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Planning Climate Smart and Wise Cities

A Multidisciplinary Approach

Springer

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Preface

Climate change, natural disasters, and dramatically increasing urbanization-associated challenges raise disruptive issues that have come to the forefront of global discussion on the agenda of sustainable development and sustainable "human friendly" living. The recent "UN 2019 Climate Action Summit" in New York has highlighted the urgent need for and recognized the criticality of immediate action to deliver a sustainable and livable planet and world to the future generations. To be effective, the actions at the city level should be multidimensional, with the integration of disruptive and transformational platform solutions leveraging disruptive technologies, policies, business models, financing instruments, but also leadership for a response from all levels, from the city government level to the level of individual citizens.

Climate actions must be mainstreamed in integrated sustainable development goals (SDGs) actions. The main challenge in the pursuit of the SDGs is that actions targeting simultaneously the achievement of several of them are rare. Most of the time, the SDGs are addressed separately, without seeking synergy. Yet all the goals are interconnected. The big challenge now is how to integrate different actions for SDGs.

Rationale for This Book

The post-COVID-19 pandemic recovery provides an opportunity for enhanced climate action mainstreamed in the recovery measures planned by major countries all over the world. Shaping a low GHG emission and resilient post-COVID-19 urban era and charting path forward on the Green Deal have become new agendas for urban planning and management. The European Union has announced plans to set aside 25% of a proposed $826 billion coronavirus-related temporary recovery instrument NextGenerationEU for climate-friendly measures such as building retrofits, clean energy, electric vehicles, and sustainable land use. If such a recovery plan goes through, it could be the most significant green investment in history. Bonus points: it will create 1 million new jobs (Joel Jager, WRI DIGEST, June 10, 2020).

Climate smart city planning and the digital, carbon and ecological technologies behind it hold to the cities' stakeholders much promise and other interesting opportunities for new markets, services, and practices for the Green Deal and post-COVID-19 recovery plans. Though cities and communities around the world have elaborated a wide variety of climate change actions and plans, their development and implementation often follow a project-based approach with no network connections between projects. The increasing number of urban responses to climate change, Green New Deal, and COVID-19 highlights the need for carbon-centered comprehensive (3Cs) smart planning model which incorporates climate change mitigation and adaptation and Green Deal policy goals, and post-COVID-19 recovery plans at each stage of the planning process.

Such a model aims for digitalizing platform solutions for individual actions and viability decisions in a connected manner, and, therefore, the model needs to combine a large number of different ICT uses that are relevant to climate and COVID stimulus measures. Lots of institutional capacity are needed in execution of smart ICT networks.

In urban systems modeling, existing urban models are not sufficient to take into account mechanisms relevant for climate, Green Deal, and post-COVID-19 recovery issues which introduce complexities with high level of uncertainties, volatilities, ambiguities, and interactions across the issues. This requires developing a new integrated dynamic urban model to address more parameters with the smart, resilient, and resource wise grid platform systems on the concept of artificial neural network.

We can learn lessons from the coronavirus lockdown and use big data, AI program, and machine learning to tackle urgent urban planning challenges relevant to the global crisis. Cutting edge data, creative uses of technology, and forward-thinking partnerships can help find solutions to many urban challenges.

Another important challenge is the one related to incentivizing climate action in cities. Indeed, there is a mismatch between the GHG accounting system of cities and the type of climate actions their potential climate actors can undertake, what they are accountable for or can claim credit for. While a production-based approach is widely used for cities GHG accounting, cities are less and less producers of carbon-intensive products and more and more consumption centers. As the GHG accounting system is the basis for incentivizing action, it should address the types of climate actions the cities' climate actors are able to conduct. These are mainly need-based and solution-oriented climate actions aiming at satisfying the needs of the citizens at the lowest level of GHG emissions. Hence the need to use Consumption Based Approaches for GHG accounting. However, this approach to the GHG accounting for cities raises challenges including complexities and availability of data. One chapter of this book is dedicated to addressing this important issue and presents a new GHG accounting system for cities, leveraging the frontier technologies of the fourth industrial revolution such as distributed ledger technologies.

Access to low cost finance is key for cities to implement green action plans. The book opens a dialogue on how green bonds, the most widely used instruments for the mobilization of finance for green activities, can serve cities and the long-term climate goals.

Methodologies: A Multidimensional Approach

This book adopts a multidimensional but integrated approach which combines different sectors and themes of cities, leveraging combination of climate solutions such as digital systems, policies and planning instruments, financing mechanisms and disruptive leadership and ensuring their prompt but inclusive deployment. This approach would leave no one behind.

In terms of planning models, the book focuses on the state-of-the-art spatial planning practices to regulate development and land and resource use in a coordinated manner. The new spatial planning model seeks to streamline climate, Green Deal, and COVID-19 issues into coordinated land and resource uses in a sustainable, smart, resilient, and resource wise manner. Land use planning may incorporate mechanisms to coordinate other sector policies. However, spatial planning is more than the land use planning and is more centrally concerned with the coordination or integration of the spatial dimension of sectoral policies through a territorially based strategy. The strategy acts as a framework for the formulation and implementation of sectoral policy. One of the sectors will be land use planning. In this sense, spatial planning seeks to identify and address the contradictory effects of sectoral policies, and the opportunities for synergy through the territorial strategy.

Climate and urbanization-based global challenges are increasing exponentially. Our individual disciplines are unable to grasp the magnitude of climate and environmental challenges ahead. For that, we need a multidisciplinary approach to work collaboratively, calling on the knowledge of climatologists, engineers, sociologists, economists, ecologists, urban planners, designers, architects, AI experts, community organizers, and more, using an integrated holistic approach. For the scale and pace of the response to be commensurate to the challenge, transformative solutions are expected from these experts and tools to measure their impacts are needed.

Based on decades of teaching, research, exploration, advice, guidance, implementation, and brainstorming with scientists, politicians, practitioners, civil societies, researchers, and private sectors on various occasions, authors are now proposing challenging, innovative, and stimulating solutions as a response to the climate emergency. Subsequently, the action proposals to support the Green Deal and climate pact are addressed in the relevant chapters. Each chapter of the book is an open door to further exploration and development, and cross-referenced carefully to avoid overlapping and conflicts between chapters.

All together, the elements of these various chapters—with the help of ICT—propose a fully integrated, disruptive, and transformative approach to support city's climate goals.

The key point with regard to the multidimensional approach is that digital technology-based approach for climate action is a useful tool for addressing a need-based and solution-oriented approach to climate action than expand the climate action space for cities with possibilities of disrupting markets as well as entire value chains.

Structure of the Book

As the table of contents shows, this book is divided into four parts and eleven chapters with an appendix. Following this foreword, the first part contains the overview of climate smart city plans and other planning instruments, and climate big data, IoT, and AI for better decision. It focuses on theory and practices of integration platform cities.

Part 2 discusses the nature-based approach from urban nature, vulnerability and risk assessment, and mangrove forest perspective. Part 3 addresses several new developments to foster climate action in cities. It includes (1) possible climate actions currently available in cities, (2) market mechanisms from project to mitigation activities, (3) how global carbon markets can promote low-carbon cities in developing countries, (4) climate change mitigation action enablers for climate smart cities, (5) market mechanisms in the building sector from an urban perspective, and (6) new advanced GHG accounting system for cities enabled by distributed ledger technologies.

Finally, an appendix offers the readers a practical guide for preparing the carbon neutral city plan 2050 within the broad framework of climate smart cities described in this book. It is intended to assist cities to develop strategies, measures, and project activities for carbon neutrality in response to global requirements to keep the global temperature to 1.5 degree Celcius above preindustrial era levels. This appendix is oriented to some principles, practical methodologies, procedures, implementation, co-benefits, indicators, and suggestions for writing carbon neutral city plans, and alleviating common criticisms. The guide provided herein can be improved by the appropriate pilot test and validation. We have great expectations that this guide will help turn the ideas and proposals contained in this book into action in a consistent and coordinated manner.

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A complete list of contributors and their affiliation is provided following the table of contents.

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Kwi-Gon Kim
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Disclaimer

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Abbreviations

AFOLU	Agriculture, Forestry, and Other Land Use
BID	Business Improvement District
BIT	Bus information Terminal
BRT	Bus Rapid Transit
C40	Network of the World's Megacities
CBA	Consumption-Based Approach
CCDA	Climate Change and Development Authority
CCP	Climate Protection Campaign
CDM EB	CDM Executive Board
CDM	Clean Development Mechanism
CDR	Carbon Dioxide Removal
CEPA-JICA	Central Provinces
CERs	Certified Emission Reductions
CI	Coverage Index
CICES	Common International Classification of Ecosystem Services
CIFA	Community-wide Infrastructure Footprint Approach
CPA	Component of Project Activities
CPAs	CDM Project Activities
CPLC	Carbon Pricing Leadership Coalition
DAOs	Decentralized Autonomous Organizations
dApps	Decentralized applications
DEM	Digital Elevation Model
DER	Distributed Energy Resources
DLT	Distributed Ledger Technologies
EBA	Ecosystem-based Adaptation
EcoDRR	Ecosystem-based Disaster Risk Reduction
EEIO	Environmentally Extended Input–Output
EFP	Emission Footprint
ER	Emission Right
ES	Ecosystem Services
ESCO	Energy Service Companies
ESCO	Energy Service Company

ESS	Energy Storage System
EU	European Commission
EV	Electric Vehicle
FEMA	Environment and Sustainable Development Fund
GHG	Green House Gas
GHG	Greenhouse Gas
GIS	Geographical Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GPS	Global Positioning System
HVAC	Heating, Ventilation, and Air Conditioning
IASS	International Advanced Sustainability Studies
ICT	Information and Communication Technology
IEA	International Energy Agency
IET	International Emission Trading
InVEST	Integrated Valuation of Environmental Services and Trade-offs
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
ITS	Intelligent Transport System
JI	Joint Implementation
KP	Kyoto Protocol
LCA	Life Cycle Assessment
LDC	Less Developed Country
LED	Light Emitting Diode
LFG	Landfill Gas
LGGFA	Local Government Green Funding Agency
LID	Low Impact Development
LoA	Letter of Agreement
LPA	Local Planning Area
MOOCs	.
MOS	Mitigation Outcome Security
MRV	Monitoring, Reporting, and Verification
NBS	Nature-based Solution
NBS	Nature-Based Solutions
NCD	National Capital District
NCDC	National Capital District
NDCs	Nationally Determined Contributions
NSCs	Need Satisfaction Companies
NWRM	National Water Retention Measures
PA	Paris Agreement
PAYT	Pay As you Throw
PBA	Production-Based Approach
PDD	Project Design Document
PES	Payments for Ecosystem Services
PNG	Papua New Guinea

PoA	Program of Activities
RFID	Radio Frequency Identification
SC	Smart City
SCADA	Supervisory Control and Data Acquisition
SDGs	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SID	Small Islands Developing States
SLR	Sea Level Rise
TEEB	The Economics of Ecosystems and Biodiversity
TOC	Theory of Change
UEA	Urban Environment Accords
UERA	Urban European Research Alliance
UN SDSN	UN Sustainable Development Solutions Network
UNCCD	United Nations Convention to Combat Desertification
UoP	Use of Proceeds
VUCA	Volatile, Uncertain, Complex, and ambiguous world

Part I
Climate Smart and Wise Cities

Chapter 1
Planning Instruments for Climate Smart and Wise Cities: A Spatial, Green and Digital Deal Approach

Kwi-Gon Kim and Hee-Sun Choi

Abstract The Smart City Council defines a smart city as one that has simple, easy, and practical digital technology embedded across all city functions. Though cities and communities around the world have elaborated a variety of climate actions and plans, their development and implementation often follow a project-based approach with no network connections between projects. Climate smart and wise cities extends the concept and approach of smart cities to include the diverse dimensions of climate actions in a holistic manner.

This chapter describes how climate smart and wise cities can support climate actions with a variant of the New Urbanism called the climate smart and wise urbanism., which is intended to be more climate-oriented and nature-based. The chapter argues that our task now is to mainstream climate city planning into urban planning and development policy. The contents of this chapter include new issues and solutions for climate emergency which need a new tenet of planning, a conceptual framework, and key components of the planning system for integrated climate smart and wise cities, planning procedure, and planning methodology. The models include holistic planning models, sub-system planning models, and sectoral dynamic platform models with the use of automation and Internet control system technology development.

Keywords Climate smart and wise cities · Climate emergency · Sustainable development goals · Environmental integrity · Carbon footprint · Urban normal · Digital space mapping · Energy transition · COVID-19 deal · Green transition · Energy transition · State of pandemic · Hydrologic simulation models · Flood risk assessment · Land use platform · Smart growth scenarios · Digital city · Spatial planning · Transparency framework · Katowice rulebook · Digital transformation

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1.1 Introduction: Issues and Solutions for Climate Emergency

Climate change is our common enemy and became a global multidimensional issue. The next coming generation is watching the present generation. We should not underestimate the climate change threat to them.

We are at a pivotal moment in urban planning history where the way in which we integrate the Green Deal movement offers the possibility to reorient urban planning toward sustainable development goals (SDGs) and climate.

The Green Deal movement is growing all over the world. In particular, the Green Deal is an integral part of the European Commission's strategy to implement the United Nation's 2030 Agenda and SDGs. As part of the Green Deal, the Commission will review the regulatory framework which should foster the deployment of innovative technologies and infrastructure, such as smart grids, hydrogen networks or carbon capture, storage and utilization, energy storage, also enabling sector integration. The European Commission's Green Deal policy and strategy have many implications for the development of climate smart and wise city (European Commission 2019). Article 6 of the Paris Agreement (PA) offers opportunities for Parties to voluntarily cooperate to promote Nationally Determined Contributions (NDCs) implementation and sustainable development. Capacity building is crucial for enhancing the transparency framework, thus requires multiple approaches and actors.

In this context, at the UNFCCC COP 25, groups assembled for side events entitled "The role of CDM in decarbonizing cities and its co-benefits," "How digital technologies can support climate action,", "Nature-based solutions: Coastal ecosystems in 2020 NDCs," and many other climate-friendly themes and topics (Photos. 1.1 and 1.2).

There are increasing interests in the potential of cities to contribute to climate change and COVID-19 recovery. Multiple assessments have evaluated the scale and composition of urban GHG emission, while others have evaluated some aspects of urban mitigation potential. Climate smart and wise cities need smart innovative solutions. There have been newly emerging solutions for climate emergency which can be summarized as follows:

Planning-based solutions

Future cities need to be more consciously planned if they are to address sustainability and climate issues properly. These issues cannot be left to spontaneous mechanisms or to market forces. Urban planning practices also need to be changed to reflect a new awareness and international movements, and to integrate environmental, climate, economic and social concerns in the twenty-first century. The relevant planning policy guides have to be developed for climate smart and wise cities.

For example, these solutions need to explore the role of national planning laws for local flood resilience and the interplay between adaptation planning laws and disaster risk reduction and management. The linkages between urban planning law and environmental planning law have to be strengthened to integrate green spaces

Photo 1.1 Side event on "The role of CDM in decarbonizing cities and its co-benefits," at the UNFCCC COP 25, Madrid, December 2019

and river systems with wind passages in cities to cope with fine dust (particles) and for climate change adaptation.

Cities are on the frontlines of COVID-19. Reopening our cities in the midst of COVID-19 in the era of climate change calls for different approaches to urban planning and implementation.

Nature-based solutions (NBS)

A renewed focus should be on the need for the city to make a committed transition toward a 'green', environmental integrity and carbon neutrality 2050.

Nature-based Solutions (NBS) are defined by IUCN as actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g., climate change, food and water security, or natural disasters) effectively and adaptively, while simultaneously providing human wellbeing and biodiversity.

If nature-based action is to provide part of the climate solution, it must do it by reducing emissions, integrating biodiversity, protecting the ecosystem and supporting the livelihoods.

These solutions aim to integrate urban and coastal ecosystems in 2020 NDCs. The approaches include protection and wise use of ecosystems with multiple co-benefits and IPCC guidelines for measuring mitigation value. The solutions will serve as contributions to the broader discussion on the role of climate smart and wise cities.

Photo 1.2 Side event on "How digital technologies can support climate action," at the UNFCCC COP 25, Madrid, December 2019

Nature-based solutions enable cities to learn best practices of design and implement policies and programs to better equip and manage urban spaces under a changing climate.

Wetlands, peatlands, mangroves, forests, and other primary ecosystems retain massive carbon stocks and improve resilience. Biodiversity underpins carbon storage and sequestration. Harnessing and mapping linkages between nature-rich and carbon-rich areas will catalyze higher ambition for NDCs. These solutions provide policy and practice sharing on mangrove conservation and zero deforestation, agricultural and forestry supply chain in time of climate change.

AFOLU (agriculture, forestry and other land use) sector presents great opportunities to increase NDC ambitions. The strategic alignment of all urban and regional plans and initiatives in the AFOLU sector, enhances its urban and regional mitigation and adaptation ambition, toward carbon neutrality in the sector, by 2050. Contributing up to 8.4% of GHG globally, new approaches to agriculture have a key role to play in slowing down the effects of climate change by adopting innovations and evidence-based good practice. These solutions explore options for farmers to address the biggest challenge of the twenty-first century. The solutions take a look at earth, air, fire and water elements for sustainability.

Climate change is inextricably linked to water for adaptation and mitigation, and there are significant co-benefits to managing climate and water in a more coordinated

and sustainable manner. We have to manage water for climate change resilience. Water security is linked to ecosystem services. Therefore, the recent calls to action demand a new narrative on water management with ecosystem services to water. Nature-based solutions help catalyze the revolution by highlighting how climate-resilient water management delivers critical adaptation solutions for food systems, cities, finance infrastructure and local action.

Nature-based adaptation to climate change in cities explores how to measure the impact of NBS not only on climate change adaptation but also on its multiple benefits of health and wellbeing, social cohesion, and sustainable economic development. Nature-based approaches also contribute to disaster risk reduction. Carbon dioxide removal can be obtained from nature and technology-based solutions. These solutions present their co-benefits, adverse effects, cost, technical potential and enabling conditions and implementation of landscape restoration.

Ecosystem-based adaptation in the water sector mobilizes "no-regret" nature-based solutions including resilient land and forest management that best deliver at the scale of the basins of lakes, rivers and aquifers based on bioregional units. The ecological approaches can be used for landslide hazard mitigation and management.

There is potential for coastal blue carbon to support countries' NDCs. The effects of climate change on oceans continue to adversely impact economies, societies and biodiversity. Yet, the potential of coastal and marine NBS to support global mitigation and adaptation efforts remains underutilized. New science and successful NBS projects, a global cooperation and fundraising will be necessary to develop the NBS tools and methods.

Faced with the need for greater NDC ambition, we need to show how land is a key to nature-based solutions with a mitigation potential of 1/3 of the gap. We can share experiences of protecting and restoring diverse biomes, like mountains and forests.

Nature-based approaches that help people adapt to climate change and simultaneously reduce poverty and protect or restore biodiversity and ecosystems are particularly promising in mountain regions. Forest-based solutions in climate change mitigation and adaptation incentivize mechanisms to promote global green supply chains. Sustainable supply of goods and ecosystem services provided by forests are essential to economic development and to the environment.

Tree planting with "Plant-for- Planet App" is a good example. It's a solution put forward by the UN Environment to solve the climate crisis as a part of the UN Decade of Ecosystem Restoration (2021–2030). The App redefines transparency of planting projects. Forest, water, and carbon storage create synergies and balancing trade-offs in view of climate change.

There is an urgency for all countries to develop more ambitious commitments in order to achieve the Paris goals. Renewables- solar, wind, biomass, hydro & geothermal-working together can strengthen national and local commitments to achieve a just and equitable transformation to a renewable energy future. An integrated bioregional approach managing from hilltops to oceans is needed to take full advantage of the benefit that nature offers- be they ecological, economic, social, or cultural.

Market-based solutions: market-ready technological solutions for climate emergency

These solutions explore approaches to guide an international carbon market based on experiences with the Kyoto mechanisms and regional ETS to guard the environmental integrity of the market mechanism under the Paris Agreement (PA). These solutions include the impact of using offsets on the economy. Significant challenges remain to account for the transfer of emission reductions under Article 6 of the Paris Agreement. New analysis has to be made on the risk of spreading hot air throughout the Paris agreement, as well as suggested ways to ensure that all emission reductions are properly accounted for.

Developing countries are now earning credits from REDD+ activities, verified by the UNFCCC.

Future carbon markets can be designed and blended with climate finance in order to mobilize finance for NDC implementation in developing countries and LDCs.

Digital technology-based solutions: innovative technical solutions

It is important to modernize, simplify and transform IT with solutions from climate smart and wise city perspectives.

For global CO_2 emission reductions, accelerating innovation that benefits each country by adapting the advanced decarbonizing technologies respectively are crucial not only for climate action mitigation but also for multiple SDGs.

Digital technologies can revolutionize climate action. The combination of IoT, AI and DLTs/Blockchain is critical to the mobilization of the full potential of climate policy making. It enables the measurement and attribution of scope 3 (indirect emissions)) climate contribution as well as climate contribution arising from enhancing the circularity of a city.

Data-driven approaches lay out a new strategy for equal access to climate action, "Climate Action for All, not just the Privileged." Digitalizing traffic and parking data in cities for traffic and park equity is a good example experienced Chandler, Arizona, USA.

With the Katowich rulebook in place, transparency will inform the global stocktake. This will require data/ information and analyzes of countries' policies and pledges. Other digital data techniques are digital geophysical mapping and digital twin (3D virtual simulation).

Best available science requires high-quality monitoring of GHGs. High-precision, sustained, interoperable and freely accessible data on climate impacts are a prerequisite for relevant climate policies. Research infrastructures have to cooperate globally to provide standardized observations and contribute to enhanced monitoring, reporting and verification (MRV).

Financing fit for Paris (3fP)-based solutions: effective carbon pricing to reach global carbon mitigation goals

Aligning financing systems with the Paris Agreement—The Pathway to 1.5C convened by UNEP FI and partners, leading banks and investors are targeting net zero

emissions by 2050, striving for a 1.5C world and driving GHG emission reductions in the real economy.

For the implementation of the commitments made by countries through the NDCs under the Paris Agreement, one of the major challenges is the mobilization of related financial resources despite the existence of several climate funds.

2021 is a critical year for scaling up climate finance to respond to climate priorities and the needs of developing countries. Carbon financing issues include carbon pricing in emerging economies, policy choices between CDM, ETS and carbon taxes, options to address competitiveness concerns, and how to create domestic support for carbon pricing. Climate finance and project development is another finance infrastructure issue for bridging the gaps between climate finance access and building resilience on the ground. These solutions can demonstrate that ambitious climate action can be a driver for inclusive green growth, job creation, rights and social justice.

Many developing countries that are vulnerable to climate change are unsuccessful in accessing the magnitude of finance required to turn their climate targets into action. Financing solutions help support improved access to climate finance.

Alignment of the financial sector and climate finance obligations constitute challenges for both countries with large financial centers and recipient countries. Financing-based solutions cover regulatory approaches to shift and mobilize finance but also strategies to overcome unintended side effects. Financial regulation can support the Paris goals by shifting billions toward a low-carbon and climate-resilient economy. The 3fP-Tracker tool provides transparency across jurisdictions and helps define the global knowledge frontier, including for non-state actors.

Banks, insurers, and investors have a key role in ensuring the implementation of the PA, especially in article 2.1c. The financing solutions explore which measures are necessary to divert funds from the fossil industry to the sustainable energy transition and low-carbon development.

To shift from incremental improvements to transformational changes in climate actions, financiers should be incentivized to conduct green investments. This requires the measurement and attribution of their scope 3 climate contribution, a complex task that raises several new and challenging issues. Business opportunities in climate action accelerate investments that are needed to close the gap in adaptation and mitigation financing.

Climate governance-based solutions: local sustainable solutions

Growing international momentum around net-zero targets can drive more ambitious NDCs and share experience in setting the domestic legislation and governance arrangements to support this. The role of people on the frontlines, such as children, youth, women, workers, including those in the informal economy, and indigenous peoples is to drive ambitious climate action that ensures ecosystem integrity and their empowerment through the fulfillment of the human right to participate. Creative, visual, and digital methods can be used for empowering communication to connect personal stories to collective issues.

New city master plans, new neighborhood plans and climate action plans can be guided by a set of community values and a new community vision involving

the citizens. Private actors engagement and community mobilization promote low-carbon water and climate change: the engagement of private actors, water partnership, promoting low-carbon and resilient development through community mobilization advocacy and equity for enhanced climate action. Transboundary water governance could be a good solution for adaptation to climate change.

Ambition, innovation and leadership by non-party stakeholders are crucial for accelerating the transition to a low-carbon economy. These governance-based solutions could lead to a new Movement of Climate Change through New Climate and Practice Establishments.

Corona virus and green new deal-based solutions

The world is changing at an incredible rate and cities are at the heart of it all.

The Corona virus has been sweeping the globe and many organizations have issued emergency advisories. Across the globe, COVID-19 is threatening cities and communities, endangering not only public health but also the economy and fabric of urban society. COVID-19 is already having a deep, multidimensional impact and is expected to create the worst economic contraction in decades, with job losses already at an all-time high.

Given these shocks, the World Bank estimates that about 100 million people will likely fall into poverty due to the impact of the pandemic, with as many as 49 million falling into extreme poverty.

Residents in slums and informal settlements are particularly vulnerable. The one billion people who live in slums and informal settlements lack infrastructure and basic services, including water, sanitation, waste collection and access to basic health care. Many rely on communal water and toilet facilities, which accelerates infection rates (World Bank Blogs, “Cities are on the front lines of COVID-19”, May 13, 2020).

Times are uncertain as city officials respond to a health pandemic and find ways to build urban resilience. Every day, across the globe, new and innovative approaches are emerging. These ideas will lead us into an urban normal.

Petersburg climate dialogue took place via video conference. Officials from 30 countries took part in the dialogue. The talks focused on making a green economic recovery after the COVID-19 pandemic. Guteres says that we have an opportunity to build our world for the better. The Green New Deal could offer us many opportunities for post COVID 19.

In light of steep declines in transit ridership and municipal budgets as a result of COVID-19, transit providers are rapidly becoming more reactive and nimble in their offerings. For example, to support cities and businesses for their efforts to provide transportation for their riders, Ford Mobility subsidiaries TransLoc, Ride Systems and DoubleMap are providing free transit consulting and demand response software for transit agencies in an effort to help them quickly deploy a responsive service that can both support evolving rider demand, and adhere to quickly-changing health guidelines (Meeting of the Minds Webinar, May 13, 2020).

It has been suggested in the recent World Health Assembly (WHA), delivered via video conference that corona virus vaccines and treatments should be public goods for humankind. The principles of transparency obligation and early warning system

have to be adopted to prevent COVID-19. President Moon Jae-in proposed in the WHA Monday (May 18, 2020) that the international community cooperate beyond borders to develop vaccines and treatments for COVID-19 and other pandemics that may emerge in the future (The Korea Times, Tuesday, May 19, 2020).

We need to create transformative urban solutions to address global pandemics within the broad framework of healthy cities. The decision tree can be used for predicting severe causes of COVID-19 with help from AI and machine learning. AI experts can analyze historical patterns of corona virus disease cases with Big Data. Several actions to be taken can be summarized as follows:

- Assessment of impact on ICT industries.
- Analysis of present ICT policies and future tasks to cope with COVID-19.
- Government's countermeasures: Building of digital infra, digitalizing of social overhead capital (SOC), promoting of untact industries, etc.
- Tasks to prepare for post COVID-19.
- New digital standards for new group facility development and operation (e.g., virtual shops).
- Empowering communication: The use of creative, visual and digital methods to connect personal stories to collective issues.
- Driving economic growth and recovery, helping to advance productive and sustainable industries, and building long-term resilience in cities and communities.
- Matching a new economic vision with the legislation.

Endemics and pandemics are both standalone city risk as well as an amplifier of existing trends and vulnerabilities. The sustainable urban agenda must not lose momentum, and climate smart and wise city should be at the forefront of urban planning facing years of climate and health uncertainty. As urban climate planners adapt to a period of extreme volatility, there are many questions to be answered as follows:

- What are the pandemic implications for the cities?
- The impacts of COVID on the green urban development: challenge or opportunity?
- The difficulties of mobilizing finance to reach a 1.5 degree target in the midst of a pandemic.
- Forecasting the short and long-term impacts.
- Preparation of the city digital management method to minimize urban functional failures such as city lockdown or blockade as a long-term countermeasure (e.g., digital early warning system).
- Considerations for the economically and socially deprived people to solve the polarization of the digital economy at the urban policy, planning and design level.
- Updating utility grids, automating systems and services, and meeting increased connectivity need to create flexible and resilient cities that can outlast and grow beyond whatever comes their way are just a few of the critical upgrades to be considered.

- Dynamic street management, city airspace, and capturing the value of municipal infrastructure including transport:
  - Whether streets temporarily closed to vehicle traffic during COVID-19 should be permanently closed or not.
  - Before we take the next step with drone delivery, cities and FAA need to come to a conclusion on who controls, and in what manner, the airspace above cities.
  - How can we leverage public/private partnerships to create new opportunities and experiences for constituents?
  - How can we move from ad hoc solutions to a well-planned path to recovery?

Stimulus packages, including COVID-19 economic recovery funding and digital services, that address climate change and prioritize efficiency, sustainability, circularity, connectivity, equality, and resiliency are likely to have higher returns than those that merely shore up past approaches. As with pandemics, early planning action on climate reduces risks and slashes costs for the journey toward the "next normal".

We have to deal with the root causes of the COVID-19 pandemic for our 'New Normal.' Shaping a resilient post-COVID-19 urban era and charting a path forward on the Green New Deal have become new agendas for urban modeling. As an example, the European Union has announced plans to set aside 25% of a proposed $826 billion corona virus proposal for climate-friendly measures such as building retrofits, clean energy, electric vehicles, and sustainable land use. If a recovery plan like the proposal goes through, it could be the most significant green investment in history. Bonus points: it will create 1 million new jobs (Joel Jager, WRI DIGEST, June 10, 2020).

Holistic thinking-based solutions

We have to take our climate action to the next level with multi-sector solutions to deal with complex climate problems.

Many urban planners realize that the environmental, social and economic factors that promote wellbeing are complex. The holistic approach, advocated by planning pioneers, looks at the interrelationships between the whole person and his or her environment. This generalist approach is not opposed to the specialized thought and detailed work on health carried out by the medical profession. These two approaches are not only complementary but also mutually indispensable.

Our task now is to integrate Green New Deal, Digital Deal, COVID-19 and climate change issues into urban planning policy. To achieve these goals, this book suggests four deals as follows:

- Land and resource, and climate deal aim for ecological transition to avoid climate impacts and contribute to sustainable use of land and resources;
- Green deal is designed for green transition to implement the United Nation's 2030 Agenda and the Sustainable Development Goals;
- Digital deal addresses for digital transition to transform cities into digitalized, automated, connected cities;
- COVID-19 deal is geared up for recovery transition to improve human health and reopen cities in the midst of COVID-19.

1.2 Climate Smart and Wise City Planning Framework

This section describes an integrated, whole of urban planning response to climate emergency in the digital era. It includes planning system, focusing on a hierarchy of physical and digital space planning, and planning procedure targeting spatial planning process at the city level.

1.2.1 Planning System: A Hierarchy of Physical and Digital Space Planning

(1) **Definition and Principles of Climate Smart and Wise Cities**

Cities can be defined according to a multiplicity of perspectives on emerging fields of urban development and tools. The definition of the city sought by eco-city, sustainable city, smart city and resource wise city can be injected into the new climate smart and wise cities. In terms of planning principles, in addition to efficiency, sustainability, connectivity, circularity, resiliency principles of cities, environmental integrity and resource wisdom principles have become increasingly influential in the emergence of climate smart and resource wise urbanism.

Plunz and Sutto (2010) argued that sustainable cities will be sustainably integrated into local and global ecological processes, using energy efficiency and low-carbon technologies, emphasizing the quality of life in local communities and building healthy systems for transport, recreation, and employment. According to them, ecology and economics will merge, rather than being distant and often conflictive modes of thinking and action. Design in its broadest sense- integrating technology, spatial analysis, community participation, and a deep appreciation of ecology- will provide an integrative framework for action.

This is the digital age. The Smart City Council defines a smart city as one that has simple, easy, and practical digital technology embedded across all city functions. On the other hand, climate-resilient and low-carbon smart cities can be defined as ones that have digitalized connections of all sectors and functions, in which everything is connected, supporting sustainability, resiliency, circularity, efficiency, and connectivity of the city to combat climate change by promoting climate actions. It incorporates climate change mitigation and adaptation policy goals at each stage of the planning process and in urban policies.

A new concept and approach called climate smart and wise cities aim to reform all aspects of urban planning, in terms of ‘environmental integrity’ and ‘carbon neutrality’ rather than in narrow terms considered sufficient in the nineteenth and twentieth centuries. The principle of environmental integrity expresses a complex set of concepts that describes a healthy natural system that can support essential processes. The principles of sustainability include the environmental integrity which refers to maintain the state of the environment. This means that human activities should not unduly disrupt the ecosystems and human communities located in the area. Furthermore, care should be taken so that the surrounding landscape is not drastically impacted by human activities.

The Paris Agreement introduces a quite different definition: environmental integrity here means not a natural system, but the transfer of units. The term 'environmental integrity' is used several times in Paris Agreement, but is not defined clearly. In the context of international market mechanisms, what we mean by environmental integrity is that the transfer of units does not result in higher global emissions than if the NDCs had been achieved only through domestic action. Environmental integrity is central to both the effectiveness and credibility of mark mechanisms.

Difficulties arise with the distinction between the definitions of natural system and international market mechanisms for maintaining environmental integrity. Climate smart and wise city planning systems provide an important mechanism for connecting these two definitions within an integrated framework. Smart networking and innovative cyber- physical solutions are vital for the utilization of the entire city's resource potentiality. Innovative solutions help individuals, communities, and the whole city to renew and manage resources wisely.

The principles of climate smart and wise cities are summarized as follows:

Principles of green new deal: idealogical revolution

Europe now has its own green deal. The European Commission President Ursula von der Leyen presented the European Green Deal on Dec. 11, 2019, which aims to make the EU climate neutral by 2050 as follows (European Commission 2019):

- A zero pollution ambition.
- Preserving and restoring ecosystems and biodiversity.
- From 'Farm to Fork': a fair, healthy and environmentally friendly food system.

Figure 1.1 shows the European Green Deal which contains 10 strategies.

Resource Wisdom Principles

As summarized in Table 1.1, resource wisdom principles have been developed by the Finish Environment Institute. A list of principles of resource wisdom is as follows:

- Zero climate emissions.
- A resource wise city aims to minimize its climate emissions or greenhouse gas emissions. The unit used for this indicator is the carbon dioxide equivalent per resident.
- Zero waste.
- Zero overconsumption.
- Sustainable wellbeing.

In Table 1.1, the indicators have been selected to correspond to the principles of resource wisdom.

Connectivity principles

- Entailing a greater scale of information gathering for big data, more integration of information and greater cooperation among information providers, both amateur and expert.