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APPLYING ANTIFRAGILITY TO POLICYMAKING

Policy Report
2024

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TABLE OF CONTENTS

Executive Summary	1
Introduction	2
Applying Antifragility to Policymaking	5
Recommendations for Operationalising Antifragility	14
About the Authors	16

Executive Summary

The concept of antifragility coined by Nassim Nicholas Taleb describes a system that can thrive when exposed to disorder. This goes beyond robustness or resilience, which emphasise merely returning to the status quo after experiencing disorder. However, converting Taleb's idea into practice and applying antifragility to policymaking is not quite straightforward, particularly where the costs of subjecting a system to disorder are high or pose a risk to human lives.

Using selected examples of Singapore's experience with water management, this report aims to provide a starting point for discussion of how antifragility can be meaningfully encouraged in various domains across the policymaking process. We argue that Singapore's successful efforts to marshal its water resources in the face of existential vulnerability following independence from Malaysia provide us with a historical example of antifragility at work. The report concludes by analysing the challenges associated with operationalising antifragility across other policy domains. We offer preliminary suggestions to address the identified challenges, while acknowledging the need for further research to substantiate their efficacy.

Introduction

In his 2012 book *Antifragile*, Nassim Nicholas Taleb examines the triad of fragility, robustness, and antifragility when systems are exposed to disorder.¹ Disorder is an umbrella term for uncertainty, variability, imperfect or incomplete knowledge, chance, chaos, volatility, the unknown, randomness, turmoil, shocks, stressors, errors, and dispersion of outcomes, among other concepts. Robustness, or having resilience to bounce back and resist disorder, emphasises returning to the status quo after experiencing disorder.² Antifragility, as opposed to fragility, goes beyond robustness and resilience, and refers to the ability to thrive, flourish, or benefit from disorder.

This report discusses Singapore's experiences with water management as a novel historical example illustrating the concept of antifragility at work in the public policy context, and seeks to identify generalisable ways to operationalise the concept of antifragility that could serve as a practical framework for decision making when dealing with other challenges. In our view, antifragility complements rather than replaces resilience as a mindset and approach guiding desired outcomes from the policymaking process.

This report does not assess the substantive merits or otherwise of Singapore's water management policy. Our aim is more modest—to demonstrate the potential of applying Taleb's concept of antifragility, which many think is difficult to accomplish. Our goal is to challenge this assumption by demonstrating how Singapore's historical approach to water management policy exhibits key features and decision-making behaviours aligned with Taleb's concept of antifragility.

The Theory of Antifragility

In *Antifragile*, Taleb endeavors to offer a method for surpassing mere resistance to disorder; his aim is to “domesticate... dominate, even conquer, the unseen, the opaque, and the inexplicable.”³ He provides a continuum from fragile to antifragile in describing how systems react to disorder—fragile systems experience more downsides than upsides, whereas antifragile systems are

¹ Nassim Nicholas Taleb. *Antifragile: Things that Gain from Disorder* (New York: Random House, 2012), p. 27.

² Manoj Harjani and Tan Ming Hui. “Can an Antifragile Mindset Help Reframe the China-US Tech Rivalry?” *The Diplomat*, 27 April 2022. <https://thediplomat.com/2022/04/can-an-antifragile-mindset-help-reframe-the-china-us-tech-rivalry/>.

³ Taleb. *Antifragile*, p. 13.

the opposite.⁴ This is summarised in Figure 1 below. Taleb emphasises that resilient or robust systems are at the centre of this continuum—they are not harmed by disorder, but also do not benefit from it.⁵ He goes one step further to argue that disorder is not necessarily ‘bad’, and that depriving a system of it can even be harmful and hinder innovation.⁶

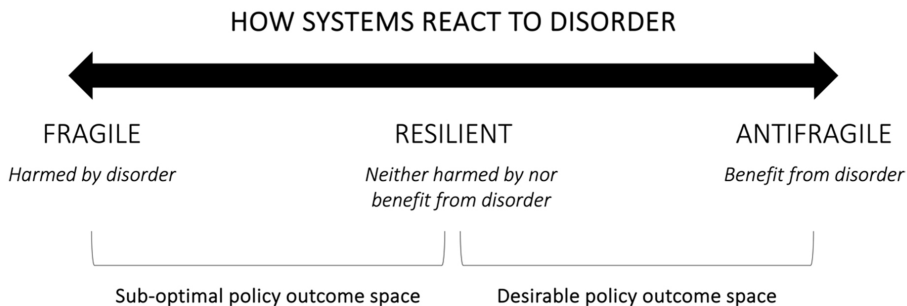


Figure 1: Taleb's view of how systems react to disorder

Critiques of Antifragility

Scholars have attempted to apply antifragility to other fields ranging from supply chain management⁷ to urban planning.⁸ While this has demonstrated the potential for broader applicability of antifragility, there are some challenges which have persisted when applying it across different contexts. Despite more than a decade passing since the publication of *Antifragile*, antifragility has yet to gain significant traction among researchers seeking to apply the concept in their respective fields. In Taleb's book, the theory of antifragility, while simple and thought provoking, is generally backed by his personal observations, caricatures, and broad generalisations. This raises concerns regarding whether the theory could actually lead to practical applications, and therefore whether there is a limit to its utility.

⁴ *Ibid.*, pp. 13-25.

The reality is that there are few real-world examples of antifragile systems, and some resilient systems may share features that Taleb attributes solely to antifragility. Moreover, as with resilience, antifragility is inherently difficult to measure. Taleb's view is that empirical data is not needed to measure antifragility. Instead, what matters is whether the system "is accelerating towards harm or benefit."⁹ However, this may be insufficient for policymakers who require tangible ways to measure progress against desired outcomes to justify continued investment in a particular strategy or policy measure.

Why Apply Antifragility to Policymaking?

While the concept of antifragility presents certain challenges, it offers a potentially valuable lens for policymakers to analyse behaviors and decision-making approaches, particularly when framed as a complement to resilience. Antifragility is by no means a winning formula or silver bullet (as the critiques highlighted above have demonstrated). Nevertheless, it offers policymakers a way to reflect on existing decision-making approaches and consider how they can be improved.

In applying antifragility retrospectively to Singapore's experience with water management, we want to demonstrate the feasibility of transitioning a system from fragility towards antifragility. We recognise that broader application of antifragility to other policy domains comes with significant challenges that need to be better understood. For instance, applying an unorthodox and counterintuitive approach like antifragility to national security and defence would need to account for the fact that policymakers have little or no room to take gambles on how systems will react to disorder, as potential errors could carry significant human costs.

⁹ Nassim Nicholas Taleb. "Antifragility' as a mathematical idea." Accessed 15 September 2023. <https://www.fooledbyrandomness.com/nature-definition.pdf>

Applying Antifragility to Policymaking

In this section, we connect our conceptual understanding of antifragility to Singapore’s experience with water management by highlighting selected examples of planning and decision-making approaches since independence. The discussion is not meant to be exhaustive, but rather, it seeks to exemplify some of the key features and behaviours associated with antifragility in the policymaking context.

One key takeaway from our analysis is that antifragility works in a layered manner, with “skin in the game” often acting as a precondition. In Taleb’s theory of antifragility, this refers to individuals having a personal stake when making decisions that affect others.¹⁰ “Skin in the game” is crucial in fostering what we have termed an ‘antifragile mindset,’ which encompasses two key attitudes—agility and learning. Agility and learning then contribute to specific approaches to decision making, which include decentralisation, diversification, and layering. This is summarised in Figure 2.

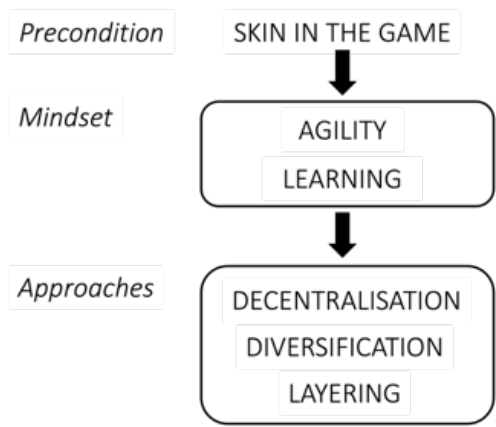


Figure 2: Connecting an antifragility mindset to decision-making approaches

Singapore’s Water Challenges

Securing Singapore’s long-term water supply was among several existential challenges that then-Prime Minister Lee Kuan Yew and his government faced after independence following a tumultuous separation from Malaysia in

¹⁰ Taleb. *Antifragile*, Ch. 23.

1965.¹¹ Land scarcity and polluted catchment areas meant that Singapore was not able to store and use much of the abundant rainfall it received annually. Instead, it had to import water from the neighbouring Malaysian state of Johor under two agreements signed in 1961 and 1962. Since then, the water issue has plagued relations between the two countries, and periodic disagreements have prompted Singapore to diversify its water sources beyond imports.

Singapore now has a diversified water supply that draws from four ‘National Taps’: (i) catchment, (ii) imports, (iii) reclamation, and (iv) desalination. The country aims to meet up to 80 per cent of overall demand domestically by 2030, which would bring it closer to self-sufficiency despite growing needs (see Table 1). Singapore’s water management policy is well regarded internationally, and has contributed to its overall status as a global hub for solutions and expertise.¹² This outcome—where vulnerability has been turned into strength—is an exception rather than the rule, as many countries often struggle to overcome similar existential challenges.

	Current – 2018	Projected – 2030
<i>Demand</i>	430 mgd	~540 mgd
<i>NEWater supply</i>	175 mgd (~40%)	~270 mgd (~50%)
<i>Desalinated water supply</i>	100 mgd (~23%)	~160 mgd (~30%)

mgd = million gallons per day

Table 1: Singapore’s current and projected water demand and domestic supply [Source: Our Water, Our Future (Singapore: PUB, 2018)]¹³

Note: Projected demand is based on PUB’s estimate of a 25 per cent increase in current demand by 2030. Projected supply of NEWater and desalinated water is based on PUB estimates of the proportion of total demand that these sources will meet by 2030.

“Skin in the Game”

Taleb defines “skin in the game” as bearing risks and being accountable for actions and decisions.¹⁴ For Singapore, vulnerability in the face of several

¹¹ For a historical account of this period in Singapore’s history, see CM Turnbull, *A History of Modern Singapore, 1819-2005* (Singapore: NUS Press, 2009).

¹² Gabrielle Chan. “PUB bags 4 prizes for project innovation at International Water Association Awards.” *The Straits Times*, 14 September 2022. <https://www.straitstimes.com/singapore/environment/pub-bags-4-prizes-for-project-innovation-at-international-water-association-awards>.

¹³ PUB Singapore. *Our Water, Our Future* (Singapore: PUB, 2018), p. 19.

¹⁴ Taleb. *Antifragile*, Ch. 23

existential challenges at the time of its independence likely fostered “skin in the game” among the post-independence generation of politicians and policymakers.¹⁵ In the context of water management policy, this motivated decision-making processes to react to disorder in a manner that at first glance appear to overcompensate, but which had in fact created opportunities for antifragility (see Box 1).

Box 1: “Skin in the game”

As one of the most water-scarce countries in the world due to its small size, providing a reliable water supply for an expanding population has long been an existential issue for Singapore. At the time when it attained independence, Singapore was heavily dependent on neighbouring Malaysia for its water supply. An agreement signed with Malaysia in 1961 gave Singapore the full and exclusive right to draw off water within designated land areas, and in return, supply Johor with treated water for a period of 50 years until its expiration in 2011. Another water agreement was signed in 1962 for 99 years until 2061, which is currently still in effect.

Before separation from Malaysia in 1965, then-Prime Minister Lee Kuan Yew had ensured that the 1961 and 1962 water agreements were enshrined in the Separation Agreement.¹⁶ The Separation Agreement was further bolstered by its registration with the United Nations, thereby acquiring international legal standing. Despite these legal safeguards, Malaysian leaders have on occasion threatened to “cut off the water supply” during bilateral disagreements.¹⁷ Water has therefore played an outsized role in shaping bilateral relations between Singapore and Malaysia.

Following the Asian financial crisis in 1997-1998, Malaysia and Singapore began discussing a ‘framework of wider cooperation’ where loans from Singapore were contingent upon a guarantee of long-term supply of water from Malaysia.¹⁸ Although Malaysia ultimately did not take up the loans, the issue of water supply became entwined with a package of bilateral issues that were discussed over several years—in particular, Malaysia wanted to raise

¹⁵ Genevieve Chua. “Too much education is bad. Don’t over-educate the young: Nassim Taleb.” *The Straits Times*, 22 December 2014. <https://www.straitstimes.com/opinion/too-much-education-is-bad-dont-over-educate-the-young-nassim-taleb>.

¹⁶ Tan Gee Paw. *Water - Singapore Chronicles* (Singapore: Straits Times Press, 2016), p. 15.

¹⁷ Cecilia Tortajada, Yugal Joshi, and Asit K. Biswa. *The Singapore Water Story: Sustainable Development in an Urban City-State*, (Abingdon, Oxon: Routledge: 2013), p. 87.

¹⁸ Ministry of Foreign Affairs, Singapore. “Water Agreements.” Accessed 15 September 2023. <https://www.mfa.gov.sg/SINGAPORES-FOREIGN-POLICY/Key-Issues/Water-Agreements>.

the price of raw water being sold to Singapore.¹⁹ However, despite several rounds of discussions and high-level correspondence, Malaysia's shifting proposals on price forced Singapore to make its official exchanges on the water issue public in 2003.²⁰ More importantly, it also prompted Singapore to intensify its efforts to develop NEWater and desalinated water as alternative sources to water from Malaysia.

Agility and Learning

“Skin in the game” contributes to agility and learning by providing the motivation and resolve for politicians and policymakers to address challenges at hand. Agility here refers to planning and decision making that keeps pace with an evolving economic and strategic environment. Learning is linked to agility—here it refers to being flexible and both willing and able to adjust in response to what is not working, rather than being wedded to a particular approach. Regarding agility and learning, Singapore has been consistent in pursuing a pragmatic water management policy that has been responsive to evolving needs without being overly weighed down by short-term or politically unpopular considerations (see Box 2).

Box 2: Agility and learning

In the 1960s, poor sanitation was a significant challenge for Singapore's water supply. Its main rivers were badly polluted and unsuitable as catchment areas despite receiving 2,400mm of rainfall annually.²¹ Water shortages became common, and Singaporeans went through several water rationing exercises as the population grew and an economic strategy to promote rapid industrialisation further escalated the demand for a more stable water supply.

During the 1970s and 1980s, Singapore's approach to water management evolved towards becoming self-reliant with its water supply by expanding and investing in existing clean water capacity on top of exploring alternative water sources. A Water Planning Unit was set up in 1971 and the first Water Master Plan was drafted in 1972, outlining blueprints for water supply from

¹⁹ Wahab Jumrah. “The 1962 Johor-Singapore Water Agreement: Lessons Learned.” The Diplomat, 20 September 2021. <https://thediplomat.com/2021/09/the-1962-johor-singapore-water-agreement-lessons-learned/>.

²⁰ Ministry of Communications and the Arts, Singapore. “Water Agreements.” Accessed 15 September 2023. https://www.mfa.gov.sg/-/media/Images/MFA/Special-Events/Water/Water-Talks_-If-Only-It-Could.pdf

²¹ Tan. Water, p. 16.

local catchments, reclaimed water, and desalinated water. Additional catchment areas and new reservoirs were identified, while waterways were cleaned and upgraded. At the time of independence, Singapore only had three reservoirs—MacRitchie, Peirce, and Seletar. Today rainwater is collected from 17 reservoirs, with catchment covering two-thirds of the country's land area.

1977 proved to be a turning point for Singapore's water management policy. A 10-year Singapore River clean-up programme was launched, resettling approximately 46,000 squatters and relocating 5,000 street hawkers to markets and hawker centres equipped with sewage facilities.²² Another difficult policy decision was phasing out the highly pollutive pig farms in 1984.²³ Despite pork being an important component of the local diet, the government assessed that it was far too costly to treat pig waste to minimise its impact on water catchment areas.²⁴ The government first attempted to resolve the problem by relocating farms from Kranji to Punggol, which was outside water catchment areas. This was a costly solution, but it did not dampen the severity of pollution. Furthermore, the requirement to allocate a nuisance land buffer of at least 1,000m between the farms and residential areas to minimise odour presented a significant urban planning challenge. Following a comprehensive assessment in response to these larger challenges, the government decided to close the pig farms, despite opposition from local farmers.

Decentralisation and Diversification

While agility and learning can be considered facets of the overall policymaking mindset, they also lead to specific approaches towards decision making that encourage antifragility. We have considered three here—decentralisation, diversification, and layering of systems.

Decentralised systems are more antifragile as they are more stable in the long term.²⁵ Distributing decision making helps prevent a single point of failure. It also creates more points for the system to gather information about its operating environment, which may enable the earlier detection and dealing of problems, along with more effective mobilisation of resources across

²² *Ibid.*, p. 24.

²³ Tortajada, et al. *The Singapore Water Story*, p. 143.

²⁴ Tan. *Water*, p. 26.

²⁵ Tan Ming Hui. "Living with Uncertainty: A Whole-of-Society Approach to Pandemics." *RSIS Policy Report*, p. 10.

the system. Diversification—particularly to build redundancies—and allowing for overcompensation, are critical for an antifragile system. They reduce the system’s vulnerability to random external stressors that cannot be predicted or avoided (see Box 3).

Box 3: Decentralisation and diversification

As early as 1975, engineers in Singapore had developed the technology to safely recycle wastewater, dubbing the final product ‘NEWater’. While it was deemed too expensive at the time, technological advancements in recent decades have allowed Singapore to revisit the idea and produce NEWater at scale since 2003.²⁶ NEWater now forms one of Singapore’s four ‘National Taps,’ alongside water from local catchment areas, imports, and desalination. The reclaimed water, which exceeds global safety standards,²⁷ now meets up to 40 per cent of Singapore’s water demand and is targeted to rise to 55 per cent by 2060.²⁸

Singapore’s national water agency, the Public Utilities Board (PUB), adopted a public-private partnership (PPP) model to ensure stable and secure sources of water for Singapore. By 2020, PUB had awarded seven PPP contracts for five desalination plants and three NEWater plants based on a ‘design, build, own, and operate’ project structure.²⁹ PPP projects are not only cost-saving and encourage competitiveness, but also allow the public sector to leverage “access to the intangible, special expertise (knowledge) and management know-how of the private sector.”³⁰ This model also promotes the development of Singapore’s status as an international hub for water management policy and solutions. PUB’s PPP projects are audited regularly to ensure accountability and effectiveness³¹, and PUB retains capabilities to mitigate any potential shortcomings of its private sector partners.³²

²⁶ Tan. *Water*, p. 52.

²⁷ International Water Association. “Singapore”. Accessed 15 September 2023. <https://iwa-network.org/city/singapore/>.

²⁸ Louisa Tang. “PUB aims to double water supply by 2060 without using more energy or producing more waste.” *TODAY*, 4 July 2018. <https://www.todayonline.com/singapore/pub-aims-double-water-supply-2060-without-using-more-energy-producing-more-waste>.

²⁹ Sock-Yong Phang, Thomas Lim and Flocy Joseph. “PUB’s PPP Journey: Learning How to Make the Most of a Scarce Resource.” Singapore: Singapore Management University, 2021.

³⁰ Soojin Kim and Kai Xiang Kwa. *Exploring Public-Private Partnerships in Singapore: The Success-Failure Continuum* (London: Routledge, 2019), p. 15.

³¹ *Ibid.*, p. 43.

³² *Ibid.*, p. 79.

Layering

Layering here refers to taking a multi-level view towards decision making. In particular, it enables decision makers to see how the fragility of smaller systems can contribute to the antifragility of a larger system.³³ Disorder (such as in the form of mistakes or stressors) in smaller systems can create a positive feedback loop for the larger system to learn from. However, this is not a necessary condition to achieve antifragility of a larger system. Singapore's water policy should therefore not be seen in isolation, but as a critical component of an overall national strategy encompassing other policy domains and systems that require a whole-of-government effort and a long-term perspective (see Box 4). This includes land use, housing and urban planning, economic development, environment and sustainability, as well as foreign policy.

Box 4: Layering of systems

At an event in 2008, then-Minister Mentor Lee Kuan Yew famously remarked that “every other policy has to bend at the knees for our water survival.”³⁴ This encapsulates the guiding principle shaping policymakers' approach, whereby water policy is inextricably linked other policy domains. For example, regarding land use, Singapore implemented a policy in 1983 to balance the competing demands of housing and industrial development with the protection of vital water catchment areas.³⁵

Another area where Singapore has sought to manage competing policy objectives was regarding industrial water use. In the 1960s, Singapore pursued the expansion of the semiconductor industry as part of its overall industrial base, but the manufacturing processes in this sector are water-intensive.³⁶ Over the years, PUB has actively engaged in collaborations with industries to enhance its water efficiency, and more recently has mandated required levels of water recycling.³⁷

³³ Taleb. *Antifragile*, Ch. 4

³⁴ Siau Ming En. “The Big Read: How S'pore's water conservation message got diluted by recent successes.” *TODAY*, 11 March 2017. <https://www.todayonline.com/singapore/price-success-how-spores-water-conservation-message-got-diluted>.

³⁵ Yang Wen and Kuang Jin Yi. “Urban Systems Studies: Water: From Scarce Resource to National Asset.” Singapore: Centre for Liveable Cities, 2020, p. 13. Accessed 15 September 2023. <https://www.clc.gov.sg/docs/default-source/urban-systems-studies/uss-water-revised.pdf>.

³⁶ PUB, Singapore's Water Agency. “Best Practice Guide in Water Efficiency: Wafer Fabrication and Semiconductor Sector: Version 2.” Singapore: PUB, 2022, p. 6. Accessed 15 September 2023. https://www.pub.gov.sg/Documents/Water_Efficiency_Wafer_Fabrication_Semiconductor_v2.pdf.

³⁷ Wong Pei Ting. “New water recycling requirements for wafer fab, electronics, biomed sectors from 2024.” *The Business Times*, 2 March 2023. <https://www.businesstimes.com.sg/esg/new-water-recycling-requirements-wafer-fab-electronics-biomed-sectors-2024>.

Sustaining Antifragility

Sustaining antifragility in the long term is an important concern since “skin in the game” is not permanent, particularly for subsequent generations of policymakers who did not experience the original crisis or challenging circumstances. For Singapore’s water management policy, looking ahead to future challenges such as climate change is providing the impetus for continued agility and learning even as the original challenge of securing water supply becomes a more manageable concern (see Box 5).

Box 5: The challenge of climate change

Being a low-lying coastal nation, Singapore is particularly vulnerable to the impact of climate change, especially from floods. This is not a new problem. In December 1969, Singapore recorded one of its worst-ever floods, causing waist-high waters in some areas and major disruptions to telephone networks, electricity supply, and transport, including road and rail links with Malaysia.³⁸ Flooding continued to pose a challenge throughout the 1980s until the implementation of various control measures, although the late 2000s and early 2010s once again saw significant incidences.³⁹

While Singapore has already gained experience in mitigating floods since independence, extreme weather events exacerbated by climate change could become more intense and frequent. The Centre for Climate Research Singapore has projected that the mean sea level could rise by one metre by 2100.⁴⁰ Rising sea levels would likely mean more frequent and severe floods, putting low-lying and coastal areas such as East Coast Park and Changi Beach at risk.

Rather than passive acceptance of rising water levels, PUB launched a study in 2023 to actively assess how to create an underground drainage and reservoir system.⁴¹ Such infrastructure would allow excess water from

³⁸ “Worst Floods in 35 Years Caused Three Deaths and Devastation Throughout S’pore.” *The Straits Times*, 1 December 1969. <https://eresources.nlb.gov.sg/newspapers/digitised/article/straitstimes19691212-1.2.17>.

³⁹ Asit K Biswas and Cecilia Tortajada. “Commentary: How prepared is Singapore for the next flash flood?.” *TODAY*, 17 September 2020. <https://www.channelnewsasia.com/commentary/singapore-flash-flood-rain-weather-climate-change-drain-prevent-592186>.

⁴⁰ National Climate Change Secretariat, Singapore. “Impact of Climate Change and Adaptation Measures.” Accessed 15 September 2023. <https://www.nccs.gov.sg/faqs/impact-of-climate-change-and-adaptation-measures/>.

⁴¹ Ang Qing. “PUB explores underground space to protect Singapore against rising sea levels.” *The Straits Times*, 3 January 2023. <https://www.straitstimes.com/singapore/pub-explores-underground-space-to-protect-singapore-against-rising-sea-levels>.

floods to be stored and released to manage the impact on low-lying areas. Furthermore, in March 2023, PUB also launched a S\$125 million research programme focused on coastal protection and flood management.⁴² Some of the solutions that PUB is considering aim to integrate advantages from nature such as mangroves, which can help mitigate sea level rise and complement man-made structures.⁴³

However, it is also important to recognise that adopting antifragility mindset and approaches to decision making alone would not necessarily guarantee that the wide range of complex and evolving risks that Singapore will face as a result of climate change will be addressed. Some of these risks include the failure of companies participating in PUB's PPPs such as Hyflux,⁴⁴ and rising costs for supplying water through methods such as desalinisation.⁴⁵ An antifragile approach to policymaking has to be combined with processes to measure progress against desired outcomes and other accountability mechanisms. When it comes to climate change, these accountability mechanisms may involve international commitments, such as those made by Singapore to the Conference of the Parties (COP) under the United Nations Framework Convention on Climate Change (UNFCCC).

⁴² Cheryl Tan. "Singapore launches \$125 million coastal research programme." *The Straits Times*, 2 March 2023. <https://www.straitstimes.com/singapore/politics/singapore-launches-125-million-coastal-research-programme>.

⁴³ Cheryl Tan. "Climate-proofing Singapore's coastlines: Some coastal protection projects." *The Straits Times*, 11 September 2023. <https://www.straitstimes.com/singapore/climate-proofing-singapore-s-coastlines-some-coastal-protection-projects>.

⁴⁴ Keng Gene Ng. "YTL Power acquires Hyflux's Tuaspring power station for \$270m in cash." *The Straits Times*, 1 June 2022. <https://www.straitstimes.com/singapore/yt-power-acquires-hyflux-tuaspring-power-station-for-270m-in-cash>.

⁴⁵ Sarah Koh. "Cost of delivering water continues to rise and will need to be reflected in water prices: Amy Khor." *The Straits Times*, 13 September 2023. <https://www.straitstimes.com/singapore/cost-of-delivering-water-continues-to-rise-and-will-need-to-be-reflected-in-water-prices-amy-khor>.

Recommendations for Operationalising Antifragility

In policy domains such as national security and defence, applying the concept of antifragility may seem unorthodox and counterintuitive. These domains are generally seen as being more risk-averse than others, seeking to limit any exposure to disorder and uncertainty which could result in the loss of lives. Nevertheless, it is worth asking if a deeper understanding of the principles underpinning antifragility can support policymaking even in these domains. To provide a realistic view of antifragility's utility for policymaking, we identify some of the challenges for operationalising the concept in this section. At the same time, based on our analysis of the examples presented in this report, we also offer some suggestions as a starting point to address these challenges. These suggestions are not meant to be definitive—further research is needed to establish their validity in supporting the policymaking process.

Developing “Skin in the Game” as a Precondition

One of the main challenges with developing “skin in the game” is doing so organically. The trials faced by Singapore's politicians and policymakers at the time of the country's independence and in its early years fostered a sense of personal accountability that is difficult to replicate. Singapore's experience with water management policy, however, highlights the importance of regularly communicating the challenges that the country faces collectively. A recent example where the value of this has been demonstrated was during the COVID-19 pandemic, where the government held daily press briefings and used various communication channels to highlight challenges across different policy domains affecting society and the country as a whole. Another challenge for building policymakers' experience with crisis and risk management is that the demands of such situations often see those with prior experience favoured to lead over those without. Where practical, more opportunities should be considered for less experienced policymakers to lead to prevent a cycle that limits opportunities for building exposure.

Fostering a Mindset Based on Agility and Learning

Compared to “skin in the game”, a mindset based on agility and learning can potentially be fostered through organisational processes (e.g., involving strategy formulation, planning, and after-action reviews) and individual capability development (e.g., through training emphasising

metacognition).⁴⁶ Nevertheless, there is the challenge of measuring the extent to which individual decision makers have embraced this mindset and are applying it in the course of their work. Lessons can be drawn from existing approaches used to foster resilience and risk adaptation, particularly those which involve tools and frameworks to cope with decision making under uncertainty. For example, Singapore already recognises the need for national-level resilience as evident in the country's six pillars of Total Defence that encourage a whole-of-society, decentralised response to collective security. Singapore's well-established capabilities in strategic foresight and scenario planning empower policymakers to consider alternative options vis-à-vis existing strategies and plans. This approach fosters a dynamic learning environment informed by observations of long-term trends.⁴⁷

Implementing Decision-Making Approaches

Although we have highlighted “skin in the game” as a precondition for encouraging antifragility, this does not mean that it develops out of a linear process. “Skin in the game” does not only need to emerge out of a crisis or challenging circumstances. Practitioners can be motivated by other means to adopt an antifragile mindset driven by agility and learning. In fact, decision-making processes involving decentralisation, diversification, and layering can be adopted as a starting point to encourage resilience and as part of a longer-term strategy to develop an antifragile mindset.

⁴⁶ Metacognitive strategies include “taking conscious control of learning, planning and selecting strategies, monitoring the progress of learning, correcting errors, analysing the effectiveness of learning strategies, and changing learning behaviours when necessary.” See D. Scott Ridley, Paul A. Schutz, Robert S. Glanz and Claire E. Weinstein. “Self-regulated Learning: The Interactive Influence of Metacognitive Awareness and Goal-Setting.” *Journal of Experimental Education* 60, No. 4 (1992), pp. 293-306.

⁴⁷ See Centre for Strategic Futures, Prime Minister's Office, Singapore. “The Evolving Foresight Ecosystem in Singapore.” *Conversations for the Future (Volume 3)* (2003), p. 1.

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