensive inquiry, and good-faith cross-examination within a policy epistemic otherwise characterized by exclusionary self-certitude.

Instrumental rationalism and the logic of technocratic policymaking

Technocratic approaches are often mismatched with complex or 'wicked' policy problems (Hartley et al., 2019; Head, 2019). The narrative perpetuation of a nature-culture split[i] reproduces the technocratic epistemic by promoting instrumental-rationalist logic[ii] in the management of natural and human realms that are resistant to reductive governance. Taking a technocratic approach to SWM, for example, could lead to an entrenched efficiency trap that profoundly exacerbates water sustainability challenges.[iii] The mechanism connecting the efficiency trap and sustainability crisis is moral hazard; in this case, how society's consumption behaviors assume and come to rely on technical fixes for material challenges arising from declining sustainability. The term 'moral hazard,' as we use it, does not invoke the colloquial definition of 'moral' as 'ethical,' but instead refers to the behavioral economic concept in a principal-agent setting characterized by imperfect information. The concept is commonly illustrated in terms of insurance. Marshall (1976) provides the following definition: "moral hazard…is defined to be any misallocation of resources which results when risks are insured with normal insurance contracts and only with such contracts. In this case 'normal' means that the insured is paid a specified amount in case of loss but his actions in avoiding or reducing loss are not stipulated by the contract" (p. 880).

The analog of moral hazard to the sustainability crisis asks for no great leap of logic. Technology is 'insurance' against actions of society that inadequately avoid or reduce loss from ecological overshoot and its consequences (Kuecker and Hall, 2011; Tainter, 1988). In short, society and individuals avoid behavioral change because they anticipate being 'bailed out' by increasingly sophisticated technologies. Furthermore, the use of moral hazard to describe SWM's potential challenges highlights the externalization or socialization of costs, which in this case are not only the real costs of infrastructure development but also the abstract and real costs of declining sustainability resulting from the continued or increased consumption needed to maintain consumption habits. This perspective shifts the conceptualization of water from a 'toll good' to a 'common pool resource,' changing the relationship between society and nature to one of conservation and survival rather than of extraction and contract-based market exchange (Hartley, 2018).

Instrumental rationalism, the applied manifestation of technocracy partially responsible for exacerbating moral hazard, is the proverbial hammer that treats every problem like a nail; the broken pipe is fixed without deeper reflection about why it was broken. Behaviors that broke the pipe fail to change because the fix is always available, invoking moral hazard by illustrating the 'safety' of maintaining existing habits and the externalization or socialization of costs associated with them. In service to short-term fiscal convenience and political feasibility, the reductionist 'problem-solving' or 'management' epistemic overlooks predicaments and wickedness for which conclusive solutions are inconveniently unavailable. Despite these shortcomings, the technocratic epistemic (referring more to an idea than to the people or interests executing it) maintains its practical legitimacy because it boasts a record of delivering immediately tangible solutions and performing well on a curated suite of myopic fiscal and operational measures.

By operating in this way, the epistemic is never politically pressured to confront the structural determinants of wicked policy problems and the embeddedness of those problems in the technocratic solutions proposed for them (e.g., technological initiatives as an outlet for surplus investment capital – evidence of the dominant market-based and consumption-based logics testing ecological limits). While the 'common-sense' narrative of technocratic solutions, like various iterations of 'smart,' enjoys favor among political and corporate elites, the current era of populist agitation has shown that such dominant narratives are assailable; indeed, Caesar's wife is not above suspicion. Where technocratic solutions contravene populist sentiment, they lose their legitimacy amidst politically charged rhetoric. This was evident when United States President Donald Trump undermined the authority and popular credibility of scientific experts, including the Centers for Disease Control (CDC), in seeking to prematurely 're-open' the economy amidst a continuing increase in COVID-19 cases.[iv] This case underscores that claims to legitimacy made by technocrats are not impervious to political challenge, a matter that policymakers must consider when making appeals to the authority of expertise.

Finally, while technocratic thinking exists in ring-fenced policy domains like SWM and smart cities, global institutional architecture like that supporting the SDGs is a type of Trojan Horse through which such ideas are widely disseminated (e.g., concepts like 'best practices' and 'first principles' that *prima facie* do not invite criticism but are subtly deployed to privilege certain policy narratives). The normalizing power of the instrumental-rationalist perspective is given effect by an enabling global political economy of development, reified through actors, ideas, and institutions (Béland 2009): actors and their relationships as constitutive of a power-knowledge nexus, ideas as the narratives around sustainability used for validating public resource commitments, and 'hard' institutions that protect and facilitate those ideas – including local or national governance arrangements (e.g., special-purpose investment vehicles) on one hand and the SDGs and associated institutional structures on the other. In this way, 'smart' practices like SWM progress towards 'common-sense' status, promulgated by policy actors as exemplars of successful experimentation. This process gives rise to a core-periphery dynamic in the translation and transfer of hegemonic policy ideas, resulting in a disciplined and normalized view of problems and their solutions; logical shortcomings are widely disseminated but weakly interrogated.

Smart Water Management as technocratic thinking

In smart initiatives like SWM, the private sector produces and mainstreams science- and technology-backed initiatives around which the logic of naming and framing problems is designed to fit the solutions on-offer.[v] This process illustrates how capitalist logic induces the types of investments that perpetuate particular approaches to policy intervention. The accompanying narratives around pragmatism and the primacy of technology support the political legitimacy of such interventions and congeal over time to form the 'common-sense' logic behind buzz-solutions like smart cities and 'disaster risk reduction.' As the conceptual impetus behind a revised (but not

uprooted) narrative drawing on longstanding capitalist doctrine, 'smart' or 'sustainable' become a new 'development' (as a globally encompassing policy vision) through which technology provides solutions and markets drive needed innovation and mainstreaming (Kuecker and Hartley, 2020a).

In accordance with this model, SWM is likely to be the dominant water management paradigm in service to 'new development,' due principally to its appealing allure as a scientific, evidence-based, 'common-sense' approach to IWRM and to the copiously articulated compatibility of its narrative with that of the SDGs. Both facilitate SWM's transferability in the international context, as SWM's ideas become principles through institutional privileging and the self-referential legitimacy and credibility of its expert defenders. For example, capitalist reproduction is a moral hazard that SWM obscures by discursively positioning itself as a 'sustainability-focused' solution; this itself becomes a moral hazard by externalizing the social and environmental costs of capitalist reproduction.

With SWM serving as a prescriptive and formulaic means for accomplishing the SDGs, its technocratic gestures not only generate the aforementioned moral hazard but also risk marginalizing alternative narratives about society's declining ability to sustain itself, including those that challenge capitalism's logic of perpetual growth and market fundamentalism. Nearly one billion informal dwellers around the world struggle every day to procure water, a circumstance exacerbated by the COVID-19 pandemic. The resulting incomplete or staged 'soft collapse' (Kuecker, 2020) invites questions not about the design and calibration of policy instruments – even the most technologically advanced – but about the deference that policy narratives show to a totalizing capitalist project progressing unchallenged despite imminent depletion of natural resources and a socially and politically destabilizing wealth gap. The moral hazard of SWM is that it pretends to solve or trick the laws of thermodynamics, especially the wicked problem of systemic entropy, with its ring-fenced problem-solving epistemic. The SWM solution adds additional order to a system already experiencing an unsustainable rate of declining returns from successive technocratic solutions and waves of technological advancement. Chasing the failure of order is, inevitably, more order – accelerating collapse. In short, society is doing the wrong things but more efficiently, which in a profound paradox can be politically sold as progress. Ultimately, however, an efficiency trap leads to an entropic trap, as illustrated by the Tainter curve (Tainter, 1988).[vi] We contend that it is time to break this cycle.

The pursuit of more order will not end without a painful reckoning. Like its recent smart city adventures (Kuecker and Hartley, 2020b), South Korea's SWM efforts are backed by world-class technology, ample capital, and a competent government committed to its own vision for the future. SWM will be highly successful according to its principal metrics: efficiency and effectiveness in service delivery, as against broader reforms to economic and societal systems that reduce the need for such urgent and aggressive technocratic policy action. Further, we maintain that the leaders, technicians, and scholars driving South Korea's SWM project are guided by a genuine interest in addressing water challenges and a sincere belief in the efficacy of their methods. As such, this critique is based on the overarching and hegemonic ideas that have come to dominate

the sustainability narrative worldwide and reinforce the influence of the power-knowledge nexus. The executors of SWM may fail to see, for example, the moral hazard of technocratic interventions because the policy epistemic by whose language problems are named and framed dominates the way these agents are trained and 'socialized' into the community of technocratic practice. The failing is not reflective of the actions and motivations of individuals within the system but of macro-structural forces that are difficult to see and beyond any individual's influence. In this way, the question of SWM legitimacy illustrates the predicaments of cultural hegemony as well as it does the Marxist question of structure and agency as explored in the context of rational choice (Carver and Thomas, 2016; Carling, 1995) and collective action (Brewer, 1987; Lash and Urry, 1984).

While smart technology promises to bring sustainable efficiencies to the challenges of water management, they present an additional, longer-term moral hazard of unintended consequences. Lurking within SWM's wires, monitors, routers, and clouds are powerful algorithms that pursue technocratic rationalism's dream of perfecting the human condition. The promise of these algorithms, especially with the emerging power of quantum computing, offer society the ultimate insurance policy against the perils of ignoring existential threats to the planetary system. With this algorithm comes a profound moment of transition, the emergence of 'singularity' (Shanahan, 2015; Vinge, 1993) that accomplishes the ultimate act of problem-solving by removing human agency from the pursuit of sustainability. SWM's moral hazard faces an imminent reckoning about this post-human Pandora's box, one that cannot simply be dismissed until it fully reveals itself.

Towards even 'smarter' water management

There is no easy way to question the received technocratic narrative in public policy because the mechanisms by which it interprets the world have no way of recognizing alternatives; examples are the concepts of governance and public policy itself (neither of which have a language to engage meaningfully with the concept of anarchy, for example) and the concepts of capitalism and markets (which have no language to describe alternative means of resource distribution). Alternative ideas are not so much confronted and discredited by technocracy as simply erased or rendered discursively invisible by its epistemic frame, and there is no critically self-reflective tool that allows the technocratic epistemic to stand outside of itself and ask prickly questions. As a programmed or algorithmic concept, technocracy sees only what it is told to measure and manages only what it sees. Any self-vetting would be done only within the confines of the same epistemic that created the policy to begin with – the core flaw in an SDG logic that so eagerly presents itself as a transformative and emancipatory way of thinking. Even the concept of community empowerment, which ostensibly plays a role in SWM and receives copious mention in related policy documents,[vii] exists at the pleasure of the epistemic that defines the macro-concept of SWM (i.e., that 'smart' as technical and 'management' as technocratic or capitalistic are pathways to

sustainability, with engagement efforts asking only which flavor of technocracy and capitalism the public prefers). It is often in the halls of academia where critical vetting takes place, illustrating the importance of scholarly independence and, as importantly, the perilous degree to which technocratic and instrumental-rationalist epistemics have captured governance institutions.

One way to address the hegemony of technocracy and SWM's consequent moral hazard is to apply the precautionary principle to its planning, design, and implementation. The precautionary principle suggests a range of metrics around limiting potential harm by regulating or barring policies even when the prospects of harm are unknown. It restrains the Cartesian proclivities of instrumental rationalism, which presume that humans can discipline nature through reason; in this way, the principle implicitly and explicitly recognizes the rights of nature while also presuming the fallibility of human reason. This approach invites policymakers to assume that if something can go wrong with SWM, then it will – a logic that commands them to consider all regulatory contingencies, including cancelation. Sunstein (2005) calls the precautionary principle 'the laws of fear' that lead inevitably to policy paralysis, a critique that resonates in a world currently facing a 'perfect storm' of large-scale, intersecting, and synchronous crises, among them water scarcity (Kuecker, 2014). At the crux of the predicament of balancing policy urgency with mitigating moral hazards is the question of risk, especially in its socio-cultural manifestation. The conceptualization of 'risk society' (Beck et al., 1992; Jarvis, 2007), as a fundamental feature of the modern policy epistemic in how it structures markets and managerialist cost-benefit analysis, is constitutive of what earns technologies their 'smart' distinction; technocrats identify, parameterize, and eliminate risk. However, the perfect storm, now potentially manifest as a pandemic-driven soft collapse (Kuecker, 2020), destabilizes the structures that constitute the meaning of risk itself, to the degree that the constitutive position of risk in defining the need for 'insurance' falters in a world of multiplying crises and moral hazards. Technocracy, as the epistemic underwriting risk and SWM, becomes a dysfunctional construct that is as eligible for policy exile as a blithely ignored set of CDC social distancing guidelines.

Politically risky though it may appear, public policy would benefit from getting comfortable with a critical view of its own epistemics – which for practical reasons should be expressed in friendly critiques that provoke but do not alienate. The question then becomes how policy makers and 'street-level bureaucrats' (Lipsky, 2010) can stand watch against regressive and costly reproductions of power-knowledge narratives like 'smart,' 'development,' and 'sustainability' – terms laden with normative ideas and agendas but enjoying canonical and virtually unassailable status. While our recommended solution is to deploy mechanisms for vetting these and other moral hazards, the difficulty is that such undertakings are done often as mere institutional window-dressing (e.g., by appointing a committee or adding a paragraph in a consulting report) while actually requiring a fundamental change in mindset – not from the 'wrong' old thing to the 'right' new thing, but from stable and occasionally arrogant 'certitude' to precaution,[viii] disciplined reflection, intensive inquiry, and good-faith cross-examination. This solution requires the type of sincerely self-critical attitude that leadership in many countries –

particularly those under the power of dominant political parties desperate to maintain their legitimacy – simply cannot have. However, in freer multi-party democracies like South Korea, Taiwan, Japan, Australia, the UK, Germany, and others, such a change in mindset is a possibility.

South Korea's SWM project will likely earn globally elite 'pilot' status, and its narrative convergence with the SDG project will further the privileging of its instrumental-rationalist elements in global narratives about the 21st century's existential challenges. In closing, however, our critical argument is made not in a fit of grizzled pessimism but in the sincere hope that the same creativity, ambition, and competence that South Korea brings to innovative megaprojects like SWM and smart cities will inspire policy actors to undertake a fundamental re-thinking of technocratic governance and ultimately to critically reflect on the hazardous logic on which modern society is precariously situated. On this issue, South Korea has an opportunity to be a transformative global leader.

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[i] Illustrating the concept of the nature-culture split, Kuecker and Hartley (2020a) argue that "the societal impacts of natural disasters are socially constructed by [for example, the disaster risk reduction narrative] as insults to reason – a rebellion by nature – rather than a consequence of modernity's faulty attempt to rationalize nature" (p. 10).

[ii] This essay uses the term 'rationalism' rather than 'rationality.' The terms may appear to be interchangeable but there is a subtle and important distinction. Rationality is the behavioral logic that observes a particular rule-set (e.g., the self-interested behavior of an economic 'satisficer'). Rationalism connotes a type of signaling in which individual or institutional behavior (e.g., policymaking) embraces 'rationality' for specifically political, social, economic, or organizational objectives. Referring to rationalism primarily as the 'rule of reason,' we often preface the term with the qualifier 'instrumental' (i.e., the tools of policy) or 'technocratic' (e.g., the epistemic embraced by policymaking systems).

[iii] The efficiency trap (Hallett, 2013) has long been theorized through the 'Jevons paradox' (Alcott, 2005), in which the more efficient extraction, processing, and/or use of a resource is accompanied by increased demand for and use of that resource. While examples of the Jevons paradox have been used commonly in reference to natural resources, the study of transportation planning has also applied it to the concept of 'induced demand,' in which the expansion of transportation capacity (e.g., addition of new lanes on a highway) leads to increased usage that offsets the efficiency gains of the added capacity (Cervero, 2002). The application to SWM and the relationship between water supply and demand adopts the same logic.

[iv] https://www.nytimes.com/2020/05/07/us/politics/trump-cdc.html (accessed 9 July 2020)

[v] This rhetorical sleight-of-hand is reminiscent of the real estate agent telling a client, "if you bought this house, you would be home by now." The problem (that the client is, at that moment, not currently at home) is constructed in a way that can solved by the item already for sale.

[vi] The Tainter curve (Tainter, 1988) is an n-shaped graphic showing that the benefits of complexity within a system initially rise as the level of complexity increases, but at a declining rate. Past a given inflection point, further increasing levels of complexity coincide with a decline in the benefits of complexity.

[vii] https://www.iwra.org/swmreport/ (accessed 9 July 2020)

[viii] According to O'Riordan and Jordan (1995), "At the core of the precautionary principle is the intuitively simple idea that decision makers should act in advance of scientific certainty to protect the environment (and with it the well being interests of future generations) from incurring harm…In essence, it requires that risk avoidance becomes an established decision norm where there is reasonable uncertainty regarding possible environmental damage or social deprivation arising out of a proposed course of action" (p. 3).