



Risk and Resilience in the Era of Climate Change

Vinod Thomas

Second Edition



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ISBN 978-981-97-2768-1 ISBN 978-981-97-2769-8 (eBook)
<https://doi.org/10.1007/978-981-97-2769-8>

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Cover photo by Vinod Thomas

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The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

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Reviews of the first edition of this book

The biggest contribution is the framework to help policymakers assess, adopt, create, measure. G. Ananthakrishnan, *The Hindu*

It spells out its message of what it will take to meet the rising climate risks by building higher resilience. —Eduardo Araral and Talitha F. Chairunissa, *The Jakarta Post*

Brings home the crying need for correcting the course of development. —Preety Bhandari, *Ecology, Economy, and Society*

An interesting combination of intellectual rigour and practical advice. —Sreekant Gupta, *JSEAE*, Singapore

Thomas fearlessly critiques the inadequacies of mainstream economics in addressing climate change, highlighting its fixation on short-term GDP gains.—Muthukumara Mani, *Global Policy*

A reference gold mine for bureaucrats, researchers, and the lay reader.—Ilyas Salim, *The Business Times*, Singapore

Full of practical case studies and conceptual frameworks on resilience.—Simon Sharpe, *Finance and Development*, IMF

To my sister, Malini

FOREWORD

This authoritative and clearly written book by a renowned economist focuses on the key concepts of risk and resilience in the context of sustainable development under the imminent danger of climate change. Prof. Thomas' rigorous and skillful analysis and policy applications highlight the need for holistic solutions to climate change and other sustainable development issues, as envisaged in the 17 Sustainable Development Goals (SDG).

The book should inspire decision-makers to formulate new policies and strategies for resilience and sustainability—and avoid the pitfalls. It will help point the way towards a balanced inclusive green growth (BIGG) path and an eco-civilisation for the twenty-first century.

The principal challenge facing humanity is sustainable development, which is at great risk as highlighted by the climate crisis. Here, we are all stakeholders because these risks and building resilience to them affect us all. For over six decades, mainstream development focused on material-based economic growth to overcome problems of poverty, hunger, sickness, and inequality. These issues are still severe in most of the poor countries, and even among poorer communities in the rich countries.

More recently, the concept of sustainable development has become more recognised as the framework needed to address multi-faceted and interlinked global issues. An essential element of this approach, discussed in this book, is to seek solutions, including resilience to growing risks, that

harmonise and balance the economic, environmental, and social dimensions of the sustainable development triangle. At the global level, the United Nations (UN) has sought to operationalise these ideas through the 2030 Agenda and the SDGs, universally accepted by all countries in 2015.

One vital SDG is climate action, which recognises that climate change is the ultimate threat multiplier—worsening all the other sustainable development problems. In this context, leading international scientists in the UN Intergovernmental Panel on Climate Change (IPCC) have clearly confirmed that continued human activities that emit greenhouse gases (GHGs) lead to catastrophic climate change, with the greatest impacts falling on the poor. This is the major driver underlying “climate justice” since the poor suffer the most, although they have the least responsibility for GHG emissions that heighten the climate risk. The two principles, “polluter pays” and “victim is compensated”, argue that the rich will need to transfer resources to the poor to offset climate damages.

The most effective way of tackling the climate conundrum is to integrate climate mitigation and adaptation policies within sustainable development strategies. Maintaining this balance in the sustainable development triangle (economy, society, and environment) dispels the “persistent false dichotomy” between economic prosperity and environmental protection—as argued by Prof. Thomas. The alleviation of poverty among billions requires continued economic progress in these areas, but reducing inequality and poverty must go hand in hand.

The concept of ecological footprint highlights the huge risk associated with humankind overusing ecological resources equivalent to 1.7 Earths. By 2030, it will need the equivalent of two planets to sustain the current way of life. Meanwhile, consumption is highly unequal with the richest 20% of the world’s population consuming more than 85% of planetary resources, 60–70 times more than the poorest 20%. Climate risk is rooted in the fact that just one per cent of the rich emit 175 times more GHG per person than the poorest 10%.

In this book, Prof. Thomas shows his deep commitment to sustainable development, especially its attention to vulnerable people and groups. As a highly experienced global practitioner in development policy, who has served at the most senior levels of both the World Bank and the Asian Development Bank (ADB), his advice is eminently practical. As a distinguished academic and veteran university professor, with an enviable record

of publications and presentations at high-level meetings, he presents his arguments lucidly and convincingly.

The book is valuable and highly relevant for global decision-makers, practitioners, researchers, students, and the public. Its attractive features include: a lucid explanation of the key principles linking risk and resilience, and its application to the “intractability of climate change”; clear examples of practical policy applications relevant to a range of circumstances, countries, sectors, and ecosystems; and an extensive and up-to-date bibliography to aid further research.

Colombo, Sri Lanka
April 2024

Mohan Munasinghe

A COMMENT: HOW POLITICS THWARTS CLIMATE CHANGE ACTION

- First appeared in The Straits Times, October 11, 2023, and reproduced with permissions. The original publication is accessible here: <https://www.straitstimes.com/opinion/how-politics-thwarts-climate-change-action>.

Kicking the can down the road on measures against climate change may be expedient politics but it's bad economics.

September 2023 was the hottest month in recorded history, surpassing the previous record set in September 2020. In fact, the hottest 12 years have been those since 2010. During that time, climate disasters have repeatedly hit the headlines: epic floods that submerged one-third of Pakistan, Hurricane Ian in the US that caused damage estimated at US \$100 billion, wildfires in Canada that razed an area as large as Germany, countless tropical storms, and heatwaves in the unlikeliest of places, including the Arctic and Antarctica, to cite but a partial list of recent cases. So frequent are the reports highlighting such catastrophes that people have become numb to news of them. What were once-in-a-century, off-the-chart events are being accepted as the new normal hazards of life.

As the economist and climate change expert Vinod Thomas, a former Senior Vice President at the World Bank and currently a Senior Fellow at ISEAS, notes in his eye-opening recent book: Risk and Resilience in

the era of Climate Change, it is not enough to simply label these catastrophes as “climate disasters” as if they are acts of God. They need to be understood as human-induced and avertable. The longer they remain unaddressed or under-addressed the deadlier they will get. Tipping points will occur from which, Dr. Thomas warns, there may be no return, like an irreversible rise in sea levels, the death of coral reefs, devastating marine ecosystems, and the extinction of more animal species.

FALLING SHORT OF WHAT IS NEEDED

The science is clear about what the world needs to do: to reduce carbon emissions by 43 per cent by 2030 if we are to achieve the target of an increase of 1.5 degrees in temperatures compared to pre-industrial levels, according to the International Panel on Climate Change (IPCC). But even if all countries abide by their Paris commitments, which is doubtful, emissions will fall by only 7 per cent according to climate researchers. What is needed, then, is a massive increase in ambition to mitigate climate change by reducing its main source, namely greenhouse gases. Adaptation—building defences against the impact of climate change—is of course also needed as part of building resilience, especially in countries most exposed to climate disasters, such as island states, river deltas, and places most prone to heat waves. But as Dr. Thomas points out, adaptation is not enough. “You don’t just need a bigger bucket to collect the water from a leaking roof”, he says. “You also need to fix the roof”.

People readily accept measures to boost adaptation, like building sea walls, constructing more heat and flood-resistant housing, and creating early warning systems to alert against climate catastrophes, because these yield immediate benefits.

But when it comes to mitigation, the gains from which accumulate slowly over time, neither people nor politicians appear ready for bold action. If you ask people, most will agree that climate change is a huge problem, maybe even the biggest facing the world. But do they feel personally at risk? The answer, according to surveys, is mostly no. And are they willing to bear higher costs associated with mitigation, in the form of, say, higher taxes on fuel or airline tickets? Definitely not.

This ambivalence translates into policies. While politicians solemnly proclaim the need for more ambitious mitigation measures, they don’t act like they believe it; the electoral calendar is more important. Last week, my colleague Jonathan Eyal documented the recent rollbacks on green

policies in Europe in what is now being called a “greenlash”: the rush to authorise new offshore oil drilling platforms in the North Sea by British Prime Minister Rishi Sunak who faces an election next year; the shelving of plans to ban new oil and gas heating systems for homes in Germany by the end of 2023 by the country’s Economy and Climate Protection Minister Robert Habeck, who comes from the Green Party; the opposition to nitrogen emission laws by farmers in the Netherlands, whose new anti-green party has made huge gains in recent parliamentary elections.

Climate deniers like Donald Trump in the US and Viktor Orban in Hungary still get high poll numbers. In Asia—the world’s largest emitter of carbon by region—no country has implemented a carbon tax besides Japan and Singapore.

Politics also intervenes when it comes to supporting developing countries’ energy transition or even raising funds for climate finance domestically. Rich countries have struggled to mobilise the US \$100 billion per year by 2020 for developing countries, which they had pledged during the Copenhagen climate conference in 2009.

They have even fallen short of raising US \$10 billion for the UN’s main fund to help poor countries adapt to climate change—a fraction of the US \$200–250 billion these countries will need every year by 2030, according to a report by the UN Framework Convention on Climate Change.

Yet, advanced economies spent at least US \$10 trillion in bailouts, stimulus packages, and other measures to fight the global financial crisis of 2008 and lavished US \$22 trillion to fight the COVID-19 pandemic in 2020 and 2021.

MISPLACED PRIORITIES

This ordering of priorities raises fundamental questions, according to Dr. Thomas: “Is the priority given to a problem related to perceptions of the imminence of outcomes? Are risks that are mostly outside one’s control, such as pandemics, valued more than ones that can be influenced by own actions? Is attention more easily directed to more immediate and modest issues that are manageable, while postponing the focus on the slower onset of intractable ones, even if they have ultimately deadlier consequences?”

The answers to these questions appear to be yes. What this amounts to, in the context of dealing with climate change, is kicking the can down the

road. But as Nicholas Stern, chairman of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics points out, “this is the opposite of good economics, because it will make the pathway to net zero more expensive, not less.” While the costs of action—mainly in the form of mitigation—are high at around 0.6 per cent of global GDP per year (or about US \$5.7 trillion relative to 2022 GDP) according to the IPCC, the costs of inaction would be at least four times higher by 2030 and seven times higher by 2050 under a high emissions scenario.

GETTING THE ENERGY MIX WRONG

What kind of energy mix countries choose is also influenced by politics. Granted, this is a tricky issue. While renewables such as solar and wind hold out much promise, with the costs of generation from these sources having plummeted in recent years, they still account for barely 5 per cent of global energy use. More than 75 per cent still comes from hydrocarbons like coal, oil, and gas. Abruptly halting investments in all of these would send energy prices through the roof and be a recipe for disaster. But that should not be an excuse to persist with politically expedient fuel subsidies, which hit a record US \$7 trillion in 2022, according to the IMF, mostly from advanced economies—which encourages the consumption of dirty fuels and makes it harder for renewable energy sources to compete. In addition, although countries have invested heavily in renewables, this has been more than matched by their investments in dirty energy. For example, India has increased its solar capacity roughly tenfold over the last decade, but also increased its energy generation from coal to the extent that its reliance on hydrocarbons has not been reduced. And in response to the sharp increase in fuel prices in the wake of the war in Ukraine, Germany chose to revive its coal-fired power plants which it had planned to phase out, while instead phasing out its nuclear power plants, which provided clean energy.

The political resistance to nuclear persists in several countries even though it is the safest and cleanest source of energy. Although there have been a few high-profile nuclear accidents—as in Chernobyl in 1986 and Fukushima in 2011—that have probably cost hundreds of lives, the number of lives lost to respiratory and other illnesses as a result of the pollution from coal and oil runs into the millions, not to mention the other environmental damage resulting from these energy sources.

THE PERILS OF GDP WORSHIP

Finally, the economics profession has failed both politicians and the public by continuing to focus on gross domestic product (GDP) as the main measure of economic progress, ignoring the depletion of natural capital and the degradation of the environment associated with increases in GDP. For example, destroying a forest to build shopping malls and condominiums adds to GDP but no adjustment is made for deforestation because there is no market price for the forest and its environmental benefits—including carbon capture. Economists agree that such adjustments should be made, yet they—including the IMF and the World Bank—continue to put GDP growth front and centre in their reports.

What gets measured gets acted on, so politicians continue to enact policies to boost GDP growth per se, regardless of their impact on the environment or human well-being. There is a narrative propagated by vested interests that green policies are “anti-growth”. This is false: Investments in renewables, energy efficiency, sustainable agriculture, and green technologies and industries can lead to massive job creation as well as GDP growth that is consistent with protecting the environment and reducing the costs of climate change.

As the world gears up for the 28th Conference of the Parties on Climate Change (COP 28) in Dubai, the delegates would be confronted with a huge agenda, including raising the ambition for mitigation, delivering on old promises to help countries with adaptation and energy transition and compensating countries for loss and damage associated with climate change. But they also face the challenge of overcoming what is probably the biggest obstacle to positive action in all these areas: politics.

Singapore, Singapore
October 2023

Vikram Khanna

A COMMENT: THE UNRAVELLING CLIMATE CRISIS

This book gets it right on the nose: the risks are high and rising, and the urgency to build planet-wide resilience greater than ever. It delivers a timely and actionable reminder.

On November 17, 2023, the global average temperature was 2 °C above the pre-industrial baseline, and 2023 proved to be the hottest year on record. Both could be dismissed as transient anomalies, but they delivered a stark warning. With GHG emissions continuing to rise, annual average temperatures could blow past the targets agreed to by the signatories of the Paris Agreement within a decade. The risk that warming could accelerate is growing because several ecosystems are perilously close to the tipping point. Hardly a day passes without the release of a new study that adds detail to what is an increasingly grim eco-climatic picture. Droughts, floods, heatwaves, and wildfires are regular occurrences and rising sea levels are compounding the pain from other sources.

What is more, these destructive events are being baked-in because CO₂ will persist in the atmosphere for centuries. And we may have seen nothing yet. Because of the speed with which climatic conditions are unfolding, ecosystems that used to change on a different geological timescale will have little time to adjust and consequently will be irreparably harmed. There is no need to guess as to what might happen. The evidence is inescapable at least to those with a moderate degree of awareness and belief in science.

According to one calculation, the risk of overshooting the 1.5 °C Paris goal by 2034 could be halved if annual emissions of CO₂ are reduced by 8 per cent. But with fossil fuel consumption, especially coal, showing no signs of slowing, achieving the desired reduction is slipping out of reach. In the apt phrasing of the UN Secretary General Antonio Guterres, if the use of fossil fuels is unchecked, “we are simply inflating the lifeboats while breaking the oars”, in that we may lose the ability to steer our economic futures.

The analysis in the book, cogently presented, stresses mitigation (or prevention) and adaptation (or coping) equally because unless the pace of mitigation is accelerated, the current warming trend will inevitably necessitate greater adaptation. Undoubtedly, mitigation is the first best option, especially as scientific projections are being proved accurate if not conservative regarding the deadly outcomes that await a world absent a decisive course correction. But with efforts to arrive at binding agreements via a succession of COPs (Conference of the Parties) making limited headway, the case for a Plan B that promotes adaptation and enhances resilience becomes compelling. Both developed and developing countries are finding that the sheer volume of investment needed to wean industry, transport, and power generation away from fossil fuels exceeds their capacity. Climate-related spending in 2022 amounted to over \$1.4 trillion, but to adequately address the challenge it may have to increase sevenfold by 2030. Technological advances could make this less of a stretch but given the few commercially viable technologies on offer, the transition of manufacturing and transport away from fossil fuels will be a slow process.

There is no silver bullet out there: not from the electrification of everything; and not because a near miraculous abundance of blue or green hydrogen will motivate industry to forsake energy-dense conventional sources. Although Direct Air Capture (DAC) and Carbon capture and Sequestration (CCS) offer some hope, scaling up currently available technologies to the point at which they would appreciably reduce the rate of warming is infeasible. The technologies are neither mature nor cost effective. Reversing deforestation even if it was a practicable solution, which arguably it is not, would be a King Canute like gesture so long as carbon emissions are not checked.

The book forcefully advocates efforts to mitigate climate change and shows how they could be financed. However, considering current trends, resilient adaptation would deserve undivided attention from policymakers.

This will be an immense undertaking with many different facets but if well-planned and systematically implemented, a growing global population might minimise hardship and continue to improve its well-being. The book offers policymakers a valuable agenda to consider and put into practice. Importantly, many steps in adaptation overlap and reinforce mitigation be it lifestyle changes or actions to protect forests and biodiversity. Indeed, meaningful adaptation will need to be pursued on many fronts. National and subnational governments will need to look beyond fire-fighting in the short term and muddling through over the longer term. Instead, they must plan for a future where disruption will be the norm by harnessing the scientific knowledge that is attempting to show where the Anthropocene is heading.

Policymaking for the longer term must be suitably far-reaching. Climate proofing the infrastructure will be unavoidable. The geographical distribution of the population, urban development, and land use must be reimagined because some coastal areas, islands, and regions exposed to extreme heat and water scarcity, may not remain habitable irrespective of defensive measures taken. Dietary habits may have to change and alongside, food security issues will loom large. Countries will need to develop adequate early warning systems using information from multiple sources. And most importantly, whether the objective is mitigation or adaptation, countries must work together to safeguard an imperiled planetary habitat.

This book eloquently echoes the warning many others have sounded, and it goes the extra mile by offering decision-makers a rich menu of practical policies.

Washington DC, USA
January 2024

Shahid Yusuf

PREFACE

Climate change is the gravest development risk facing humanity, upending lives and livelihoods and creating an existential crisis for life on the planet as we know it. It cuts across the global economy and has cascading effects on multiple fronts. That is why it is of special significance that its dangerous trajectory has coincided with several globally significant events: the COVID-19 pandemic, the biggest health crisis in a century that broke out in Wuhan, China in December 2019; Russia's continuing war in Ukraine that began on February 24, 2022 triggering severe food and energy shortages; and the Palestinian militant group Hamas' unprecedented attack on Israel on October 7, 2023, and Israel's brutal and unrelenting air and ground offensive and demolition in Gaza.

Environmental, social, and economic risks are headline news everywhere. Decades of environmental destruction and high-carbon economic growth were spearheaded by industrialised countries and followed by emerging economies. Backed, implicitly or explicitly, by mainstream economic policy and advice, they are the roots of today's rapidly unfolding climate crisis. The climate problem exacerbates daunting risks of shrinking water resources, financial distress, habitat loss and biodiversity extinction, and involuntary migration. These exigencies, in turn, weaken society's ability to deal with climate change and find workable solutions.

Closely linked to risk is resilience, which is getting increased attention from policymakers. With risks rising globally, there is a growing realisation that resilience building must go beyond simply strengthening how things are. Building resilience in these uncertain times means restarting from an improved position. In dealing with climate change, it is crucial to recognise that greater resilience must come both in the form of prevention or mitigation and coping or adaptation. Acting on resilience with anticipation would represent a sea change in development practice.

Risk and Resilience in the Era of Climate Change brings together frameworks of analysis and the latest findings on the dangers of and responses to runaway climate change and other rising threats. The risks to lives and livelihoods, the accelerating threat to biodiversity and the health of the planet will demand far-reaching changes in behaviour and sizable investments in resiliency—and a global consensus of zero tolerance for climate inaction. We are very far from these. Countries are grappling with the hazards of climate disasters, but because the crisis is global, the threat can only be effectively mitigated by including international response. Beyond climate disasters, economic agents are also worried about stranded assets, supply chain bottlenecks, and financial stress.

The high and rising stakes do not argue against all risk-taking, for example, in finding innovative solutions to climate change itself. But they revise the felt need for resilience building, especially in countries prone to hazards of nature, to have the capability and capacity to counter the next disaster. Resilience building tries to add flexibility and dynamism to tackle new dangers. A slew of economic tools and regulations is available for shoring up resilience, for example, carbon trading and taxes in targeting carbon emissions. But all these have yet to come close to having the impact needed to stave off the most deleterious effects of climate change. Trends in burning fossil fuels and the resulting GHG emissions—notwithstanding some decoupling of Gross Domestic Product (GDP) and emissions in several rich countries and a brief respite due to the COVID-19 pandemic—have continued to move in the wrong direction (Wolf 2024), marking higher records in 2024. The situation calls for an overhaul of global governance that will enable the enforcement of commitments needed to achieve global climate goals. Averting catastrophes through such efforts would not mean that the original predictions were false.

Understanding the risks of climate inaction and the need for resilience building tools that are most fit for purpose can help build the political support for action that is needed to avert the worst effects of global warming. Risk and resilience frameworks can help formulate climate policies that are suitable for country situations. Beyond the specifics of policy measures is the crucial change required in the mental frameworks in policymaking—from seeing environmental protection and climate action as impediments to economic growth to essential aids to continuing growth and well-being. Indeed, a better approach is needed for how economic growth is conceived and measured in the era of climate change—such as in lost labour hours or the decimation of forests due to extreme weather conditions. The UN’s SDGs target the quality of growth, and this book underscores the value of so doing. Annual meetings of Conference of the Parties (COP) and their follow-up have been lacklustre so far, and they must record binding commitments of countries on environmental care and climate action.

This second edition of the book, issued just over a year after the first, comes with the recognition of the emergency nature of climate change and rapidly changing conditions surrounding it. For one thing, climate scientists are seeing the breakneck speed of unfolding climate disasters in 2023 as an indication that their worst-case scenarios are playing out. Some are deeply concerned that they might have underestimated the speed and scale of the crisis. Unfortunately, science-based projections made for the end of the century have contributed to the false notion that this is a distant crisis. The reality is that the future is upon us (Robinson 2020). Worse is the storyline falsely spread by the powerful fossil fuel lobby as well as a segment of the economics profession that scientists’ disaster scenarios are overstated or that the case for strong action needs to be weighed against any cost to short-term GDP growth. The prospect that climate action favors sustained growth and wellbeing gets short shrift (Stern and Stiglitz 2023).

One year is a very short time span, but the year 2023, with all-time records in weather extremes and an avalanche of new studies, brings greater clarity about the nature of the crisis. It reinforces one of the book’s messages that there is a shift from uncertainty about an uncertain future to certainty that things are unravelling in the face of weak action (Lenton et al. 2023). Outcomes of the recent two COPs highlight this point (below). This trajectory also underscores a second message that both adaptation, because of the inevitable climate trend, and mitigation,

as adaptation alone can never keep up, are imperative. Both these points feed into a third message: that faced with the climate trend, it is not enough to react, but there needs to be prevention ahead of time, both to mitigate and to adapt.

The update is also prompted by the ups and downs in tackling the problem over the past year, which have been complicated by competing geopolitical, health, and economic emergencies. The outcomes of the COP27 in 2022 remain unimpressive. While members laudably committed to a specific fund for “loss and damage” beyond the usual financial support present in earlier COPs, most damaging is the continually lukewarm fidelity to the promise of limiting global warming within 1.5 °C. This limit would put the world on track as exceeding this threshold will result in severe impacts on ecosystems and human lives.

Outcomes of COP28 were slightly more encouraging than the preceding COP, though it remains to be seen if concrete action will be taken. Notably, language on fossil fuels was finally added to the agreement—though not that they would be phased out or even phased down, but that countries would transition away from them (Carbon Brief 2023). A Loss and Damage fund was also established to assist developing countries with recovery efforts resulting from damage from climate change. Other encouraging commitments include oil and gas companies stepping up for the first time on reducing emissions from methane, and a renewed focus on tripling renewable energy capacity (Fogarty 2023). However, while textual agreement seems to indicate increased global commitment to tackling climate change, it is not clear if there will be specific global actions to meet these goals.

This work adds to a growing literature on risk and resilience, and on how solutions to the climate conundrum might be found. Technological breakthroughs in low-carbon growth continue to hold promise, with 2023 marking new developments in nuclear fusion. The book brings together the essentials of analyses and experiences that readers can draw on to arrive at conclusions. But it goes further in offering key differences in observations and implications that could help move the needle to get better results. That leaves room for innovations, ingenuity, and surprises along the way that aid in the search for solutions. The book grew out of teaching graduate classes on climate and environmental policy, and development management at the National University of Singapore and at the Asian Institute of Management. It draws on three decades of operational work, policy discussions, and research at the World Bank and ADB. That

involved working with countries and the international financial community, including a decade spent evaluating the development effectiveness of investment projects and programs in all regions, particularly regarding their environmental sustainability and climate impacts.

Bethesda, Maryland, USA
April 2024

Vinod Thomas

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ACKNOWLEDGEMENTS

I would like to acknowledge the substantial contributions of several colleagues in writing this book. I thank Lee Kuan Yew School of Public Policy research assistants Chitranjali Tiwari and Kendra Wong for their excellent research and presentational improvements during the project, and Saba Abdulaziz S. Altwayan, Marion Hill, Monica Khoo, Shameen Idiculla, Megan Leong, Aman Thomas, Leila Thomas, Tsai Yi-Chen, Ranjana Sengupta, Myla Villavicencio, and Shih Hui Voon towards its end. Detailed and useful feedback from Laveesh Bhandari, Preety Bhandari, Deepak Bhattasali, Ninan Karachepone, Keith Cabaluna Detros, Sreekant Gupta, Silke Heuser, Siong Guan Lim, Igor Lincov, Robert Picciotto, Euston Quah, Cherian Samuel, Jose Sokol, Anil Sood, Daniel Rajasingam Subramaniam, Benjamin D. Trump, and Shahid Yusuf is deeply appreciated. I would like to note my close association with the work of Ramon E. Lopez. This work benefited from collaboration with Eduardo Araral Jr, Geeta Batra, Amar Bhattacharya, Benjamin W. Cashore, Lesley Y. Cordero, Shanta Devarajan, Homi Kharas, Joe Ingram, Gautam Kaji, Jikyeong Kang, Vikram Khanna, Muthukumara S. Mani, Vikram Nehru, Danny Quah, Marqueza Cathalina L. Reyes, Jyotsana Puri, Michael Sarris, Eng Dih Teo, Ioannis Tirkides and Frank Van Gansbeke. Support from Institute of Water Policy and Institute for Environment and Sustainability, and collaboration with Asian Institute of Management are gratefully acknowledged.

PRAISE FOR *RISK AND RESILIENCE IN THE ERA OF CLIMATE CHANGE*

“As we stare down at the climate emergency, this publication provides crucial insights into risk and resilience in troubled times. The work enriches our understanding of smart policy instruments which serve a dual aim, to mitigate climate change and enhance resilience. In so doing, it makes a key contribution to viewing economic growth through a different lens, one which accounts for the quality of growth, resilience, social inclusion, and environmental sustainability—where climate action makes sustained growth possible.”

—Inger Andersen, *Under-Secretary-General of the United Nations, and Executive Director of the UN Environment Programme*

“Here is a call—desperate yet well-reasoned—for global attention to climate change as a “super-wicked problem”, and the implication: nations and peoples must focus on “resilience” to contain the growing risks of irreversible catastrophe. In calm and convincing language Thomas calls for accountability across the board: of fellow economists for neglect of the natural environment and the quality of life; of global institutions (which he knows well) and of rich country leaders for the (pathetic) failure to help poor countries finance mitigation and adaptation; of journalists and weather reporters who have failed to connect weather disasters to climate change; of the “ugly” interests of the powerful fossil fuel industry. An important book, not only but especially for economists.

—Nancy Birdsall, *Founding President Emerita, Center for Global Development*

“Professor Vinod Thomas has eloquently and forcefully highlighted how important it is to improve climate resilience in the energy sector. He provides invaluable insights on the impacts climate change is already having on energy systems and about the key actions that are needed in response, covering policy, communication, innovation, investment, and individual behaviour. By doing so, he delivers a strong message that building energy sector resilience against climate change requires a multi-faceted approach across all parts of society.”

—Fatih Birol, *Executive Director of the International Energy Agency*

“With sweeping coverage and compelling analysis, Vinod Thomas explains the rising risk from climate change and other threats facing society. But Professor Thomas does not stop there. Rather he highlights the path forward including the need for investments in resilience, better disaster management, recast economic thinking, improved global governance, business transformation, and most urgently, a shift in mindsets that will reshape education, public values, and ultimately behavior. Critical reading for policymakers, corporate leaders, environmental advocates, energy experts, as well as students and scholars—and anyone else interested in a sustainable future.”

—Daniel C. Esty, *Hillhouse Professor, Yale University and Editor, A Better Planet: 40 Big Ideas for a Sustainable Future*

“With the sharp rise in climate risks, various discussions of policy and technical solutions are at center stage. However, for these deliberations to have meaningful traction, they need to be supported by a sea change in people’s mindsets and policymakers’ priorities for action. This book makes a significant contribution in calling for transformational change in values, education, and behavior that will underpin the sustainability of development. A must-read for policymakers and academics alike.”

—Jikyeong Kang, *President, Dean and MVP Professor of Marketing, Asian Institute of Management*