Report of the Independent Task Force on Creative Climate Action

CONTENTS

Task Force Background	04
Executive Summary	05
Section 1 · The Context	13
Section 2 · On Climate Enlightened Actions	27
Acknowledgements	39
Annex 1 · Task Force Members	40
Annex 2 · Essays by Task Force Members	44

Task Force Background

The Independent Task Force on Creative Climate Action was formed by a group of intellectuals and change-makers, with diverse fields of competence, from twelve countries around the world. Deeply concerned about the lack of climate action at scale on mitigation and adaptation issues, the members came together to think creatively. Acutely aware that institutions of governance have not been able to respond to the climate crisis at the scale needed and the urgency demanded, the members sought to put their collective capacities together to develop alternative approaches.

Starting in mid-May of 2021, at the request of Professor Shiv Someshwar (then the European Chair for Sustainable Development and Climate Transition at Sciences Po, Paris) we began discussions on the current global responses to the climate crisis. The offer of Dean Enrico Letta, and later of Dean Arancha Gonzalez, of the Paris School of International Affairs, Sciences Po (PSIA) to provide institutional support was gratefully accepted. Meetings of the Task Force have been virtual, other than the final one held at PSIA in late September 2022.

Civil society critics have demanded altruistic actions from the state and the market to solve this common human and planetary crisis. Efforts over the last 30 years have not shown evidence that such altruism can and will manifest at the scale that is required. In the meanwhile, climate change and its impacts have accelerated. As a group of independent citizens, the Task Force believes that enlightened self-interest of individuals, countries and companies is the lever for climate action that is equitable and environmentally sustainable.

The members of the Task Force do not represent any specific social constituency, government or company. Rather, they come together in the conviction that participation in the ideation of creative climate action is a positive public good. The intention of the Task Force is not to be prescriptive of what countries, companies or societies must do. Rather, the report of the Task Force is an invitation to a deeper dialogue on the issues of enlightened self-interest, its opportunities and its challenges, with the hope of motivating new thinking and significant and effective climate action around the world.

Executive Summary

Executive Summary

THE CONTEXT

Climate action is anemic despite three decades of science, awareness, promises and protests. While international climate diplomacy soldiers on year after year, in COP after COP, and scientific support for immediate actions mounts in successive reports, a majority of economic policies, trade negotiations, and business decisions around the world, pay little heed to climate promises. Vigorous and passionate civil society climate movements, despite failing to make discernible impacts on practical policy and decision making, continue to make demands for altruistic behavior on the part of economic agents, whether businesses or governments.

As members of the Task Force, we see the context for climate action in terms of more than climate and economics. The impacts of climate change are large and growing. The economic and social impacts of climate have considerable political resonance as well, both within national borders and in distant countries. Livelihood systems of vulnerable communities in the Global South and North, and islands and low-lying regions, face the brunt of impacts. No country or community is immune from droughts, extreme dry conditions, torrential rains, pest infestations, forest fires, hurricanes, storm surges, flooding, ocean acidification and record-breaking heat waves.

Policies undertaken in response to climate change also have considerable economic and social impacts, with political ramifications. While deferring emission reductions would mean higher costs in the longer term, reduction in fossil fuel subsidies often leads to cost increases in energy in the short term, often resulting in social unrest. Policies that seek to replace fossil fuel with less Green House Gas (GHG) polluting forms involve difficult debates, and intense pushback from industries and labor alike. The origins of social inequity, whether gender, sexual orientation, race, class, ethnicity or education, heighten vulnerability to a changing climate, in the Global North and South. Development policies that may have little direct relation to climate have resulted in large scale changes to the underlying ecology and environmental services more generally, and thereby have enormous implications for climate action. The accelerated unfolding of the impacts of Anthropocene – consumption coupled with enhanced climate variability, is wrecking societal abilities to create stable planetary stewardship.

The GHG reduction pledges of countries are mostly 'far too little, too late,' resulting in the reduced likelihood of holding the planet to 2 degrees Celsius rise, let alone the aspirational goal of 1.5 degrees Celsius of the Paris Agreement. The 'polluter pays' model favored by economists has been 'just over the horizon' for the last several decades, with its limited uptake and loopholes failing to make a dent in reducing global emissions. The language of 'win-win' of climate actions, familiar to readers of reports of think tanks, NGOs and philanthropies as much as of governments and companies, is also to blame. Stranding of fossil fuel, a critical climate action, for example, would result in not only losing profits, but also the loss of jobs and revenues which would not be evenly distributed between countries or even within a country. Faulty framing of solution pathways, with a bias for hope, ignores the self-interest of stakeholders and tends to exaggerate the benefits of technology. The deployment

of 'net-benefits' language struggles with short term social costs and their political ramifications. Energy transition models, for example, often ignore the potential for regional and ethnic tensions due to the geographical concentration of fossil-fuel production and the political context in which the production is taking place. Just transition plans suffer from similar myopia, jeopardizing earnest attempts of countries and companies. The scale of solutions needs to be people centered, with social mobilizations releasing systemic lock-ins and influencing policies.

Two notable tensions are observed in democracies with respect to climate action. One, between citizens' desire to participate and be involved in choices impacting their lives and the high degree of technical complexity of the choices. Two, assurance to political parties (and governments) investing a considerable amount of political capital on ambitious climate agendas of being rewarded on election day. The first is important for setting up a virtuous cycle involving societal impetus and technical expertise for climate transition, with both being in sync on issues of distributional equity (and the well-being of nature). The second is on the predominantly negative sentiments associated with climate change by the public (as a risk, with more losers than winners) and the relatively light traction of climate change vis-à-vis more traditional issues (such as national security, economic growth, or identity) at the polls. Resolving these tensions is of paramount importance to enable democracies around the world to accelerate the climate transition.

While the climate narrative of aligning economic development choices with the goals of the Paris Agreement is gaining traction everywhere, a sense of injustice pervades it. The ethical and financial obligations at the heart of climate convention formalized in the UNFCCC have had poor traction in practice, whether it is the principle of the Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) or the US$100 billion promise. Policy actions for stronger climate mitigation face growing social distrust and economic volatility. Contributing to a sense of a breakdown of 'social contract,' the rise of illiberal politics in some countries has resulted in policies that help maximize economic self-interests of the powerful and wealthy classes, widening disparities. An unfortunate consequence has been a widespread loss of trust that impacts and limits global climate action. Recent wins in the courts of several countries, in both the Global North and South have rekindled the hope of advancing effective climate policies, albeit in a small number of countries.

Mitigation and adaptation efforts continue to be choked by a lack of finance. There are some signs of movement, such as the International Solar Alliance initiated by India and France with 90 countries as its members, the Network for Greening the Financial System of central bankers, the International Sustainability Standards Board, and the Glasgow Financial Alliance for Net Zero with assets of over $130 trillion, but the overall progress is slow. The global constrains include the need to finance energy producers in the short term, lack of consistent policies on carbon pricing, private pools of capital being outside social and regulatory pressures, and international financial agreements lacking clarity and teeth, among other issues.

In infrastructure and economic planning, the practice of using 30-year periods of reference of climate conditions ('climate normals') is becoming questionable, with past years being poor climate guides for the future due to climate change. Statistics of climate elements important to human well-being are increasingly subject to deviations. Policy and decision makers have to contend with four kinds of uncertainty in their responses to climate change: from lack of information, from randomness, from radical uncertainty and from contrived uncertainty. While the first two are routinely dealt with by enhanced data gathering and use of optimization functions and probabilistic understanding, the latter two require new approaches. Radical uncertainty requires an understanding of non-linear systems behavior. Contrived uncertainty is due to the deliberate obfuscation of science in the social and political spheres. Current institutions are hard pressed to deal with both the latter kinds of uncertainty.

A critical aspect of the context of climate action is the interconnectedness of systems – of food, energy, economy and livelihoods, and the vulnerability of the systems to shocks and stresses. Social protection systems, if insufficient in

shielding vulnerable communities and individuals from the effects of climate change, further deepen impacts. The shock of COVID-19 adds to the difficulty, making it harder to reach several targets of the UN Sustainable Development Goals, with climate change further accentuating the risks. Policy making is hence extremely challenging, with several system variables interacting to produce new emergent properties and unexpected behavior in systems, thereby creating social and fiscal volatility. Pessimistic of the ability of modern science to understand and evaluate the dynamics of complex ecosystems in Amazonia, the Congo Basin and Kalimantan/Borneo, scientists are partnering with local knowledge systems. The tool kit for complex adaptive management is being assembled, though still in its early days for the practice of policymaking.

Despite global recognition of the value of 'nature-based solutions', efforts to scale them have been elusive. Top-down designs, poor understanding of valuation of ecosystem services and of the complex feed-back loops from a changing climate, fragmented governance arrangements and uncertain market access continue to challenge their practice.

Path dependency, constraining the future, plagues effective response to climate change. Beyond the financial cost, time, and dislocations involved, political economy of self-interests is a major factor. In responding to climate change, it is not only the question of technology or price that matters, but equally the manner of dealing with powerful interests that are fearful of the impacts of new policies or are indifferent to climate change.

The question of 'what needs to be done?' to reduce GHG emissions and build resilience to climate risks is *well understood by now*. They include managing climate risks of households and societies from weather to climate change scales, while protecting the most vulnerable populations and ecosystems; the large scale deployment of efficient and economical net zero energy systems and widespread electrification of end uses; decarbonizing of industrial, urban settlements and urban infrastructure; the transformation of food systems by intensifying use, agroforestry, better nutrient, livestock and soil carbon management, the improved restoration of natural ecosystems, while reducing food waste on the demand side and a sustainable healthy diet; creating new livelihood opportunities that are economically productive, environmentally sustainable and help store carbon for populations in peat and coastal wetlands and savanna ecosystems; the use of blended financing of local, national and global low carbon pathways away from fossil fuel use and for 'just transition' to secure the well-being of natural systems, vulnerable populations and fossil fuel dependent communities, states and regions. While some countries, companies and social enterprises are translating plans into action, the scale is nowhere near what is required. Countries and companies approach climate action utilizing a narrow frame of economic self-interest. The real challenge is the question of *'how to deal with self-interest to advance climate action?'*

Led by diverse civil society groups, the push to reduce GHG emissions, especially the opposition to fossil fuel use, is growing in several parts of the world. It spans a wide range — from the better-known Global Citizen, Extinction Rebellion, Sunrise Movement, and Fridays for the Future, the movements of indigenous people in the Amazon, Kalahari and Kalimantan, of youth and religious leaders, to the everyday activism of citizen groups in the Global South fighting for environmental justice. What makes them more similar is their central demand for governments and companies to jettison short-term profit motivations, and to focus instead on the long-term well-being of societies (including planetary interests, in the case of some). The lack of success has led the movements to further double down on their demands. Members of the Task Force seek the same outcome as the numerous fearless peoples' movements – for policies and decisions of governments and companies to implement a low carbon future, while safeguarding pathways for the well-being of nature and prosperity for all in a future ravaged by climate change in the Global South and the North. However, the abysmal record of the inability of policy and decision makers to implement actions for the climate good makes us question the root expectation of decision-making that is against the perceived self-interest of individuals, communities, companies and countries.

ON CLIMATE ENLIGHTENED ACTIONS

Global climate transition to carbon-neutrality will be successful only when all countries *and* companies undertake transformations that effectively drive down GHG emissions and build climate resiliency in their societies. However, that will not happen if each country and company continue to pursue self-interest that is 'narrowly framed' in their policies and decisions, a self-interest that is measured solely by standard economic indicators over short time horizons.

Material self-interest of people (and companies and countries) is inextricably entangled with the well-being of nature, as well as those of other people (and companies and countries).
An enlightened climate understanding is the knowledge of impact entanglements from climate change. The impacts of climate change on others and on nature, as well as their responses to it, affect one's material self-interest in both the short and longterms. Utilizing that knowledge in the design of policies and investments responding to climate change is climate enlightened action. The task force has concluded that enlightened self-interest is the only realistic pathway to a sustainable world in the face of the current and future impacts of climate change.

ETHICAL CONSIDERATIONS

Ethical considerations, of accepting responsibility of past emissions and of the curtailment of future emissions' impact on others and future generations, central to the 1992 UNFCCC convention, enriches the conception of self-interest noted above. Distinct from self-interest focused on the material and ethical considerations is a third conceptual definition, emerging from a deeper understanding of how humans understand their own nature and their relationship to the cosmos. Long the hallmark of spiritual traditions such as the Advaita of Hinduism, Christianity of John of the Cross, Islam-Sufism, Buddhism and Daoism, and amongst some indigenous people, the understanding is emerging as well in contemporary science, on the nature of relationship of the quantum and the macro worlds and in human cognitive inferencing.

Calls to mobilize climate action *based exclusively on ethical considerations* have been less than successful. This is the case with the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC), elaborated in the UNFCCC treaty in Article 3.1 and Article 4. The application of CBDR-RC has, unfortunately, been mired in contention. Perceived material self-interest in the short term has been its Achilles' heel. The unsuccessful attempts to decarbonize international shipping reveals the manner in which CBDR-RC principles in the context of a flag state system has been used by some shipping companies.

In the following paragraphs, we highlight issues and illustrations from an enlightened approach to climate action. They are examples from several areas of competencies of the Task Force members. The intent is to illustrate the potential for climate enlightened action. They are not prescriptive nor intended to be priority considerations for countries and companies pursuing climate enlightened action.

DISTRIBUTIONAL IMPACTS, SOCIAL STABILITY AND ECONOMIC GROWTH

Action on climate is not solely determined by the economics of climate. This is all the more obvious in democracies where mass support for climate action is dependent on the electorate's expectation of the benefits of action. Net zero and deep decarbonization plans, for example, must be transparent of the societal implications of the uneven distribution of the losses and gains of stranded fossil fuel assets. The implications for societal stability and governance are critical as well. For a virtuous dynamic to emerge between bottom-up citizen participation and technical expertise requires investing political capital in more participatory and deliberative forms of democracy. Further, efforts in terms of political capital to advance climate action should go beyond extolling effectiveness and raising awareness of climate change risks. Utilizing climate enlightened self-interest is essential in framing the responses by showing benefits at the individual and the interdependent collective levels, the reductions in inequality and the benefits of energy independence.

The interlocking of societies and nations through trade and supply chains offer other opportunities. *Forest management*

in Gabon is an example of the successful use of enlightened national self-interest in leveraging international demand for timber to make the well-being of Gabon's forests and ecosystems integral to its long term low-carbon pathway of economic growth.

GAME THEORY-BASED APPROACHES

Game theory-based approaches, replacing economic or limited rationality by enlightened self-interest, should go beyond the current preoccupation of 'winning the game' to 'continue playing', seeking potential cooperative agreements for ambitious climate action at national and international scale.

WEAKENING OF 'CLIMATE NORMAL'

With climate data from the past no longer a reliable guide on their future status, optimization for a 'future climate' is not useful. Reformation is urgently needed of the manner by which companies and countries derive costs and benefits of action and non-action regarding climate. They must include effect of volition, power imbalances and ethical considerations of impacts of past action, as well as path dependency and its equity implications.

THE JUST ENERGY TRANSITION PARTNERSHIP

The Just Energy Transition Partnership (JETP) of South Africa and some G-7 members is a good example of the leveraging of self-interests in the context of domestic coal politics, stranding assets for decarbonization, and the need of international climate diplomacy to succeed. Unique given its context and timing, advancing similar efforts elsewhere should not merely replicate a JETP-type partnership framework. The efforts should bring to bear more foundational understanding of the context and the possibilities: of local industrial political economy, social and institutional tractions, and the dynamics of self-interest of powerful stakeholders.

Enlightened self-interest of EU and Carbon Border Adjustment Mechanism (CBAM) · CBAM is a tariff instrument being imposed by the EU to help achieve carbon neutrality by 2050 in the European Union. It includes cement, iron and steel, aluminum, fertilizer, and electricity production, with others such as hydrogen, plastics and organic chemicals likely to be added. With a climate enlightened approach, we consider other possibilities and continuities, drawing attention to commonalities and shared purposes of EU and the world, and carbon neutrality as both an end and a means to get to equitable and environmentally durable societies. Such an approach would center on the EU paying equal attention to socio-economic and ecological considerations in countries and regions outside the EU, as it does to carbon content of their products. We believe it is in EU's enlightened 'self-interest' to enhance investments in advancing low-carbon production systems and to help develop linked carbon markets in Africa, Asia and Latin America, thereby generating virtuous cycle of equitable low carbon growth. That would be real progress, benefiting EU's businesses and advancing the world towards carbon-neutrality that is just.

ADAPTIVE MANAGEMENT

Economic turbulence amongst households and communities, due to the impacts of enhanced variability of climate as a result of climate change and from policy responses requires institutions of governance to anticipate shocks and put buffering systems in place. Purely physical infrastructure engineering solutions (such as the use of embankments to contain a river or sea walls to stem storm surges) are woefully insufficient in situations of climate uncertainty and surprise. For institutions to embrace adaptive management, the most important ingredient is leadership. That requires changing our education system to include design thinking, planning in the face of social anxiety, holarchic scaling, and value of empathy, issues that are currently at the margins of pedagogy.

GOVERNANCE INSTITUTIONS

State influencing and capture by special interests is a major challenge for climate action. While the current focus is on governments in the Global South, perhaps far more damaging to the global climate is state influencing in some countries in the Global North. The livelihoods in sectors with large carbon emissions such as fossil fuel and industry, should be the foci of 'just transition' efforts both in the Global South and the North rather than being villainized. The political dividends of such climate actions would be tremendous. Climate change is the one common adversary in all fragile contexts. Such an

enlightened understanding should be the basis for collective climate action, potentially sowing the seeds for pathways to peace.

CITIES FOR CLIMATE ACTION

Cities constitute climate action conundrum. The ever-rising tide of consumption by the middle income and wealthy residents in the cities in Global North and South, is the single most important driver of global GHG emission. At the same time cities are at the receiving end of extreme climate events. The political economy of cities is at odds with the dominant social climate ethos. With the exception of some cities in Western Europe and possibly Singapore, amongst a handful of others, and despite the massive push by specialized movements such as C40 Cities and 100 Resilient Cities among others, cities are, mostly, sites of fragmented climate action on mitigation as well as climate risk management. Structural changes in city administration and budgets to drive sustainability operations required of a 'one-city' approach, or transforming land use and restricting the use of personal automobiles to enhance climate resiliency are far less common. It is very much in the self-interest of city residents to change the situation with respect to climate action. The wealthy and the poor both are vulnerable to climate impacts, the difference being a matter of degree. Acting in their self-interest, the influential residents of cities need to facilitate collective rather than private climate action.

SCALING UP

Climate action in the Global North and South is beset with tens of thousands of successful pilots that have failed in the scaling up. Solutions at scale are not merely deft applications of technology, incentive creation or regulatory control. Coordination is essential between the state, society and market, reducing friction between the three, and allowing each to accomplish what it does best. Access and agency must be at the heart of scaling up, successfully leveraging enlightened self-interest in varied locales. DIKSHA school education platform of the Ministry of Education of the Indian government is an example of scaling up success. Catalyzed by the EkStep Foundation, DIKSHA is available across India, supporting diverse languages and solutions. During the COVID-19 pandemic with schools shut down for several months, the digital platform became essential for schoolteachers and students, resulting in 5 billion sessions, and over 100 million verified credential awards to teachers. Useful to consider for climate action as well, EkStep's core values and methods include enhancing agency of all stakeholders to participate, co-create and innovate, designing for what works at scale, leveraging technology for public good creation, and using existing institutions and partnerships in implementation. A quota policy on GHGs, providing unambiguous signals for businesses to respond to, could work in robust, well regulated market settings.

The 'Luz Sustentable' program of the Mexican government launched in mid-2011 is a noteworthy example, leveraging the self-interest families to save on their elecricity bills (using energy-saving bulbs, thereby reducing electricity consumption while not having to cut back on it) and resulting in avoided GHG emission. Advancing societal thinking utilizing shared technology infrastructure, co-creating solutions, and inducing network effects are critically needed for scalable climate solutions. The climate action community needs to draw on the wellspring of successful scaled up actions from other sectors as well.

FINANCIAL SECTOR

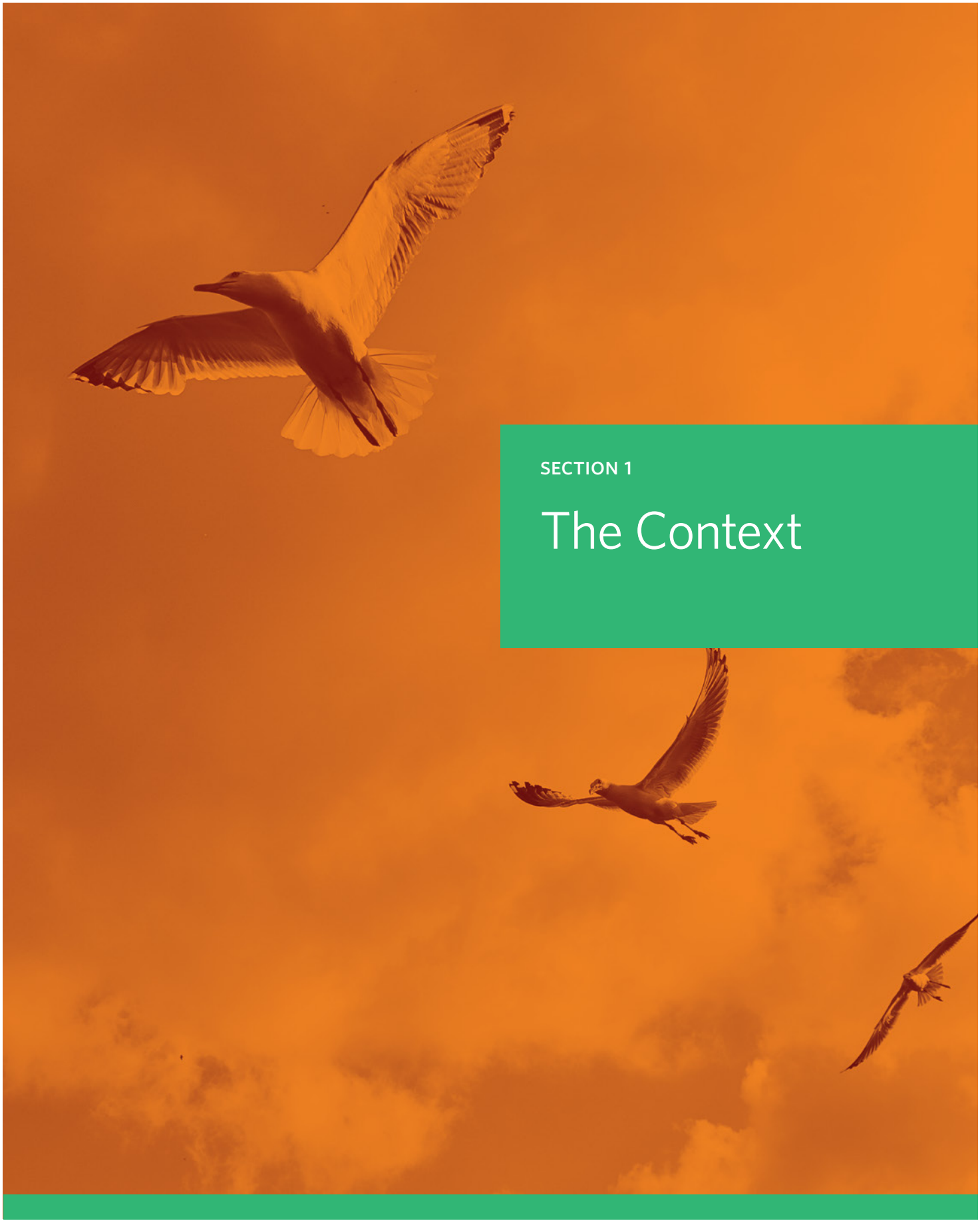
Enlightened self-interest in the financial sector requires financial firms channeling investment to those companies that are equipped to handle the challenges of climate transition and likely to prosper in a zero-carbon world. They would also need to avoid lending to companies whose business models make them vulnerable to rising carbon prices and climate change, and in particular, to avoid long-term lending secured on fossil fuel assets whose value may fall sharply. The sector's enlightened self-interest could be more effectively harnessed by giving a clear mandate to central banks and financial regulators to take climate change into account, the formulation and global implementation of a common methodology for stress testing banks and insurers, a competitive set of disclosure standards for financial and non-financial companies, clarity on the Environmental, Social, Governance (ESG) standards, and extending regulatory and social accountability to private equity and shadow banking systems.

AGRICULTURE, FORESTRY AND OTHER LAND USE SECTOR

The Agriculture, Forestry and Other Land Use (AFOLU) sector presents a critical area for climate action, accounting for high level of emissions while also critically important to economic and cultural lives of marginalized local people and indigenous communities. Attaining universal food security in the face of climate change will require several key transformations. They include sustainable intensification with production increases in some locations offsetting the production declines in others due to land degradation, climate impacts, and other factors, movement toward greater tree-based and forms of agriculture more rooted in perennial plants that often resist climate impacts better than annual crops, physical and market infrastructure to better withstand heightened extreme climate events, improvements in food storage and postharvest stewardship, reducing consumption of meat and dairy from ruminants as part of a systemic shift to more healthy diets for improving both human health and environmental sustainability, and strengthening social protection to help meet the needs of people who face various forms of malnutrition as a result of climate disasters.

NATURE-BASED CLIMATE SOLUTIONS

Nature-based climate solutions incentivizing self-interest of individuals and businesses, while ensuring centrality of equity and sustainability, is another area for AFOLU action that should be context-specific on social, cultural and ecological issues. Market-based mechanisms should be based on values that are tangible for people (such as the approach taken in valuing individual wild animals). Markets for natural assets would need to be regulated reflecting moral and ethical standards for sentient natural assets, and ownership and usufruct rights to land and natural assets of local people. Institutions with appropriate standards and metrics on the delivery of the solutions would need to first and foremost be co-owned by local communities and responsive to their needs, while being integrated with appropriate government bodies in the deployment of regulations.



SECTION 1

The Context

SECTION 1

The Context

The decision by Germany to bring back coal-fired power plants, by the US to increase gasoline supply at the pump in the summer of 2022, and of the UK to award around 100 licenses for oil and gas exploration in the British North Sea to boost domestic hydrocarbon output are grim reminders of the fragility of climate policies even in countries with leadership supportive for taking action on climate change. While forest fires in California, Spain and Portugal, extreme heat waves in Tunisia, western Canada, the US, UK, India and Pakistan, flooding in China, Nigeria, Pakistan, Sudan and Western Europe, hurricanes in Cuba and Florida, and prolonged drought and famine conditions in the Horn of Africa – events just in the last twelve months, irrefutably prove vulnerability of societies in the Global North and South to a changing climate, political decisions on economic issues remain divorced from their impacts on climate. That has been the way, for the most part, since the scientific evidence on climate change began to be widely circulated and made available over the last 30+ years. Policymakers are not ignorant of the impacts of human activities on the global climate. It is not a lack of knowledge of what needs to be done to forge pathways of mitigation and adaptation towards a more sustainable and resilient world.

In this section we draw attention to issues of the current context that *often tend to get less attention*. Following a brief overview of the direct impacts of climate, we briefly highlight the following issues of the current global context as they relate to climate action: the impacts of policies taken in response to climate change, issues of economic inequality, societal thinking, 'win-win' and net-benefit' framings urging action, vulnerabilities of 'limited access' states, greenhouse gas (GHG) reduction promises, the sense of 'injustice' that pervades the climate narrative, promise of climate litigation, financing climate action, limitations in using historical climate data and conditions of complexity, implications of kinds of uncertainty and of path dependency, and the emergence of 'nature-based' solutions. A global overview of the current impasse on climate action rounds off the section. The issues highlighted in this document provide an orientation of the collective world view of the Task Force vis-à-vis climate change. *They animate our understanding as well as our aspiration for actions to advance a more humane, equitable and climate-just world.*

IMPACTS OF CLIMATE

The direct and indirect impacts of climate are considerable. No part of the world is now immune. Amongst direct impacts are the effects of extreme events such as from flooding following torrential rains (in Chad, Germany, India, and Nigeria, and recently in Australia), drought and chronic food-insecurity (across the Sahel and the Horn of Africa), the drying of major waterways (including portions of the Mississippi, Rhone, Parana and Mekong rivers) that have affected shipping, fishing, and hydroelectricity production in addition to city water access and agricultural loss. Several countries are facing droughts and floods simultaneously as well. A warming ocean with thermal expansion of sea water and land ice melt has accelerated sea level rise to 4.4 mm per year in the 2013 and 2021 period, an increase by a factor of 2 relative to the 1993 and 2002 period, with continued ocean acidification. Arctic sea ice and the East Greenland Sea ice extent are a record low by a large margin.[1] In several cases, the infrastructure designed to withstand extreme events (where they exist) have failed, impacting agricultural and industrial production systems; for example, global automobile supply chain disruptions from flooding in Bangkok in 2011 that led to severe contraction in automobile and electronic production

in Japan[2] with knock on effects in automobile markets across the world. The magnitude of extreme weather-scale events puts an enormous economic strain on cities, provinces and countries. Storm surges overrun coastal barriers inundating cities and farm land (as in western Florida and Cuba because of Hurricane Ian and Typhoon Noru in Vietnam); high tide, sea level rise and storm surge inundating cities (as New York city from Hurricane Sandy, and the expensive plan to relocate Indonesia's capital to East Kalimantan given the likely threat of rising sea to Jakarta); food insecurity due to loss of harvests from long dry spells and droughts (as in parts of Chile, China, Malawi, Uganda, and the Horn of Africa); failure of rains threatening urban water supply (as in Cape Town and western US) and intense heatwaves leading to surge in morbidity and mortality amongst the elderly (in Europe). According to the US Drought Monitor, in July 2022, almost a third of the western states were experiencing extreme or exceptional drought, exceeding the severity of droughts in the region since 2000.[3] In rainfed areas, drought affects crop and livestock productivity and profitability. Drought also reduces the quantity of snowpack and the flow of water to irrigated farmlands. Further, ravaged by unseasonal rain or droughts, hundreds of thousands of people seek refuge across national borders as in Central America, or due to the intense pressure for forest and pastureland catalyzed by climate events that lead to large-scale violence. There is considerable undercounting of the direct impacts as well, while little attempt is made to systematically consider the fracturing of social networks and splintering of communities that are an indirect impact of climate change. The economic and social impacts of climate have considerable political resonance as well, both within national borders and are felt in distant countries.

POLICIES IN RESPONSE TO CLIMATE CHANGE

Policies taken in response to climate change have considerable economic, social and political impacts on societies. While it is well known that deferring emission reduction would mean higher costs in the longer term,[4] reduction in fossil fuel subsidies often leads to volatility and cost increases in energy in the short term.[5] Cost increases in energy often lead to unrest as seen in Kazakhstan and the *gilets jaune* marches in France, and the expectation of mass protests in Western Europe later in 2022.[6] Policies that seek to replace fossil fuel, such as coal, with less GHG polluting forms generate harsh and difficult debates, including intense pushback from industries and labor alike. Policies to enhance natural systems in urban areas at the expense of built environment leads to new urban patterns, in turn creating new winners and losers. Climate policies interact in real time with other social and financial dynamics, and risk deepening economic inequality. Development policies that may have little direct relation to climate have also resulted in large scale changes to the underlying ecology, with enormous implications for climate. Examples include the explicit policy encouragement to expand beef rearing or cultivation of rice and oil palm, as well as the clandestine support for illegal extraction of timber, gold and coca. Policies that seek to rectify the issues are not designed to deal with the changed ecological conditions and new sets of socio-economic relations that would have emerged in the interval.

ECONOMIC INEQUALITY

Economic inequality is pervasive in the Global North and South. The origins of social inequity, whether gender, sexual orientation, race, class or education, heighten vulnerability to a changing climate. The poorer sections of society, whether in Latin America, the US, EU, Asia or Africa, in urban and rural areas alike, are most vulnerable to the direct impacts of climate change, as well as from disruptions that result in

soaring food and energy prices. They result in hunger, malnutrition, loss of livelihoods and most importantly a sense of despair amongst the impacted populations. Relocation policies that are poorly designed result in the splintering of social networks, further impacting the ability of the populations to recover. Policy responses to climate change — whether a deep greening transformation of industries, the closure of coal mines (to decarbonize energy system), the rise in the cost of gasoline (to disincentivize travel), the commoditization of natural resources that marginalize, reduce or forbid access, or the oligopolistic nature of the fossil fuel systems (including their refining) have a higher impact on the poor in all societies. Hence, it is not surprising that in many countries it is the lower income groups that mobilize against climate policies that are perceived to threaten their economic near future.

CHALLENGES OF SCALING UP

The enormous scale of impacts of climate change requires solutions at the scale of whole societies. Further, climate impacts reflect complex socio-economic contexts and inequities. The solutions hence need to emerge from specificities. As a result, climate actions need 'societal thinking' to develop localized solutions that scale. To be truly local, in contrast to the default approaches of governments and corporations, the solutions have to start with people and communities. Participatory approaches are just the beginning of the types of community-centered approaches needed. A key challenge to instill trust is to restore agency, of individuals and communities. The loss of agency in communities around the world is due to the interplay over decades, if not centuries, of a number of issues: centralized governance, devalorization of local knowledge, social and cultural marginalization, and external design and planning expertise (whether metropolitan or from the Global North). Restoring agency requires unique local knowledge and skills and for local populations to own the process of creating solutions. For that to happen, *communities should be able to see, sense, solve and aspire for change*. It requires going beyond community-driven development where the ownership still lies with distant entities, of governments, corporations or multi-lateral institutions.

'WIN-WIN' FALLACY

Reports urging climate action on the part of countries, companies and individuals assure us of 'win-win'. Whether from a think tank, bank, fossil fuel company or a multi-lateral agency, climate plans laid out for mitigation and adaptation urge action as a 'win-win' for all of the stakeholders involved. The lack of practical action at scale around the world, despite promises of 'win-win' is, hence, all the more incomprehensible to observers. In democracies, a win-win rhetoric damages broad-based support as it would be perceived as disconnected from the reality of distributional impacts, thereby undermining the credibility of the climate action framed in those terms. The 'win-win' logic ends up ignoring the criteria of social justice and equity, which, instead, must be the very building blocks of any climate agenda.[7] A key reason lies in faulty framing of the solutions. Most cases of climate 'win-win' have a bias for hope: partial consideration of stakeholders (leaving out business interests in global supply chains of non-timber forest products, for example), assume a facilitating mechanism where none exist (such as a well-functioning national carbon market), ignore powerful set of interests (such as of coastal real estate developers), exaggerate the potential of technology, assume political decision-making to be neutral to stakeholder interests, or assume societal indifference between short and long-term economic interests (an issue we highlight next). Most of these assumptions are unrealistic, with little bearing in the context of the place. The facile use of win-win framing does more harm than good, giving rise to public cynicism. Moreover, the need to compensate those who are disadvantaged is often overshadowed by the illusion of win-win outcomes.

CONSIDERATIONS IN DEMOCRACIES

Advancing climate action in western style democracies requires a high level of mass support. Such support is born of sufficient understanding by the mass of people of the technical complexity of climate, impacts and policy responses. At the same time political parties need some assurance that courting mass support for climate action would pay off on election day. The tension is between, on the one hand, citizen awareness about the negative impact of climate change and, hence, the need to tackle it and, on the other hand, the still limited traction of climate policies in terms of electoral effectiveness relative to the more traditional issues (such as national security, economics and identity). The role of pessimism in heightening this tension cannot be underestimated.

When thinking about the future, the conventional wisdom is that because of climate change, societies will be worse-off. In other words, people tend to frame the climate challenge in a defensive manner, as a risk and not an opportunity. Electorates, hence, tend to be sceptical of win-win climate action pronouncements. The prevailing sentiment is that while there would be winners and losers, there would likely be a lot more losers in the future due to climate change. Therefore, it is critical to clarify the distributional impacts of climate change as well as of the climate actions that are being contemplated. This becomes all the more important when the system transformation is fundamental, such as exiting from fossil fuels.

CALCULATION OF 'NET-BENEFICIAL'

Over the long term, climate actions to carbon neutrality are 'net-beneficial' for most countries.[8] Calculating the 'net' involves two related metrics with enormous implications for both equity and the political salience of action. One, the direct costs and benefits of climate action: who and where loses or gains through decarbonization? Fossil-fuel dependent economies and livelihoods stand to lose in the short term, while fossil-fuel importing countries are likely to gain, for example.[9] Further, the spatial locus of likely loss (more so than gain) has domestic political implications. Considerable political power is wielded in national politics by coal mining constituents, for example, from East Kalimantan and South Sumatra in Indonesia, Jharkhand and Odisha in India, Mpumalanga in South Africa, and West Virginia in the US. Two, since decarbonization is a complex process over several decades (and is not instantaneous - a critical issue that is glossed over by some researchers and activists), over what time frame will the costs and benefits materialize? Further, results of policy action are not uniform over time, with costs and benefits coming about in temporal bursts, contingent on capacity, scale and domino issues of the energy and economic systems being transformed. The two underlying features of equity—space and time — strongly influence the political viability of climate action. Hence, decarbonization pathways need to unpack the 'costs and benefits' suggested by economic modeling. The 'net' needs to be the focus of 'just transition' actions right from the very beginning, marshaling support of the communities who will likely 'gain' while reaching out to work with those likely to bear the 'cost' of the transformation. Otherwise, net-beneficial plans remain on paper, as we have seen around the world. One important way out of this dilemma is using the very condition of being 'stranded' (with a fossil fuel 'asset') to leverage climate action (coal mines, for example, becoming uneconomical as renewable energy become cheaper). Such a possibility is being realized in South Africa through the Just Energy Transition Partnership, a joint effort of South Africa with some members of the G7.[10]

GOVERNANCE

The capricious nature of governance in 'limited access' states (those in which economic rents are traded for political access and privilege) impact societal ability to respond effectively to the challenges of climate change. Populations already at risk from climate are further impacted by economic and social shocks, and in some parts of the world additionally exposed to high levels of violence, especially against women. Failure of state mechanisms to guarantee personal safety and security, provide effective social safety nets in the face of multiple crisis and insecurities, or enhance economic opportunities has led to large numbers of people seeking refuge elsewhere. The absence of effective governance has led to a violent expansion of clandestine activities at considerable scale in some regions, focused on illegal extraction of gold and timber, and coca production. The uncertainty on what the near future holds, understandably, has large numbers of people maximizing short term returns, resulting in large scale conversion of forests for meat, soy and oil palm production or for mining rare-earth ores, for example.

TRANSFORMATION OF ECOLOGICAL PROCESSES

Ecological processes are being transformed due to acceleration of interlocking changes, making large swaths of the world even more vulnerable to drying, rapid run offs, topsoil depletion, land erosion, permafrost thawing, and biotic infestations. What we are witnessing now is the acceleration of Anthropocene impacts due to the very high levels of resource extraction (for insatiable markets) coupled with enhanced climate variability (due to climate change) that is wrecking societal abilities to create stable forms of planetary stewardship. Global appeals to maintain sustainability for the 'long term' in the face of growing inequities seem vacuous and incredulous for populations who are trapped in such dire political ecologies.

PROBLEMS OF GHG REDUCTION PROMISES

GHG reduction promises pepper NDCs and corporate reports alike. We draw attention to a few key issues regarding those promises.

1. *On the ambition of the Paris Agreement that was negotiated by the state-parties at COP21 in 2015.* "The planet's current policies put it on a trajectory to emit carbon dioxide at a rate between 58 and 62 gigatons in 2030. Pledges under the Paris Agreement would bring that down to a range between 52 and 57 gigatons of carbon dioxide. Keeping the planet's temperature rise below 2 degrees Celsius would require limiting greenhouse gas emissions between 31 and 44 gigatons per year."[11] To meet the Paris Agreement's aspirational target (of 1.5 degrees Celsius) would require far greater limits, starting even earlier.

2. *On country pledges in terms of GHG emission reductions as signatories to the Paris Agreement.* In the words of Robert Watson, co-author of a report on climate pledges, "Simply, the pledges are far too little, too late..." A report of the UN Framework Convention on Climate Change Climate - UNFCCC (of Oct 2022), prepared ahead of the Conference of Parties (COP 27) shows the combined climate pledges of 193 Parties under the Paris Agreement could put the world on track for around 2.5 degrees Celsius of warming by the end of the century.[12] Further, the "current commitments to reduce emissions between 2020 and 2030 shows that almost 75% of the climate pledges are partially or totally insufficient to contribute to reducing GHG emissions by 50 percent by 2030..."[13] Almost two-thirds of the firms on the Forbes Global 2000 list of publicly traded companies do not have net zero emissions target.[14] About "two-thirds (456 out of 702) of corporate pledges [for net-zero target] "do not yet meet minimum procedural standards for target setting."[15] The collective result of the failure to act is becoming clear. The IPCC (2022) reports that the global net anthropogenic GHG emissions have continued to rise across major groups of emitters between 1990 and 2019 and that even the implementation of the Nationally Determined Contributions (NDCs) would make it likely that warming will exceed 1.5 degree Celsius during the twenty-first century.[16] 140 countries have announced net zero targets covering 90% of global emissions. However, apart from the EU, Climate Action Tracker reports that none of the major emitters have acceptable plans to meet their net zero commitments.

3. *On the use of carbon offsets to reduce emissions*. Companies (and countries) highlight the use of carbon offsets, either through avoided emissions or by removing carbon. However, in order to qualify, the avoided emission category of offsets need to be additional and cannot be from projects registered before 2013. A study of randomly selected Clean Development Mechanism projects from around the world concluded that only 2% of the projects are additional and are not overestimated.[17] Further, carbon offsets cannot be the first response of companies (and countries) given the planetary limits of emission absorption by oceans and the atmosphere.

4. *On pricing carbon*. For decades the preferred 'polluter pays' instrument, putting a price on carbon, has been slow to be embraced by national policymakers. So far, the two versions of pricing, carbon taxes and Emission Trading Schemes (ETS), cover between 22% and 30% of global emissions.[18] Further, the current global average of $6 per ton of CO_2 is found to be too low to be of practical value in reducing GHG emissions.[19]

CLIMATE INJUSTICE

A sense of injustice pervades the climate narrative, even as it is gaining traction everywhere. It is most notable among vulnerable populations and generally in the Global South. The climate convention formalized in the UNFCC has ethical and financial obligations at its heart – the acceptance of more industrially advanced countries (the 'Annex 1 countries, formerly) of their responsibility for past actions that resulted in pollution of the atmosphere for more than a century and half. Discharging their responsibility was agreed to be in two ways, both important for the welfare of the global atmosphere. One, to take the lead in finding innovative ways to reduce GHG emissions across all sectors of the economy, and two, of helping the less industrially advanced countries (mostly in the Global South; formerly the non-Annex 1 countries) in their climate actions, both of mitigation and adaptation. However, the practice of discharging these ethically founded responsibilities, agreed to in 1992, has failed for the most part. EU's Carbon Border Adjustment Mechanism is a disappointment so far in this regard. It has been conceived unilaterally by the EU as a standard for other countries, disregarding the WTO principle of 'gradual negotiation.' This battle of jurisdictions harms multilateralism and exacerbates power asymmetries between countries and regions of the world.[20] For climate action, it runs counter to the principle that the least carbon emitters be given credit and room to define the path. In the Global South, erratic policies on energy generation and adaptation by some countries has not improved the situation. Forest systems, on which more than a third of the world depends for part of their livelihoods were marginal to the global discussion until a few years ago.[21] An unfortunate consequence has been a wide-spread loss of trust in the multilateral process underpinning global climate action.

RENEGING ON CLIMATE RESPONSIBILITY

'Reneging on climate responsibility' is a prominent criticism found in the global climate narrative. The widespread nature of social and economic impacts of extreme climate events, and the heightened impacts experienced by poor and vulnerable populations around the world in crowded settlements, small islands, and low-lying regions has been seized by policymakers in the Global South and activists alike as the result of the industrially advanced countries (and multinational companies) reneging on their ethical responsibilities. The dismal record on climate aid ('new and additional' – $100 billion per year Copenhagen pledge of 2009 that remains unfulfilled)[22] and on technology transfer are exhibits of this global failure. The sense of injustice is no longer restricted to the Global South. Policy actions on the part of the EU for stronger climate mitigation is encountering resistance by populations within Europe, whose livelihoods are tied to fossil fuel-based economy. While the European Green Deal is the most advanced and integrated approach for a deep transformation of the whole economy and society, social distrust and economic volatility are contributing to a sense of breakdown of 'social contract,' and the concomitant rise of illiberal politics of populism and nativism. The continual endeavors to maximize economic interest in the short term, by countries, by public and private stakeholders, and by the wealthy and the franchised classes, is an unfolding global tragedy with disastrous consequences for the world.

CLIMATE CHANGE LITIGATION

A modest number of court cases, in countries in the Global North and South, have kindled hope of leveraging the national judicial systems to advance effective climate action. While decisions are generally limited to national borders, landmark decisions can and do provide inspiration and strategic ideas, with potential to influence judges in other jurisdictions. However, it is still early days. The coming years are likely to have more systemic mitigation and adaptation cases at the national level, against governments, private sector and financial actors. The scope of legal action would likely broaden to include extractive and industrial supply value chain and subsidies to the fossil fuel and agroindustry.[23] North-South cooperation would be important to provide financial resources to plaintiffs in developing countries, as well as the sharing of climate litigation knowledge and experience. To fully harness the potential of litigation, the legal system urgently needs climate-literate lawyers and judges, an area of opportunity for creative climate action.

CASE STUDY ON THE PROMISE OF STRATEGIC CLIMATE LITIGATION

Climate litigations are considered 'strategic' when they are designed to produce ambitious and systemic impacts beyond an individual case, and to achieve regulatory ends that advance climate change goals.[24] The number of strategic climate cases has risen dramatically in recent years. As of July 2021, with thirty-seven systemic mitigation cases around the world against governments, and a smaller number on adaptation and targeting corporations.[25]

LEGAL STRATEGIES USED

In the Global North, the Grantham Research Institute, of the London School of Economics and Political Science (LSE), has identified key strategies against governments to be to: enforce/enhance climate commitments, seek redressal under human rights arguments and international obligations, and the use tort law (duty of care). Against private companies: target corporate liability and damages to pay for adaptation investments. In the Global South, the strategies have relied mainly on existing legislation on climate and human rights-based approaches.[26]

LANDMARK CASES IN THE GLOBAL NORTH

1. Urgenda Foundation v. State of the Netherlands (2019): The first litigation case to "successfully challenge the adequacy of a national government's overall approach to reducing emissions"[27] and "...ordering states to limit greenhouse gas emissions for reasons other than statutory mandates."[28] It has provided the basis of the whole-of system-approach adopted by many others.[29] The legal strategy relied strongly on human-rights informed tort arguments.[30]

2. Notre Affaire à Tous and others v. France (2021): Brought by four French NGOs and supported by over 2 .3 million who signed a petition.[31] The Court agreed that climate change has already caused significant ecological damage, and that the Government has "failed to carry out the actions that it had itself recognized as likely to reduce greenhouse gas emissions". The Government was found liable for part of the alleged ecological damage and ordered to pay each plaintiff a symbolic one euro to account for the "moral damage".[32] In a subsequent decision, the Court ordered the government to take measures "to repair the damage," by 31 December 2022, caused by the failure to compensate for excess emissions.[33]

3. Neubauer et al. v. Germany (2021): The youth plaintiffs argued that "by introducing a legal requirement to meet the overall goals of the Paris Agreement but setting insufficiently strict 2030 emissions reduction targets and providing insufficient detail on plans to meet these targets, the law violated the rights of future generations."[34] The Court ordered the federal government to clarify the emissions reduction targets from 2031 onward by the end of 2022.[35] In response, the German Parliament has amended the law.[36]

4. Milieudefensie v. Shell (2021): The District Court of the Hague found that oil major Shell owed a duty of care and ordered it to reduce its worldwide aggregate carbon emissions by net 45% by 2030 compared to 2019 levels.[37] This is the first case, globally, where a court held a "company legally responsible for its individual contribution to global greenhouse gas emissions".[38] Subsequently Shell announced its intention to increase speed of its planned transition, while also appealing the ruling.[39]

LANDMARK CASES IN THE GLOBAL SOUTH

1. Ashgar Leghari v. Federation of Pakistan (2015): A farmer sued the national government for failure to implement the National Climate Policy.[40] "The court ordered a number of regulatory outcomes in the face of delay and lack of action on climate change adaptation by government agencies on the basis of human rights violations."[41]

2. Future Generations v. Ministry of the Environment and Others (2018): A youth group required the Colombian government to comply with its commitment to stop deforestation in the Amazon by 2020. The Court focused on human rights and intergenerational equality and solidarity, and it recognized the Colombian Amazon as an entity subject of rights.[42]

3. EarthLife Africa Johannesburg v. Minister of Environmental Affairs & Others (2020): The High Court of South Africa determined that climate change was a relevant consideration in the environmental review of plans for a new coal-fired plant and issued an order setting aside all authorizations for the power plant.[43]

4. Greenpeace Mexico v. Ministry of Energy and Others (2020): Contesting the constitutionality of two electricity sector policies that would limit renewables, the plaintiff asked the Court "to declare the policies unconstitutional for violating the rights to a healthy environment and sustainable development and for obstructing Mexico's compliance with its international commitments to tackle climate change."[44] The Court ruled that the contested acts were unconstitutional.[45]

FINANCIAL SECTOR

Financing mitigation and adaptation efforts has been a choke point of climate action the past several decades.[46] Recently, there have been several encouraging developments. They include the International Solar Alliance initiated by India and France with 90 countries as its members, the Network for Greening the Financial System of central bankers, the International Sustainability Standards Board, the Glasgow Financial Alliance for Net Zero with assets of over $130 trillion, for example. Progress in the financial sector is, however, constrained by several factors such as the need to finance energy producers in the short term; lack of consistent policies on carbon pricing; lack of comparable data on carbon emissions by corporate clients; and, private pools of capital not subject to the regulatory pressures on conventional regulated firms. It is also not clear yet if the recent rapid growth in demand for ESG funds would have depositors move funds for that reason. While regulatory action in the finance can be justified on climate change posing risks to stability of the financial system, it is challenging due to a plethora of regulators with overlapping powers and responsibilities, international financial agreements lacking teeth, and uncertainty about the regulatory reach of independent central banks to address climate change issues. While there is considerable support in the banking and insurance communities for a positive approach to the transition to net zero, the fractured nature of 'international community' currently makes it that much harder.

BEHAVIOR OF CLIMATE

The 'behavior of climate' in the coming decades is of critical importance for the design of new infrastructure, cities and land use planning, as well as for redesign and retro-fitting of

the existing infrastructure. For example, the design of water infrastructure (for hydropower, urban, per-urban and rural water supply, ecosystems, storm water drainage, irrigation, for example), has to include likely range and frequency of precipitation events and the return period of drought, through the life of the infrastructure. The increased demand for agriculture, industry and domestic consumption has already put freshwater resources under tremendous pressure. Agriculture alone accounts for 70% of global freshwater withdrawals.[47] The approach in practice has been the use of 'climate normals.' The WMO notes that climate normals are 'widely used, implicitly or explicitly, as a prediction of the conditions most likely to be experienced in a given location' and that the 'general recommendation is to use 30-year periods of reference'.[48] However, the precipitation characteristics of the past 30 years are poor guides for the next 30, let alone 50 years, the assumed time frame for several major infrastructure, such as dams and urban water supply. For a location, such as for a watershed, the statistics (standard deviation, percentile points, exceedances of a threshold, for example) of important climate elements such as monthly mean values of maximum, minimum and daily precipitation and temperature, seasonal precipitation, the number of, frequency and amplitude of extreme events (rain/snow fall, dry and wet spells, cloud burst, drought) are increasingly subject to alteration due to climate change. The past couple of decades has seen the rise of probabilistic design with the use of risk and reliability analyses to aid physical design as well as of the calculation of the economic cost and benefit of projects. The use of probabilities is now widespread, from civil and engineering to health and finance management. Probability metrics are used to arrive at range of likely outcomes given uncertainty of key underlying variables in a system. However, identifying a trend (such as of rainfall or number of hurricanes) does not automatically mean a more accurate forecast. The mismatch is all the more critical in situations of complexity, where several underlying variables of a system are interacting to produce new emergent properties. Accelerations, non-linearities and increased intensities of events strain the models and their abilities to predict realities.

FOOD AND ENERGY SYSTEMS

The interconnectedness of food and energy systems and the vulnerability of these systems to shocks and stresses – economic, social, political and climate, is an example of complexity. The 1972-75 and 2007-2012 food and energy price spikes, and more recently, those as a result of the Ukraine-Russia crisis, are a result of dynamic interactions of several inter-connected subsystems. High food prices affect all countries, including net exporters of food. However, the impacts are felt most acutely by low-income food importing countries that have limited fiscal space to protect vulnerable households. The shock of COVID-19 pandemic adds to the complexity. Soaring fertilizer prices limit the ability of countries to respond quickly by increasing production, and aberration in precipitation compounds the problem. Hence, food, energy, economy and climate crises should not be viewed in isolation. They require a whole-of-society approach that recognizes the special needs of low-income countries and low-income people in middle- and high-income countries to spikes in food and energy prices.[49] Current social protection systems are insufficient in shielding vulnerable communities from the compounding effects of climate change.

CHALLENGES OF ADAPTIVE MANAGEMENT

The impact brought about on soil quality and water recharge by change in land use from forests to intensive agriculture, is another example of complexity. Changes are many from the clear felling of forests, water aquifers draw down, and large-scale application of chemicals inputs as fertilizer and pesticide. Their impacts in turn are several: changes in the physical and chemical cycles of hydrology, soil, and vegetation leading to new dynamics between the changing landform and content (erosion, compaction, leaching), water bodies (quality and quantity, availability, eutrophication) and atmosphere (humidity, reflectivity). In such conditions, improved data on water and soil behavior, for example, are insufficient for the emergent changes, let alone as design guides for the future. Policymaking is generally unable to respond to the challenges of adaptive management of complex systems and their ecologies. A key reason (of the several reasons) is the inertia of institutional systems (rules on use of metrics, nature of incentives and penalties) relying on past ways of

conducting business, no doubt further weighted down by lack of a culture of learning within. The advances in understanding of complex systems, whether in finance, healthcare, politics, or climate change impacts, has not been matched by its use in policy and decision making.[50] Scientists are increasingly pessimistic of the ability of modern science to understand and evaluate the dynamics of complex ecosystems such as found in Amazonia, the Congo Basin and Kalimantan/Borneo. The attempts now to seek better understanding by a blend of modern and local knowledge systems[51] will need time to mature and yield information and methods that are useful for adaptive policy making. The importance of principles such as contingent flexibility, participatory planning, and built-in redundancy are becoming clear.

FORMS OF UNCERTAINITY

The kinds of uncertainty that policy and decision makers need to contend with in their responses to climate change are of four kinds:

1. Uncertainty due to lack of information
2. Uncertainty from randomness
3. Radical uncertainty from the dynamics of social, economic, climate and environmental systems that are themselves undergoing change
4. Contrived uncertainty due to the deliberate obfuscation of scientific findings

Traditionally, the first two kinds of uncertainty were dealt by enhanced data gathering and the use of optimization functions aided by probabilistic understanding. The third, 'radical uncertainty,' however, does not lend itself to being resolved by traditional methods. An example is the rapid decline in agriculture yields despite enhanced input applications in the former peatlands that are drained by canals in Central Kalimantan.[52] The draining, accelerated during long dry spells and droughts from climate change, along with the annual burning of stubble and intensive modern agricultural practices led over two decades to far reaching changes in soil biochemistry, aquifer hydrology and soil fauna diversity. The changed 'subsystems' in turn reacted with one another as well as with external forcings (extreme events, chemicals in pesticides and fertilizers, new pests, higher than normal soil temperature, etc.), resulting in the emergence of a plurality of states, such that the generic term 'drained peatlands' no longer accurately describes the landscape. In such a dynamic situation, the policy response to enhance economic and food security of thousands of households cannot be 'more of the same.' Realization of the predicament facing farmers have led researchers to explore hybrid livelihood systems that combine local traditional ('Dayak') agroforestry, modern aquaculture and fishery practices, tree-based crops (such as rubber, coconut and oil palm), and garden agriculture approaches.[53] For the farmers who ultimately are the ones needing to manage the radical uncertainty on their fields, enhancing rice production is no longer the goal that would deliver livelihood security or economic prosperity. Dealing with the fourth kind of uncertainty, of a contrived nature due to the deliberate obfuscation of scientific findings and processes, aided by fossil fuel interests and turbo-charged by the politics of denialism in parts of the Global North and South, requires an altogether different approach.[54]

PATH DEPENDENCY

Past decisions that constrain the future, or path dependency and the resulting 'lock-ins' is another issue plaguing climate action, both on mitigation as well as adaptation issues.[55] The decision to privilege individual mode of transport, to generate power using fossil fuels, locate productive lands close to an estuary, have cities dependent on air conditioning, are all examples of path dependency. Beyond the financial cost, time, and the dislocations involved in transforming to mass transit, to renewables, letting lands frequently flooded go fallow, housing that responds to local climate, for example, path dependency involves another major threat to change. That is the political economy of self-interests striving to maintain a path dependent future.[56] Privileging models of settlement that require fossil fuel use ends up segregating urban and political structures as in the US. In responding to climate change, it is not only the question of what needs to be done differently. It is also the issue of how to deal

with powerful interests that are fearful of the uncertainties brought on by change and of the impacts on their economic self-interest. Policymakers are not ignorant of the impacts of human activities on the global climate. It is not a lack of knowledge of what needs to be done to forge economic pathways towards climate safety.

NATURE-BASED SOLUTIONS

'Nature-based solutions'[57] are widely considered as being amongst the best approaches for the dual challenges of mitigation and adaptation.[58] They rest on two well established principles that are inter-linked: Our collective economic and social well-being rests on the foundation of natural systems,[59] and climate change is threatening natural systems.[60] The approaches have significant potential to increase carbon storage ('carbon sinks') and to contribute to local economic livelihoods.[61] Governments and companies are highly aware of the importance of advancing such solution efforts.[62] Reduced Emissions from Deforestation and Forest Degradation Plus (REDD+) pilots are the pioneers of the approach, now around for some decades. Preventing tropical forest clearance and degradation, and the management of the forests by communities for 'sustainable' extraction of timber and non-timber forest produce is the leading leitmotif of nature-based solutions. More recently, the sequestration and storage of carbon in the soil in agriculture has received a boost through market-friendly efforts in temperate regions. However, a recent review of nature-based solutions noted, "despite global recognition of their value and effectiveness within national and global policy communities,[63] amongst researchers, and headlining by several corporations (exemplified by the focus on 'Natural climate solutions' of the WBCSD in Nature-4Climate centers, and a recent briefing (April 2022) by the European Environment Agency on the integral links between climate neutrality and natural capital, efforts to scale them to the level needed (to meet the challenges of climate change) are proving elusive."[64] A key challenge has been lack of agency of communities that translates into lack of capacity to make free and active choices and overcome social barriers and structural constraints. Other challenges include the dominance of top-down design, non-valuing of nature, poor understanding of valuation of ecosystem services and especially of those linked to complex feed-back loops due to climate change, importance of governments and societies working together to maintain natural systems, lack of a mechanism that seamlessly aggregates decision outcomes across levels, and fragmented nature of governance arrangements and market access.

WHAT NEEDS TO BE DONE?

What actions need to be taken to reduce GHG emissions and to build resilience to climate risks is well understood by now. As we enumerate below, lowering emissions in key sectors that are responsible for a majority of the global emissions is a critical task, as is protecting the vulnerable from climate risks. On global emissions, the IPCC Working Group III notes, 'approximately 34% (20 GtCO2-eq) of total net anthropogenic GHG emissions came from the energy supply sector, 24% (14 GtCO2-eq) from industry, 22% (13 GtCO2-eq) from agriculture, forestry and other land use (AFOLU), 15% (8.7 GtCO2-eq) from transport and 6% (3.3 GtCO2-eq) from buildings.'[65] These are of course global averages and the sector contributions in different countries could be quite dissimilar. For example, AFOLU contribution is higher than energy in several sub-Saharan countries. Recent research has shown that the food system as a whole (including land use change, agricultural production activities, and pre- and post-harvest food system operations) contributes almost one third of net anthropogenic GHG emissions.[66] Over the last three decades, researchers from international, regional and national organizations and coalitions from the Global South and North have laid out in exhaustive detail the methods and technologies for climate mitigation and adaptation. In brief they include:

- **A** Managing climate risks to households, communities and societies at weather (extreme events), seasonal, inter-annual and multi-decadal scales, using 'natural climate solutions', to the extent possible, and protect the most vulnerable populations and ecosystems.

- **B** Net zero energy systems (generating electricity without emissions through deployment of renewable energy sources {such as solar energy, geothermal energy, wind

turbines, waste and biomass energy, ocean wave and tidal energy, and hydropower} and of nuclear energy), widespread electrification of end uses in transport, space heating and cooking, use of alternative energy carriers such as hydrogen, bioenergy and ammonia to substitute for fossil fuels, more efficient use of energy, greater energy system integration across regions and components of the energy system and use of CO_2 removal technologies and direct air CO_2 capture and storage);

C Decarbonizing urban settlements (through compact urban forms and resource efficient mixed use and infrastructure, and carbon sinks through urban forests), transportation (through less car-dependent transport infrastructure, enhanced electromobility, use of battery-electric haulage and hydrogen- and biofuel-based fuels, and rail decarbonization), improve energy sufficiency of buildings (improving on density, bioclimatic design and multi-functionality, circular use of materials and moving from ownership to usership of appliances) and making buildings more energy efficient (incandescent bulbs, cool roofs, zero energy measures in construction and retrofitting, decarbonization of space heating, enhancing insulation, and use heat pumps);

D Reduce and eliminate fossil fuel use in industry through energy efficiency in fuel combustion, process emissions, product use and waste, and reduce need for primary production (of cement, concrete, steel, plastics, pulp and paper, for example) by reduced material demand, material efficiency and circular economy, use of low to zero GHG energy carriers, and use of carbon capture and storage;

E Food systems, forestry and other land uses by intensifying agriculture to reduce land use change away from forests, protection, improved management and restoration of natural ecosystems, cropland and grassland soil carbon management, agroforestry, improved rice management and livestock and nutrient management. On the demand side to reducing food waste and a sustainable healthy diet including moving away from ruminant meat towards plant-based protein;[67]

F Creating productive economic opportunities for populations in peat forest, coastal wetland and savanna systems that also help capture carbon and storage in temperate and tropical regions;

G Led by public financing and the wide adoption of regulations, enhance blended financing of local, national and global low carbon pathways, transform systems in the medium to long term away from fossil fuel use, undertake 'just transition' in the short term by secure the well-being of natural systems, vulnerable populations and fossil fuel dependent communities, states and regions.

A handful of countries are translating into action the needed structural, industrial and societal changes (along with digital economy transformations): to reduce GHG emissions and improve adaptation. Thousands of companies, the vast bulk of whom are medium and small-scale ones, are seeking to make effective climate action a key to their business. Across the world, social enterprises have expanded their traditional dual bottom lines to embrace climate action. Blended financing, cap and trade, zero-carbon technology, and carbon offsets, are familiar bywords now amongst multilateral and bilateral institutions, national development banks, and micro green financiers alike. The scale of operation, however, is nowhere near what is required. Further, the failure of global narratives, such as 'carbon tax' and 'green financing', to be realized at scale has meant a million pilots withering across diverse political and economic geographies.

The absence of determination to implement the efforts (with differential impacts across social classes and geographies), and to sustain them in the face of push back and opposition is what the world is now facing. Rather than the 'what action is to be taken?' it is the lack of effective answers to 'how to implement climate action?', which is the challenge.

Led by diverse civil society groups, the push to reduce GHG emissions, especially the opposition to fossil fuel use, and to enhance adaptation is growing around the world. The opposition spans a wide range - from the better-known Global Citizen, Extinction Rebellion, Sunrise Movement, and Fridays for the Future, the movements of indigenous and traditional peoples in the Amazon, Kalahari, Odisha, and Kalimantan, of youth and religious leaders, and the everyday activism of citizen groups in the Global South fighting for environmental justice. What makes them similar is their central demand for governments and companies to jettison their short-term economic interest, and focus instead on long-term well-being of societies (including planetary interests, in the case of some). The failure of governments and companies to achieve success on climate outcomes have led the movements to double down on their demands.

As members of the Task Force, we seek the same outcomes as the numerous fearless peoples' movements – for actions by governments and companies for a low carbon future, that safeguard pathways to well-being and prosperity for nature and for all people in a future ravaged by climate in the Global South as well as the North. However, the abysmal record of the inability of policy and decision makers to deliver those outcomes makes us question the root expectation of decision-making that's against self-interest.

The global economic and social landscape on net zero carbon emissions and climate resiliency is composed of hundreds of millions of stakeholders from the public, civil society and private sectors. Nourished by data and information from thousands of scientists and researchers across the world in universities, schools, and research organizations, the key constituencies are:

- **A** International 'climate diplomacy' — conducted in the multi-lateral setting of the UNFCCC. It has yielded important agreements with a metronomic regularity, including the Kyoto Protocol (1997), Marrakesh Accords (2001), Bali Action Plan (2007), Copenhagen Accord (2009), Cancun Agreements (2010), Warsaw Outcomes (2013), Paris Climate agreement (2015), Marrakech Partnership (2016), Katowice Climate Package (2018) and the Glasgow Climate Pact (2022). Lacking the force of international law, the UN multilateral diplomacy on climate remains an important motivational and aspirational process — necessary but insufficient.

- **B** National governments with economic policies and engaged in negotiations among countries, in the Global North and South, impacting climate such as in energy production, transportation, urban growth, agriculture production, and industrial manufacturing.

- **C** Businesses that make deep climate commitments for the long term, while maintaining a sharp focus on short-term profitability to meet current shareholder demands.

- **D** Civil society movements, of youth, the elderly and indigenous and traditional people marching to voice alarm and anguish at the inability of governments and businesses to follow through on their climate action promises.

While international climate diplomacy soldiers on year after year, in COP after COP, and scientific support for immediate actions mounts in successive IPCC reports, economic policies, trade negotiations and business decisions pay little heed to climate promises. Vigorous and passionate civil society climate movements, despite failing to make discernible impacts on practical policy and decision making, continue to make demands for altruistic behavior on the part of economic agents, whether companies or governments. Countries and companies have made and continue to make promises to reduce their GHG emissions, but not just yet.

SECTION 2

On Climate Enlightened Actions

SECTION 2

On Climate Enlightened Actions

Over the last few decades climate change has come to be a theatre of tragedy - sonorous green promises of leaders of countries and companies in response to a drum beat of scientific evidence of an increasingly dire future, with the moralistic naming and shaming by climate activists, peaking at the annual UNFCC Conference of Parties. Outside of this theatre, countries and communities are increasingly ravaged by heatwaves and droughts, floods and hurricanes. The climate future of countries and communities in the Global North and the South looks increasingly bleak, every passing year the promises remain unkept. A situation so dire that the Secretary General of the UN, Mr. António Guterres, uncharacteristically lashed out:

"The jury has reached a verdict. And it is damning. This report of the Intergovernmental Panel on Climate Change is a litany of broken climate promises. It is a file of shame, cataloguing the empty pledges that put us firmly on track towards an unliveable [sic] world." [68]

Global climate transition by 2050 to carbon-neutrality will be successful only when all countries undertake economic transformations that effectively drive down GHG emissions and build climate resiliency in their societies. However, that will not happen if each country continues to pursue policies solely framed by economic 'self-interest', narrowly framed. What is required now of governments and businesses is to leaven policies and decisions with **'climate-enlightened self-interest'**, to transform economies and advance climate action jointly, to their best of their abilities.

The economic self-interest of people (and companies and countries) is inextricably entangled with the well-being of nature, as well as those of other people (and companies and countries). Hence, the impact of climate change on people, companies and nations is more than the direct effects from climate events. It includes the climate's impact on nature and natural services, on other people, as well as that of the response of nature, people and institutions (policies and decisions) to climate change. While this is blatantly obvious over the long-term, we are now witnessing the vulnerabilities of even the wealthy here and now.

An enlightened climate understanding is the knowledge of impact entanglements from climate change. The impacts of climate change on others and on nature, as well as their responses to it, affect one's material self-interest in both the short- and long-terms. Utilizing that knowledge in the design of policies and investments responding to climate change is climate enlightened action. The task force has concluded that enlightened self-interest is the only realistic pathway to a sustainable world in the face of the current and future impacts of climate change.

ETHICAL CONSIDERATIONS

Ethical considerations of accepting responsibility of past emissions' (and of the curtailment of future emissions') impacts on others and future generations, further enriches the conception of self-interest. Ethical considerations are central to the 1992 UNFCCC convention. As Gardiner notes,

"The claim that climate change is an ethical issue may initially seem surprising. However, it should not be. After all, ethical concepts play a central role in the foundational legal document, the UNFCCC, which has been ratified by all major nations, including the United States. This treaty states as its motivation the 'protection of current and future generations of mankind,'

declares as its major objective the prevention of 'dangerous anthropogenic interference' with the climate system, and announces that this objective must be achieved while also protecting ecological, subsistence, and economic values." [69]

Distinct from self-interest enriched by ethical considerations is a third conceptual definition, emerging from a deeper understanding of how humans understand their own nature and their relationship to the cosmos.[70] Such an understanding, for long the hallmark of many spiritual traditions such as the Advaita of Hinduism, Christianity of John of the Cross, Islam-Sufism, Buddhism and Daoism,[71] and of some indigenous groups in Amazonia, Kalimantan and other regions of the world, is emerging now in contemporary science – on the nature of relationship of the quantum and the macro world, and in human cognitive inferences.[72]

Unlike actions engendered by an instinct of altruism, enlightened self-interest serves to secure and advance in a robust manner the interest of oneself from now onwards. The enlightened aspect emerges in two ways: For 'simple systems' (relationship with constant proportional response, predictable, lacking feedback loops, for example), the course of action must consider the likely responses of others (countries, companies, populations) as well as the response of natural systems that effects one's material interest. For 'complex systems' (with randomness leading to large uncertainty range, and where causes do not always produce proportional responses, for example) planning must consider emergent risks (including likelihood of 'surprise') plus the response of others and of natural systems due to climate change in deciding on a course of action that safeguards one's self-interest.

An enlightened approach would be, for example, a government realizing the multiple connections and interactions between climate impacts, market and policy actions for national food security. Ensuring food security would require, in the immediate, building resilience of agriculture and food systems to extreme events, such as droughts, flooding and hailstorms, and actions to keep food prices in check (such as assurance of government stockpiles). But those actions are insufficient by themselves given impacts of longer time scale climate events (such as on seasonal precipitation, behavior of the monsoon and Atlantic Jetstream) on biodiversity and hydrology and soil chemistry, and their effects on agricultural production and food access. Other countries and global market also would be responding to climate events and to price signals and policies. Hence, a government in its design of climate action to enhance food security of its citizens would need to have an enlightened view of multiple considerations impacting its national food security self-interest.

Calls to mobilize climate action based exclusively on ethical considerations have been less than successful. This is obvious in the practice of the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) elaborated in the UNFCCC treaty. Article 3.1 and Article 4 of the treaty are ethical obligations agreed to by the 193 signatories.[73] The application of CBDR-RC has, unfortunately, been mired in contention. Perceived economic self-interest in the short term, of governments in this case, has been its Achilles heel (See the case study on 'Decarbonizing International Shipping'). A perusal of the National Determined Contributions (NDC) reveals that developing countries are more likely to reference the principle to advocate for increased action by the industrialized countries and to condition their action on increased finance and support for climate capacity from the developed countries. In contrast, developed countries are unlikely to directly reference the principle, except to use it to praise their foreign aid. The ethical foundations for action so clearly laid out in the treaty has not persuaded a majority of countries to undertake responsible climate action.

CASE STUDY OF CBDR-RC: DECARBONIZING INTERNATIONAL SHIPPING

Maritime transport, while an energy-efficient mode of transport, is a large and growing source of greenhouse gas emissions (responsible for around 2.9% of global anthropogenic emissions, IMO 2022).[74] The International Maritime Organization's GHG strategy aims to phase them out in this century – to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008, while pursuing efforts towards emission reduction consistent with the Paris Agreement. The strategy highlights the principle of common but differentiated responsibilities and respective capabilities[75] along with other principles of long-standing use in international shipping such as of non-discrimination and no more favourable treatment (NMFT). However, in practice, CBDR-RC has been a bone of contention, rather than one enabling solution. The 'developed' flag states view it as incompatible with the principles of non-discrimination and NMFT, arguing that regulations on limiting GHG emissions from international shipping should apply to all ships of all countries. In the IMO discussions, developing countries, however, insist that the CBDR-RC principle should be applied and only 'developed' countries enforce the regulation.[76]

The flag state system of international shipping has created further complication. The domestic laws of the flag state, the nation in which the ship is registered, apply to the vessel carrying its flag in high seas and in other areas covered in international treaties. Not all vessels are registered in their country the company is headquartered in. Ships registered in Panama, Liberia and the Marshall Islands represent slightly more than a third of the global gross tonnage (UNCTAD, 2020)[77] accounting for a third of CO_2 emissions from shipping (for 2019). Relatively lax regulation standards over labour and safety in these shipping registries make them attractive for cost savings for vessel owners headquartered in 'developed' countries. The countries gain substantially (the registry, for example, brought in $500 million to Panama in fees, services and taxes in 2014).[78] The contribution to global emission from ships registered in Panama, Liberia and Marshall Islands, countries in the 'developing' category by UN and World Bank measures, is substantial. It raises a conflict of interest for the countries - increase in climate ambition by them on shipping could result in shipowners registering their vessels elsewhere, moving their tax contributions as well. The unambitious emission targets of shipping companies (that are conventionally headquartered in the developed world) becomes that of the developing member countries in IMO discussions on climate mitigation.

Climate enlightened self-interest obviates the need for policy and decision makers to accept altruism as a basis for action, which has been the dominant expectation from civil society groups over the last several decades. The world has little to show for it, unfortunately. It is indeed past the time to look for other ways. Advancing climate enlightened action requires evaluating multiple criteria — the likely impacts of climate change on societal and individual well-being, impacts of the proposed action on the economy, society, and the environment of oneself and of impacted others (including future generations), as well as the impacts due to the response of others. Such an enlightened conception of self-interest, we believe, would have a greater chance of success in reducing impacts of human activities on the climate and nature, while enabling socially inclusive economic growth and reducing vulnerability to the climate system.

In the rest of this section, we draw on examples from several areas of competencies of the Task Force members. The intent is to illustrate the potential for climate enlightened action. They are not prescriptive nor intended to be priority considerations in pursuing climate enlightened action.

IMPORTANCE OF THE MATERIAL AND SOCIAL CONTEXTS

Mitigation and adaptation actions are important in the public and private spheres, in both the industrially advanced and the industrially less advanced countries. Beyond the obvious reasons that climate change impacts everyone (hence, requir-

ing adaptation) and everyone's action impacts the climate system (requiring mitigation actions), solidarity and multiple sources of innovation should be key considerations. Solidarity that made possible the 1992 UNFCCC Convention has considerably weakened in the decades since. Solidarity on climate starts with a common purpose; but does not require policy uniformity. Climate activism has unwittingly created silos, harking on distinct goals in the Global North and South – for companies in the Global North to focus on GHG emissions reduction, and for Global South NGOs to focus on adaptation, for example. Such simple dichotomies miss the interlocking nature brought about by trade and global and regional supply chains and the resulting economic interdependencies of livelihoods. They also miss the reality of economic and social situations in the Global North that are closer to those in the South and vice versa. The terms North and South do not depict mutually exclusive social and economic realities. Their use leaves out the common earth resources they depend on, in addition to the financing and trade ties that bind them together. The multilateral and bilateral institutions, as well, have unwittingly advanced the dichotomy – institutions in the North considered to be the primary source of innovation, knowledge and financial resources, with the communities in the South being the 'beneficiaries.' Action on climate is not solely determined by the climate of a place. It is critical to pay equal attention to the economic and social context, including the institutional structures, norms and processes, as well as nature and natural systems. Advancing mitigation and adaptation actions in both the Global North and South makes possible knowledge sharing (of what doesn't work and why, as much as what works and reasons thereof), applicable across diverse local contexts in both the North and South, and hopefully engendering a sense of mutual commonality of purpose.

CLIMATE ACTION IN DEMOCRACIES

In democracies, resolving the tension between technical complexity and broad citizen participation is critical, in order to catalyse the power of the grassroot to support ambitious climate agenda. In other words, it requires a virtuous dynamic to emerge between bottom-up citizen participation and technical expertise such that each strengthen the other. This would require investing political capital in more participatory and deliberative forms of democracy. It is not an easy challenge, and requires careful planning and are not without limitations or risks for the political parties concerned. The other core issue in democracies is a positive framing of climate change in order to convince people that there is a real chance for a genuinely better future, and not simply a series of "lesser evil" kind of options. Clarity of effectiveness is not enough. Climate policies must show precisely how they help reduce not increase inequality, by paying close attention to the distribution of costs and benefits. Efforts in terms of political capital should largely focus on these two aspects and not, as it is often the case, on simply raising awareness that climate change is a problem. Utilizing climate enlightened self-interest is essential in framing the responses to move away from fossil fuels by showing how individuals and the interdependent collective would benefit from domestic generation of renewable energy: by bringing about energy independence, stabilizing energy prices and protecting consumers and companies from price spikes brought about by geopolitical and global market events, and advancing climate mitigation targets.

DEVELOPMENT IMPLICATIONS

Societal stability and development implications need to be critical considerations of all net-zero plans and decarbonization pathways. They include the loss of revenue from stranding fossil fuel assets and its impacts on public debt. Facing the end of the licensing periods, energy companies are unlikely to undertake major investments presenting risks of brownouts, blackouts and severe shortages of electricity for residential and industrial use. The heightened risk of political pushback by coal and fossil fuel dependent sectors, including the pressures for maintaining jobs in these sectors during the transition to a low carbon economy. Given the geographical concentration of fossil fuel production and jobs, pressures are likely to be regional and could exacerbate ethnic and other regional tensions. The differential cost structures countries face to meet their basic development and energy needs, and the pathway they choose within budget and debt overhang constraints. It is hence critical to consider in energy transition plans and climate policy not only the energy sector and the economic effects of transition, but also broader governance and social stability aspects. The issues highlighted above, also are amongst critical considerations for just transition plans, as well.

Forest management in Gabon is a very good example of the strategic use of enlightened self-interest, that includes considerations of the value of forests to society, employment based on local culture, in addition to the traditional concern of financial return in such calculations.

CASE STUDY OF GABON FOREST MANAGEMENT

Gabon's forest management is a case study of action taken on the basis of enlightened self-interest. Africa's timber exports are mostly in the form of logs, and not as finished or semi-finished products. Hence the critical discrepancy: "Africa's forests account for about 21% of its total land area, roughly equal to those of North America or Asia, and four times bigger than the EU." However, in 2019, "the export value of the EU's forest products was an astonishing 17 times greater than Africa's, $100 billion compared to $6 billion. Yet in the same year Africa produced 54% more wood than the EU."[79] Gabon would export logs to meet the high demand for hardwoods for furniture making from countries like Italy, China and India. The wastage was high and often led to larger swathes of forests being clear-felled due to illegal logging. Despite being a country with a very high forest area per capita, Gabon began to have a serious deforestation challenge. In 2009, the government put in place a simple regulation that sought to fulfill two societal aspirations, traditionally viewed to be contradictory ones: enhance forest conservation and advance economic growth. The regulation banned the export of logs. Timber could only be exported if transformed into a product, such as furniture. Over the last few years, the regulation has had several remarkable outcomes simultaneously: job creation in furniture making, a revival of traditional hand-made craft industry, higher levels of income generation across a larger cross-section of society, higher levels of revenue for the government, reduction in deforestation rates, as well as inflow of additional foreign capital to the newly emergent furniture export industry. Gabon's annual deforestation rate is low (less than 0.05%) and stable, making Gabon one of the few remaining High Forest, Low Deforestation countries.[80]

Instead of viewing economic interest solely through the lens of timber export, the leadership of the government of Gabon integrated the value of its standing forests to society with the need to have economic growth. Such an expanded and integrated concept of self-interest is an example of an 'enlightened self-interest.' Further, the Gabon Sovereign Wealth Fund is diversifying Gabon "away from its reliance on oil and places forestry at the center of government efforts to secure different revenue streams,"[81] thereby advancing a 'climate-enlightened self-interest.' In 2019, Gabon and CAFI signed a 150 million US dollars agreement through which Gabon is "rewarded a 10-year deal for both reducing its greenhouse gas emissions from deforestation and degradation, and absorptions of carbon dioxide by natural forests."[82] Gabon became the first country in Africa to receive results-based payments for reduced emissions from deforestation and forest degradation.[83] The welfare of Gabon's forests and ecosystems has now become an integral part of its long term low-carbon pathway to economic growth.

USE OF GAME THEORY-BASED APPROACHES

Game theory-based approaches, utilizing self-interest of individual parties, are the backbone of analyses about potential cooperative agreements for ambitious climate action, both in national policy contexts and at international scale. While useful to understand structural obstacles, they limit our understanding of what could foster cooperative action, and in particular the effect of enlightened self-interest. Classical game theory approaches have been extended to account for limited rationality, as well as the repetition of negotiations. But the space for an agreement on climate action is close to zero if the motivation of the parties is to win, while there could be radically different outcomes with parties seeking to continue playing. This is an example of how the framing of self-interest, embedded in our mainstream representation of strategic interplay between different forces in a society or different countries globally, is excluding some key possibilities in the solution space.

PRACTICE OF POLICY MAKING

Thumb rules and triggers for response depend on data. The global regime of a stable climate since the Industrial Revolution was the basis for climate one such data. However, that is no longer the case. Radical climate uncertainty is now evidenced across all elements of climate – frequency and intensity of wet and dry spells, monsoon failures, return period of droughts, strength of hurricanes, storm surges, size and intensity of heat domes and forest fires, and pest infestations. Data from the past on bioclimatic elements is no longer a reliable guide on their future status. As a result optimization for 'future climate conditions' requires consideration of a range of strategies, a task that is beyond the current capacity of most institutions.

Reformation is urgently needed in the manner by which societies arrive at costs and benefits of action and non-action regarding climate. Environmental services and the value of nature should no longer be un-costed, and ecological connectiveness requires assigning them social value. Rather than economic utility, climate enlightened approach brings brought forth considerations of volition and power imbalances between geographies and ethical considerations of impacts of past action. Path dependency and its economic equity implication should become design routine. These are some of the key elements of a sea change required in the cultures of policymaking and practice. The radical departure in calculating costs and benefits of chemicals in the environment, at personal and societal levels, as a result of the movement catalyzed by Rachel Carson's *Silent Spring* is instructive in this regard. So too are lessons from the threat of nuclear winter forcing an abrupt change in policies regarding nuclear arms and their testing.

Carbon Border Adjustment Mechanism (CBAM) through climate enlightened lens

The European Green Deal (EGD) is the union's key policy package to reduce GHG emissions by at least 55% by 2030, compared to 1990 levels, and to achieve carbon neutrality by 2050.[84] CBAM is a tariff instrument of the EGD in the July 2021 'Fit for 55 communication' to encourage "partner countries to establish carbon pricing policies to fight climate change" with an initial transition phase through 2026.[85] The carbon-intensive sectors and products to be covered by CBAM include cement, iron and steel, aluminum, fertilizer, and electricity production[86] (with others such as hydrogen, plastics and organic chemicals likely to be added at a later date). To better reflect CO_2 costs for European industry, Members of the European Parliament have signaled their intention to include emissions deriving from the electricity used by manufacturers.[87] The rationale is for CBAM to "prevent offsetting the EU's greenhouse gas emissions reduction efforts through imports of products manufactured in non-EU countries, where climate change policies are less ambitious than in the European Union. It will also help prevent the relocation of the production or the import of carbon-intensive products."[88] CBAM is designed to advance the carbon-neutrality agenda of the EU within its borders and is born of game theoretic framing of the problem in dichotomies: Inside/outside EU, means/end of low carbon, and economic benefit/loss, for example. A climate enlightened approach would get us to consider other possibilities and continuities, that draw attention to commonalities and shared purposes of EU and the World and Global North and South, and carbon neutrality as both an end but also a means to get to equitable and environmentally durable societies.

As several studies have noted, CBAM will most likely impact the competitiveness of a wide swath of industries that export to the EU.[89] Such a likelihood has alarmed EU's developing country trade partners, including important ones such as Brazil, China, India and South Africa. Their Joint Statement at the conclusion of 30th BASIC Ministerial meeting on climate change hosted by India records, "... Ministers expressed grave concern regarding the proposal for introducing trade barriers, such as unilateral carbon border adjustment, that are discriminatory and against the principles of Equity and CBDR-RC." (Government of South Africa 2021).[90] Researchers note that the "most affected lower-income economies include the African fuel-exporting countries such as Cameroon, Egypt, and Nigeria. Other African economies such as the Congo, Ghana, Morocco and Zimbabwe would also be affected due to the relative importance of their exports affected by the CBAM."[91] Center for Global Development reports, "Mozambique where 60% of people live below the poverty line sends more than half of its steel and aluminum exports to the EU. If those exports are subject to a carbon border tax, the country could lose 1.6% of its gross domestic product (GDP).[92]

An unintended effect of CBAM could be the acceleration of a market system wherein some companies across the world work to lower their carbon emissions levels in order to qualify exporting to the EU, while others, medium and small companies, lacking capacity perhaps, supply to markets that do not have carbon emission restrictions, whether for steel, beef, or palm oil. EU becoming carbon neutral would be a pyrrhic victory if carbon emissions surge in other parts of the world. We would like to emphasize a different and a more global role for CBAM.[93] *We believe it is in the self-interest of EU, both for economic and carbon neutrality reasons, to frame the CBAM in an enlightened manner.* European companies could be incentivized to partner with developing country ones on low-carbon technologies, with global competition leading to innovation acceleration. The EU could leverage its decades long practical experience to help advance the development of robust carbon markets in regions where none exist, and further, their integration with the European Trading System, thereby providing encouragement for governments and companies to rapidly adopt low carbon growth measures and help seal carbon leakage. Such a development would in turn pressure companies across the world to adopt low-carbon technology partnerships in their global supply chains, enabling a virtuous circle based on economic self-interest. CBAM could be the spearhead of a global Climate Marshal Plan of the EU, based on an enlightened self-interest of economy, equity and carbon neutrality.

Enlightened self-interest of the EU with respect to CBAM suggests that the EU pay attention to socio-economic and ecological considerations in countries and regions outside the EU,[94] as it does to carbon content of their products. It is in EU's enlightened self-interest to stimulate investments in low-carbon production systems in Africa, Asia and Latin America for the global market. It is through such an expanded concept of self-interest the can EU accelerate building a lasting global partnership for a collective low-carbon future.

ECONOMIC TURBULENCE AND CLIMATE SURPRISE

Economic turbulence amongst households and communities due to the impacts of enhanced variability of climate as a result of climate change will continue to have severe political repercussions. Frequent crop failures or supply chain disruptions would impact hundreds of millions of households, that in the absence of social safety nets lead to food insecurity, if not systemic hunger amongst the most vulnerable, and economic anxiety all round. Turbulence requires institutions of governance to anticipate likely shocks and have in place buffering systems, such as differentiated risk insurance and community-led participatory warning, response and rebuilding systems. For the longer term, where the cause-effect relations between climate and the natural and economic systems themselves undergo change, institutions need to become more adaptive, alert to possibilities of non-linear responses and cascading economic impacts. Ongoing research in a variety of contexts, from the Florida Everglades and the Thames River to coral atolls of Maldives and farming in flood plains and high valleys, indicate that dependence on a purely physical infrastructure engineering solution (such as the use of embankments to contain a river or sea walls to stem storm surges) is a mistake in situations of climate surprise. The real challenge is for the institutions to recognize, reorganize and embrace adaptive management. Perhaps the most important ingredient to make that happen is leadership. That requires

reorienting our education system to include design thinking, planning in the face of social anxiety, holarchic scaling and value of empathy, with an emphasis on systems thinking and less of an anthropocentric focus in many forms of training, issues that are currently at the margins of pedagogy.

RESTRICTED STATE CAPACITY

Activists and the public need to pay close attention to issues that restrict state capacity to implement climate action. A key one is 'state influence' (if not 'state capture') by special interests. The current focus on such matters is in the Global South (for example in the Amazonian frontiers where the agro-industrial dynamics have led to explosive, and mostly illegal, deforestation) and especially on 'limited access' governments on their capture by interests inimical to the public good, including at the extreme by purveyors of clandestine goods such as coca, illegal timber and wildlife.[95] Going forward in our responses to climate change, it is critical to also investigate and find ways to counter state influencing in parts of the Global North.[96] The livelihoods in sectors with large carbon emissions such as fossil fuel and industry should be the foci of 'just transition' efforts both in the Global South and the North, rather than being villainized, taking account of the differential impacts on different income groups and regions. The political dividends of such climate actions would be tremendous.

The sixty fragile contexts,[97] mostly low-emitting but with high vulnerability to climate risks, also require special attention in advancing climate action in the collective interest. An enlightened approach starts with the realization that climate change is the one common adversary in fragile contexts that all antagonists have to contend with their religious, racial, ethnic or ideological differences being secondary. All communities are climate impacted and will be at high risk from amplified climate variability. Such an enlightened approach, focused on self-interest, should be the basis for collective climate action with the warring leaders coming together in the first instance, potentially sowing the seeds for pathways to peace.

CLIMATE ACTION IN CITIES

Cities constitute a climate action conundrum. The ever-rising tide of consumption by the middle income and wealthy residents in the cities in Global North and South, is the single most important driver of global GHG emission. At the same time cities are at the receiving end of extreme climate events. They cause massive economic losses and huge social disruptions, to which no city resident is immune to, irrespective of their wealth. In city after city, the residents, especially belonging to the wealthy class, are often most aware of the dangers of climate change. Cities are home to philanthropies, universities and research institutes active globally on climate change, and are the sites for countless climate marches. The political economy of cities, however, is at odds with the dominant social climate ethos. With the exception of some cities in Western Europe and possibly Singapore, amongst a handful of others, and despite the massive push by specialized movements such as C40 Cities and 100 Resilient Cities among other efforts, enhanced social awareness has not resulted in systematic climate action. Cities are, mostly, sites of fragmented climate action, choosing from a standard global menu: raising embankments, de-risking bridges, tunnels and mass transit, creating smart grids, mandating green infrastructure, subsidizing vertical farming, etc. Structural changes in city administration and budgets to drive sustainability operations required of a 'one-city' approach or transforming land use and restricting the use of personal automobiles to enhance climate resiliency have far less takers in practice. While studies and plans abound, decarbonization pathways and equity-focused vulnerability reduction efforts remain as pilots across a scatteration of cities. We believe that it is very much in the self-interest of city residents to change the situation with respect to climate action. The wealthy and the poor both are vulnerable to climate impacts, the difference being a matter of a few degrees. Washed away roads and bridges, flooded airports and plummeting air quality impact everyone. Acting in their self-interest, the influential residents of cities need to facilitate collective climate action instead of their own private resiliency bubble.[98] The example of nineteenth century Netherlands where eminent residents of cities pressured the development of sewage networks for all, even for the poorest neighborhoods is instructive. It shows the workings of enlightened self-interest, when the science of microbiology revealed the causal links between wastewater and cholera epidemics, sparing none.[99]

SCALING UP ACTION

Climate action in the Global North and South is beset with tens of thousands of *successful* pilots that have failed in the scaling up. Solutions at scale are not merely deft applications of technology, incentive creation and regulatory control. Diverse, contextual solutions are required beyond the ability of any single organization, entity, platform or network to provide. Complex societal problems, such as climate change, need the active the response of institutions of the state, society and market. Coordination is essential, reducing friction between the three, and allowing each to accomplish what it does best. Diverse stakeholders from across the three sectors need to be engaged on their intrinsic (stated and unstated) demands. Access and agency must be at the heart of all scaling up efforts, in order to successfully leverage enlightened self-interest in varied locales on their specific challenges.

A successful example is the DIKSHA platform of the Ministry of Education of the Indian government. Catalyzed by the EkStep Foundation, DIKSHA is India's national school education platform. Launched in 2017, it is available across the country, supporting 33 languages and solutions. During the COVID19 pandemic, with schools shut down for several months, the digital platform became the go-to solution for teachers and students across the country, resulting in over 5 billion sessions and over 100 million verified credential awards to teachers who completed courses on the platform. While climate challenge is undoubtedly a more complex challenge than a national public education one, it does share some characteristics: the presence of a diversity of societal, state and market stakeholders, distinct sets of self-interests, low agency for collective action, and a need to respond urgently at scale. EkStep's core values and methods of "societal thinking", could be of high value for planning climate actions. They include:

1. An aim to enhance or restore agency of stakeholders across the ecosystem (rather than make choices that deplete agency), thereby distributing the ability to solve instead of privileging a single channel or solution.

2. From the start, designing for what works at scale and unbundle the problem since solutions for each part may be useful.

3. Catalyzing an open ecosystem for stakeholders to participate, co-create and innovate.

4. Leveraging technology to create digital public goods for building societal-scale public goods.

5. Implementing through existing institutions and partnership with existing players.

Another example of successful scaling up is the 'Luz Sustentable' program of the Mexican government. Launched in mid-2011 it leveraged the self-interest of families to save on their elecricity bills (by using energy-saving bulbs, and reducing electricity consumption while not having to cut back on it) while advancing the climate interest of the government. The program resulted in families saving up to 18% on their electricity bills by saving a total of 1400 gigawatt hour of electricity, and an avoided emission of 700,000 tonnes of CO_2.

However, scaling up should not be seen as an end in itself, becoming an ideology, often driven by financial interests. Many local solutions, especially in the tropics, cannot scale up because of ecological limits of the localities. For example, when systems based on resource extraction for the local market (such as of herbs, condiments and other specialized non-timber forest products) or those that cater to regional tourists become integrated into the global market, the insatiable demands they are exposed to can wreck local ecologies.

FINANCIAL SECTOR

Enlightened self-interest in the financial sector would require financial firms channeling investment to those companies that are equipped to handle the challenges of climate transition and likely to prosper in a zero-carbon world.[100] Just as importantly, they would need to avoid lending to companies whose business models make them vulnerable to rising carbon prices and climate change, and in particular, to avoid long-term lending secured on fossil fuel assets whose value may fall sharply. The sector's enlightened self-interest could be more effectively harnessed by the following steps: a) Central banks and financial regulators be given a clear mandate to take climate change into account in their monetary and regulatory policies, with the regulators setting out

a global roadmap to net zero; b) The Network for Greening the Financial System, the Basel Committee and the IAIS to agree to a common methodology for stress testing banks and insurers, to be implemented globally; c) The ISSB to publish a rigorous and competitive set of disclosure standards for financial and non-financial companies; d) Clarity on the ESG (Environmental, Social, Governance) standards, including a clear taxonomy on 'green investment'; and e) explore ways to extend regulatory and social accountability to the shadow banking system and private equity.

AGRICULTURE, FORESTRY AND OTHER LAND USE SECTOR

Agriculture, Forestry and Other Land Use (AFOLU) sector presents a critical area for the pursuit of 'societal thinking' led climate action. AFLOU accounts for high level of emissions (globally at 22%, and Asia with the highest share with some countries such as Bangladesh and Indonesia between 50% to 60%). Further, marginalized local people and indigenous communities rely on natural resources for their livelihoods. Marketable carbon offsets are one type of solution. With scores of NGOs and civil society groups tangled in helping counter impacts of climate change on communities, the need for scalable solutions that are localized is ever more pressing. Advancing societal thinking in order to 'sense, make sense, solve and aspire for effective climate action' requires the actualization of self-interest of diverse stakeholders, with outcomes that deliver at scale. At a minimum it requires the use of a) Shared technology infrastructure: that allows for diverse actors to access and use knowledge, common data, tools, protocols, standards effectively at scale instead of having to invest individually and end up with fragmented infrastructure. A shared system improves efficiency (cost/effort), ensures focus to work at scale from the get-go, and provides a common 'language' for solutions to coordinate, cohere and aggregate impacts. b) Designing an environment for Co-Creating Solutions: No single organisation has the ability to find solutions to the myriad problems of climate change. Problems that are complex, interactive, dynamic and evolving. The 'working together' of diverse stakeholders, beginning with local people and indigenous communities, requires active thinking about specifics of self-interest and ways of leveraging them, and of collective capacity to measure and monitor change (land use, resources inventory, markets, access and inequity, for example). c) Inducing Network Effects whereby increase in the numbers of participants improves the impact of climate action. A critical requirement is for participants to see the value of their individual involvement, whether a self-help women's group or a reforestation company.

UNIVERSAL FOOD SECURITY

Universal food security, where all people have access to healthy and sustainable diets, is beneficial to all nations and all firms.[101] Attaining it in the face of climate change will require sustainable increases in food supply, enhanced food distribution and access, reduced food losses and waste, and improved nutrition for all, while operating within environmental limits and seeking to mitigate an adversely changing climate. Key transformations required include: a) *Sustainable intensification* whereby production increases in some locations will need to offset the production declines in others due to land degradation, climate impacts, and other factors, including movement toward greater tree-based and agriculture more rooted in perennial plants that often resist climate impacts better than annual crops; b) *Market infrastructure* with food availability coupled with food access. including infrastructure to better withstand heightened climate variability from climate change; c) *Postharvest stewardship* whereby food losses and waste are reduced with positive impacts on food security and reduced GHG emissions; d) *Healthy diets* for improving both human health and environmental sustainability including reducing consumption of meat and dairy from ruminants, that would help drive down GHG emissions; and e) *Social protection* to help meet the needs of people who face various forms of malnutrition as a result of climate disasters (as well as conflict, poor health, or extreme poverty). Applied contextually in different food system settings, this portfolio of transformations represents an adaptation to changing climatic constraints while, in aggregate, mitigating climate change.

NATURE-BASED CLIMATE SOLUTIONS

Nature-based climate solutions have high potential to advance both mitigation and adaptation. They are nevertheless challenging to scale up. In contrast to the body of current approaches, bottom-up mechanisms and interventions to climate change are needed to reduce GHG concentrations, advance the material well-being of individuals and communi-

ties, and promote equity within and between societies and generations.[102] The mechanisms should emerge from local experiences and contexts. A promising path is to incentivize the self-interest of individuals and businesses, while ensuring that equity and sustainability are central to all actions. Such context-dependent solutions would need to value nature to be more fully understandable to individuals and corporate decision-makers, develop and provide more tangible market mechanisms to translate self-interest-based decisions into nature-based solutions, and incentivize and regulate those markets. On valuing nature, 'Natural Capital Accounting' while logical at the macroeconomic scale, is a long way from influencing how individuals make decisions about investing in nature-based solutions. Valuing individual animals, elephants and whales, for example, whose conservation is appreciated by individuals could allow for more a credible decision-making system that is based on tangible values people or businesses. Several market mechanisms in addition to the voluntary REDD+ projects (for marketing carbon credits to individuals and businesses) are being trialed such as the World Bank's US $150 million Wildlife Conservation Bond and the $100M in private investment being mobilized by Coalition for Private Investment in Conservation (CPIC) as part of the GEF's Blended Finance initiative.[103] Markets for natural assets would need to be regulated reflecting moral and ethical standards for sentient natural assets, ownership and usufruct rights to land and natural assets of local people, and appropriate standards, metrics and regulations on the delivery of the solutions that are nature-based over decades and decades.

CODA OF HOPE

"You go out into a world where mankind is challenged, as it has never been challenged before, to prove its maturity and its mastery — not of nature, but of itself. Therein lies our hope and our destiny."
— Rachel Carson's Commencement speech at Scripps College, June 1962

"Hope... is not the same as joy that things are going well, or willingness to invest in enterprises that are obviously headed for early success, but, rather, an ability to work for something because it is good, not just because it stands a chance to succeed."
— Vaclav Havel in Disturbing the Peace, 1991

It is time to recharge the deep aquifers of climate despair with the wellsprings of hope. Hope is not denial; hope is not romance. It is the opposite of lazy cynicism. Hope is the energy that propels right action whether the millions cycling in Copenhagen and Beijing, the tens of millions voluntarily reducing their meat consumption or choosing not to own a car, environmental defenders across the world – they are statements of climate hope. Not of despair. The coming massive shift to electric vehicles is an indicator of the joining of society, state and market to innovate. We may well be witnessing a change in the way we view abundance itself, thereby transforming the pattern of energy consumption globally. Let us not forget how the recent pandemic, and the subsequent anthro-pause gave millions of people a chance to experience clean air and water, reduced noise and light pollution, and renew their wonderment about nature's beauty.

It is too late for pessimism, too late for despair. Wringing hands over the climate problem is truly past. Now is the time of solutions, embracing action, and challenging practices that threaten our very survival. We need not be trapped by old stories about the times to come. We can write a new story about the future, and then tell and retell it so that people everywhere work to make it ring true. This is the true treasure of human beings – our endless capacity to imagine and create. We have an enormous capacity for empathy—we are wired to love. Climate change is indeed the opportunity to demonstrate these capacities urgently and in full measure.

We are at a watershed moment in history, when hope separated from despair, when apathy stirred into action and when society, state and markets came together—not out of empathy or altruism, but in enlightened self-interest—to overcome the biggest threat we face.

Acknowledgements

As members of the Task Force, we thank Dean Enrico Letta (who worked with us until late 2021) and Dean Arancha Gonzalez (who begun working with us from July 2022) of the Paris School of International Affairs, Sciences Po, Paris for their support of the Task Force.

The work of the Task Force could not have been accomplished without the tireless efforts of Alejandra Guraieb on research and logistical help through 27 July, 2022.

The Task Force is grateful for the research support of Priya Ajmera, Sharanya Balasubramanian, Michele Bellini, Elizabeth Bennett, Rosina Bierbaum, Eva Dayan, Saliem Fakir, Fiona Hurrey, Felipe Jukemura, Suzie Marshall, Joanna O'Flynn, Frank Okoth-Menya, Marin Pitavy, Mary Mediatrix Recella, Stefano Santori, Samantha Youngeun Shin, Jotham Teo, Feby Utari, Elisson Wright and Yuwei Zhong, who provided support to the work of individual members of the Task Force.

Our sincere thanks to Jenny Correa, Nathalie Corvée, Marie-Zenaide Jolys and Mark Maloney for their logistical support in making possible the Paris Task Force meeting.

ANNEX 1

Members of the Independent Task Force for Creative Climate Action

Shiv SOMESHWAR (India), Task Force Chair

Someshwar is the founder chairholder of the European Chair for Sustainable Development and Climate Transition at Sciences Po, Paris. He is a visiting professor at Sciences Po and Columbia University, New York. Someshwar leads multidisciplinary efforts on building resilience to climate risks, and advises governments and multilateral institutions on implementing sustainable development action priorities in pursuit of Agenda 2030. He received a Ph.D. in urban planning from the University of California, Los Angeles, and he was a Bell-MacArthur fellow at Harvard University. He has two Masters' degrees in housing and environmental planning, and is also trained as a professional architect. Someshwar has previously worked at the Earth Institute, Columbia University, the Rockefeller Foundation in New York, and the World Bank in Washington D.C.

Howard DAVIES (UK)

Davies is Chairman of the Royal Bank of Scotland. He was the Director of the London School of Economics and Political Science (2003-2011), and since 2011, is a professor at the Paris School of International Affairs (PSIA), Sciences Po. He has been chairman of the British Government's Airport Policy Review, of UK's Financial Services Authority, Deputy Governor of the Bank of England, independent Director of Morgan Stanley Inc and Non-Executive Director of Prudential Plc. He earlier worked in the Foreign and Commonwealth Office, the Treasury, and McKinsey and Co. He is a member of the Regulatory and Compliance Advisory Council of Millennium Management LLC. In 2012, he was appointed Chairman of the International Advisory Council of the China Securities Regulatory Commission. Davies was a Trustee of the Tate Gallery, member of the governing body of the Royal Academy of Music, and is Chairman of the London Library Trustees. He has published five books on the financial markets and regularly writes for *The Financial Times, Times Higher Education, Prospect,* and *The Literary Review*.

Glenn DENNING (Australia)

Denning joined the School of International and Public Affairs (SIPA) at Columbia University in 2009 as founding Director of the Master of Public Administration in Development Practice. From 2011 to 2014, Denning served as Director of the Earth Institute's Center on Globalization and Sustainable Development. He continues to serve on the Earth Institute faculty as Chair of the Practice Committee. Over the past 40 years, Denning has advised governments and international organizations on agriculture and food policy in more than 50 countries. He has also served on the UN Millennium Project Hunger Task Force and the Senior Steering Group of the UN High Level Task Force on the Global Food Security Crisis. In 2000, Denning was honored by the Government of Cambodia as Commander of the Royal Order of Sahametrei for his role in establishing the Cambodian Agricultural Research and Development Institute and his contributions to increasing national rice production.

Susanna HECHT (United States)

Hecht's research focuses largely on land use change in the Latin American tropics. Supported by research agencies and foundations including US National Science Foundation, NASA, MacArthur Foundation, Ford Foundation and Guggenheim Foundation, amongst others, her research integrates the humanities, including the history of ideas, social and environmental history, and the social sciences of development into the dynamics and sciences of tropical and planetary change. She has worked with the governments of Brazil, El Salvador, Bolivia, Ecuador and Colombia and for European and US development agencies, World Bank and InterAmerican Development Bank, and many non-government organizations. She is a professor at the School of Public Affairs/Urban Planning and at the Graduate Institute, Geneva. Her book, *Scramble for the Amazon and the Lost Paradise of Euclides da Cunha*, won the Eleanor Melville Award for best book in Latin American environmental history from the American Historical Association, and the Carl O. Sauer Award.

Frannie LEAUTIER (Tanzania)

Léautier is a partner and CEO of SouthBridge Investment, Kigali. She leads the investment activities of the firm. She previously worked in asset management, development finance, and risk management. Léautier graduated from the Massachusetts Institute for Technology with a Master of Science in Transportation and a Ph.D. in Infrastructure Systems. She went on to work at the World Bank Group, where during her 15-year career she held senior financial positions. She served as Vice-President for nearly seven years at the WBG and won several awards for her outstanding contributions. She held various roles at the Trade and Development Bank Group, including vice chair of the board, special advisor to the president, before becoming the group's first chief operating officer. She has authored several books and has lectured at Sciences Po, MIT, Harvard, and University of Tokyo.

Enrico LETTA (Italy)

Letta is the Secretary of the Italian Democratic Party. Until recently, he was Dean of the Paris School of International Affairs (PSIA) at Sciences Po in Paris. Letta was the Prime Minister of Italy from April 2013 to February 2014. Prior to that he served as Minister for EU Affairs (1998-1999), Minister for Industry, Commerce and Crafts (January-April 2000), Minister for Industry, Commerce and Crafts and Foreign Trade (2000-2001) and Undersecretary of State to the Prime Minister of the government led by Romano Prodi (2006 to 2008). Between 2001 and 2015 he was Member of the Italian Parliament, excluding between 2004 and 2006 when he was Member of the European Parliament. In 2016, he received the Commander of the Legion of Honor of France.

Carlos LOPES (Guinea Bissau)

Lopes is an honorary professor at the Nelson Mandela School of Public Governance of the University of Cape Town, and a Visiting Fellow at the Oxford Martin School of the University of Oxford. In 2018, he was appointed High Representative of the Commission of the African Union and is a member of the African Union Reform Team led by President Paul Kagame. He was executive secretary of the United Nations Economic Commission for Africa from September 2012 to October 2016. Lopes has a Ph.D. in History from the Panthéon-Sorbonne University in Paris, and has a Research Master's degree from the Graduate Institute of International and Development Studies in Geneva. He has honorary doctorates from Hawassa University in Ethiopia and from the Universidade Cândido Mendes in Rio de Janeiro, Brazil.

Stefano MANSERVISI (Italy)

Manservisi is special advisor to Commissioner Paolo Gentiloni, Chair of the Global Community Engagement and Resilience Fund, and senior advisor at the European Institute of Peace. He has served the European Union for more than 35 years. Manservisi was Director-General for International Cooperation and Development (DEVCO) at the European Commission. Prior to that, he was the Head of the Private Office of Federica Mogherini, High Representative of the Union for Foreign Affairs and Security Policy and Commission Vice-President. He was the head of the Delegation of the European Union to Turkey. Before that, he held different positions at the Commission, including as Director-General for Migration and Home Affairs, and DG for Development and Relations with African, Caribbean, and Pacific States. He also headed the private offices of the Commission's President Romano Prodi and Commissioner Mario Monti. He studied law at the Universities of Bologna and Paris-Sorbonne. Manservisi lectures at PSIA at Sciences Po and at the EUI.

José Antonio MEADE (Mexico)

Meade is a professor at ITAM, Mexico City, Commissioner of the Global Commission on Adaptation, a non-executive Director of ALFA General Board, and independent non-executive Director of the HSBC Board of Directors. Between 2011 and 2017 he held cabinet-level positions in the federal government of Mexico, including acting as Secretary of Finance and Public Credit, Secretary of Social Development, Secretary of Foreign Affairs and Secretary of Energy. Prior to his appointment to the Cabinet, he served as Undersecretary and as Chief of Staff in the Ministry of Finance and Public Credit. Meade served as the Director General of Banking and Savings at the Ministry of Finance and Public Credit. As the Chief Executive Officer of the National Bank for Rural Credit, he led financial restructuring and transition to a new institution, Financiera Rural. He studied Economics and Law from the Instituto Tecnológico Autónomo de México and Universidad Nacional Autónoma de México, before receiving a Ph.D. in Economics from Yale University.

Rohini NILEKANI (India)

Nilekani is an Indian philanthropist. She is the Chairperson of Rohini Nilekani Philanthropies and Co-founder and Director of EkStep, a non-profit education platform. She is also the Founder and Former Chairperson of Arghyam, a foundation she set up in 2001 for sustainable water and sanitation, which funds initiatives across India. From 2004 to 2014, she was Founder-Chairperson and chief funder of Pratham Books, a non-profit children's publisher that reached millions of children during her tenure. She sits on the Board of Trustees of ATREE, an environmental think tank. In the past, she has served on the Audit Advisory Board of the Comptroller and Auditor General of India and the Eminent Persons Advisory Group of the Competition Commission of India. A former journalist, she writes for several Indian publications. Her non-fiction book *Uncommon Ground* is based on her eponymous TV show. She has written several books for young children, including the popular *Annual Haircut Day*. In 2017, she was inducted as Foreign Honorary Member of the American Academy of Arts and Sciences. Together with her husband, Nilekani signed the Giving Pledge, which commits half their wealth to philanthropic causes.

Cherie NURSALIM (Indonesia)

Nursalim is an Indonesian businesswoman and philanthropist. She is a Vice Chairperson at the GITI Group and special advisor to the government of the Republic of Indonesia. She is Vice Chairman of the International Chamber of Commerce and is a board member of Publicis Groupe, Blended Finance Taskforce, Partnering for Green Growth, University of Indonesia Research Center for Climate Change and Singapore Science Center, World Green Building Council, amongst others. She serves on the International and Asia Advisory Boards for Columbia University and MIT Sloan School of Management respectively. She chairs the Southeast Asia Chapter of the UN Sustainable Development Solutions Network, and Tsinghua University Southeast Asia Centre in Bali, where she is developing Kura Kura Bali to implement the Tri Hita Karana philosophy of happiness. Nursalim is a founding trustee of the United in Diversity Forum. She is a graduate in Engineering and Economics from St Hilda's College, Oxford, and has an MBA from Columbia Business School.

John G. ROBINSON (United States)

Robinson is IUCN Councilor for North America and the Caribbean and is the Joan L. Tweedy Chair in Conservation Strategy at the Wildlife Conservation Society (WCS). Robinson oversaw the programs of the WCS in North America, Latin America and Caribbean, Asia, Africa and the Marine realm from 1990 until the end of 2019. He has been a member of the board of the Christensen Fund, Foundations of Success, Tropical Forest Foundation, and World Parks Endowment. He served on the Board of Governors of the Society for Conservation Biology and as its President. In recognition of his contributions to conservation, Robinson was inducted into the Royal Order of the Golden Ark by Prince Bernhard of the Netherlands in 2003. In 2016, he received the Lifetime Achievement Award by the Zoological Society of London. He has a Ph.D. in Zoology. In over 200 books, book chapters and journal publications, he has written extensively on conservation research, practice and policy.

Naresh C. SINGH (Guyana and Canada)

Singh is a professor and Director of the Centre for Complexity Economics and Applied Spirituality for Public Policy, Jindal School of Government and Public Policy at Jindal Global University, Sonipat. He has over three decades of experience, across 60 countries, as an international development practitioner, scholar and policy adviser to governments and international institutions. He serves as special adviser on sustainability at the Toronto Centre, and as senior VP for Global Partnerships at Global Development Solutions Canada. Singh was the executive director of the UN Commission on Legal Empowerment of the Poor co-chaired by Madeleine Albright and Hernando de Soto. He has held senior positions in the Federal Government of Canada, United Nations Development Program, International Institute for Sustainable Development and Caribbean Environmental Health Institute. He has lectured at several universities including Boston University, Harvard, McGill and Waterloo and universities of Guyana and the West Indies.

Sébastien TREYER (France)

Treyer is the executive director of the Institute for Sustainable Development and International Relations-IDDRI, since 2019, having joined in 2010 as the Director of Programmes. Prof. Treyer is a faculty at Sciences Po, Paris and Chairman of the Scientific and Technical Committee of the French Global Environment Facility, as well as a member of the Lead Faculty of the Earth System Governance Network. A graduate from École Polytechnique, chief engineer of the Corps of Bridges, Water and Forests, and Ph.D. in environmental management, Treyer was in charge of foresight studies at the French Ministry of the Environment, and played an active role in leading the interface between science and policy and scientific programming at the European Commission, the French National Research Agency, and various territorial actors.

ANNEX 2

Essays

Essays by several members of the Task Force are appended here. The topics are wide-ranging, reflecting the diversity of interest and experience of Task Force members, and thereby the diverse scope for climate enlightened action.

PAGE 45 Consciousness for Climate: Exploring Human Spirituality in the fight against climate change through an Integral Approach
NARESH SINGH

PAGE 50 Democratic Dimensions of Advancing Enlightened Climate Action
ENRICO LETTA AND MICHELE BELLINI

PAGE 52 Energy and Development in the African Context
FRANNIE LAUTIER

PAGE 55 Activating Self-Interest in Nature-Based Solutions To Climate Change
JOHN ROBINSON

PAGE 60 Harnessing the Enlightened Self-Interest of the Financial Sector to Advance Climate Action
HOWARD DAVIES

PAGE 65 The Just Energy Transition Partnership in South Africa – A promising idea inspiring the world
CARLOS LOPES AND SALIEM FAKIR

PAGE 68 Achieving Universal Food Security in an Adversely Changing Climate
GLENN DENNING

PAGE 76 Quota Policy – An Ideal Alternative To Address Climate Change?
JOSE A MEADE

PAGE 78 A Job for The One Percent: The Elite Must Help Build Better Cities, In Public Interest and In Their Own Interest
ROHINI NILEKANI

Consciousness for Climate: Exploring Human Spirituality in the fight against climate change through an Integral Approach.

NARESH SINGH

INTRODUCTION

The fight against climate change is not going well. That is well documented. Various reasons and explanations are expounded and matching proposals for acceleration of action suggested. They are mostly typical of western rationality, left brained, deterministic and reductionist. Even the attempts at systems thinking and holism are partial and incomplete. It is argued here that humans have a deep source of wisdom beyond regular information and knowledge from which their aspirations and behavior ultimately spring. This source has not been tapped since the scientific and industrial revolutions that have brought us all this material wealth and yet much destruction including of the climate system.

HUMAN SPIRITUALITY AND CLIMATE CHANGE: AN OVERVIEW

"The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift."
— Albert Einstein

In this piece we explore reawakening our sacred gift (our spirituality) while working with our faithful servant (rationality). In order to use enlightened self-interest to address climate change we must first figure out what enlightened self-interest is as distinct from self-interest. In order to do to this, we must first find out who we truly are, but since that is quite difficult, we can settle for what we know for sure that we are not. The spirituality discussed here is not coterminous with religion, prayers or belief systems. It is about secular spiritualty, the experience that every human has from time to time when sensing something bigger than one's self or one's ego.

There is significant established and emerging evidence which points to consciousness[104] as the ground from which all else emerges including matter. This, of course, overturns the long held scientific premise that matter was primary. One way or another, if the former premise, backed up as it is by solid evidence, provides new insights on how enlightened self-interest can help us make progress against the worst effects of climate change, then it is worth pursuing.

The main sources of the evidence pointing to the new premise are the worlds wisdom traditions and emerging findings from contemporary science: quantum physics, quantum social science, complexity theory, and cognitive neuroscience. The conclusions of importance to us in climate change work are a) the unity or oneness of consciousness that living things share, b) the ephemeral nature of duality and the underlying non-duality, c) the illusion of separation of humans from each other and from nature, and d) the imaginary nature of the ego as the source of fear, insecurity and feelings of inadequacy that lead to greed, over-consumption, and default public policy which prioritizes GDP per capita growth above all else. Such growth is unfortunately driven by fossil fuel consumption and a capitalistic mode of production and distribution, which in turn leads to concentration of wealth in the hands of few resulting in a global situation in which 20% of the world's population consumes 80% of the world's resources and generate 80% of the waste. While these figures are probably changing with the growth in India and China, they are largely valid.

The wisdom traditions of the world whose insights support the conclusions on the nature of reality and human spirituality[105] include a) Christianity as described by John of the Cross,[106] Meister Eckhart,[107] Thomas Keating,[108] Thomas Merton, the Desert Fathers among others; b) the mystical side of Islam-Sufism as described by Rumi, Ibn Arabi and may other Sufi mystics; c) Hinduism mainly from Advaita Vedanta as described in the Upanishads, the sutras of Patanjali, the Ashtavakra Gita, the Bhagvad Gita and teachers like Ramana Maharshi, Nisargadatta Maharaj, and Rupert Spira[109] among others. The convergence of the insights from all these sources as complemented by those from Buddhism and Daoism provides compelling evidence. The western scientific evidence and conclusions from scientists such as David Bohm on quantum physics and implicate order; Menas Kafatos quantum physics and Kashmiri Shaivism complexity theorist Stuart Kaufmann and cognitive neuroscientist Donald Hoffman in the *Case Against Realty* among many others can no longer be ignored.

Yet as Chris Lucas put it, "In our supposedly material world, the cultivation of spiritual excellence is often regarded as at best irrelevant or at worst a psychotic delusion. Complexity Science however can throw a very different light on this subject, revealing spiritual development to be not only advantageous, but perhaps the most valuable asset currently available to the human race."[110] As we continue to fall short of the requirements for keeping anthropogenic induced global temperature rise below 1.5 Celsius compared to preindustrial levels, should we not explore everything in our arsenal? Is it not in our enlightened self-interest to revisit long held assumptions such as our essential separation from nature and from each other, that human nature is essentially greedy and that we will always seek to acquire much more than we need for a life worth living? A brief root cause analysis of climate change dilemma will show the need to dig deeper than we have been doing so far to make greater progress at a faster rate.

ROOT CAUSE ANALYSIS OF THE CLIMATE DILEMMA

We are all familiar with the well-established IPCC consensus that the climate disaster we are facing is anthropogenic in nature and caused by emissions of greenhouse gases (GHGs) such as Carbon Dioxide and Methane among others. So, the problem is increasing temperatures, its immediate effects are extreme weather events increasing intensity and frequency and follow-on effects like droughts and floods as well sea level rise, eroding shorelines and so on, with a range of social, economic and financial effects. The immediate cause is the buildup of GHGs. The cause of the buildup is a combination of increased emissions and reduced absorptions by sinks together with a range of feedback loops reinforcing the shifts. Increased emissions are caused by increasing use of fossil fuels which form the basis of the global economic system while reduced absorption is caused by destruction of sinks such as forests and poor land use systems coupled with reduced absorptive capacity of existing sinks. For example, the acidification of the oceans due to the CO_2 build up. In short, our civilization is fossil fuel-based capitalism driven by the default public policy goals of all countries which seek increased GDP per growth based on material consumption. Growth at any cost is the high priest of progress. Over-exploitation for over consumption based on corporate and individual greed work hand in hand to make change intransigent. This challenge is so fundamental to what we have come to accept as the good life that we put all our efforts elsewhere tinkering at the edges with all kinds of brilliant technological and economic innovations which merely add up to re-arranging the chairs on the deck. We have to come accept that it is human nature to be greedy and hence overconsumption will always be with us, and that capitalism is the most efficient way to continue to satisfy our natural urge to over consume. On the other hand, if we wake up and see that we are not merely our bodies, with only material needs that there is something else to us a new possibility arises. This insight is of course not new, it has always been with us but then we lost it as the left hemisphere of the brain with its grabbing, individualistic, reductionist and deterministic characteristics[111] became dominant in western civilization and is now mimicked by all. The bottom line of this argument simply put is that deep reflection on our own nature quickly reveals that we are inherently spiritual, that we share a common consciousness, that our sense of separation from each other and from nature is false, that our sense of insecurity and inadequacy which we try correcting with the constant acquisition of material things, is the result of imaginary ego mistaken as our selves.

CAN THIS BE OF VALUE IN THE WORLD OF CLIMATE POLITICS AND POLICY?

So why is this understanding important now since it has always been with us? Can this be of any value in the world of climate politics and policy? The answer to the first question is that the limits to our current civilizational approach are more evident than ever, that the dangers of the Anthropocene are clear and present, that the data on which these insights are based are now corroborated by both the timeless wisdom traditions of the world such as the mystical dimensions of Christianity, Sufism (the spiritual aspects of Islam), Buddhism and Daoism, and Advaita Vedanta (of Hinduism) as well as many branches of contemporary western science as mentioned at the beginning of the analysis. The convergence of these previously disparate systems of inquiry into the human condition and the possibility of utilizing these insights not only for individual self-realization and enlighten-

ment but for societal awakening is now not real and practical but vital to our survival in the Anthropocene. These ideas are not a panacea, and in any event, they might not be adopted in time and so all the other good work with all their limitations must continue. Nevertheless, the faster we act on these new insights the better our chances for long term success even if by 2040 to 2060.

The answer to the second question is 'yes' and provides additional reinforcement to the first question 'why now?' Let us explore how these insights can contribute to climate politics and policy. The root cause analysis offered earlier has its basis in a civilizational ethic based on having and so the dominant discipline used in policy making tends to be political economy the study of who gets what and how. Clearly such a discipline will seek to maximize having in addition to some redistributions and will not be well placed to deal with reductions in consumption of energy and matter in the pursuit of well-being. This is where the politics of being becomes important. It suggests that the fundamental transformation is to move from a civilization based on having to one that's based on being. So far, the political and policy debates on climate change, nationally and internationally are framed in political economy terms of who gets what, who stop produces what or how. The politics of being might instead ask what public policy would look like if the goal of society at large and individually is greater love, compassion or human self-realization.

A recent book, *The Politics of Being: Wisdom and Science for a New Development Paradigm*[112] lays out well a new policy approach-based spiritual awakening. This spirituality is not coming from any given religion, it is rather the source of the all the world's major regions and as such offers a human inter-spiritual frame for a new way of human well-being that offers a root cause answer to the climate dilemma as it does to the Anthropocene's civilizational challenges.

This approach to politics is more real than we might think. As Legrand points out, western civilization has already offered its vision of democracy, human rights, individual autonomy, and science to the world. Scandinavian cultures of partnership, with their successful family, education, and gender policies, still have a lot to share. However, the many imbalances inherited from the Western worldview are leading us to chaos. As globalization becomes multipolar, it is now time for other civilizations to also share their best and help us find a balance. If China is able to move beyond its current form of dictatorial communism and reconnect more to its Confucian and Taoist roots, Chinese civilization could draw on its millennia of experience and wisdom to offer a non-ideological, longer term, more enlightened and harmonious model of development as it asserts its leadership. Other examples of enlightened political leadership are Bhutan's experience with happiness, the *buen vivir* political philosophy of Andean people, indigenous people's restorative justice models and their recognition of the rights of nature, Costa Rican nature and peace inspired politics, and India's political leadership of Yoga. These are small windows at the moment. Greater investments in research, teaching networking, capacity building and advocacy will blaze a new trail of enlightened self-interest moderating climate change causes and effects.

Others are seeking a new paradigm in politics[113] driven by the convergence of the new sciences of quantum like thinking and complexity theory and the wisdom traditions. Looking at China through this lens, Frederick Sao says:

"A new worldview is framing a Chinese form of a socialistic market economy based on oneness with the universe, harmony among nations, tolerance in society, and the morality of seeking goodness. This, in fact, is a revitalization of the traditional Chinese worldview—a unified view, reflecting the insight of the quantum paradigm that fundamentally we all are one. As politics shifts to a unified mindset inspired by the quantum paradigm, a new consciousness is born. This is worth looking into. We should know how China is doing with its fast-paced transformation. Unification is the guiding value contributing to the flourishing of life and will change politics both its system and its structure. It will change how we govern ourselves."[114]

Beyond the political level to the public service level, the OECD has concluded in its Public Service Innovation Work[115] that success in public service innovation has citizen engagement at its core:

"Innovative governments are enhancing citizen engagement and ensuring public involvement at every stage of the policy cycle: from shaping ideas to designing, delivering and monitoring services. The goal is not only to improve the type and quality of services that governments provide, but also to transform the culture of government so that citizens are seen as partners who can shape and inform policy and services."

Quite independently, based on a large number of case studies, the Centre for Public Impact has articulated a Human Learning Systems approach to public service delivery which has these same goals. This type of approach might hold the keys of new partnership of mutual self-interest between governments and citizens in implementing tough climate actions. These are closely akin to the teachings of the wisdom traditions.

In Buddhist and Daoist Systems Thinking: The natural Path to Sustainable Transformation, Josep Coll explores a radical new conception of business and management. This is grounded on the reconnection of humans with nature as the new competitive advantage for living organizations and entrepreneurs that aspire to regenerate the economy and drive a positive impact on the planet, in the context of the Anthropocene. Consistent with this thinking is that put forward by the Said School of Business in its recent book *Putting Purpose into Practice* in which it proposes a fundamental shift in the purpose of business which should be *to make the world a better place and in so doing make a profit*. It is this level of deep core self-interest that must now be put to work in dealing with climate change. This requires core systemic second order change unlike for example green finance which is merely *doing the wrong thing righter*, an example of first order change as discussed in the next paragraph.

Putting into practice any set of social and economic reforms is fraught with problems and so these ideas will face challenges. It is an approach that combines systems thinking, the modern sciences and the wisdom traditions and will require what has been called Second Order Change. According to Ray Ison in the *Hidden Power of Systems*,[116] First-order change (doing the wrong thing righter) has not worked. Second-order change, a change-of-change that changes the 'whole system' is concerned with developing new ways of thinking and acting to break out of the traps we have created for ourselves – of learning how to do the right thing for current circumstances.

As early as 1969, Horst Rittel and Melvin Webber had come to the view that the difficulties attached to rationality are tenacious, and we have so far been unable to get untangled from their web. This is partly because the classical paradigm of science and engineering – the paradigm that has underlain modern professionalism – is not applicable to the problems of open societal systems. In this regard the Australian Public Service has asserted that tackling wicked problems calls for high levels of systems thinking, thinking [that] helps policy makers to make the connections between the multiple causes and interdependencies of wicked problems that are necessary in order to avoid a narrow approach and the artificial taming of wicked problems. Agencies need to look for ways of developing or obtaining this range of skills.[117]

INNER DEVELOPMENT GOALS

An operational bridge that might facilitate the evolution of our consciousness to help us seriously embrace the SDGs in general and the challenge of climate change in particular are the now well established Inner Development Goals.[118] The diagnosis is the that we lack the inner capacity to deal with our increasingly complex environment and challenges.

The goals are captured in in 5 categories as follows: a) Being: Relationship to Self; b) Thinking: Cognitive Skills; c) Relating: Caring for Others and the World; d) Collaborating: Social Skills; e) Acting: Driving Change. In each category there several attributes. For example, in the first category of being, the attributes focus on cultivating our inner life and developing and deepening our relationship to our thoughts, feelings and body to help us be present, intentional and non-reactive when we face complexity. These attributes are:

1. **INNER COMPASS** · Having a deeply felt sense of responsibility and commitment to values and purposes relating to the good of the whole.

2. **INTEGRITY AND AUTHENTICITY** · A commitment and ability to act with sincerity, honesty and integrity.

3. **OPENNESS AND LEARNING MINDSET** · Having a basic mindset of curiosity and a willingness to be vulnerable and embrace change and grow.

4. **SELF-AWARENESS** · Ability to be in reflective contact with own thoughts, feelings and desires; having a realistic self-image and ability to regulate oneself.

5. **PRESENCE** · Ability to be in the here and now, without judgement and in a state of open-ended presence.

WILBER'S INTEGRAL APPROACH APPLIED TO CLIMATE POLICY: MOVING TO ACTION

To draw from and utilize the ideas discussed in this section we need to bring the inner and outer dimensions together with the individual and collective actors in an operational framework. This can be facilitated by the Ken Wilber Integral Approach[119] which is quite simply explained by reference to the figure below.[120]

There are many appeals for holism and integrated approaches, and they typically fall in the systems box which is a major advance from the fragmented project-based actions that are more common. This diagram however makes clear that much more is needed in addition to systems thinking. These include behavioral changes drawing from human development psychology such as the work of Robert Kegan, who considers immunity to change is the "processes of dynamic equilibrium, which, like an immune system, powerfully and mysteriously tend to keep things pretty much as they are."[121] Much action is now flowing from the issues in this quadrant which include behavioral economics and behavioral science and public policy. In the culture quadrant, much relevant anthropological work on resistance to change and new opportunities for change are being explored and should be drawn upon. Missing in action has been those activities discussed in this piece and flowing from the inner individual consciousness quadrant. Seeing and acting in this integral framework bring together actions flowing from each lens will hopefully help us address the most intransigent challenges in climate change whether these be nation states diplomacy and international negotiations or national level climate friendly policies which meet short sighted opposition from vested status quo interests.

CONCLUSION

It is apt to reflect on the words of James Gustave Speth, former administrator of the UNDP and former Yale Professor: "I used to think the top environmental problems were biodiversity loss, ecosystem collapse and climate change. I thought with 30 years of good science we could address those problems. But I was wrong. The top environmental

INTEGRAL QUADRANTS OF KEN WILBER

	INTERNAL	EXTERNAL
COLLECTIVE	**CONCIOUSNESS** Worldviews, Values, Purpose, Knowledge	**BEHAVIOUR** Habits, Skills, Communication, Health
INDIVIDUAL	**CULTURE** Shared Values, Shared Purpose, Social Norms, History	**CULTURE** Structure, Processes, Agreements, Metrics

problems are selfishness, greed and apathy... And to deal with these we need a spiritual and cultural transformation – and we scientists don't know how to do that." Cited in a paper in a paper by Ives *et al* (2020),[122] the authors conclude: "The vast majority of sustainability science has focused on the external world of ecosystems, economic markets, social structures and governance dynamics. In doing so, a critical second dimension of reality has been neglected: the inner lives of individuals."

Democratic Dimensions of Advancing Enlightened Climate Action

ENRICO LETTA AND MICHELE BELLINI

A crucial aspect in determining the advancement of an ambitious climate agenda is certainly related to the democratic dimension (where democracy exists). More specifically, it deals with the ability to generate a push in terms of democratic consensus in favor of climate action. This is crucial, at least in democratic countries, because this bottom-up push – if strengthened and/or intercepted – has the power to influence the degree of ambition of policies and, therefore, the speed of the ecological transition. There are at least two main tensions to keep in mind when thinking about the democratic dimension.

First, there is a tension between citizens' desire to participate and be involved in choices impacting their lives and the high degree of technical complexity of these choices. This tension – which as a general principle applies to so many policy fields – becomes very relevant with respect to climate policies. This is because climate change is both highly scientific and intersectional in nature.

Through this tension one can, for example, explain a criticism that is often (mistakenly) levelled at youth climate activism, namely that it is limited to protest without making any proposals. Those who make this kind of criticism confuse the means with the end: in an area where the technical complexity is so high and difficult to 'delegate', protest should not be interpreted as a lack of proposals, but rather as a way of expressing strong dissatisfaction towards the status quo, insufficiently ambitious or effective policies, or the timing of these policies.

Trying to resolve, or at least mitigate, the tension between technical complexity and broad citizen participation becomes a priority in order to unleash the power of the grassroot push and, by doing so, also overcoming the dichotomy between protest and proposal. This can be done by investing political capital in the innovation of democratic participation. There are already several innovative experiences of citizen's participation to take a cue from. In particular, the main democratic innovations develop along the lines of participatory democracy and deliberative democracy. It is clearly not an easy challenge, because all these innovations require careful planning and are not without limitations or risks, but they are essential in order to create a virtuous mechanism whereby the bottom-up approach of citizen participation strengthens the top-down element of technical expertise of experts and vice versa.

The second tension concerns more directly the underlying determinants of consensus towards climate policies. In other words, the question is how to create another virtuous process whereby political parties and governments investing a considerable amount of political capital on ambitious climate agendas maximize their returns on election day. The tension here is between, on the one hand, citizen awareness about the negative impact of climate change and, therefore, the need to tackle it and, on the other hand, the still limited capacity of climate policies to enjoy the same levels of electoral effectiveness as more traditional issues such as pure economics or identity.

It is already clear how this tension goes right to the heart of enlightened self-interest. Put another way: how is it possible to reframe climate policies (and the need to think in collective terms) by leveraging the electoral strength of the more traditional electoral activators such as economics and identity?

To answer the question, one should firstly reflect about the context, which is not a neutral one on climate. First of all, support for a climate agenda is less a question of awareness: most people – in some places even almost everyone – are aware that climate change is a problem that needs to be tackled and countered. If there is a lack of awareness it is more about the two big issues of a) the magnitude of the challenge and b) the timing. On these, it is certainly key to raise awareness of the depth of the change needed and of the urgency of this change. Both elements still seem to be in scarcity today.

Secondly, especially in high-income countries, pessimism is widespread. When thinking about climate change and the future, the conventional wisdom is that we will be worse-off in terms of economic well-being and employment. In other words, people tend to frame the climate challenge in a defensive and skeptical way: it is a risk, not an opportunity. Hence, not only is it perceived there are winners and losers, but probably more losers than winners. If that is the case, distributional impacts are an essential piece of the puzzle: they cannot be overlooked but they are at the very core of any climate policy. Afterall, the deeper a transition is, the greater its distributional effects.

These considerations confirm that fear of climate disasters alone is not enough. What is difficult is trying to produce a positive framing of climate change in order to convince people that there is a real chance for a genuinely better future and not simply a series of "lesser evil" kind of options. The solution to reverse skepticism and pessimism certainly cannot be found in the win-win rhetoric. First and foremost, a win-win rhetoric damages democratic support as it would be perceived as disconnected from the reality of distributional impacts, eventually undermining the credibility of any climate agenda framed in those terms. More importantly, the win-win logic ends up by ignoring the criteria of social justice and equity, which, instead, must be the very building blocks of any climate agenda.

Then trying to answer the previous question, one could say that in order for enlightened self-interest to be embodied in climate policies capable of generating consensus, these must first clearly demonstrate that they are effective in pursuing the goals of reducing emissions. In other words, they must not be abstract or vague, but show how and how quickly they can get a system from A to B. This is for instance the goal of the EU's 'Fit For 55' package, which aims at enabling the EU to achieve the target of reducing net GHG emissions by at least 55% by 2030. Clarity of effectiveness is not enough. Climate policies must also show precisely how they help reduce – not increase – inequality, paying close attention to the distribution of costs and benefits. Efforts in terms of political capital should largely focus on these two aspects and not, as it is often the case, on simply raising awareness that climate change is a problem.

This is enlightened self-interest because it simultaneously intercepts the dimension of mere individual economic interest – "*show me that it works and we can be better-off*" – and the dimension of the collective interdependence – "*show me that it manages the distributional effects.*" To sum up the two aspects, one could say: "We have a plan that works (self-interest) and it will leave no one behind (enlightened). Here one can go a step further and note that in addition to the strength of climate policies inspired by the principle of enlightened self-interest, enlightened leaderships are needed: we need leaders with the credibility, the vision and the courage to overcome the starting point of pessimism and skepticism.

To conclude, it is important to emphasize that the current energy crisis offers a concrete example of how enlightened self-interest could be put into practice. The logic goes along these lines: increasing a country's (or the EU's) share of clean energy by moving away from fossil fuels would simultaneously solve three issues: geopolitics, climate, and economics. Firstly, since renewable energy is by definition domestically generated, increasing its share would reduce the geopolitical

problem of dependency from other countries weaponizing the supply of energy. Secondly, increasing energy production from renewable sources helps to advance on climate targets. Thirdly, given the price crisis on fossil fuels, more renewable energy means significant savings in energy costs. These savings can be directed towards the most fragile parts in our societies who are known to be more vulnerable to inflation.

It is clear how these three aspects reinforce one another and are in line with the enlightened self-interest approach. Implementing such a strategy to contribute solving the current energy crisis would be of great political importance because it would show the strength and effectiveness of enlightened self-interest inspired climate policies.

Energy and Development in the African Context

FRANNIE LAUTIER

Energy sector plays a critical role in all economies, with its shortcomings more visible in emerging and developing countries. African economies, for example, are highly dependent on the development and smooth functioning of energy markets, regardless of their carbon content. Recent global stability, macroeconomic and climate related shocks have caused global energy and food markets to undergo tremendous volatility; with high price crises affecting countries differentially depending on their import or export status in relation to fossil fuels.

In general, countries face five major transition risks in relation to setting climate policy in the energy sector, and choosing to move to a lower carbon footprint.

One, the transition out of the COVID-19 pandemic and the effects of the war in Ukraine, shocks that have generated long term scarring effects on many economies. While the pandemic has generated many risks and challenges for the energy sector and climate policy, it has also generated opportunities for global energy transition, such as broadening green financing instruments, strengthening international cooperation, and enhancing green recovery plans. (Tian *et al* 2022).[123]

Two, in transitioning to new technologies the importance of managing the technological obsolescence of critical endpoints to deal with stranded assets or major gaps in energy sources. Mercure *et al* (2018)[124] estimate a stranded fossil fuel assets loss at a discounted global wealth loss of US$1-4 trillion, which would not be evenly distributed. Clear winners would be the countries that are net importers of fossil fuels and clear losers would be those that are major exporters of the same. These losses would be driven by technological as well as climate policy pressures.

Three, the transition from the end of licensing periods and the need to provide sufficient time and certainty to allow investments to take place and avoid disruptions to the energy supply. More than half of the planned 2020 energy licensing rounds were at risk of cancellation due to COVID-19 related disruptions and the energy prices (Lepic 2020).[125] Such countries will likely face gaps in their energy markets, effecting electricity generation and declines in manufacturing and industrial outputs. Energy companies equally face uncertainty towards the end of the licensing periods and may not undertake major investments that they may not be able to fully recover from operations. As a result, end of licensing presents risks of brownouts and blackouts and severe shortages of electricity for residential and industrial use.

Four, the risk of political pushback by coal and fossil fuel dependent sectors, including the pressures for maintaining jobs in these sectors as the transition to a low carbon economy takes place. The effects on people who would be unemployed, in countries where fossil fuels are a key part of the economy and have weak safety nets, would reverberate widely across society, and especially where the wage earner has a large number of dependents (Adebayo 2022).[126] Given the geographical concentration of fossil fuel production and jobs, pressures are likely to be regional and could exacerbate ethnic and other regional tensions. Hence, it is critical

to consider in energy transition plans and climate policy not only the energy sector and the economic effects of transition, but also broader governance and social stability aspects.

Five, the differential cost structures countries face to meet their basic development and energy needs, and the pathway they choose within budget and debt overhang constraints. Countries that are net importers of fossil fuels and that have abundant other sources of energy, like wind, solar, geothermal and nuclear, face a different cost structure for transition than those that are dependent on the coal and fossil fuel sector for export revenues.

For reasons noted above there are many arguments for seeking a just transition, one that does not unduly burden countries that have not contributed to the carbon problem with the costs of getting to a lower carbon footprint. The five transitions are also important from a trade and investment perspective if energy markets are to grow and develop. Net-zero strategies therefore have to consider development perspectives.

Self-interest in the setting of climate policy and development of energy markets varies depending on the level of development achieved as well as cultural and social attributes of a country. In the African context, embedding past and future generations is a natural part of daily life – ancestors and the departed are as important as children, grand and great grandchildren who represent future generations. Thinking of self-interest from a multigenerational perspective therefore comes quite naturally and is a critical aspect of the argument of caring for the future of the planet.

At the national level, self-interest has to do with engaging in nationally net-beneficial actions that produce national benefits (Nordgren, 2016).[127] Such benefits include: a) access to energy for those who are not connected to energy or who face unreliable supply; b) improved public health due to better air quality (especially less indoor air pollution) because of switching to cleaner cooking fuels; c) improved access to education, health and administrative services due to improved access to the internet which relies on electricity and energy production; d) advanced technology development – with particular relevance in cleaner and more flexible use of technologies that depend on reliable energy; and f) enhanced productivity and availability of new types of jobs as a result of better access to reliable and renewable energy.

National benefits are usually presented using 'net-beneficial' calculations. But in our pursuit of the 'how' of climate action, the costs (in the costs-benefits to yield 'net') are equally important considerations from an equity perspective, especially if they are typically borne by those least able to. Hence the importance of a 'just-transition', as argued in this paper. Another aspect in the calculation of 'net' is in the temporal sphere – such as when people are told (usually on the basis of economic arguments) of benefit flows in the long term, for some economic pain in the present. High discounting by people makes this politically unpalatable.

Nationally net-beneficial actions are not always guaranteed and are contingent on other actions that need to be taken – such as afforestation and reforestation along with carbon trading to sequester carbon. Benefits at the national level could also be linked to broader social welfare or individual well-being such as access to jobs, enjoyment of green spaces, better water and waste management at the community level, protection of national parks and presentation of soils, increased tourism revenues from natural assets, revenues from exporting agricultural products from agroforestry, and income from carbon trading amongst others.

Countries need to balance these beneficial aspects to the negative aspects of not using fossil fuels or choosing to de-carbonize early in their development pathway. For example, decarbonization could have negative financial effects – for major industries like steel, aluminum, and cement manufacturing industries that are heavy users of fossil fuels, and for whom there are few renewable energy alternatives. In addition, oil exporting countries who depend on income from fossil fuels, could suffer negative effects from decarbonization and would therefore not be too keen to do so, or may not have the political support to undertake decarbonization actions. Sectors like transport and shipping which are also dependent on fossil fuels and whose transition to lower carbon is likely to take time, could also fall into the negative aspects of decarbonization at the national level.

Uneven distribution of costs and benefits has an advantage as it allows countries to develop unique strategies for climate. Consider that the countries rich in fossil fuels are not rich in carbon sequestration assets like forests. This allows for carbon trade between countries, for example using the opportunity of the African Continental Free Trade Area (AfCTA). Yet to meet all of its electricity needs, Africa is therefore open for external incentives to drive electrification using net-zero strategies. Concessional and grants financing are being used to drive that transformation which is aligned to the self-interest of nations. Finally, for the vast majority of populations not connected to electricity, having an alternative that is renewable is very welcome as many times it is the only alternative that is available.

Indeed, several leaders from emerging and developing countries have argued for exploitation of fossil fuels using arguments of national security, development outcomes deriving from industrialization and other such nationally net-beneficial self-interests. These arguments are built into the Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC) of the UNFCCC. As noted earlier in the report, CBDR-RC recognizes that while all countries have a common obligation to address climate change, they have different duties and abilities. African leaders have argued in their speeches at COP26 and after, that Africa should be able to exploit its fossil fuels to support its industrialization and development policies (Pilling, 2022). Since the war in Ukraine, pushback on including sectors such as natural gas as a transition fuel (which had begun before the war) have diminished and indeed natural gas has been classified along with nuclear energy as a transition fuel in Europe.

Yet, a number of countries in Africa have been able to prove the concept that poor countries can achieve a high living standard level without the use of fossil fuels. Kenya, which has high levels of geothermal energy sources, is able to reach 85% of its total energy generation from renewable sources (Richter, 2022).[129] Its national net-beneficial action of using natural resources and creating jobs while industrializing can be achieved while also contributing to the global goals of decarbonization.

Self-interest is more complex to argue universally when it comes to broader social welfare aspects. This is mainly because, for the most part, the poorer and excluded or marginalized groups in most emerging and developing countries do not usually enjoy access to energy. Hence delivering renewable energy, even if at price points far higher than energy from fossil fuels, is still net beneficial, because the unserved or underserved face prices that are orders of magnitude higher than those connected. Consider this study from Pakistan which showed the effects of electricity shortages on individuals' social well-being and psychological health (Lodhi and Malik 2013),[130] which far outweigh the additional cost they would pay to access a mini-grid for example (Daly 2018).[131] And these effects are present even after considering potential for cross-subsidization.

Self-interest from an individual well-being perspective is generally harder to argue for all segments of society, as some tend to benefit greatly in the short run from the status quo – like people employed in the fossil fuel dependent industries – than those benefiting in the short run from wholesale movement to renewable sources of energy. The timing of transition impacts the pattern and nature of distribution of benefits, and is hence likely to generate different outcomes if self-interest is the motivator for transition.

Social justice is an argument that usually comes up to delay or suspend decisions to transition to lower carbon alternatives. Emerging and developing countries argue that as they have contributed little to the current stock of emissions, they should be allowed to develop using their fossil fuel assets, while the countries that have generated the bulk of the emissions should be the ones to first adopt lower carbon pathways. And those who have generated the bulk of the carbon-based pollution should shoulder the cost of transitioning to lower carbon pathways of the developing countries. This argument was tested at the onset of the war in Ukraine when advanced economies reverted to fossil fuel sources in addressing their self-interest for their immediate energy needs. Consider for example, Germany, a country which decided to fire up coal plants long left dormant as Russia throttled gas supplies (Meredith, 2022).[132] Calls of hypocrisy rang out loudly from developing countries who had been

starved of financing from multilateral and bilateral development agencies on the arguments for the need to transition away from fossil fuels. The self-interest choices of both developed and developing countries have put the world on an increasing carbon pathway with limited opportunity to argue for resumption of carbon reducing pathways.

Sustainable development is an argument that can be used to align short- and medium-term self-interests with longer term interests across a wide variety of countries. A young woman in Kenya came up with a solution of capturing water particles from air – Majik Water – that tends to become even more reliable with climate change as hotter temperatures cause more evaporation and hence make capturing water particles from air easier (Hirschlag, 2019).[133] Aligning her self-interest in getting a solution for her community with her education as a mechanical engineer allowed her to evolve this unique technology. Her technology solves the short term shortage of potable water with the long term water scarcity risks in a sustained cycle of water capture which does not consume large amounts of energy.

Continents like Africa have a unique situation to drive net-zero and climate strategies from a self-interest point of view. They can maximize the attraction of grant and concessional resources to support the transition to a net-zero economy. They can deploy domestic resources to exploit fossil fuels for development and use trade between countries with fossil energy and those with forests to contain, through sequestration, any carbon released, and hence move towards a net-zero strategy. Countries in Africa can also leapfrog into new technologies and use the opportunity to connect the unserved or underserved through a net-zero carbon strategy.

Activating Self-Interest in Nature-Based Solutions to Climate Change

JOHN ROBINSON

Attaining transition to net-zero carbon is challenged by the characteristics of climate change: Climate change is expressed and best understood at a global scale (although the consequences are often local), and it is not *immediate, tangible, or easily predicted*. Therefore, efforts to address climate change, such as the UN Framework Convention on Climate Change (UNFCCC) have sought to stabilize in the global climate system by relying on "top-down", government-driven, multilateral mechanisms and interventions. Those efforts, while they continue to make slow progress, are challenged by multiple concerns including: a) large scale efforts to decarbonize energy and industrial production are still mostly aspirational, b) national mechanisms to monitor and verify compliance with international commitments are inadequate, c) new technologies to reduce emissions and remove carbon from the environment have not yet been designed and implemented, d) the mechanisms that have been posited to promote decarbonization are not ecologically, economically and socially fair, and e) the suggested global resource allocations to foster a climate transition at a national scale are not equitable across nations.

Even more fundamentally, while the phenomenon of climate change is increasingly understood by the public, there has been a failure *to connect climate concerns to individual self-interest*. In other words, there has been an absence of "bottom-up" mechanisms and interventions, in which individual realization and identification promotes individual actions, which in turn can scale up to promote a climate transition.

Bottom-up mechanisms and interventions to climate change, if they are to be effective, would have to promote solutions that (a) have consequences on greenhouse gas concentrations in the atmosphere (b) have direct relevance to individuals, communities or local entities, and influence the well-being and future prospects of individual people, and (c) promote economic and social equity across countries and generations (thus reinforcing the relevance of climate change to individual people). These mechanisms might derive from individuals, local communities, civil society, the private sector, or local governments, but they would emerge from local experiences and places.

Efforts to conserve nature or biodiversity could meet these requirements. The conservation of nature has a direct effect on carbon storage and sequestration, it is tangible, easily understood and relevant to individual people and businesses (in both in the developed and lesser developed world), and the stewarding of natural resources especially preferences the needs of marginalized and poor people.

First, nature and natural resources are the foundation of our societies, our economies and the existence and well-being of people. Nearly half of the world's population depends directly on natural resources for their sustenance and livelihoods (especially those who are poor and marginalized), and $44 trillion of the world's gross domestic product (GDP) – more than half – depends on nature and its services.[134] Nature is linked to both the present well-being and future prospects of people. This was formally recognized by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) which introduced the concept of 'nature's contribution to people' to capture all the contributions of organisms, ecosystems and their associated ecological and evolutionary processes to the quality of life for people, both now and in the future.[135] More generally, there is a recognition that delivering on the Sustainable Development Goals (SDGs) for people depends on nature conservation. In particular, SDG15 (Life on Land) and SDG14 (Life below Water) are considered to be foundational goals for the other SDGs.[136] Loss of nature and natural resources is concrete to the lives of many individual people.

Second, the loss of biodiversity and ecosystem services are inextricably tied to climate change. The mutually reinforcing synergies between addressing biodiversity loss and climate change have been explored recently in an IPBES-IPCC workshop.[137] Given that there is overlap between centers of biological diversity and high carbon ecosystems,[138] loss of the integrity of natural ecosystems and their associated biodiversity directly contributes to climate change. The workshop promoted "a new conservation paradigm [that] would address the simultaneous objectives of a habitable climate, self-sustaining biodiversity, and a good quality of life for all." The workshop recognized that this will not be easy, but structuring approaches around consensus goals, such as the Sustainable Development Goals (SDGs) and the Paris Agreement, mainstreaming biodiversity into climate policy and vice versa, and integrating both public and private actors and improving cooperation across sectors and jurisdictions, can promote inclusive and adaptive decision-making that can result in the necessary transformation of our socio-ecological systems.

Third, interventions that promote the conservation of biodiversity and ecosystem services can contribute to the storage and sequestration of carbon and contribute to a positive climate transition. Such interventions have been labeled as 'nature-based solutions to climate change.'[139] While not a substitute for mechanisms that would phase out fossil fuels and decrease the release of greenhouse gas emissions into the atmosphere, systematic implementation of such interventions can make a very significant contribution to a climate transition.

Protecting nature and conserving natural resources, while frequently not put into practice, is understood and highly supported by the general public. The 'Nature for All' movement, stewarded by IUCN, has built constituencies for nature globally and across the urban-rural divide. Appreciation of nature in turn can translate into its conservation.[140] This characteristic of nature, and the public recognition of the environmental services provided by nature, suggests a likely mechanism to implement a bottom-up approach to addressing climate change.

NATURE-BASED SOLUTIONS

Nature-based solutions are defined by IUCN as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits."[141] Such solutions have very significant potential to increase carbon storage and/or avoid greenhouse gas emissions, thus affecting greenhouse gas concentrations in the atmosphere. Indeed, protecting intact lands, managing working lands, and restoring native cover are estimated to be able to provide up to 30% of solutions as the planet seeks to reach the 2030 carbon emission targets.[142] In particular, protecting, managing and restoring forests can both reduce net emissions (especially by avoiding deforestation) but more importantly by ensuring that maintaining and enlarging the carbon sink to absorb the global human CO_2 output.[143]

Of particular importance for storing and sequestering carbon are ecologically intact forests.[144] Intact ecosystems, especially forests, absorb 29% of all human CO_2 emissions each year.[145] Preventing forest clearance and degradation, and managing selective logging is a nature-based solution that retains carbon in the forest and allows continued sequestration and storage. Forests with high ecological integrity also provide a wide range of services to people[146]: These natural systems are resilient to climate shocks; retain high biodiversity which provides ancillary benefits to people; are homelands for vulnerable people and Indigenous cultures, provide watershed protection and local climate amelioration, and resist the disease spillover from animals to humans.

Similarly, efforts towards ecological restoration, and the mitigation and amelioration the biodiversity consequences of modern agricultural and livestock practices, can also result in the sequestration and storage of carbon in the soil.[147]

Investments in nature-based solutions are already not insignificant. In a recent report,[148] the UN Environment Programme, the World Economic Forum, and the Economics of Land Degradation estimated that based on figures from 2020, about US $133 billion is being invested in nature-based solutions, much of which contributed to carbon storage and sequestration. Of the 86% which came from public funds, about a third went to direct protection of natural areas, and two thirds towards restoration of forests and peatlands, and promoting more sustainable agriculture and water management. Of the 14% from the private sector, investments included biodiversity offsets, sustainable supply chains, and impact investments. Most of these investment in nature-based solutions are very much top-down, rather than bottom-up and activating individual self-interest, but there are opportunities for the latter.

Compared to the risk of climate change, therefore, the loss of biodiversity and ecosystem services is more immediate, tangible, and predictable for many individual people. Nevertheless, while individuals more directly value nature and recognize their dependence on natural resources, these realizations too infrequently translate into individual conservation action. Nature and biodiversity are still too abstract to be effectively valued, and ecosystems and the services they provide can be too large and complex to help individuals make decisions that ultimately will translate into climate action.

If nature-based solutions are to be relevant to individuals and businesses, and have the potential to be a bottom-up intervention, then we need to a) value nature to be more fully understandable to individuals and corporate decision-makers, b) develop and provide more tangible market mechanisms that can translate individual and business decisions into nature-based solutions to climate change, and c) incentivize and regulate those markets.

VALUING THE ENVIRONMENTAL SERVICES PROVIDED BY NATURE

Having an effective way to value the environmental services provided by nature is essential for the development of markets. A compelling case has been made in the Dasgupta Review[149] to use 'Natural Capital Accounting.' Inclusion of natural capital in measurements of Inclusive Wealth, which more tightly tracks human well-being, is essential if societies are to address the challenges of biodiversity loss and climate. While logical at a macroeconomic scale, natural capital accounting has still not been incorporated in national planning, although the United States has recently released a draft National Strategy.[150] Nevertheless, natural capital accounting methods are a long way from influencing how individuals make decisions about investing in nature-based solutions.

In the absence of more complete accounting methods, market-based methods, or valuing on the basis of what people will actually pay, is the default way in the modern world to value assets. This approach traditionally does not capture non-market, non-use values, and is generally considered inadequate for the valuation of nature and the services that it provides – it does not, for instance, adequately capture the intrinsic, social or cultural value of nature.[151] Novel approaches to use markets to value nature however are ongoing: 'Natural asset companies' (NACs)[152] have been proposed as a way to value and monetize the ecosystem services provided by nature. The proposal is to raise capital through an initial public offering, which would then be used to protect and manage natural areas. As the area prospers, shares would appreciate and are marketable.

Reduced Emissions from Deforestation and Forest Degradation (REDD+) is a way to use carbon as a proxy for some of the environmental services provided by nature.[153] The concern with this approach is that the ability of an ecosystem to store and sequester does not reflect its biodiversity value.[154] Diverse ecosystems, in particular, are typically inefficient at generating biomass production and thus carbon sequestration. Nevertheless, the approach has some traction because of the difficulty of valuing biodiversity, and because of the relevance of carbon to address climate change.

The approach of calculating carbon storage and sequestration value has been extended to individual animals by a team led by Ralph Chami at the International Monetary Fund.[155] The approach is to use behavioral economics that would generate values for individual resources rather than biodiversity in general or ecosystems as a whole. They build the case for valuing individual animals, in this case elephants and whales, whose conservation is appreciated and understood by individual people. This would allow people or businesses to have access to credible information to inform their decision making on nature-based solutions to climate change. The team focused on valuing the carbon contribution of elephants and whales. Educating people, they argue, about the value of the contribution of an individual of a species to carbon capture, would be a tangible argument for investing in the preservation of the species and its habitat. This approach to valuation has the potential "to stimulate excitement, concern and ultimately action" in individuals. Chami et al valued the carbon sequestration of a single forest elephant at over $1.75 million (the sum of the contribution of a single elephant today and its contribution to future generations of elephants over the next 1000 years), building their argument on Berzaghi et al (2019) which estimated that forests with elephants sequester about 7% more carbon that those without elephants.[156] They used a similar approach to estimate the value of whale populations off the coast of Brazil and Chile. The body of a single blue whale sequester over 30 tons of CO_2 equivalents. In life, their iron-rich feces stimulate primary production in phytoplankton,[157] and in death, the whale's body and its carbon fall to the ocean floor. While there are differences among the different species of whales, the calculated value of a single whale in terms of its carbon sequestration averaged about $2 million.

CREATING MARKET MECHANISMS FOR NATURE-BASED SOLUTIONS

In addition to having a way to value nature, and we need more tangible mechanisms that can translate individual and business decisions into nature-based solutions. This might involve the creation of markets for environmental services/assets, in which investors/buyers purchase those services/assets from the owners (which often might be local rural communities or governments) and invest in their management and conservation.

Nature is not an independent, stand-alone asset – people live in nature and use natural resources – so there is a clear need for principles of engagement. These will include ensuring that markets directly benefit biodiversity and ecological services (that they are 'nature positive'),[158] that local communities are integral to financial arrangements (including a commitment to Free, Prior and Informed Consent (FPIC), and acceptance that the communities are both senior beneficiaries of investments, and of revenues prior to investment returns are distributed), and there is a fair and equitable sharing of market upsides.

Markets associated with REDD+ are the most developed efforts to value the carbon storage and sequestration, especially of natural forests. These value the reduction in forest loss and degradation and sell carbon credits based on the decrease in forest losses (associated with more effective management) compared to historical baselines. Voluntary REDD+ projects in particular have marketed carbon credits to individuals and businesses.

One example of many forest-based REDD+ voluntary carbon markets is Keo Seima wildlife sanctuary, where the Wildlife Conservation Society working with the Government of Cambodia has implemented a carbon emission reduction program through avoided deforestation.[159] Carbon credits are marketed to individuals and corporations, and revenues generated have been invested in the conservation and management of this tropical forest, and programs to benefit community livelihoods and empowerment.

While markets have yet to be developed for the conservation of whales and elephants, the recent launch of the Wildlife Conservation Bond (i.e., the WCB Rhino Bond) offers a way forward for species-focused investments that channel finance from capital markets. Launched by the World Bank in March 2022,[160] the World Bank's US $150 million Wildlife Conservation Bond is a first-of-its-kind outcome-based bond that supports the financing of conservation activities, and together with financing from the Global Environmental Facility (GEF) transfers project risk from donors to investors. The World Bank will make conservation investment payments totaling about US $10 million to finance rhino conservation activities at two parks in South Africa. This is a performance related bond, with the return to investors dependent on the extent of population increase of rhinos over the next five years. Investors fund the (relatively high) set up costs of protection and law enforcement, and the financial return to investors is covered by funds provided by the Global Environmental Facility.[161]

Numerous initiatives aim to promote a larger role for private sector investment in "green" finance in general, and nature-based solutions in particular. For instance, the Coalition for Private Investment in Conservation (CPIC) brings together the public and private sectors and seeks to tap the assets of the private sector and individual investors to support conserving nature and its services. With support from the Rockefeller Foundation, and the Global Environmental Facility, CPIC recently launched an effort to mobilize $100 million in private investment, as part of the GEF's Blended Finance initiative.[162]

INCENTIVIZING AND REGULATING MARKETS FOR NATURE-BASED SOLUTIONS

Markets for the natural assets involved in nature-based solutions will need to be carefully regulated.[163] Unlike stocks and bonds, natural assets actually exist physically, and they are living organisms which are sometimes sentient. Moral and ethical standards for all of these natural assets will need to be considered and governed.

In addition, people live in nature and depend on its resources. They have ownership and usufruct rights to land and natural assets (which might conflict with intrinsic rights of wild species). The 'ownership' of these natural assets is often contested. The people on whose land they are found are frequently economically and politically marginalized, and these living assets can be subject to misappropriation. Safeguarding the rights of Indigenous people and local communities is critical.

Investments must also be tightly tied to the delivery of nature-based solutions over decades and decades, and revenues from the sale of the environmental services need to be reinvested in the conservation of the natural assets. Ensuring these requires that appropriate standards, metrics and regulations are established so that investors can be confident that the environmental services can be and are delivered. Bottom-up development of environmental services markets and the involvement of individual investors and private businesses will require a concomitant development of policy frameworks to incentivize and regulate these markets. These more top-down mechanisms are only beginning to be put into place. And these mechanisms must also encourage the bottom-up processes to aggregate and scale up – a necessary step if this approach to nature-based solutions is to significantly contribute to the climate transition.

Harnessing the Enlightened Self-Interest of the Financial Sector to Advance Climate Action

HOWARD DAVIES

Enlightened self-interest in the financial sector is easy to describe. On the positive side, financial firms will wish to channel investment to sustainable companies which are equipped to handle the challenges of climate transition and to prosper in a zero-carbon world. Just as importantly, on the negative side they will wish to avoid lending to companies whose business models make them vulnerable to rising carbon prices and climate change. In particular, they will want to avoid long-term lending secured on assets (oil, gas and coal) which it may be impossible to use in the future and whose value may fall sharply, causing lenders to lose money.

THE PROBLEM

There are two complications embedded in this simple analysis.

One, it sees the financial sector as essentially reactive, responding to changes elsewhere in the economy and adapting its funding channels accordingly. Can the financial sector not be incentivized to promote transition, and accelerate the progress to net zero?

Two, there are serious horizon problems (Carney 2015).[164] Much bank lending, in particular, is short term. A simple analysis of expected losses may show that it is still safe for banks to lend to high-emitting firms, or on the security of energy-inefficient buildings. During the short period of the loan, they are unlikely to suffer climate related losses. Finance is a highly regulated sector. This is especially true of banking, which is far more highly regulated since the global financial crisis. Regulators in banking have been wrestling with the question of how they can strengthen the incentives for banks and equity investors, to invite them to invest in firms and technologies which may contribute to the needed transition, and to avoid supporting high polluters. At the heart of their concern is the risk that if banks lend unwisely and investors invest similarly and insurers provide illusory comfort through their policies, the financial system will eventually become unstable, with damaging consequences for the global economy. So regulatory action can be justified on financial stability grounds.

The task of devising a regulatory framework which promotes enlightened self-interest is, however, proving highly complex for four principal reasons:

(A) There are many regulators who have a relevant purchase on the financial system with overlapping powers and responsibilities. In the European Union there are at least 100 bodies, even though the European Central Bank is by far the most important and powerful.

(B) Much of financial regulation is set in the context of international agreements, overseen by bodies such as the Financial Stability Board and the Basel Committee, but those agreements are all voluntary: there is no relevant international law, or oversight body with teeth. There is no equivalent of the World Trade Organization, to which appeals may be made if a country does not follow international best practice. There is, therefore, no global enforcement mechanism in the financial world.[165] That means individual countries and their financial firms fear that if they take an aggressive approach to high-emitting clients, they will be replaced by finance from elsewhere, where the enforcement of net-zero commitments may be less strict, or non-existent.

(C) There is a large, and growing, unregulated financial sector, including hedge and private equity funds, and various forms of shadow banks. Tight lending obligations imposed on the regulated sector will reduce the availability of credit from banks or increase its cost and may push the financing of high emitters into the shadows.

- (D) There are serious doubts about whether independent central banks, where they have regulatory powers, should address climate change as well as their traditional tasks of maintaining monetary and financial stability, or whether those risks compromising their independence, especially if they have no specific mandate from an elected government.[166] Furthermore, it is argued that the tools they have at their disposal, notably manipulating capital requirements, are far less effective in promoting effective climate transition than are changes in tax policy.

Regulators are aware of these challenges. They are trying to address them. Communication has been improved by the establishment of an overarching body, the Financial Stability Board, but attempts to give it teeth have so far been unsuccessful, for political reasons. The FSB is, however, addressing the problem of unregulated firms (the shadow banking sector) and individual members have been looking at ways of using other regulatory tools to support climate change adaptation.

PROGRESS TO DATE

Against that background, we should examine what has been done so far to create incentives for the financial sector to promote climate action, how effective it has been, and whether it would be possible to construct a more effective framework.

Central bankers set up the Network for Greening the Financial System (NGFS), in December 2017 at the Paris, One Planet Summit.[167] The Network is intended to share best practice among regulators, and it aims to mobilize mainstream finance to support the transition towards a sustainable economy. The prime focus is on central banks as overseers of the financial system, rather than as monetary authorities. There are important climate related questions in the monetary arena, for example should central banks discriminate in their bond buying when engaged in quantitative easing? They are outside the scope of this paper.

At the outset, there was one obvious absentee. Under the Trump Presidency the Federal Reserve chose not to join the NGFS. It eventually did so shortly after President Biden's election. But Central Bank involvement in climate policy remains highly contested. One of Biden's choices for the Federal Reserve Board chose to withdraw when her past statements on the Fed's potential climate role provoked controversy in Congress.

Now the membership is quite comprehensive, including China (though no longer Russia), and the Network has done useful work in developing techniques to assess the vulnerability of the financial system to different climate scenarios. There are dissenting voices who claim that central banks are running risks with their independence, and lack the understanding and skills needed to make well informed judgements (Hansen 2022)[168] but most central banks and banking regulators (where different) now acknowledge some responsibility in this area.

They have, however, been moving at different speeds, and there is no global consensus on the approach to take. In the UK and the euro zone, banks are subjected to stress tests of their portfolios, against a set of climate scenarios. The regulators make assumptions about the evolution of the carbon price and future government policies and require banks and insurers to assess how their loan portfolios would be affected. The three scenarios are, approximately, an early and gradual rise in the carbon price, a later sudden and high jump, or a hot house world in which the average temperature continues to rise, without an effective policy response. The Bank of England, which has been a little ahead of many of other central banks, published the results of its first climate stress test in May 2022. It showed that the costs to the financial system would be highest in the late policy action scenario, but that in general the banks and insurers were well prepared in terms of capital resources (Bank of England 2022).[169] The ECB's results were similar, but their conclusion was that "many banks are still at an early stage in terms of factoring climate risk into their credit risk models" (ECB 2022).[170]

Does this regulatory activity create incentives for financial firms which will enhance climate action? No direct consequences flow from the results. The Bank of England has so far decided against using variable capital requirements to incentivize lending (by loosening capital requirements on green lending) or disincentivize lending (by tightening them on brown lending, thus making it more costly) to particular industries or companies (Credit Suisse Equity Research 2022).[171] The ECB has reached the same conclusion, for now. But the need to satisfy the data requests from regulators has required firms better to understand the nature of the risks they run in different future states of the world. That, in turn, could provide the basis for more discriminating lending practices in banks, or risk underwriting by insurers. Banks are themselves increasing the interest rates charged on climate-rising loans, and insurers are raising previsions for vulnerable customers. But the exercise has also demonstrated the limitations of the data available to banks or insurers about the practices of many of the companies to which they lend.

The central banks have tried to plug the data gap through the work of the Task Force on Climate Related Financial Disclosures (TCFD). But they are not empowered to impose disclosure standards on non-financial firms. That responsibility falls under the aegis of the International Organisation of Securities Commissions (IOSCO) and the International Accounting Standards Board (IASB). In the absence of a clear lead from these two bodies a variety of disclosure standards have been developed by a range of public and private entities, all well motivated but as a result, cooking an alphabet soup of initiatives which created a complex and overlapping patchwork of disclosures. At the end of 2021, the trustees of the International Financial Reporting Standards (IFRS) foundation, which sits above the IASB, announced the establishment of the International Sustainability Standards Board (ISSB) to create order out of chaos, and deliver sustainability related disclosure standards that provide investors and other capital market participants with information about companies' climate-related risks and opportunities to help them make informal decisions (International Financial Reporting Standards 2021).[172] That will be an heroic endeavour, but it is an essential building block for successful climate action.

The third leg on the regulatory stool is the International Association of Insurance Supervisors (IAIS). As the IAIS says, insurers can be "key agents in identifying, mitigating and managing climate risk and thereby contribute to a sustainable transition to net zero" (International Financial Reporting Standards 2021).[173] The principal impact comes through the pricing of risk, and therefore the cost of insurance cover. The increasing cost of insuring properties in flood plains is an obvious example. The difficulty coal and other high carbon industries now face in insuring their activities and the rising cost is another incentive to reduce emissions. The escalating costs of directors' and officers' insurance in polluting industries is another route. But the principal focus of the IAIS today has been on building capability, rather than on creating new financial incentives.

The regulators *have* been active, largely to raise awareness of the risks their clients face. Firms have been affected by that pressure. Although regulators lack focused powers in this area and have so far been reluctant to use the powers they have, most firms will not ignore their advice and encouragement. And many have been taking initiatives of their own. The most ambitious initiative is the Glasgow Financial Alliance for Net Zero (GFANZ),[174] launched at COP 26 in Glasgow. It is described as a "global coalition of leading financial institutions committed to accelerating the decarbonization of the economy" (Natwest is a signatory). The numbers are, on the face of it, impressive. 160 firms with assets of over $130 trillion have signed up. There are sub initiatives for banks, insurers, investors, and the other flora and fauna of the financial industry. The banking commitment is to transform GHG emissions from their lending and investment portfolios to align with pathways to Net Zero by 2050 or sooner. Insurers can now see that they risk severe losses in a hotter world, and pension funds appreciate that there is little point in saving for a pension if you will not be able to enjoy the benefits.

Will that and other private sector commitments make a difference? Again, they are voluntary, though one should not underestimate the influence of shareholders, in particular, on the behavior of investee companies. When big investors

threaten to sell shares, or vote against the board, that focuses the mind. But there remain shareholders not convinced of the need for urgent action. Mark Carney, the UN Special Envoy on climate action and finance, asserts that the financial system as a whole "is funding temperature increases of over three degrees 'centigrade'" (Grantham Research Institute 2021).[175] Do consumers care enough to direct their business to financial firms with a strong climate commitment? There is a rapid growth in demand for ESG funds, but little evidence yet that depositors move funds from one bank to another for that reason.

Furthermore, we have recently seen the emergence of countervailing pressures on the financial sector. The State of Texas passed legislation in 2021 which allowed state entities to refuse to do business with firms which reduced or cut investment in the oil and gas industry. In August 2022 Texas published a 'blacklist' of firms, including Blackrock Inc, and entities within Goldman Sachs and Morgan Stanley.[176] Other Republican States are likely to follow the Texas example. The consequences for firms are as yet unpredictable.

My observation is that the leaders of large, regulated, financial firms, whether investors, banks, or insurers, are convinced of the scientific evidence for climate change, and understand the need to adjust the funding and pricing to contribute to effective actions in response. Insurers have already incurred large losses due to extreme weather events, and banks are concerned about the sustainability of some of their lending. Furthermore, they see potential commercial opportunities in funding the transition to a net zero carbon economy. If the science is correct, and public policy follows, there is money to be made by being an early mover. But progress is constrained by a number of factors:

(A) The need to finance energy producers, in particular, in the short te rm (which may be longer as a result of the war in Ukraine and a revival of coal burning in parts of Europe).

(B) The lack of clear government policies, especially on carbon pricing, though much constructive work has been done to demonstrate the way carbon pricing can harness enlightened self-interest.[177]

(C) The lack of clear and comparable data on carbon emissions by corporate clients, and,

(D) The uneven nature of the competitive environment, with private pools of capital not subject to the social and regulatory pressures on conventional regulated firms, and different approaches taken by regulators from one justification to another, which to some extent reflect the different powers and responsibilities they have.

The first two factors are outside the scope of this paper, but there is scope for initiatives to mitigate the last two.

WHAT MORE COULD BE DONE?

The financial sector's enlightened self-interest could be more effectively harnessed if the following steps were taken:

(A) Central banks and financial regulators should be given a clear mandate to take climate change into account in their monetary and regulatory policies. The Bank of England has such a mandate from the government, but many other central banks do not, and are therefore open to the criticism that they are exceeding their responsibilities and putting their independence at risk.[178] A parallel mandate in the EU would be valuable. The European Parliament could press for that.

(B) The Network for Greening the Financial System, the Basel Committee and the IAIS, should agree a common methodology for stress testing banks and insurers, which should be implemented globally.

(C) The ISSB should publish a rigorous and competitive set of disclosure standards for financial and non-financial companies. Ideally, that should build on the work of the TCFD in its climate risk financial disclosure guide.[179]

(D) The Environmental, Social, Governance) standards operated (with wide differences (ESG) by investors, their advisers and NGOs should be disaggregated. The three sub-segments of ESG can work against each other. For example, some investors vote against positive climate change resolutions at annual meetings because of their views on the primacy of the board in a public company.

(E) Clearer guidance on what may be categorized as a green investment would make the market work more effectively. Insurers and banks are often criticized for 'greenwashing'. The word green attached to a bond can mean a number of things today: a clearer internationally supported definition would help greatly.

(F) Regulators should set out a roadmap to net zero, compatible with the UN climate Action Pathway.[180]

(G) There is a need for more work to understand why asset prices do not seem fully to price in climate risks. Useful analyses have been completed, but need to be taken further to help banks, in particular, understand the risks interest in lending and on assets which might be unusable, or significantly written down, in different climate scenarios.[181]

(H) The need for a just transition, which takes account of the differential impact on different income groups, should be incorporated into the models used by regulators, and by financial institutions themselves.[182] Very little work has yet been done in that area.

(I) The FSB should explore ways of bringing the political, regulatory and social focus, which is acting on the regulatory financial system, to bear on the shadow banking system and the world of private equity. Otherwise, there is a risk that high emitting firms and technologies are sustained in being far longer, and the transition to net zero is significantly delayed. High carbon emitters may have a competitive advantage for some time as a result.

As the number of firms who have committed themselves to the GFANZ demonstrates, there is considerable support in the banking and insurance communities for a positive approach to the transition to net zero. There are leaders and laggards, to be sure, but regulated firms are highly conscious of their social role, and of the need to retain their license to operate in the world in which a net zero commitment is increasingly expected by investors and consumers. But at present the power of the financial system to make a difference is being held back for the reasons set out above. Some of the actions needed to ensure that enlightened self-interest plays a positive role are essentially technical, disclosure standards are an obvious example, but other aspects have a political dimension.

It is not straightforward to achieve global agreements in this area, especially at a time when the 'international community' is fractured, and the absence of any effective enforcement mechanism is a major handicap. But that is not an excuse for not trying.

The Just Energy Transition Partnership in South Africa - A promising idea inspiring the world

CARLOS LOPES AND SALIEM FAKIR [183]

Sometimes the impossible seems far-fetched and unrealistic – but the impossible can be on the cusp even if it has still some distance to go. The history of the Just Energy Transition Transaction (JETT) has many dimensions and lessons. We share here some vignettes from a bird's eye view and sometimes from having the good fortune of being a fly on the wall. The script of the JETT was written by many people, some known and others hidden from the public gaze. What started off as a JETT has subsequently changed to the Just Energy Transition Partnership (JETP) as it involves a joint partnership between South Africa and some members of the G7 group of countries. South Africa secured a $8.5 billion pledge from five countries the USA, UK, Germany, France and the EU at COP 26, as part of the Glasgow Pact. The idea was germinated within South Africa and was latched on to by eager members of the G7, as part of the Race to Zero campaign that was part of the mantra and build-up to COP 26. The UK by necessity – as part of its climate diplomacy – needed a good story to tell. The JETP represents a convergence of national and global interests given that the world was busy squeezing itself out of the pandemic.

This paper shares insights on behind-the-scenes developments – and some attendant intrigue – of how the JETP came about, what it means for South Africa and why this idea is catching on in the rest of the world.[184] The recent G7 summit is a testament to Africa's contribution to a novel way to translate national determined contributions (NDCs) into a real economy climate investment.[185] The South African idea has suddenly unlocked ways by which climate risk has been turned on its head to what are now called country platforms on climate investment pathways. They can best be described as large-scale structural shifts in financing the energy sector – to lock in private and public finance into investable options and give developing and emerging economies access to new sources of finance for assets that if the net-zero pathway were to gain pace would undoubtedly become stranded asset problems. Since stranded assets involve investment flows from all over the world they can transmit systemic risk – a Minsky moment for carbon intense sectors.[186]

INTRODUCTION

If you read the daily news the southern tip of the African continent can seem like dystopic place with little room for hope or imagination. In the last 15 years South Africa has experienced recurrent power cuts,[187] 'loadshedding' given ailing power infrastructure and the slow pace, and often despairingly painful progress, at which necessary power sector reforms are embarked upon. In a country that also boasts the fastest and largest Renewable Independent Power Producers Purchase Programme (RI4P), the share of South Africa's renewables is still small compared to coal. Renewables constitute around 10% of the electricity generation mix with coal close to 90%, (with hydro at 4% and solar and wind combined around 6% of the energy mix).[188]

South Africa's history is complex, its political geography multi-layered and its future dependent on the interplay of internal and external forces. The complexity relates to its colonial and apartheid history, eleven official languages, a wide gap between the poor and rich, high levels of unemployment and being the second largest economy after Nigeria on the continent. Its electricity generation system is reliant on Eskom, the single centralized producer of power, which has been riddled with corruption and mismanagement.[189] No country is an island. The future of every sovereign state is an outcome of the interplay of internal and external dynamics. South Africa's history is littered with such outcomes, and to suggest that it is an insular political and economic entity would not match with the historical reality.

The climate debate in South Africa is also subject to both internal and external dynamics. In the early 2000s South Africa's leadership through the WSSD and climate diplomacy – especially the early scientific and technical work on the Long-Term Mitigation Scenarios (LTMS) enriched and contributed to global thinking and debate on transitions.[190] During the Mbeki era climate issues came to the forefront, with South Africa considered as a member of pariah club of carbon emitters: its carbon intensity and per capita footprint due to two 'dirty' industries (coal fired power and liquid fuels,

run by Eskom and SASOL respectively) made it the highest emitter of carbon on the continent, and one of the 20 largest emitters in the world.

The African National Congress (ANC) since it came into power in 1994 as part of its progressive internationalism and desire to protect the multilateral system as part of the international order post collapse of the Berlin Wall, understood multilateral environmental agreements as an important instrument of international diplomacy and one phalanx of a diverse global diplomatic tract that was necessary to keep alive the multidimensional nature of multilateralism. Enlightened diplomacy on the global stage needed to be matched with enlightened tract in tackling environmental issues within the national sphere. A hard-won battle to have the environmental right enshrined in the Bill of Rights of the South African Constitution was only possible with the ANC coming to power.

Much of this progressive climate diplomacy and internationalism was undone or was partly in retreat during the latter period of the Zuma era. The era was mired in corruption headlined by the ill-fated $76 billion nuclear power plant construction deal with Russia. The era witnessed a changing of the guard in which old coal interests changed hands with new black-empowered companies that came to control the coal mining sector.[191] The interests of companies were closely tied to the incumbent political party given that the coal mining regions of Mpumalanga and Limpopo were also key provinces – if not strategic political arenas for any contest for the ANC Presidential elections. It is not an exaggeration to say that without Mpumalanga, Cyril Ramaphosa would not be the incumbent President of the ANC and of the country. Ramaphosa was himself invested in the coal industry through his company Shanduka. These shares have now been sold to a different black empowered company.

This shift from what one would describe as a shift from old to new coal effectively produced a new incumbency in the coal value chain, tying local and national interests in a pervasive coal value chain linked to coal exports and coal use at South Africa's single utility and monopoly Eskom. Control of coal from mining to the trains that carry coal to the Richards Bay coal terminal are part of the sinews of the political economy of coal in South Africa. Coal mining is still an important

THE ORIGINS OF THE JETP FROM TECHNICAL WORK TO POLITICAL ALIGNMENT

Firstly, the JETP as it is now called was known originally as the Just Transition Transaction.[192] Adopted by Eskom, as early as 2018 it came to be known as the Just Energy Transition Transaction (JETT). The focus then was only on a climate finance solution to replace Eskom's debt with cheaper sources debt and with Eskom committing to a phase out of coal. The JETP now has three elements: increasing renewables and grid capacity, supporting South Africa's hydrogen economy, and upscaling its capacity to manufacture electric vehicles.

Meridien Economics, a think tank based in Cape Town, deserves much credit for putting a novel idea on the table, with the timing that matched the transition from the presidency of Zuma to that of Ramaphosa.

Secondly, Meridien's technical work and concept of how to turn a liability into a climate finance play was original and pathbreaking. Early modelling work by Meridien showed that the value of carbon that can be taken off the global budget was significant – up to 1gigaton at a relatively competitive price, given that the extant global carbon price rate per ton of carbon was still relatively more expensive than the cost of offsetting carbon dioxide per ton in South Africa through the JTT.[193]

Thirdly, good timing and serendipity came together with Andre de Ruyer taking over at the helm of Eskom in early 2020. The company was a very troubled institution suffering from high debt, poorly performing coal plants (including new plants such as Medupi and Kusile which were built out of budget) and a regulated tariff regime. It appeared that Eskom would not be able to service its debt without significant changes to its financing. Early engagements on the JTT by the Meridien team with de Ruyer and the Eskom team seemed promising. In the course of the 2020 to 2021 period Eskom formed its own Just Energy Transition unit. The concept evolved into the Just Energy Transition Transaction (JETT),

giving it a distinct Eskom stamp, while tilting away from the idea of climate for debt swap type of climate finance deal to a *climate for finance deal for infrastructure*.

Within Eskom reforms were already taking place to unbundle Eskom into three entities, each in charge of generation, distribution and systems operation. These changes were aimed at opening the electricity market for broader participation largely by private generators (for own use and with surplus power being sold back to the grid). The other key reforms in the 2021-22 period included lifting of cap from 1MW cap to 100MW and the possibility of (financially sound) municipalities to apply to the Minister of Energy to procure their own electricity.

Finally, in the 2021 the Presidential Climate Commission (PCC) was established as a result of the Presidential Job Summit in 2018 and South Africa's NDC having provisions for a Just Transition plan.[194] The articulation of the just transition concept had its early development in the National Planning Commission (NPC) development plan. The NPC was chaired by Ramaphosa during the Zuma era, which allowed for the issue to be taken further during his own presidency.[195] It was recognized that South Africa was too coal dependent, and that this dependency would need to be broken. Also, a number of aging coal plants (producing between 18-22 GW) would have to be decommissioned by 2035.[196] The old, however, cannot be shed summarily without having consequences for South Africa. One of the first countries to incorporate the just transition concept in its NDC, the country had to find a way to effectively incorporate the concept as it transitioned away from coal.

PHILOSOPHICAL ASPECTS OF THE JETP

Three issues stand out from the perspective of enlightened self-interest:

One, the JETP is a special ring-fenced infrastructure investment programme of scale to advance clean energy for South Africa that can be catalyzed by climate finance but is not solely dependent on it. The climate finance option would need to be better than other options available to South Africa given that country's the mature capital markets and experience with funding several rounds of renewables programs using domestic sources of finance, along with an excellent model for renewable energy procurement.

Two, the structural shift in the energy sector has ramifications for the whole economy. JETP has the transformational potential to catalyze a new path, a cleaner one, that crowds out coal, expands the scope of power grid via renewables, and drives new types of infrastructure investment and services. The impacts for other sectors are clear – creation of new jobs along with the evolution of the hydrogen economy and electric vehicles, as new pathways for industrial capability. President Ramaphosa's recent energy plan has a sense of urgency for the pace to be picked up.[197]

Three, the JETP, while attracting useful catalytic funds, will need to be supported by other policy instruments like reforms to the Reserve Bank's macro prudential policies and transparency provisions in the financial and non-financial sectors in terms of their commitments to carbon intense investments. Keeping the longer term self-interest of South African society in mind, the National Treasury would need to move beyond narrow financial recipes and minimalist carbon tax regime. The work of the South African Reserve Bank, fortunately, is in line with the global developments under the auspices the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), described previously in this report. Other fiscal reforms that cushion against what is likely to be an uneven and difficult transition process involving millions of unpredictable decisions of state entities, private firms and households would need to be undertaken.[198]

Achieving Universal Food Security in an Adversely Changing Climate[199]

GLENN DENNING

CONTEXT

Climate has shaped the current distribution and productivity of crops and livestock around the world. From the dawn of the Neolithic Revolution, farmers have selected crop types and livestock breeds to meet their consumption preferences and market demands within boundaries set by climate and other factors, such as soil type, landscape, and access to water resources. Generations of farmers have taken seeds and animals with them when migrating to new lands. Some of these genetic resources have survived and thrived, while others have perished. As population pressures and market opportunities have increased, farming has inevitably extended into areas that are marginal or beyond the practical limits of adaptation for particular species or varieties, often degrading natural resources, sometimes with disastrous consequences. In this way, the biophysical limits to productivity and food security have been established and often breached.

As we move from the relative calm of the Holocene to a more volatile Anthropocene, we can anticipate increasing disruptions to agriculture and the world's food systems.[200] Today, climate change is explicitly identified as a central challenge to sustaining agricultural productivity and achieving a food-secure world.[201] Among the physical effects are increased temperatures on land and water; changes in precipitation patterns, both distribution and intensity; melting of glaciers with impacts on downstream river systems; increased extreme weather events, such as heatwaves, droughts and associated fire risks, floods, and storms; sea level rise and corresponding increases in salinity and flooding. These localized changes in the biophysical environment redefine the adaptation and productivity of our food systems.

Agriculture is also a significant contributor to climate change through its greenhouse gas (GHG) emissions. Land clearing and land degradation are the main food-related causes of carbon dioxide emissions. Methane is generated from anaerobic decomposition of carbon compounds under flooded conditions (mainly from rice cultivation, and from dams and reservoirs) in addition to enteric fermentation by ruminants. Nitrous oxide is emitted from soils mainly through excessive fertilizer applications and from manure deposition. Using the Intergovernmental Panel on Climate Change (IPCC) terminology, Agriculture, Forestry, and Other Land Use (AFOLU) activities contribute about 23% of total net GHG anthropogenic emissions.[202]

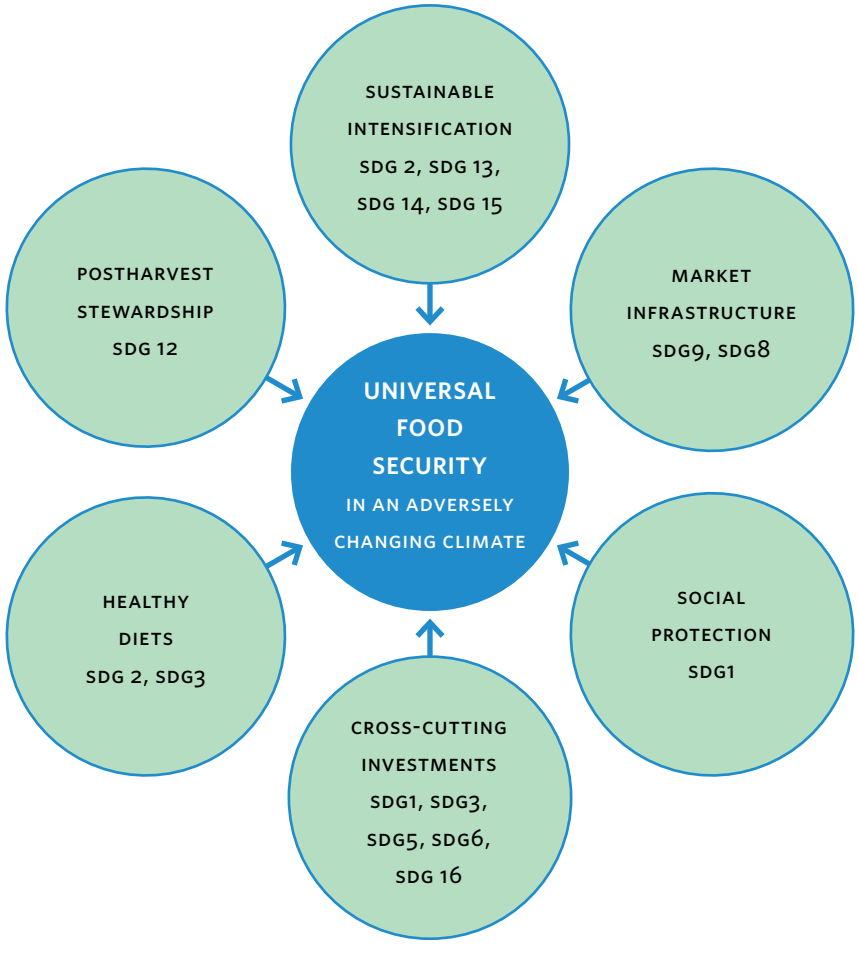
Taking a broader perspective beyond agriculture, food systems contributed about one-third of global anthropogenic GHG emissions in 2018.[203] Of those emissions, 20% came from land-use change associated mainly with the conversion of natural ecosystems to agriculture. On-farm production activities, including on-farm energy use, contributed 44% of GHG emissions from the food system. The remaining 36% came from pre- and post-postproduction activities, including food transport and waste disposal. These numbers provide insights to how the food system could potentially contribute to climate change mitigation efforts.

The Rome Declaration on World Food Security (1996) defined food security as existing "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."[204] Inspired by this vision, the concept of universal food security reflects a broader aspiration to meet the food requirements of every person on Earth while conserving the environment: "healthy diets for all, from sustainable food systems."[205] This concept recognizes food security is a human right, as embodied in the Universal Declaration of Human Rights (1948) and elaborated in the International Covenant on Economic, Social, and Cultural Rights (1966).

Notwithstanding increases in agricultural productivity and a sharp reduction in the proportion of undernourished people over the past 50 years, it remains a shameful fact that we are far from a state of universal food security. The most recent estimates show that 10% of the world population are under-

FIGURE 1

THE BIG FIVE INVESTMENT STRATEGY FOR ACHIEVING UNIVERSAL FOOD SECURITY IN AN ADVERSELY CHANGING CLIMATE. ADAPTED FROM DENNING (2022).



nourished in terms of their food energy requirement; around 2.3 billion people are moderately or severely food insecure; and 3.1 billion people cannot afford a healthy diet.[206] These numbers establish a baseline for measuring progress toward a food-secure world in times of climate change.

Transformation Strategy with Implications for Climate Action Attainment of universal food security will require a comprehensive investment strategy that sustainably increases food supply, enhances food distribution and access, reduces food losses and waste, and improves nutrition for all, while operating within and seeking to mitigate an adversely changing climate. Many expert commissions, panels, and task forces have offered prescriptions in a range of combinations. There are also vocal advocates of silver-bullet solutions such as organic agriculture, vegetarian diets, cutting food waste, and the like. Taking an evidence-based, pragmatic, SDG-aligned approach, I have concluded the need for five-pronged investment strategy – the Big Five portfolio – that spans our objectives to increase food availability, access, utilization, and stability (Figure 1).[207] For each of the Big Five, I present implications for climate change adaptation and mitigation and provide illustrative interventions (Table 1).

TABLE 1

INVESTMENT AREA	ADAPTATION	MITIGATION
Sustainable intensification	Use of drought and flood tolerant crop varieties Early warning systems and weather index insurance to offset increased risks	Conservation agriculture techniques, including no-till farming Agroforestry and other tree-based production systems
Market infrastructure	Climate-resilient transport infrastructure design (e.g., elevated roads with improved drainage in critical flood-prone areas) Technology-enhanced market intelligence and commodity exchanges to moderate risk across value chains	Renewable energy systems for transport infrastructure (e.g., electrified rail) Measurement systems and financial instruments and mechanisms to support carbon credit markets for producers
Postharvest stewardship	Electrification for refrigeration to reduce postharvest and transport losses Warehouse receipting to encourage more effective storage by smallholder farmers	Public education, awareness and incentives to reduce household food waste and related landfill emissions Reduced transaction costs for cross-border trade efficiency
Healthy diets	Programs to encourage climate-smart crop diversification, including use of nutrient-dense legumes and cereals (e.g., millets, sorghum) Use of aflatoxin resistant crop varieties and related pre- and post-harvest management practices	Public education, awareness and incentives to promote contextually appropriate shift to plant-based diets Use of feed additives (e.g., seaweed) to reduce enteric methane emissions
Social protection	Food for work and assets programs that support climate resilient infrastructure (e.g., farm to market roads and improved drainage) Home-grown school meal programs that incentivize use of climate-resilient agriculture systems (e.g., water harvesting in rainfed areas)	Conditional cash transfer and voucher programs coupled with education, awareness and incentives to promote reduced waste and healthy, sustainable diets Creative use of digital technology to improve social protection design and targeting of most vulnerable

SUSTAINABLE INTENSIFICATION

The premise here – representing a broad consensus of evidence-based studies – is that we will need more food supply. Even if we take a highly optimistic view of the countering forces of shifts to plant-based diets and food loss and waste reduction, it is implausible and highly risky to believe that we can rely on existing systems of production to meet and sustain global food demands of 10 billion people by 2050. Production increases in some locations will need to offset the production declines in others due to land degradation, climate impacts, and other factors. We need to consider sustainable intensification as a transformation process in aggregate, whereby combinations of the following shifts are realized:

- (A) Some farms may increase output with more efficient use of inputs like fertilizer, water, and energy. This strategy increases food supply per unit of net carbon emitted.
- (B) Some farms may maintain current output but with a reduced carbon footprint, again increasing food supply per unit of net carbon emitted.
- (C) Some farms may reduce output or go out of production altogether, shifting to enterprises with less environmental impact or, in some areas, returning the land to nature. This may reduce net carbon emissions with the potential to increase carbon storage through the replacement land use system.
- (D) Some abandoned and unproductive lands may be restored through strategic use of critical external inputs, such as fertilizer, agroforestry, and irrigation. In such cases, there is potential to introduce production systems with reduced net emissions.
- (E) By halting extensification – conversion of natural ecosystems for agriculture or aquaculture – carbon storage in natural ecosystems may increase. Importantly, it may also bring economic co-benefits that enhance the prospects for sustained adoption. Consider the case of mangroves: a coastal forest ecosystem adapted to saline and brackish environments in the tropics and subtropics. By reducing mangrove deforestation for aquaculture development, we not only reduce carbon losses, we also preserve their roles as a breeding ground of wild fisheries and as a physical buffer against coastal storm surges.

Applied contextually in different food system settings, this portfolio of sustainable intensification processes represents an adaptation to changing climatic constraints while mitigating climate change.

MARKET INFRASTRUCTURE

Food availability must be coupled with food access. Much more can be done to improve the functioning of markets in an adversely changing climate. In very simple terms, our goal should be to move food (sustainably) from where it is produced (sustainably) to where it is consumed (sustainably). Making markets work for food producers has been a focus of investment for decades. There are many historical cases of farmers being able to produce surpluses but being unable to sell their crops profitably. Physical infrastructure investment – in roads (and other transport conduits), electrification, and information technology – is key in connecting producers to consumers. However, the design of infrastructure investments must now incorporate features that improve adaptation to climate change (such as resilience in the face of extreme weather events) while also being assessed for its implications on GHG emissions (such as effects on reforestation).

POSTHARVEST STEWARDSHIP

One-third of all food produced is lost or wasted due to poor practices in harvesting, storage, and transportation, and as market and consumer waste. This represents lost opportunities to improve profits for farmers and reduce the cost of food to consumers. In addition, food loss and waste embody the resources (land, water, fertilizer, energy, and labor) that were used to produce the unconsumed food and the environmental costs of associated deforestation, biodiversity loss, and GHG emissions. Food storage capacity is essential to offset shortages following disruptive climate events. While not a panacea, improved postharvest stewardship must be a central component of a strategy to achieve universal food security in an adversely changing climate.

HEALTHY DIETS

The EAT-Lancet Commission report[208] and other published sources and country cases provide evidence that dietary change is necessary for improving both human health and environmental sustainability. Beyond the nutritional impacts of a balanced diet, it is increasingly clear that our diets are driving our production systems, as in the case of growing demand for animal products. Reducing consumption of meat and dairy from ruminants on a global scale will ultimately reduce pressure to clear land and reduce enteric fermentation with their implications for GHG emissions. However, policies that deter animal production must be nuanced and localized to recognize the impacts on livelihoods and the value of nutrient-dense animal products for improving nutrition of the world's undernourished people.

SOCIAL PROTECTION

When people are unable to provide for themselves, society can and often does step in to protect and support the most vulnerable through systems, policies, and programs that are collectively described as social protection. In a food and nutrition context, social protection helps meet the needs of people who face various forms of malnutrition as a result of conflict, natural disasters, poor health, or extreme poverty. These are people for whom the markets do not work, and the right diets are out of reach, physically or economically. The increasing frequency of climate-driven disasters requires that social protection should be retained and strengthened in the quest for universal food security. Practical approaches to investment include food and cash transfers, school meal programs, and food voucher programs that are designed more explicitly to encourage climate actions that advance adaptation and mitigation.

Efforts are being made in each of these Big Five investment areas (see Table 1). But often these initiatives are undertaken by passionate and committed individuals working within disciplinary and institutional silos. By taking a more holistic approach, investing in the Big Five portfolio can be transformational. That will require institutional innovation and capacity building, including the development of a new cadre of practitioner-leaders who are equipped and motivated to act.

IMPLEMENTATION

Transforming food systems to be productive, healthy, and sustainable requires a whole-of-society approach. We cannot leave the challenge of universal food security to any one sector or level of engagement. For the purposes of implementing a climate action agenda for food systems, there are three broad groupings of institutions that serve as the essential *agents of transformation*.

Public sector: Institutions that are mandated (albeit sometimes self-mandated) and funded to act in the public interest. These actors are normally governments and their constituent institutions, groups of governments such as the United Nations, or other intergovernmental initiatives such as multilateral development banks. For climate action in food systems transformation, the public sector has a critical role in safeguarding the interests of stakeholders with limited or no voice, including future generations. That is most important for climate change mitigation where the future costs of inaction are not being met by current food system actors.

Private sector: Firms that seek profits for their owners and shareholders through market forces, enabling competition and innovation. These actors may range from large multinational corporations to smallholder commercial farms. Private-sector-led innovation to support climate adaptation is a relatively easy ask as the incentives of stakeholders (food producers and consumers) can be more easily aligned with those of profit-seeking businesses. In such cases, the adopters can see tangible benefits of action in the short- to medium term – for example, the adoption of crop varieties that are better adapted to drought or flooding. In contrast, the private sector will more likely invest in mitigation innovations where there are complementary public-sector interventions (for example, subsidies, regulation) or where there are reputation and market-share benefits that businesses can secure.

Third sector: Not-for-profit organizations, often described as the third sector, are entities that seek social and/or environmental outcomes, but are not part of the formal public sector and are not explicitly seeking financial profit for their owners and supporters. Included in the third sector are social entre-

preneurs, community-led organizations and social movements, and philanthropic entities. Farmers' organizations play an important role in advancing farming household livelihoods through collective action in accessing information, inputs, finance, and markets. They also advance the interests of producers through public and political advocacy. Third sector organization can play a crucial role in promoting, piloting, and modelling climate action, especially in the absence or limited role of government institutions.

Institutions from these three sectors can drive policy change and investment decisions that support positive climate action. However, institutions are made up of individuals. Ultimately, climate action requires behavioral change by individual people, acting independently or in concert with others. Individuals have enormous power to transform food systems to be more productive, sustainable, and resilient in an adversely changing climate through the following actions:

Ⓐ Giving electoral and financial support to other individuals and to political parties who commit to climate action. The food riots across the world, in response to rapidly escalating prices during 2007–2012, spotlighted the position of food security as a political issue. Individuals must hold their leaders accountable for the decisions and commitments made at the 2021 World Food Summit.

Ⓑ Making buying and consumption decisions that shape private-sector policies and investment decisions that favor climate action. Individual consumers decide on what to eat and drink within the context of their food environments, financial capabilities, and cultural norms. The growing interest of plant-based alternative foods reflects consumer support for climate action and healthy diets.

Ⓒ Volunteering with and giving financial support to third-sector organizations that act in ways to advance sustainable food system transformation in times of climate change. There is growing support for social activist organizations like Global Citizen that mobilize individuals – particularly youth – to end extreme poverty and tackle climate change, with a focus on taking concrete actions.

Ⓓ Educating themselves on how to become more informed about the need and opportunities for climate action, and thereby becoming more effective agents of transformation through their own behavior and their encouragement and support of others.

Ⓔ Choosing careers and jobs that lead to work that directly furthers the agenda for action. There is growing interest among young people to pursue careers focused on climate action for food systems transformation across the public, private, and third sectors.

Notwithstanding the power of the individual, transforming food systems to achieve food security in an adversely changing climate requires collective action to advance interventions and investments across the Big Five investment areas. Those actions must come from coherent and, where possible, synergistic policies and actions from the public sector, the business sector, and the third sector, at three levels of engagement:

International: Initiatives implemented by organizations that operate beyond national boundaries, often undertaking multi-country cooperation to achieve common goals and address transnational problems and opportunities. The UNFCCC Secretariat (UN Climate Change) is the United Nations entity responsible for supporting the global response to climate change. The importance of the food system in contributing GHG emissions, the vulnerability of food systems to climate change, and the globalization of food systems demand greater attention to food systems transformation at the international and regional levels.

National: Programs and policies implemented by organizations at the national level with the purpose of achieving national goals. International commitments, compacts, and resolutions are merely words on a page unless there is willingness to translate those noble words into national

plans, policies, and investments. Parties to the Paris Agreement were required to make formal commitments, known as nationally determined contributions (NDCs), to indicate a country's contribution to global mitigation efforts and domestic adaptation initiatives. A review of NDCs undertaken by FAO in 2019 found that 96% of the 194 countries that had submitted NDCs included agriculture, land use, and forestry in their mitigation or adaptation contributions.[209]

Local: Programs and policies implemented at various sub-subnational levels, such as states, provinces, districts, cities, and towns, right down to the village and community levels. While local initiatives on climate action can provide local benefits and demonstrate the potential for delivering results at national, regional, and even global levels, too often these investments fail to deliver on their promise for wider impact. Once again, actions aimed at improving adaptation – in contrast to advancing mitigation – are more likely to resonate with local stakeholders who stand to benefit from better adapted food systems.

Successful transformation of food systems to advance climate action inevitably involves decisions by very large numbers of individual people. These individuals make decisions on behalf of their households, their communities, their governments, their firms, and all other organizations that play a role in transforming food systems. This brings us to the final question: Who will make those critical decisions and take actions that will lead to positive climate outcomes toward the achievement of universal food security?

THE CREATIVE TRIGGER FOR CREATIVE CLIMATE ACTION: ENLIGHTENMENT OF LEADERS

We clearly have the knowhow to achieve universal food security in an adversely changing climate. The Big Five investment portfolio is built on decades of evidence and experience. In addition, there are important cross-cutting investment areas, including education, gender and women's empowerment, public health services, clean water and sanitation, good governance, and ending civil conflict. Action in each of these complementary areas will enhance outcomes across our Big Five. It is equally clear that positive transformation of the food system requires the active, collaborative involvement of public, private, and third sector institutions, acting from global to national to local levels.

Why then are we not making real progress toward universal food security at a time when climate change is threatening to undermine the progress we have made? What is the missing element in our theory of change? To address those questions, we must step back from a solutions-driven strategy, while recognizing that context-specific interventions exist and need to be deployed. In place of a technocratic solutions-driven approach, a set of eight interrelated essentials is proposed within a constellation of effort and impact that applies to all areas of food system transformation (Figure 2):

- Ⓐ Leadership: Providing direction and inspiration
- Ⓑ Governance: Ensuring systems of accountability
- Ⓒ Policies: Evidence-based decisions and pathways for impact
- Ⓓ Finance: Mobilizing funding to enable effort and accelerate impact
- Ⓔ Capacity: Assembling individual and collective ability for effort and impact
- Ⓕ Innovation: Building knowledge to inform action and impact, now and in the future
- Ⓖ Communication: Providing an understanding of issues and opportunities
- Ⓗ Negotiation: Forging alliances and commitments.

Leadership is placed at the center of the constellation because, without leadership, it is unlikely the other seven areas of effort and impact will occur. In pursuit of a food-secure world in an adversely changing climate, a transformation leader must draw on practical policies to implement the know-how. To be implemented at scale and speed, food systems policies need to be financed and supported by human capacity. Individuals and institutions must be mobi-

FIGURE 2

LEADERSHIP AT THE CENTER OF A CONSTELLATION OF EFFORT AND IMPACT
SOURCE: DENNING (2022)

lized and deployed to execute those policies, using the art and skill of negotiation and communication.

Reflecting on the successes and failures of the past, drawing inspiration from the many leaders who have influenced my thinking and practice, I have concluded that education is the single most important driver of positive change in food systems transformation to meet the challenge of climate change. A well-informed, reflective practitioner-leader has the means to ignite the food systems transformation needed in the public sector, the private sector, the third sector, and in the public at large.

Effective implementation of past programs to improve food security has unquestionably relied on the good work of talented and motivated people. By strategically introducing informed and motivated practitioner-leaders into enough key organizations, we can transition our food systems inexorably toward our goal of universal food security A global cadre of informed leaders is now urgently needed to inspire, direct, and mobilize human endeavor toward our ultimate goal. That leadership will be required at all levels: from the highest echelons of the United Nations to the frontline workers who directly engage with food producers and consumers.

Inspired by what I have seen and experienced at the Master of Public Administration in Development Practice program at Columbia University[210] over more than a decade, I envisage universities playing a critical role in triggering climate-smart food systems transformations that we are seeking. Universities can serve as the source of enlightenment for leaders acting in the broader interests of current and future generations. For the most part, these institutions have been ignored and untapped by their own governments and the international community in advancing sustainable development, including food security. Some of the blame lies with the universities themselves as a result of their failures to incentivize work across disciplinary boundaries and to connect their research and teaching with real-world problems. Yet these institutions are the source of the future practitioner-leaders who will be responsible for policies and investment decisions over the coming decades. Columbia University has recognized this explicitly in adopting a Fourth Purpose "to help bring deep knowledge to the world we serve, and, in so doing, enhance the vectors of university research, teaching, service and impact,"[211] and furthering that mission through the establishment of the Columbia Climate School. If we are to achieve universal food security and net zero emissions by 2050, targeting today's millennials and post-millennials is highly strategic.

Investing in the education and development of practitioner-leaders will lead to better decisions by individuals, acting on their own and with others through institutions in the interests of society. Those individuals and institutions will influence the actions and outcomes from the Big Five food system investment areas. Those actions, in turn, will be manifested in food systems transformation and will lead to our ultimate goal: universal food security in an adversely changing climate.

Quota Policy: An Ideal Alternative to Address Climate Change?

JOSE A MEADE

Currently, interventions on climate change focus on getting the price of carbon right, with the objective of targeting negative externalities of production and consumption over the environment and the health of the population, among other objectives. This is the case of a tax on carbon emissions, a mechanism that has been implemented in some parts of the world, seeking to reduce emissions.[212] However, coordinating a carbon tax globally is a significant challenge, and despite the urgency, one that has not succeeded.

The effectiveness of policies that target prices is limited since their results depend on the utility maximization strategies of companies and in many cases the expected results are not attained. This leads us to examine a quota policy on carbon. Martin Weitzman describes two conditions which are relevant for the climate change debate. The first is "the amount of pollution which makes a river just unfit for swimming could be a point where the marginal benefits of an extra unit of output change very rapidly", and that "it doesn't pay to 'fool around' with prices in such a situation." Second, "there is a rather fundamental reason to believe that quantities are better signals for situations demanding a high degree of coordination." That "the asymmetry between the effects of overproducing and underproducing are more pronounced the further removed from final use is the commodity and the more difficult it is to substitute alternative slack resources or to quickly replenish supplies by emergency imports" (Weitzman 1974).[213] The basic operation of a quota policy as an instrument for planning is centered on the quota definition, objectives or specific quantities to obtain a set amount of total production. Therefore, achieving the final objective of policies to target climate change can be facilitated and accelerated, since there is more control of the final effect that production and consumption have on the environment and those quotas can be adjusted in case the results are far from what is ideal. Providing renewable production sources, greenhouse effect gas emission, hydric stress level and the generation of renewable electricity are all examples of quota definition, objectives and final production. The efficiency of quota policy depends on production functions and costs; requiring the policymaker to work with all relevant companies to ensure a competitive environment and a healthy market performance.

FIXING QUANTITIES OVER PRICES: SOME EXAMPLES

1. **Chlorofluorocarbon (CFC) prohibition and the elimination of existing gas banks**
Chloroflurocarbons (CFCs) used in refrigeration products and solvents not only damage the stratospheric ozone layer but are over 10,000 times more powerful than carbon as a greenhouse gas. They were prohibited more than 30 years ago in the Montreal Protocol on Substances that Deplete the Ozone Layer. The protocol, one of the most successful environmental treaties, has resulted in a 98% phase-out of CFCs relative to 1990 levels and just between 1990 and 2010 estimated to have reduced greenhouse gas emissions by the equivalent of 135 gigatons of CO_2, the equivalent of 11 gigatons a year.[214] However, the prohibition on CFCs release is not sufficient. Past emissions ('gas banks') also need to be eliminated (by incineration in special ovens). One of the most innovative measures for the elimination of CFC gas banks is a voluntary market that consists of individuals and companies that search for carbon compensations to reach specific carbon neutrality objectives. This mechanism has been successful since countries like the United States have been able to process particles from countries that do not have the necessary infrastructure for decomposition, such as Ghana. The pilot phase of the volunteer program has prevented the equivalent of the emission of 28,000 cars per year and granted 130,000 carbon credits.

2. **China: Elimination of Ozone-Depleting Substances** [215]
A large array of companies in China, including in electronics, telecom, medical appliances, automobiles, light industry, and textiles use solvents. In 2000, China established a plan for the elimination of CFCs in the solvent sector, covering 3,200 user enterprises, including several hundred SMEs. The plan consisted of prohibitions, quota systems, training programs and technical assistance. The plan successfully reached every annual phaseout target in the period 2000-2010, eliminating over 4,000 tons of ozone-depleting chemicals. Furthermore, the second phase of the plan targets complete phaseouts of HCFCs by 2026. The phaseout may be achieved four years ahead of schedule, with a reduction of GHG emissions of 11.30 million tons of CO_2 equivalent.

3. **Lebanon: Gradual Elimination of Ozone-Depleting Substances in Parallel to the Development of National Capacity** [216]
In 1993, Lebanon adopted measures to gradually eliminate ozone-depleting substances (ODS). The effort consists of over a hundred projects, among them the adaptation of fabrication centers, green jobs creation, equipment facilitation, training programs and the prohibition of CFC imports, among others. With a total investment of US$14 billion they seek to eliminate 1,535 tons of ODS. The help to the companies that fabricated ODS improved their capacity to overcome the challenges of eliminating ODS and positioned the companies in international markets. Some other highlights include the reduction of 50% of fumigation costs for farmers and the total elimination of CFC, halons and methyl bromide.

4. **Mexico: Energy-Saving Light Bulbs**
The 'Sustainable Light' ('Luz Sustentable') program of the Mexican government launched in mid-2011 substituted 22.9 million incandescent light bulbs with energy-saving ones for more than 5.5 million families by 2012, and gaining entry into the Guinness Book of Records.[217] The program of exchanging light bulbs saved around 1,400 gigawatt hour (GWH) of electricity, equivalent to the annual energy consumption of some states in Mexico such as Nayarit or Colima. The avoided emission was 700,000 tons of CO_2, being the equivalent of 130,000 cars. Additionally, the families saved up to 18% on their electricity bills (World Bank 2021).[218]

A Job for The One Percent: The Elite Must Help Build Better Cities, In Public Interest and in their Own Interest

ROHINI NILEKANI

This article was first published by the Times of India in October 2022

The recent Bengaluru floods washed up the dirty linen of mismanagement and corruption on the shores of a crumbling city infrastructure. Yet, no matter how quickly various governments build out physical public services, especially in urban India, the demand for it outstrips the supply. Be it roads and transport, electricity and water supply, hospitals, or universities.

There are simply not enough budgeted funds to provide and sustain adequate functional physical infrastructure at a per capita annual income of around $2,000 and a tax-GDP ratio of around 11%.

It is very different when it comes to the public digital infrastructure. India has among the most sophisticated and widely accessed open, public digital goods and services in the world. Whether it is broadband, smartphones, or UPI, we have made enormous progress in creating new opportunities for all. How can we achieve the same for better physical access to mobility, housing, energy, health etc.?

The elites of the samaj (society) and the bazaar (market) have successfully created a thin slice of high-quality private infrastructure on top of this inadequate public infrastructure. And we continue to build that out at breakneck speed:

- Think of the high-tech facilities at our high-performing companies.
- Or the incredibly fancy malls in Delhi and Mumbai.
- Think of the luxe cars, private jets and gated mansions of the ultra-rich (Full disclosure – I am an UHNI, and my home and cars are also somewhat fancy).
- So far, in India, not many seem to begrudge the wealthy their lifestyle and possessions.
- The majority remain optimistic about their own upward mobility.

Yet, we have recently seen that this is not a sustainable option even for the wealthy. While the pandemic created a new leveler, the Bengaluru flooding provided the most graphic example. The local ultra-rich could not escape a common fate and cumulatively lost hundreds of crores.

This winter, sophisticated air filters will barely protect the most privileged in Delhi from the air pollution. Nor will expensive sedans and office buses smoothen the rocky rides on our potholed roads for the upper classes.

- Have the elite reached the end of our gilded private pier?
- Can private goods be sustainably built on a precarious public foundation?
- Or is there something that we the elite can do so that the base on which our private goods and services are built can be stronger, not just for us but for all?

They say much is asked of those to whom much is given. Plus, as the elite of east Bengaluru painfully experienced, we cannot merely be consumers of good governance, we have to co-create it. If we point one finger at the government, are three fingers pointing back at ourselves?

- Have we built our sprawling corporate campuses on flood plains?
- Did we build or rent our homes using ecological prudence and after a thorough legal check?
- Or have we shrugged our shoulders once too often?

The good news is that we can easily take back some agency. There are so many opportunities.

- We can invest in the excellent thinktanks around India that conduct research and provide data and analytics for improved urban governance.
- We can donate to civic institutions working on water, climate change and disaster prevention and management, because these intertwine our fates ever more closely.

- We can also support the many other civil society organisations working closely with local, state and Union governments to help implement the delivery of public goods and services, or to innovate on more inclusive urbanisation, including on dignified housing.
- Fully 42% of Mumbai lives in its slums and fast-growing cities like Bengaluru have similar numbers.

Radically, we can support more transparent taxation, so that the government can spend more on physical infrastructure and safety nets. It is time to shed the cynicism about the wastage of our tax rupees. The prospects in this country for ample wealth creation by a limited few are rather staggering. There is a strategic and a moral imperative to balance out this opportunity.

- The 2021 Niti Aayog report states that 65% of the 7,933 Indian urban settlements do not even have a Master Plan.
- India has one civil servant for 24,000 people while the UK has one for every 131 people.
- We can help bridge this vast gap of human resources by lending our time or by paying to increase state capacity.
- Like some highly successful corporate professionals, we can offer our time and talent to the different state policy outfits.
- Like some foundations have, we can fund project management units in government departments or pay for fellowships to support legislators at every level.

This is an urgent opportunity but also just enlightened self-interest. Effective public infrastructure creates the secure foundation for everyone to build on top according to needs, capacities and desires.

Like it or not, floods, pandemics and air pollution put everyone in the same boat, even if some of us are in the upper deck private cabins. We will have to row together to steer away from the rising waters. Life jackets are under the seat. But the oars are right on top.

Endnotes

1 WMO, State of Global Climate Report 2021 (WMO Provisional Report, 2021).

2 Chongvilaivan, A, Thailand's 2011 Flooding: Its Impacts on Direct Exports and Global Supply Chain Disruptions (ARTNet Policy Brief, 2012).

3 USDA Economic Research Service, Drought in the Western United States (n.d.).

4 Carton B and J-M Natal, Further Delaying Climate Policies will hurt Economic Growth (IMF-Climate Finance blog, October 5, 2022).

5 Plumer, B, "How Spiking Energy Prices Complicate the Fight against Global Warming" (New York Times, 2 February, 2022).

6 Do Rosario, J, "Rising Energy Prices could Fuel Social Unrest across Europe this Winter" (Reuters News, 2 September, 2022).

7 See essay by Task Force member Enrico Letta (with Michele Bellini), "Democratic Dimensions of Advancing Enlightened Climate Action", Annex 2.

8 Global Commission on Economy and Climate, Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action in Urgent Times (New Climate Economy, 2018).

9 See essay by Task Force member Frannie Lautier, "Self-interest and Climate Policy in the Energy and Development Context", Annex 2.

10 See essay by Task Force member Carlos Lopes (with Saliem Fakir), "The Just Energy Transition Partnership in South Africa – A Promising Idea Inspiring the World", Annex 2.

11 Umair, I, "Climate Pledges Will Fall Short of Needed 2 Degree C Limit" (Scientific American, 2016).

12 UNFCCC, Nationally Determined Contributions under the Paris Agreement: Synthesis Report (Secretariat, 26 October, 2022).

13 Of the 184 pledges, 36 were found to be 'sufficient' (20%), 12 partially sufficient (6%), 8 partially insufficient (4 %), and 128 pledges insufficient (70%). The Truth Behind the Climate Pledges, Universal Ecological Fund report (2019).

14 Vetter, D, "Forbes Global 2000 Firms Judged 'Alarmingly Weak' on Climate Plans" (Forbes, 13 June, 2022).

15 Net Zero Tracker: Net Zero Stocktake 2022 (New Climate Institute, Oxford Net Zero, Energy & Climate Intelligence Unit and Data-Driven EnviroLab, 2022).

16 IPCC, Climate Change 2022: Mitigation of Climate Change – Summary for Policymakers (2022).

17 Cames, M et al, How Additional is the Clean Development Mechanism? Analysis of the Application of Current Tools and Proposed Alternatives (Berlin, Institute for Applied Ecology, 2016).

18 World Bank, "Carbon Pricing Dashboard" (2022). Black, S. et al, "More countries are pricing carbon, but emissions are still too cheap" (IMF, 2022).

19 Black (2022) op cit.

20 Sapir, A, "The European Union's Carbon Border Mechanism and the WTO." As Sapir notes, "Both sets of issues – potential discrimination between countries with and without carbon pricing schemes, and lack of differentiation in favour of lower-income countries – should be addressed at the multilateral level in the WTO, with the EU seeking to establish with other WTO members a memorandum of understanding on carbon border adjustment mechanisms that would define some basic principles. This would certainly help deflect not only potential legal challenges but also a political backlash against the EU CBAM." (Bruegel Blogpost, July 19, 2021).

21 Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy (World Economic Forum, January 19, 2020). "Nearly half of the world's population depends directly on nature and natural resources for their sustenance and livelihoods (especially the poor and marginalized communities). Around $44 trillion of the world's gross domestic product (GDP) – more than half – depends on nature and its services." See also, Pörtner, H.O. et al. "IPBES-IPCC co-sponsored workshop report on biodiversity and climate change" (IPBES and IPCC, 2021).

22 Timperley, J, "The Broken $100-billion Promise of Climate Finance – And How to Fix it" (Nature, October 20, 2021).

23 Setzer, J and C Higham, Global Trends in Climate Change Litigation: 2021 Snapshot (London: LSE, 2021); Setzer, J. and L. Benjamin, "Climate Litigation in the Global South: Constraints and Innovations" (Transnational Environmental Law, 2021) 9(1), 77-101.

24 Peel, J and R Markey-Towler, Recipe for Success? Lessons for Strategic Climate Litigation from the Sharma, Neubauer, and Shell Cases (German Law Journal, 22/8, 2021).

25 Setzer, J and C Higham (2021).

26 Setzer, J and L Benjamin (2020).

27 Setzer, J and C Higham (2021).

28 Climate Change Laws of the World (London: LSE).

29 Setzer, J and C Higham (2021).

30 LSE, op cit

31 Setzer, J and C Higham (2021).

32 Ibid.

33 "Court orders French Government to 'Repair' Carbon Emissions Overshoot" (The Guardian, October 15, 2021).

34 Setzer, J and C Higham (2021).

35 Ibid.

36 Parliament Passes First Law Amending the German Federal Climate Protection Act (Dentons).

37 Setzer, J and C Higham; Shell Confirms Decision to Appeal Court Ruling in Netherlands Climate Case (Shell, 20 July, 2021).

38 Setzer, J and C Higham (2021).

39 Ibid

40 LSE, op cit.

41 Setzer, J and C Higham (2021).

42 Setzer, J and L Benjamin (2020).

43 LSE, op cit.

44 Ibid

45 Ibid; Acuerdo del Cenace y Política de Confiabilidad de la Sener, invalidados y sin efecto (Greenpeace obtiene amparo, Greenpeace México).

46 See essay by Task Force member Howard Davies, "Harnessing the Enlightened Self-Interest of the Financial Sector to Advance Climate Action", Annex 2.

47 Water for Sustainable Food and Agriculture (FAO, Rome, 2017)

48 WMO Guidelines on the Calculation of Climate Normals (WMO, 2017) Number 1203.

49 See essay by Task Force member Glenn Denning, "Achieving Universal Food Security in an Adversely Changing Climate", Annex 2.

50 Allen, C R and L H Gunderson, "Pathology and Failure in the Design and Implementation of Adaptive Management" (Journal of Environmental Management, 2011) Volume 92, Issue 5; and Månsson, J. et al, "Understanding and Overcoming Obstacles in Adaptive Management" (Trends in Ecology and Evolution, 2022).

51 UN-SDSN, Science Panel for the Amazon

52 Suyanto et al, Analysis of Local Livelihoods from Past to Present in the Central Kalimantan Ex-mega Rice Project Area (World Agroforestry Centre, Working Paper 94. Bogor, Indonesia, 2009).

53 Jagau, Y et al, Agriculture in the Ex-Mega Rice Project Area in Central Kalimantan (Government of Indonesia and Royal Netherlands Embassy, Jakarta, 2008).

54 Constantino, S M and E U Weber, "Decision-making Under the Deep Uncertainty of Climate Change: The Psychological and Political Agency of Narratives" (Current Opinion in Psychology, Volume 42, 2021).

55 Goldstein, J E et al, Unlocking "'Lock-in' and Path Dependency: A Review across Disciplines and Socio-environmental Contexts" (World Development, Vol 161, January 2023. Available on-line).

56 Frankhauser, S et al, "The Political Economy of Passing Climate Change Legislation: Evidence from a Survey" (Global Environmental Change, Volume 35, 2015).

57 Nature-based solutions are "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits." (IUCN: Global Nature based Solutions Standard, 2015).

58 See essay by Task Force member John Robinson, "Activating Individual Self-interest in Nature-based Approaches to Climate Change", Annex 2.

59 Pascual, U et al, "Valuing Nature's Contributions to People: IPBES Approach" (Current Opinion in Environmental Sustainability, 2017) 26-27, 7-16.

60 Pörtner, H O et al "IPBES-IPCC co-sponsored workshop report on biodiversity and climate change" (IPBES and IPCC, 2021).

61 Taskforce on Nature Markets (2022) to shape 'a new generation of purposeful nature markets that delivers nature positive and equitable outcomes, and contributes to meeting climate goals.'

62 The 2021 World Economic Forum consultation captures the global excitement regarding natural solutions to the climate challenge: "Fundamental to delivering a net-zero pathway... with a practical potential of close to 7Gt CO2 per year...sufficient to deliver around one-third of that target and to achieve carbon removal in the near term and at lower cost than technological solutions." Further, delivering "significant co-benefits to nature and humanity" natural climate solutions can be expected to generate "private capital flows to countries that offer the highest potential... typically forest-rich countries in the Global South" (World Economic Forum, Consultation: Nature and Net Zero, 2021).

63 China First NDC - Updated submission (2021), European Union First NDC - Updated submission (2020), European Green Deal (2019), Paris Agreement (2015).

64 Someshwar, S and A Guraieb, Institutional Considerations in the Practice of Natural Climate Solutions (PSIA, Sciences Po, Paris, 2022).

65 IPCC, Climate Change 2022: Mitigation of Climate Change (IPCC, 2022) 12.

66 Tubiello, F N et al, "Greenhouse Gas Emissions from Food Systems: Building the Evidence Base" (Environmental Research Letters 16, no. 6, 2021).

67 Walter W et al, "Food in the Anthropocene: The EAT–Lancet Commission on Healthy Diets from Sustainable Food Systems" (Lancet 393, no. 10170, 2019); Searchinger, T et al, Creating a Sustainable Food Future: A Menu of Solutions to Feed Nearly 10 Billion People by 2050 (World Resources Institute, Final Report, Washington, DC, 2019).

68 At the launch of the third IPCC report. https://press.un.org/en/2022/sgsm21228.doc.htm (April 4, 2002).

69 Gardiner, S M, A Perfect Moral Storm: The Ethical Tragedy of Climate Change (Oxford, UK: OUP, 2011). Further, the ethical consideration to others and to nature is elaborated in the encyclical letter Laudato Si (Praised Be) by Pope Francis (2015).

70 See essay by Task Force member Naresh Singh, "Consciousness for Climate", Annex 2.

71 The commentaries by Adi Shankara, Ramana Maharshi, Ramesh Balsekar, Jalal al-Din Rumi, Ibn Arabi, St. John the Cross, Thomas Merton, Tsoknyi Rinpoche, Meister Eckhart and Lao Tzu amongst others, as noted by Singh.

72 See the path breaking work of David Bohm and Menas Kafatos (Quantum Physics), Stuart Kaufmann (Complex Systems) and Donald Hoffman (Cognitive Neuroscience).

73 United Nations Framework Convention on Climate Change: "The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof" (See Article 3.1). And: "1. All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances" (Article 4), on a number of issues (including [4.3]) "developed country parties...shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties..." And [4.4] "also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of implementing measures..." (UNFCCC, 1992) Pages 3 and 7.

74 IMO, GHG Emissions from International Shipping (2022).

75 IMO, UN Body Adopts Climate Change Strategy for Shipping (2018).

76 UMAS, An Overview of the Discussions from IMO MEPC 78. (2022).

77 UNCTAD, Decarbonizing Shipping: What Role for Flag States? (24 March, 2020).

78 Why so Many Shipowners find Panama's Flag Convenient. (BBC, 5 August, 2014).

79 "How to Preserve Africa's Forests and Build a Green Economy", World Economic Forum, 25, June, 2021.

80 "Gabon", Central African Forest Initiative.

81 de Bassompierre, L, "Wealth Fund With Climate Focus in Its DNA Looks Beyond Gabon" (Bloomberg News, 22 September, 2021).

82 Conseil National Climate Gabonais, "Gabon National Results Report: Results-based payments under the Central African Forest Initiative – Gabon Partnership", December 2020.

83 Gabon's "forests absorb a total of 140 million tonnes of CO2 every year, the equivalent of removing 30 million cars from the road globally" See here.

84 "Fit for 55," Council of the European Union.

85 "Council agrees on the Carbon Border Adjustment Mechanism (CBAM)," Council of the European Union, 15 March, 2022.

86 Ibid

87 "CBAM: MEPs Push For Accelerated EU Action And Energy Independence," European Parliament," European Parliament News, 17 May, 2022.

88 Council of the European Union (15 March, 2022), op cit.

89 United Nations Conference on Trade and Development, "A European Union Carbon Border Adjustment Mechanism: Implications for developing countries" (UNCTAD, 2021); Xiaobei, H. et al, A European Union Carbon Border Adjustment Mechanism: Implications for Developing Countries (BU-Global Development Policy Center, 2022) - Technical paper for the Task Force on Climate, Development and the International Monetary Fund on the 'spillover effects' of CBAM notes: "Welfare losses in developing countries like Ukraine, Egypt, Mozambique and Turkey range between $1 billion to $5 billion, which are significant relative to their gross domestic product (GDP) and "CBAM could worsen income inequality and welfare distribution between rich and poor economies."

90 "Joint Statement issued at the conclusion of the 30th BASIC Ministerial Meeting on Climate Change hosted by India on 8th April 2021," South African Government, 8 April, 2021.

91 UNCTAD (2021) op cit.

92 Gill, J, "Africa: Will the EU's Carbon Import Tax Hurt Poor Nations?" All Africa, 30 March, 2022.

93 This would not obstruct the plan of some European stakeholders to have EU facilitate 'climate club' of a small number of high emitting countries.

94 Supply chain interventions on environmental grounds by the EU, like the various production moratoria in Amazonia, have had limited but not irrelevant success.

95 The agro-industrial elites in Amazonia exemplify this dynamic which has led to explosive and mostly illegal deforestation. See Klinger, M and P Mack, "Post-frontier Governance up in Smoke? Free-for-all Frontier Imaginations Encourage Illegal Deforestation and Appropriation of Public Lands in the Brazilian Amazon" (Journal of Land Use Science, Vol. 15, 2020).

96 Almiron, N et al, A sample of recent academic literature includes Manufacturing Ignorance: Think Tanks, Climate Change and the Animal-based Diet (Environmental Politics, Volume 31, Issue 4, 2022); Tindall, D. et al, Handbook of Anti-Environmentalism, (Edgar Elgar Publishing, Cheltenham, UK, 2022); Lucas, A, "Investigating Networks of Corporate Influence on Government Decision-Making: The Case of Australia's Climate Change and Energy Policies" (Energy Research

& Social Science, Volume 81, 2021); Supran, G and N Oreskes, "Rhetoric and Frame Analysis of ExxonMobil's Climate Change Communications" (One Earth, Volume 4, Issue 5, 2021); Dunlap, R E and R J Brulle, "Sources and Amplifiers of Climate Change Denial" in Research Handbook on Communicating Climate Change, ed. David C Holmes and Lucy M Richardson (Edgar Elgar Publishing, Cheltenham, UK, 2020); Thomas, A and N Doerflinger, "Trade Union Strategies on Climate Change Mitigation: Between Opposition, Hedging and Support" (European Journal of Industrial Relations, Volume 26, Issue 4, 2020); Wishart, R, "Class Capacities and Climate Politics: Coal and Conflict in the United States Energy Policy-Planning Network" (Energy Research & Social Science, Volume 48, 2019); Farrell, J, Corporate Funding and Ideological Polarization about Climate Change (Proceedings of the National Academy of Sciences, November 23, 2020).

97 OCED, States of Fragility 2022 (OECD, Paris, 2022).

98 See essay by Task Force member Rohini Nilekani, "A Job for The One Percent: The Elite Must Help Build Better Cities, in Public Interest and in their Own Interest", Annex 2.

99 Geels F W and J Schot, Typology of Sociotechnical Transition Pathways (Research Policy, 36, 2007).

100 See essay by Task Force member Howard Davies, "Harnessing the Enlightened Self-Interest of the Financial Sector to Advance Climate Action", Annex 2.

101 Denning, G, Universal Food Security: How to End Hunger While Protecting the Planet (Columbia University Press, New York, 2022).

102 See essay by Task Force member John Robinson, "Activating Individual Self-interest in Nature-based Approaches to Climate Change", Annex 2.

103 Blended Finance, Global Environmental Facility (2022)

104 Consciousness' is used here in its absolute sense as being aware of being aware, and not in the relative sense of awareness through the senses.

105 Shah-Kazemi, R, Paths to transcendence: According to Shankara, Ibn Arabi, and Meister Eckhart (2006)

106 Dark night of the soul," poem by John of the Cross.

107 Complete Works of Meister Eckhart. Revised with a foreword by B. McGinn (Herder and Herder Book, 1979)

108 Rinpoche, T and E Swanson, Open Heart Open Mind: A Guide to Inner Transformation (Random House, 2012).

109 Spira, R, Being aware of being aware (New Harbinger, 2017)

110 Lucas, C, The Spirit of Complexity (1999)

111 See for example Iain Gilchrist, The Master and his Emissary (2018) or his more recent work, The Matter with Things. Our Brains, Our Delusions, and the Unmaking of the World (2021)

112 Legrand, T, Politics of Being (Ocean of Wisdom Press, December 2021).

113 Eds Anneloes Smitsman and Alexander Laszlo, Laszlo Institute Symposia Series: New Paradigm Politics (2022).

114 The New Paradigm in Politics: The New Paradigm Symposia Series. Page 17, Select Books, Kindle Edition.

115 OECD, Office of Public Sector Innovation.

116 Ison, R and E Straw, The Hidden Power of Systems Thinking. Governance in a Climate Emergency (Routledge Press, New York, 2020).

117 Australian Public Service Commission, Tackling Wicked Problems. A Public Policy Perspective (Canberra: Government of Australia, 2007)

118 https://www.innerdevelopmentgoals.org/

119 Wilber, K, A Theory of Everything: An Integral Vision for Business, Politics, Science and Spirituality (2001).

120 Adapted from: https://integrallife.com/four-quadrants/

121 Kegan, R, Immunity to Change: How to Overcome it and Unlock Potential in Yourself and Your Organization (2009)

122 Ives et al. Inside-out Sustainability: The Neglect of Inner Worlds. (Ambio, volume 49, 2020) 208–217.

123 Tian, J et al, "Global Low-Carbon Energy Transition in the Post-COVID-19 Era" (Applied Energy, Volume 307, 2022).

124 Mercure, J F et al, "Macroeconomic Impact of Stranded Fossil Fuel Assets" (Nature Climate Change 8, 588-593, 2018).

125 Lepic, B, "More than Half of 2020's Licensing Rounds at Risk of Cancellation" Market Outlooks (Offshore Energy, April 15, 2020).

126 Adebayo, C, "Just Transition" in Nigeria: What Happens to Oil and Gas Workers? (HF Markets, July 25, 2022).

127 Nordgren, A, "Climate Change and National Self-Interest" (Journal of Agriculture and Environmental Ethics, 2016) 29. 1043-1055.

128 Pilling, D, "Can Africa Grow Without Fossil Fuels?" (Financial Times, June 1, 2022).

129 Richter, A, "Significant Increase in Geothermal Development in Kenya" (Geothermal Energy News, 2022).

130 Lodhi, R W and R K Malik, "Impact of Electricity Shortage on Daily Routines: A Case Study of Pakistan" (Energy and Environment, Sage Journals, 2013).

131 Daly, H, "1.1 Billion People Still Lack Electricity: This Could be the Solution" (WEF, 2018).

132 Meredith, S, "The Situation is Serious: Germany Plans to Fire up Coal Plants as Russia Throttles Gas Supplies" (CNBC, June 20, 2022).

133 Hirschlag, A, The Women Behind an Innovative Water Crisis Solution that Sucks up Water from the Air (Forecast Change, The Weather Channel).

134 Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy (WEF, January 19, 2020).

135 Pascual, U et al, "Valuing Nature's Contributions to People: The IPBES Approach" (Current Opinion in Environmental Sustainability, 2017) 26-27, 7-16.

136 Robinson, J.G. and F Pesce, "Using Terrestrial Ecosystems Sustainably and Halting Biodiversity Loss" in Fulfilling the Sustainable Development Goals – On a Quest for a Sustainable World, ed. by N. Kakar, V. Popovski, and N.A. Robinson (Routledge, London and New York, 2022) 373-391.

137 Pörtner, op cit.

138 Larjavaara, M et al, "Payments for Adding Ecosystem Carbon are Mostly Beneficial to Biodiversity" (Environmental Research Letters, 14, 2019).

139 Seddon, N et al. "Global Recognition of the Importance of Nature-Based Solutions to the Impacts of Climate Change" (Global Sustainability 3, 2020).

140 Kaiser, F G et al, "Appreciation of nature and appreciation of environmental protection: How stable are these attitudes and which comes first?" (European Review of Applied Psychology, 64, 2014).

141 Global Nature based Solutions Standard (IUCN, 2020)

142 Griscom, B W et al, Natural Climate Solutions (PNAS, 114, 2014).

143 Houghton, R A, "Terrestrial fluxes of carbon in GCP carbon budgets" (Global Change Biology, 26, 2020).

144 Maxwell, S L et al, "Degradation and forgone removals increase the carbon impact of intact forest loss by 626%" (Science Advances, 5, 2019).

145 Watson, J E M et al, "The Exceptional Value Of Intact Forest Ecosystems" (Nature Ecology and Evolution 2, 2018).

146 Strassburg, B. B. N et al, "Global priority areas for ecosystem restoration" (Nature, 586, 2020).

147 United Nations Environment Programme: State of Finance for Nature 2021. (Nairobi, Kenya, 2021).

148 Dasgupta, P, The Economics of Biodiversity: The Dasgupta Review (HM Treasury, London, UK, 2021).

149 "A New National Strategy to Reflect Natural Assets on America's Balance Sheet." U S White House Briefing Room, 18 August, 2022

150 Robinson, J G, "Ethical Pluralism, Pragmatism and Sustainability in Conservation Practice" (Biol. Cons. 144, 2010).

151 Cox, T, "Natural asset companies: on firm ground?" (Environmental Finance, 2022).

152 Angelsen, A, Moving ahead with REDD: Issues, Options and Implications (Center for International Forestry Research, Bogor, Indonesia, 2008). 156.

153 Putz, F.E and Redford, K.H, "Dangers of carbon-based conservation" (Glob. Envir. Change 19 2008), 400-401.

154 Seddon, N et al, "Understanding the value and limits of nature-based solutions to climate change and other global challenges" (Phil Trans. R. Soc. B. 375, 2019).

155 Chami, R et al, "On valuing nature-based solutions to climate change: A framework with application to elephants and whales" (ERID Working Paper #297, 2020).

156 Berzaghi, F et al, "Carbon stocks in central African forests enhanced by elephant disturbance" (Nature Geoscience, 12, 2019).

157 Lavery, T J et al, "Iron defecation by sperm whales stimulate carbon export in the Southern Ocean" (Proc. R. Soc. B. 277, 2010).

158 Milner-Gulland, E J, "Don't dilute the term Nature Positive" (Nature Ecology and Evolution 6 2022).

159 Seng, S et al, "Improving community resilience and biodiversity conservation from the sale of carbon credits" (ClimateLinks, 2021).

160 Wildlife Conservation Bond boosts South Africa's efforts to protect black rhinos and support local communities (The World Bank, 23 March, 2022); https://treasury.worldbank.org/en/about/unit/treasury/ibrd/wildlife-conservation-bond, The World Bank.

161 Wildlife Conservation Bond boosts South Africa's efforts to protect black rhinos and support local communities, Global Environmental Facility (GEF, 2022).

162 Blended Finance, Global Environmental Facility (2022)

163 Chami, R et al, "Towards a nature-based economy" (Frontiers in Climate, 2022).

164 Carney, M, "Breaking the tragedy of the horizon – climate change and financial stability" (Speech at Lloyds of London, September 29, 2015).

165 Davies, H and M Zhivitskaya, "Global Banking Regulation: The Limitations of Voluntarism" (The Oxford Handbook of Institutions of International Economic Governance and Market Regulation, 2019).

166 Cochrane, J, Challenges for Central Banks (ECB Conference on Monetary Policy, October 20, 2020).

167 Network for Greening the Financial System.

168 Hansen, L P, "Central banking challenges posed by uncertain climate change and natural disasters" (Journal of Monetary Economics, 125, 2022).

169 Results of the 2021 Climate Biennial Exploratory Scenario (Bank of England, May 24, 2022).

170 European Central Bank, Climate Risk Stress Test, July 2022.

171 Credit Suisse Equity Research: BoE climate risk assessment will not be used to set capital requirements (May 26, 2022).

172 International Financial Reporting Standards (November 3, 2021).

173 Climate Risk: International Association of Insurance Supervisors.

174 Glasgow Financial Alliance for Net Zero.

175 Net Zero Success Demands a Whole of Financial System Response, (Grantham Research Institute, 2 November, 2021).

176 Paige, W, US Banks Under Pressure to Prioritize Sustainability While Still Supporting Fossil Fuels (Insider Intelligence, 9 August, 2022)

177 Carbon Pricing Leadership Coalition.

178 King, M and D Katz, Central Banks are Risking Their Independence (Bloomberg News, 23 August, 2021).

179 Guidance on Metrics, Targets and Transition Plans, Task Force on Climate-Related Financial Disclosures (2021).

180 Grantham Research Institute, op cit.

181 Furukawa, K, et al. How Does Climate Change Interact with the Financial System? A Survey (Bank of Japan) WP 20-E-8.

182 Inclusive Green Finance Key to Global Climate Solutions (Alliance for Financial Inclusion 2021).

183 Full disclosure: The African Climate Foundation has been the key anchor philanthropy that supported the early conception of the JETP by funding several organizations. (UCT, Meridien Economics, The Presidential Climate Commission and the Presidential Climate Finance Task Force).

184 G7's Just Energy Transition Partnership: Should India Get on Board? (Hindustan Times, Opinion, 23 June, 2022).

185 Abimbola, O and Z Usman, "How the G7 Can Support Africa's Climate Agenda" (Project Syndicate, 20 April, 2022).

186 Burton, J et al, "Coal Transitions in South Africa: Understanding the implications of a 20C-compatible coal phase-out plan for South Africa" (IDDRI and Climate Strategies, 2018).

187 Roff, A et al, "Resolving the power crisis – Part A: Insights from 2021, SA's worst load shedding year so far" (Meridien Economics, 2022).

188 Winkler, H, "Just how much more renewable energy does South Africa need?" (ESI Africa, 14 July, 2022).

189 Talane, V, "Eskom Capture Scheme Cooked up Long Before Controversial Contracts: Zondo-Commission Final Report (BizCommunity, 5 May, 2022); Mkhwanazi, S, "Eskom was looted of R14.7 billion, says Zondo report" (IOL South Africa, 2022)

190 La Viña, A G M et al, "The outcomes of Johannesburg" (SAIS Review, 23-1, 2003).

191 Makgetla, N and M Patel, "The Coal Value Chain in South Africa," (Trade and Industrial Policy Secretariat, July 2021).

192 The original concept was started by Meridien Economics and their policy worked called it a Just Transition Transaction (JTT)

193 Steyn, G et al, "The Just Transition Transaction: A Developing Country Coal Retirement Mechanism" (Meridien Economics, September 2021).

194 The President is the de facto chair of the PCC. The PCC has a secretariat and twenty Commissioners including key Ministers such as of Energy, Environment and Public Enterprises. As a multi-stakeholder body, the mandate of PCC is to advise the President and the cabinet on South Africa's just transition. The PCC has two main roles: aligning a political settlement around the nature of what the just transition means in the South African context and undertaking the necessary technical studies.

195 "South African Talanoa Dialogue," Department of forestry, fisheries and the environment, Government of South Africa.

196 South Africa Will Keep Using Coal Power until 2073 (mybroadband.co.za, July 9, 2022).

197 President Ramaphosa's address to the nation on the energy crisis (Business Day, 25 July, 2022).

198 The NGFS, a global group of central banks and supervisors, but with very few emerging economy participants at present.

199 The paper draws extensively on Denning, G, Universal Food Security: How to End Hunger While Protecting the Planet (Columbia University Press, 2022).

200 McMichael, A, Climate Change and the Health of Nations: Famines, Fevers, and the Fate of Populations (Oxford University Press, 2017).

201 IPCC, Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems, ed. P.R. Shukla et al. (IPCC, Geneva, 2019).

202 IPCC 2019, op cit.

203 Francesco N T et al. "Greenhouse Gas Emissions from Food Systems: Building the Evidence Base" (Environmental Research Letters 16, no. 6, 2021).

204 Rome Declaration on World Food Security (World Food Summit, November 13–17, 1996).

205 Denning (2022) op cit.

206 The State of Food Security and Nutrition in the World 2022: Repurposing Food and Agricultural Policies to Make Healthy Diets more Affordable (Rome, FAO, IFAD, UNICEF, WFP and WHO, 2022).

207 Denning (2022) op cit.

208 Healthy Diets from Sustainable Food Systems, EAT – Lancet Commission, Summary Report of the EAT – Lancet Commission. (Oslo, EAT, 2019).

209 Crumpler, K et al, Assessing the Role of Agriculture and Land Use in Nationally Determined Contributions (Environment and Natural Resources Management Working Paper no. 76; FAO, Rome, 2019).

210 MPA in Development Practice, School of International and Public Affairs, Columbia University.

211 Fourth Purpose Task Force Report: On Directed Action, Memorandum to President Lee C. Bollinger (Columbia University, December 15, 2020).

212 Parry, I et al, Proposal for an International Carbon Price Floor among Large Emitters. "IMF staff 'called for the world's largest emitters to pay a floor price of $25-$75 per ton of carbon depending on their level of economic development." (IMF Staff Climate Notes 18 June, 2021).

213 Weitzman, M, "Prices vs. Quantities," (The Review of Economic Studies, 41/4, 1974).

214 UNEP (n.d.), About Montreal Protocol.

215 "Multilateral Fund for the Implementation of the Montreal Protocol", Past Successes and Future Opportunities: Case Studies from the UNDP Portfolio (UNDP, 2017).

216 UNDP (2017), op cit.

217 "Mexico's Sustainable Light Program Gains Guinness Book of Records Recognition," IISD, 14 August, 2012.

218 One Light Bulb at a Time, Mexico Achieves a Guinness Record, The World Bank, 1 August 2012.