MONSOON ACADEMY

Planning for Climate Resilience in Urban Areas

COURSE HANDBOOK

20-23 August 2019 | Goa

TANDEM RESEARCH

Global Climate Adaptation Partnership

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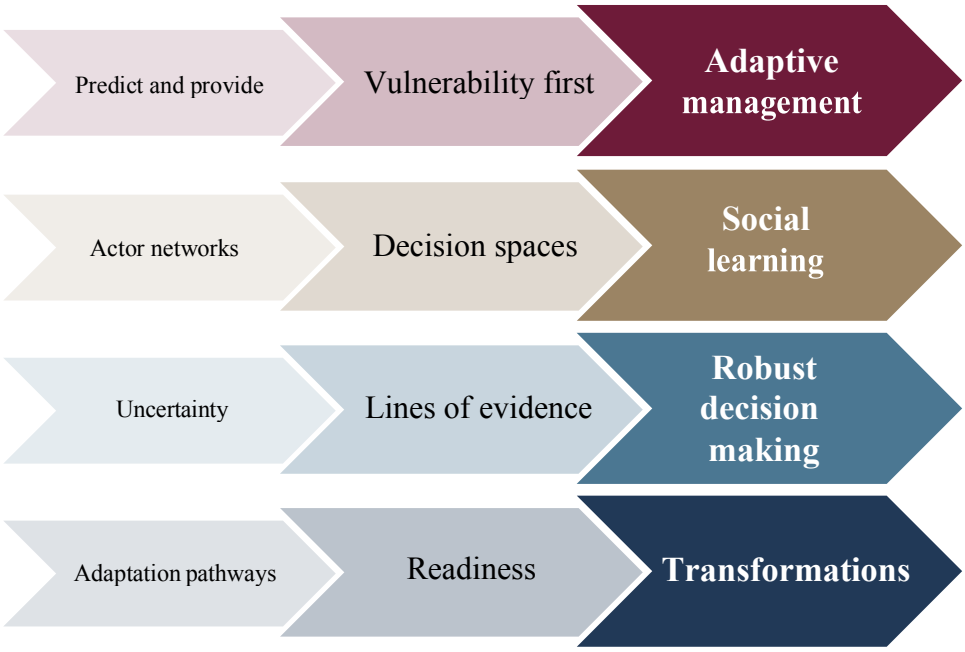
INTRODUCTION

The Monsoon Academy on Planning for Climate Resilience in Urban Areas is a concentrated, professional training facility. We do not aim to cover every topic, nor to offer an introduction to all approaches. We offer professional training based on three decades of experience - that's right, going back to the very first framing of climate adaptation as vulnerability and disaster risk reduction in the 1980s.

Our approach is captured in a set of core principles. However, the Academy is situated in the demands of organisations and practitioners. We do not offer didactic training in a single approach. We offer models of learning to find effective solutions. As such, the Academy is a hot-house environment to develop and further our own principles, shared approaches and effective tools.



The first principle concerns the progression beyond Predict-and-Provide. Early climate change studies tended to rely on a couple of climate scenarios for, say, the 2050s and 2080s and then sought to reduce the projected (as modelled) impacts through some adaptation actions. This notion of our ability to predict the complex evolution of vulnerability-impacts through decades into the future is misplaced. Yet it persists; witness the seemingly unending stream of global studies of the impacts of future climate change.

Two progressions are in play. The first was to focus more adequately on current vulnerability - the interplay of social dynamics, environmental-economic baselines and current climate events. We believe this is a good place to start, and one we promoted in the 1980s, although it is often not fully explored. It was further developed in the UNDP Adaptation Policy Framework as a core approach.

The second progression is adaptive management, or more generally resilience. An adapting well or resilience framing is in play through many projects and was recommended in the IPCC's fifth assessment.

Actors are central to adaptation strategies and measures. It may seem obvious, but so many strategies start with idealised systems or generic lists of actions without any understanding of the actor-networks that define decision spaces. This is a ripe field in social and political sciences. We pay homage to actor-network theory, but are far more practical in a focus on the nature of decision making, the stakeholder-knowledge networks that govern the scope of action and processes of social learning. We focus on ways in which personal leadership (that's us, as practitioners) learn from the theory to become agents of change.

To say uncertainty is central to adaptation decision making now seems obvious, given the inability to predict useful features of the future beyond a few decades (or even months according to some views) and the volatile nature of actor networks (including human resources and finance). The Holy Grail may well be a version of robust decision making, if not all the formal methods at least the central concepts. Along the way, multiple lines of evidence are necessary. We have not seen formal protocols for handling the many sources of uncertainty in adaptation studies, as yet. Some reduce everything to probability distributions, but this often hides the complex properties of risk. Others triumph narratives as a good place to start; we agree but often more is required in decision making. Our mantra: Uncertainty is the reason for action.

Finally, these principles come together in the notion of adaptation as a socio-institutional pathway. Act - then learn - then act again is one of the dominant paradigms in the IPCC. Some decisions in the early steps are clear, while the distant landscapes of future actions cannot be divined until those steps are taken. Lock-in, opportunity costs, enabling conditions - there are various pieces of a path-dependent analytical toolkit. At some point in such pathways, real transformations are required--the interplay of structural change and small steps is the art of navigating the adaptation landscape.

Dr Thomas E Downing

DEAN
MONSOON ACADEMY
Planning for Climate Resilience in Urban Areas

TANDEM RESEARCH

Tandem Research is an interdisciplinary research collective generating policy insight at the interface of technology, society, and sustainability. We believe in finding iterative solutions to real world problems through evidence-based enquiry and public engagement.

Rapid advancements in technology, science and innovation coupled with accelerating economic activity and global mobility are generating new forms of prosperity in India. Yet, inequality and unemployment are growing, environmental crises are on the rise, and control of the global commons is highly contested. Emerging forms of political authority are fragmenting traditional governance arrangements. Disruptive platforms for independent enquiry, collaboration, and public engagement are a need of the hour. New approaches must anticipate the future, co-create pre-emptive responses and cultivate effective participation.

We aim to bridge gaps between social science research, public policy, and public engagement. Our work seeks to ensure that no one gets left behind in the transitions that will shape India's future.

Incubate New Ideas

We bring together researchers, activists, industry, government, media makers, and others, to co-create new ideas and iterative solutions. Through our Associate Fellows, Policy Labs, and Residencies, we are continually growing our collaborative research network.

Cultivate Public discourse

We aim to translate our findings in accessible and relatable terms, exploring new forms of participatory research and public dissemination. We are always on the lookout for new partnerships and engagements that can further this goal.

Impact public policy

We aim to create evidence-based, anticipatory knowledge, to respond to future public policy challenges and inform decision making across government and industry.

GLOBAL CLIMATE ADAPTATION PARTNERSHIP

Our mission is to assist our clients to find best-value solutions to their unique climate risks and to develop innovative services and products for the new normal of climate change.

The landscape of climate resilience is to navigate a world that is rapidly changing. 2015 and 2016 look to be the hottest years on record. The new high-temperature record of 52.4 °C is the warmest ever recorded on Earth. This is the challenge we all face.

The global response interlinks mitigation to reduce greenhouse gas emissions and adaptation to prepare now for the climates of the future. Adaptation, in the context of environmental management and resilience is our primary focus.

Our vision is to improve the lives of the most vulnerable already affected by adverse weather and develop societies and economies that are resilient against future climate change.

GCAP brings together three services in a unique partnership. People are the engine of planning and change-making and the Academy is an essential component of our business. We are the only specialist company with a proven capacity building programme in partnership with a top 10 university. Practice is where expertise meets demand, and where we are confronted with the reality of what works. Our clients range for multi-lateral development banks to working with small enterprises. Resilience technology supports both practice and learning. Our technical services support fund managers with over $20 billion a year in investments.

MONSOON ACADEMY

The aim of the Academy is to enable individual and group learning on the core concepts, applications and practical toolkit for climate adaptation solutions. The Academy is also our own learning ground as we develop innovative methods and effective solutions, and share those with the Community of Practice.

Learning Profiles

Two learning profiles give a personal, stylized view of what the course does. We use these to shape the course content. It is not expected that you identify with a learning profile in its entirety. These profiles should reflect some aspects of your work. Build your own learning profile—a great way to begin the Academy.

Programme manager

Anna is the head of the Climate Resilience Unit in a line ministry in government. She informs the division head about implication of climate change for the Ministry's strategy and contributes to their development plan. However, her day job is to integrate the work of project managers in the field, learn from what works as innovative, path-breaking actions and then develop the next round of major projects for funding, especially using the various mechanisms in the Green Climate Fund, donor-supported national climate funds and also tapping into the bi-annual budget processes.

Having come through the project-manager career path, and with a good team in her unit, she does not need further training on technical issues such as how to downscale a climate scenario or the mechanics of a good vulnerability index. She admires the people in the Ministry and among her peer group who exercise effective leadership. Some people seem to do this naturally while Anna is conscious that there are many areas where reflective learning of the arts of change-making would be helpful. Knowing what a theory of change is may be helpful while she really wants to be skilled in how to use this technique to build a consensus that moves from a few projects to real 'mainstreaming' in her ministry. A good part of her career progression rests with her personal abilities as a communicator, and her command of the big picture to convince more senior decision and policy makers of the case for supporting climate resilience as a pillar of development.

Project manager

Amjad is the Climate Adaptation Manager for a project based in the semi-arid lands. He spends most of his time in the three field offices, reporting in regularly to his programme manager in headquarters. Amjad had managed a few smaller scale development projects over the past years, mostly related to community development in the drylands. He has enrolled in an MSc in Agricultural Development, but this doesn't cover the professional skills in project management. He studies have given him an introduction to climate and climate change but he has learned more from his on-the-job interactions with experts in the region.

His biggest challenge is to raise awareness of climate change in the communities he is working with, and more so to link climate resilience and community development in win-win efforts. While he is conversant with many of the terms bandied about in meetings—vulnerability, adaptation, disaster risk reduction and so forth—he knows that his knowledge is superficial. He would like to carve out a career as an innovative project manager specialising on climate resilience. To pursue this goal, he wants a solid grounding in the basic principles and tool for developing innovative solutions. He is keeping an eye on options to branch out, perhaps joining one of the growing consultancies in this field, or even starting his own!

Objectives

- Understand the principles underlying the nature and dynamics of vulnerability, risk, readiness and resilience to climatic hazards and climate change.
- Knowledge of commonly used climate adaptation frameworks for the analysis of risks and opportunities.
- Understand different approaches and develop personal skills in robust decision-making, adaptation planning and organizational leadership for climate resilience.

Learning Outcomes

These objectives are linked to specific learning outcomes:

Knowledge and Understanding

- Critically assess the uncertainties associated with different types of climate information.
- Understand how to integrate climate information into planning to make locally appropriate adaptation decisions.
- Understand the utility and limitations of tools to support adaptation decisions, build adaptive capacity and share knowledge and learning.
- Apply a range of methods to develop and choose robust adaptation strategies.
- Apply skills gained to develop adaptation investment plans in the context of multi-stakeholder networks.
- Apply suitable methodologies for evaluating adaptation outcomes.

Disciplinary, Technical and Transferable Skills

- Competence in core skills related to adaptation planning.
- Group learning and facilitation skills to support adaptive management.
- Understanding and skills in project management, team building and client-driven solutions.

COURSE PROGRAMME

	Session	Brief
Monday August 19 19.00 - 21:30	**Welcome reception** *Vikrom Mathur VM/ Ripin Kalra RK/ Suruchi Bhadwal SB/ Tom Downing TD*	Informal ice breaker to welcome participants and course facilitators over dinner hosted by Mr Varun Sahni, Vice Chancellor, Goa University.
Tuesday August 20 09.30 - 10.15	**Opening session** *Urvashi Aneja UA*	Official welcome by Urvashi Aneja, co-founder and Director, Tandem Research. Understanding course objectives and participants' expectations.
10.15 - 11.00	**What are we learning about?** *RK*	Review the design of the course with participants in a sketch of the components of professional leadership on climate resilience and the logic behind the sessions.
11:00 - 11:30	**Coffee Break**	
11.30 - 12.30	**Climate Risks and Uncertainty: Science and Scenarios** *TD*	Staying on top of the science and scenarios of climate change: How do we navigate uncertainty in decision-making?
12.45 - 13.30	**Vocabulary of Resilience: Talk the Walk** *Karen Pilgrim KP*	Becoming familiar with the vocabulary for resilience.
13:30 - 14:30	**Lunch**	
14.45 - 15.30	**Experiences in Resilience** *Zaheb Ahmad ZA*	What resilience work have you done in the past? In what context? What tools have you used? What does resilience mean to you?
15.30 - 18.15	**Patterns of Change: field visit to Colva and Benaulim** *Aaron Lobo AL*	Understanding land use change and vulnerability in two rapidly developing areas: What mechanisms are needed to ensure long-term sustainability?

Wednesday August 21 09:00 - 10:00	**Urban Resilience Frameworks** *VM*	What are the key issues and methods in implementing resilience seen in the context of diverse urban resilience frameworks?
10:15 - 11.45	**Studio 1: Designing and planning resilience** *RK*	Group exercise using a stylized map of a coastal city: How do you design and plan resilience?
11:45 - 12:15	**Coffee Break**	
12:15 - 13:15	**'Speculative futures' to design plans and proposals** *Avinash Kumar AK*	Learning from design thinking to connect ground realities, trends and future forecasts into an actionable project proposal. Develop a tool set for future opportunities.
13:15 - 14:15	**Lunch**	
14:30 - 15:30	**Governance of Resilience** *SB*	Review of the role of actors, institutions and policies to mainstream governance of climate resilience.
15:30 - 16:00	**Coffee Break**	
16.00 - 18.00	**Studio 2: Problem solving and implementing resilience** *VM/ RK/ SB/ TD*	Course facilitators work with groups in problem solving and implementing resilience.
Thursday August 22 07:30 - 12:00	**Field visit: Chorão - Shifting the resilience target from 'khazans' to mangroves and back** *AL*	Experience of ecosystem-based adaptation showcases the knowledge needs for adaptation and the politics of local knowledge in the context of global solutions.
12:00 - 13:00	**Lunch**	
13:00 - 15:00	**Field visit: Smart City Panaji** *ZA*	Imagine Panaji Smart City Development CEO discusses current experience in complex governance of urban areas. Will 'smart cities' be climate resilient?
16:30 - 18.00	**Synthesis session** *TD*	Bringing together what we have learned across the three days: participants join the 'fish bowl' to reflect on their personal and group

		learning.
18:00 - 18:45	**Course evaluation and personal reflection** *Kylee Rankin KR*	Formal evaluation of the course including suggestions for the 2020 Monsoon Academy.
19:30 - 21:30	**Closing Banquet** *VM/ RK/ SB/ TD*	Award of Certificates of Completion and closing dinner.
Friday August 23 9.00 - 13.00	**Individual discussions on mentoring and personal planning** *VM/ RK/ SB/ TD*	Discussion on follow-ups and mentoring arrangements.

SESSION OUTLINES

Climate Risks and Uncertainty: Science and Scenarios

Dr Thomas E. Downing

Objectives

- Introduce what we know about climate change.
- Explore how people make decisions regarding climate risks using a simple role-playing exercise that brings home the nature of climate uncertainty.

Presentation

Presentation with reference to the Atlas of Climate Change to establish the basic facts of global warming and the nature of regional impacts. The presentation includes a visualization of complexity in a coupled system using the two-pendulum example. This sets a context for a discussion about uncertainty in predicting major changes at the regional scale.

Vocabulary of Resilience: Talk the Walk

Karen Pilgrim

Objectives

- Familiarization and review of terminology.
- Become aware of terminological ambiguity and promote appropriate use.
- Look into approaches to address terminological challenges.

Overview

The appropriate use of terms and definitions related to climate change adaptation and urban resilience eases the communication between practitioners and other stakeholders. In this session we will review key terms and standardized definitions, thus, laying the groundwork for its use during the course and beyond. We will encounter terminological ambiguity and nuances, consider practical challenges of terminology, and introduce approaches to address these obstacles.

Please refer to the *Urban Resilience and Climate Change Adaptation Glossary* in this Handbook.

Experiences in Resilience

Zaheb Ahmad

Overview

This session's purpose is to discuss participants' experiences in resilience, resilience-related work they might have done in the past, and to understand their ideas about it.

Objectives

- Appreciate the contextual understanding of resilience.
- Understand tools/ methods for resilience that have been used by the participants.
- Reach a starting point in defining resilience based on commonalities.

Patterns of Change: field visit to Colva and Benaulim

Dr Aaron Savio Lobo

Location

Betalbatim Beach

Overview

Goa's coastline has undergone major changes over the last 30 years, primarily driven by coastal tourism. In 2018, eight million tourists visited the state (the state's resident population is 1.6 million). This has had widespread ecosystem and socio-economic ramifications. Over the years tourism-driven development has led to widespread destruction of the coastal areas, including the destruction of important coastal features which include sand dunes, pollution of freshwater bodies, and the alteration of the ecological functions in these areas. While tourism is a big contributor to the coastal state's economy and has provided the coastal community (primarily fishermen) with a crucial source of livelihood, its uncontrolled nature has led to the dilution of the local communities' social capital, and networks needed to anticipate and react to potential disasters. All this had led to the erosion of the socio-ecological resilience and the communities' ability to cope with potential disasters over time.

Objectives

- Understanding how mass tourism, an important economic activity in Goa has contributed to the long-term erosion of it socio-ecological resilience.

- Understanding how changes in legislation (for e.g. Coastal Regulation Zones notifications) is likely to influence the resilience of the place.
- Discuss the institutions and mechanisms that are needed to ensure long-term sustainability of the region.

Urban Resilience Frameworks

Dr Vikrom Mathur

Overview

There is no single framework or shared understanding of what are Resilient Cities. Plural frameworks do not simply reflect different methodological and disciplinary approaches. Visions of 'resilient cities' bring with them wider visions of society and need to be understood as 'social imaginaries'. This session will help unpack the diverse sets of ideas, institutional 'mind-sets' and practices, political values and power dynamics around different frameworks for resilience. In the context of cities in South Asia, where poor communities live in marginal low-lying areas without access to urban services it is critical to understand the social determinants of their resilience to climate impacts.

Objectives

- Understanding the difference between 'predict and prevent' and resilience approaches for dealing with unanticipated climatic risks.
- Planning for resilience: multiple knowledge perspectives and meaningful engagement of multiple stakeholders.
- Issues in implementing resilience: social and power divides.
- Framework for resilience implementation.

Studio 1: Designing and planning resilience

Ripin Kalra, GCAP

Overview

This session's purpose is to simulate the role of design and spatial planning in building urban resilience. Participants will work on an urban resilience issue in groups of 2-3 making design and planning proposals that will be discussed across the entire group.

Objectives

- Appreciate the role of design and spatial planning in urban resilience.
- Highlight good practice in design and planning for urban resilience.
- Elaborate that design offers several routes to address urban resilience issues.

‘Speculative futures’ to design plans and proposals

Avinash Kumar, Quicksand

Overview

Speculative Design enables us to explore emerging trends and best practices driving current systems and apply them onto the lives of fictional stakeholders: communities, families, citizens, one journey at a time, and see how those take form in future times of crisis, mapping their needs, expectations, and systems of resilience.

Objectives

- Introduction to Speculative Design and methodology to practice it.
- Understanding how to plan long term.
- Understanding the importance of narratives in exploring the future.
- Understanding participants’ beliefs and preferences.
- Understanding the importance of a co-creative hands on approach to futuring.
- Understanding how to extrapolate current trends.

Applications of Speculative Design

For **public engagement**
Immersing audiences, either physically or virtually, into imagines worlds enable them to experience ideas that may manifest

For **foresight, and planning**
Teams deeply engaged in a particular context often benefit from a change in perspective — a broader context timeline; to understand barriers and strategize in a more informed manner

For **innovation**
Innovation is crucial for restructuring thought, technology, and solution delivery models. Speculative design makes the user aware of what exists, and provides them with resources to adapt and innovate.

Putting oneself in the shoes of varied organisations, or people with different skill-sets, can help see the speculated world and the crisis at hand through a different perspective than their own. This leads to new insights, opportunities for collaboration, and creative pathways to a solution.

Future insights inform current practices

It must be reiterated that the goal of speculation is not just to imagine future systems and crises, but to engage in a discussion of current practices, crises, and deadlocks, and how they may evolve in the times to come. A good way to do this is by co-creating these futures with varied stakeholders, ranging from those on-ground and those planning projects, to ensure effective conversation and a precise understanding of different realities. The session will require the participants to get out of their comfort zones, think outside the box and think years ahead.

Governance of Resilience

Dr Suruchi Bhadwal, The Energy and Resources Institute (TERI)

Overview

Resilience in its broadest connotation is being understood here as a way of response to shocks and stresses. It is about how societies have emerged and coped over the years to disturbance and kind of perturbations. A dynamic concept, Resilience implementation is defined by the type of institutional structures and processes that exist in a system, normally is part of the existing governance mechanism in place. Resilience building in complex and dynamic socioecological systems presents challenges across multi -governance systems (both horizontally and vertically). Before analysing current governance approaches, this session introduces participants to the crux of the matter – understanding governance as the structure emerging from interactions between multiple-actors, through which societies share power and shape individual and collective actions. The session delves into the concepts and considers how knowledge and information on the concept of resilience is applied to the theory and practice of governance. Through analysing current governance approaches, participants are expected to develop an appreciation of shortcomings underpinning institutional deadlocks as well as identifying best practices of analysing and managing risk. The session then explores new forms of approaches based on principles of good governance that may allow for strengthening of governance systems in adaptive policymaking/ resilience building in a world of uncertainty. Various tools that help design this process will be discussed – come examples include decentralisation; multi-stakeholder interactions; participatory and community-based approaches – that enable better

management of uncertain shocks and risks through cross-scale institutional linkages. Some examples from policy and practice will be shared.

Objectives

- Basic understanding of governance as applied to climate change resilience.
- Understanding why governance of resilience matters.
- Identifying current approaches leading to institutional inertia/ deadlocks and path dependency.
- Understanding the attributes of “good” governance for climate resilience.
- Exploring new and flexible forms of governance that enable the management of complex and uncertain shocks and stresses.
- Understanding the role and influence of formal and informal political institutions on resilience interventions.

Chorão field visit: Shifting the resilience target - from ‘khazans’ to mangroves and back

Dr Aaron Savio Lobo

Location

Dr Salim Ali Bird Sanctuary, Chorão

Overview

The Dr Salim Ali Bird Sanctuary was declared a wildlife sanctuary and effectively a NO-TAKE area in 1998. However, this pristine mangrove forest that makes up this sanctuary was privately owned rice fields around 50 years ago. Neglect of the fields led to the degradation of the embankments that protected them from the saline water of the Mandovi river. Persistent salt water inundation led to the halophilic mangrove vegetation taking root in the soft sediments. Their growth was further aided by the conservation efforts of the Goa Forest Department. Aquatic life was quick to colonize the area, turning it into the thriving mangrove ecosystem it currently is.

While the sanctuary may be looked upon as a conservation success story, what has this meant for local communities? This small sanctuary is but a metaphor for larger changes within the state and understanding how this affects the systems resilience

Objectives

- Understand the age-old integrated agri-aqua system of farming called the Khazan system and its role in contributing to local resilience.
- Understand how communities in Goa modified their habitats to build their resilience.
- Understand how the changing legislative narrative post-liberation from the colonial powers resulted in a change in the land use practices resulting in the decline in this age-old system.
- Understanding on the importance of considering feedback loops at multiple scales and between social and ecological systems.

Studio 2: Problem solving and implementing resilience

Overview

The aim of the module is for participants to work one to one or in pairs with session facilitators and discuss specific issues on applying resilience within their own unique practice or institution.

Participants will think of a specific situation or resilience project and describe it to the facilitators and get their feedback to steer on any barriers they are facing in making progress, whether technical or institutional.

The plenary at the end of studio will allow participants to appreciate a range of situations that come up in projects and potential approaches to address them.

FACILITATORS & TUTORS

Dr Thomas E. Downing, *CEO, GCAP; Dean, Monsoon Academy*

Tom received a PhD in Geography from Clark University, USA. Previously he has held a number of influential positions, including Advisor to UNEP and the Munich Re Foundation Chair for Social Vulnerability. In 30 years of experience working in the field of adaptation and vulnerability he has led numerous projects, including EC assessments on the economics of climate change (ClimateCost), adaptive management in water (NeWater), responses to climatic hazards (SIRCH) and crop-climate impacts (CLAIRE and others). He is an internationally recognised leader in adaptation and has published over 100 papers, books, and reports, including the Atlas of Climate Change.

Dr Vikrom Mathur, *co-founder & Director, Tandem Research*

Vikrom is an anthropologist of science and technology. His diverse research interests include the governance of emerging technologies, social and cultural dimensions of technological transitions, political and social contingencies on the production of scientific knowledge about nature, cultural perceptions of environmental risk, dynamics between science and policy, and Cultural Theory. He has a PhD from the Institute of Science, Society, and Innovation at the University of Oxford. Vikrom is a Senior Fellow of the Observer Research Foundation, Associate Fellow of the Stockholm Environment Institute and Senior Associate of Global Climate Adaptation Partnership (GCAP).

Dr Suruchi Bhadwal, *Senior Fellow, The Energy and Resources Institute (TERI)*

Suruchi Bhadwal is a Senior Fellow, Earth Science and Climate Change at TERI. Some of the key projects she has worked on include a study on vulnerability to climate change in the Indian agricultural sector in the context of economic globalisation (supported by CIDA and the Government of Norway), contributions to India's first and second national communications submitted to the UNFCCC, and World Bank- supported study on vulnerability to climate variability and change through an assessment of issues and options for adaptation. Suruchi is also listed as a UNDP regional roster of expert on vulnerability and adaptation. At COP events she has been actively involved, as an observer, organiser and contributor.

Ripin Kalra, *Arup, UK*

Ripin is an Associate Director with Arup (London) and leads the sustainable and resilient infrastructure portfolio of work. He has been working on mainstreaming Low Carbon Development, Sustainability and Resilience within built-environment investment for over 20 years. He has first-hand experience in 25+ countries across Latin America & Caribbean, South Asia, Sub-Saharan Africa/ Indian Ocean Islands and East Asia/ Pacific regions working across several sectors. He is a Trustee of the Commonwealth Human Ecology Council (CHEC), Commonwealth Housing Trust (CHT) and on the Board of Editors for 'Open House International'. He also teaches Urban Risk and Resilience to post-graduate students at University of Westminster.

Dr Urvashi Aneja, *co-founder & Director, Tandem Research*

Urvashi works on the governance and sociology of emerging technologies; southern partnerships for humanitarian and development assistance; and the power and politics of global civil society. Urvashi is also an Associate Fellow at Chatham House and a columnist for the Indian Express. She has a PhD in International Relations from the University of Oxford.

Dr Aaron Savio Lobo, *Conservation Practitioner*

Aaron Savio Lobo is a conservation practitioner and has a long-standing interest in finding appropriate ways to reconcile conservation and economic development. He has a PhD from the University of Cambridge and has extensive experience in designing, supporting and managing projects in South Asia and West Africa. These include setting up fisheries monitoring programmes, Marine Protected Area management and addressing issues pertaining to seafood sustainability.

Avinash Kumar, *co-founder, Quicksand*

Avinash is a design strategist, researcher and artist, and one of the co-founders of Quicksand. With a natural inclination to build entrepreneurial projects in the arts and design, Avinash has been tinkering with design processes and collectives for over 15 years. He presently anchors Quicksand GamesLab, and is also the co-founder of acclaimed electronic arts collective BLOT!

Zaheb Ahmad, *Research Fellow, Tandem Research*

Zaheb is a Research Fellow at Tandem Research where he leads the Sustainability Transitions programme. His work focuses on governance and social dimensions of transitions in the environmental sector. His master's thesis explores the Indian environmental regime in response to global environmental frameworks, and evaluates the effects and impacts of the Clean Development Mechanism on communities and the ecology in India. Zaheb holds a Master of Laws with specialisation in Environmental Law from the University of California, Berkeley, School of Law, and a Bachelor of Laws from Government Law College, University of Mumbai.

Karen Pilgrim, *Adaptation Specialist, GCAP*

Karen Pilgrim is an Adaptation Specialist, currently working on climate information services, client-specific adaptation frameworks and GCAP's Adaptation Academy. She has a special interest in Ecosystem-based Adaptation, as well as climate resilience and adaptive capacity development. For her Master thesis, she developed a narrative-based appraisal framework to support learning in Ecosystem-based Adaptation efforts. Karen completed her BA in Governmental Studies at University of Erfurt, Germany, and holds a MSc degree in Disaster Risk Management and Climate Change Adaptation from Lund University, Sweden. Her previous professional experiences span international development and foreign affairs in Germany and abroad.

Kylee Rankin, *Operations and Events Director, GCAP*

As Operations and Events Director, Kylee plays a key role in GCAP's events planning, including the organisation of the Oxford Adaptation Academy and related courses, in addition to maintaining the day to day operations of the business. She has a background in events management, sales and business administration.

URBAN RESILIENCE AND CLIMATE CHANGE ADAPTATION GLOSSARY

Term	Definition	Source
Adaptation	In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.	IPCC, 2018
Adaptation limits	The point at which an actor's objectives (or system needs) cannot be secured from intolerable risks through adaptive actions. • Hard adaptation limit: No adaptive actions are possible to avoid intolerable risks. • Soft adaptation limit: Options are currently not available to avoid intolerable risks through adaptive action.	IPCC, 2018
Adaptation options	The array of strategies and measures that are available and appropriate for addressing adaptation. They include a wide range of actions that can be categorized as structural, institutional, ecological or behavioural.	IPCC, 2018
Adaptive capacity	The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.	IPCC, 2018
City proper; city	A type of urban settlement defined according to legal/political boundaries and an administratively recognized urban status that is usually characterized by some form of local government.	UNDESA Glossary
Climate	Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature,	IPCC, 2018

	precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.	
Climate Change	Term frequently used in reference to global warming due to greenhouse gas emissions from human activities.	UNDATA Glossary
Climate-resilient pathways	Iterative processes for managing change within complex systems in order to reduce disruptions and enhance opportunities associated with climate change.	IPCC, 2018
Climate services	Climate services refers to information and products that enhance users' knowledge and understanding about the impacts of climate change and/or climate variability so as to aid decision-making of individuals and organizations and enable preparedness and early climate change action.	IPCC, 2018
Climate variability	Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).	IPCC, 2018
Co-benefits; ancillary benefits	The positive effects that a policy or measure aimed at one objective might have on other objectives, thereby increasing the total benefits for society or the environment. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices, among other factors. Co-benefits are also referred to as ancillary benefits.	IPCC, 2018
Downscaling	Downscaling is a method that derives local- to regional-scale (up to 100 km) information from larger-scale models or data analyses.	IPCC, 2018
Disaster	Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.	IPCC, 2018

Disaster risk management (DRM)	Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development.	IPCC, 2018
Early warning system (EWS)	The set of technical, financial and institutional capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss.	IPCC, 2018
Ecosystem services	Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food or fibre, (3) regulating services such as climate regulation or carbon sequestration, and (4) cultural services such as tourism or spiritual and aesthetic appreciation.	IPCC, 2018
Enabling conditions	Conditions that affect the feasibility of adaptation and mitigation options and can accelerate and scale-up systemic transitions that would limit temperature increase to 1.5°C and enhance capacities of systems and societies to adapt to the associated climate change, while achieving sustainable development, eradicating poverty and reducing inequalities. Enabling conditions include finance, technological innovation, strengthening policy instruments, institutional capacity, multilevel governance, and changes in human behaviour and lifestyles. They also include inclusive processes, attention to power asymmetries and unequal opportunities for development and reconsideration of values.	IPCC, 2018
Equity	Equity is the principle of fairness in burden sharing and is a basis for understanding how the impacts and responses to climate change, including costs and benefits, are distributed	IPCC, 2018

	in and by society in more or less equal ways. It is often aligned with ideas of equality, fairness and justice and applied with respect to equity in the responsibility for, and distribution of, climate impacts and policies across society, generations, and gender, and in the sense of who participates and controls the processes of decision-making.	
Global warming	The estimated increase in global mean surface temperature (GMST) averaged over a 30-year period, or the 30-year period centered on a particular year or decade, expressed relative to pre-industrial levels unless otherwise specified. For 30-year periods that span past and future years, the current multi-decadal warming trend is assumed to continue.	IPCC, 2018
Governance	A comprehensive and inclusive concept of the full range of means for deciding, managing, implementing and monitoring policies and measures. Whereas government is defined strictly in terms of the nation-state, the more inclusive concept of governance recognizes the contributions of various levels of government (global, international, regional, sub-national and local) and the contributing roles of the private sector, of nongovernmental actors, and of civil society to addressing the many types of issues facing the global community.	IPCC, 2018
Greenhouse gas (GHG)	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself and by clouds. This property causes the greenhouse effect. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary GHGs in the Earth's atmosphere. Moreover, there are a number of entirely human-made GHGs in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Beside CO_2, N_2O and CH_4, the Kyoto Protocol deals with the GHGs sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).	IPCC, 2018

Green Infrastructure	The interconnected set of natural and constructed ecological systems, green spaces and other landscape features. It includes planted and indigenous trees, wetlands, parks, green open spaces and original grassland and woodlands, as well as possible building and street-level design interventions that incorporate vegetation. Green infrastructure provides services and functions in the same way as conventional infrastructure.	IPCC, 2018
Hazard	The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.	IPCC, 2018
Heat Island	Phenomenon arising from a difference in mean annual temperature of 1 degree centigrade or more between a city and its hinterland.	UNDATA Glossary
Impacts (consequences, outcomes)	The consequences of realized risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather and climate events), exposure, and vulnerability. Impacts generally refer to effects on lives; livelihoods; health and well-being; ecosystems and species; economic, social and cultural assets; services (including ecosystem services); and infrastructure. Impacts may be referred to as consequences or outcomes, and can be adverse or beneficial.	IPCC, 2018
Incremental adaptation	Adaptation that maintains the essence and integrity of a system or process at a given scale. In some cases, incremental adaptation can accrue to result in transformational adaptation.	IPCC, 2018
Institution	Institutions are rules and norms held in common by social actors that guide, constrain and shape human interaction. Institutions can be formal, such as laws and policies, or informal, such as norms and conventions. Organizations – such as parliaments, regulatory agencies, private firms and community bodies – develop and act in response to institutional frameworks and the incentives they frame. Institutions can guide, constrain and shape human	IPCC, 2018

	interaction through direct control, through incentives, and through processes of socialization.	
Land use	Land use refers to the total of arrangements, activities and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction, conservation and city dwelling). In national greenhouse gas inventories, land use is classified according to the IPCC land use categories of forest land, cropland, grassland, wetland, settlements, other.	IPCC, 2018
Likelihood	The chance of a specific outcome occurring, where this might be estimated probabilistically.	IPCC, 2018
Lock-in	A situation in which the future development of a system, including infrastructure, technologies, investments, institutions, and behavioural norms, is determined or constrained ('locked in') by historic developments.	IPCC, 2018
Maladaptation; maladaptive actions	Actions that may lead to increased risk of adverse climate-related outcomes, including via increased GHG emissions, increased vulnerability to climate change, or diminished welfare, now or in the future. Maladaptation is usually an unintended consequence.	IPCC, 2018
Megacity	An urban agglomeration with a population of 10 million or more.	UNDESA, 2019
Metacity; hypercity	A megacity of more than 20 million people.	UNDESA, 2019
Metropolitan area	A type of urban settlement defined by both the contiguous territory inhabited at urban levels of residential density and additional surrounding areas of lower settlement density that are also under the direct influence of the city (e.g., through frequent transport, road linkages, commuting facilities etc.).	UNDESA Glossary
Nationally Determined Contributions (NDCs)	A term used under the United Nations Framework Convention on Climate Change (UNFCCC) whereby a country that has joined the Paris Agreement outlines its plans for reducing its emissions. Some countries' NDCs also	IPCC, 2018

	address how they will adapt to climate change impacts, and what support they need from, or will provide to, other countries to adopt low-carbon pathways and to build climate resilience. According to Article 4 paragraph 2 of the Paris Agreement, each Party shall prepare, communicate and maintain successive NDCs that it intends to achieve.	
Peri-urban areas	Peri-urban areas are those parts of a city that appear to be quite rural but are in reality strongly linked functionally to the city in its daily activities.	IPCC, 2018
Resilience	The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure while also maintaining the capacity for adaptation, learning and transformation.	IPCC, 2018
Risk	The potential for adverse consequences where something of value is at stake and where the occurrence and degree of an outcome is uncertain. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard, or of adaptation or mitigation responses to such a hazard, on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. Risk results from the interaction of vulnerability (of the affected system), its exposure over time (to the hazard), as well as the (climate-related) hazard and the likelihood of its occurrence.	IPCC, 2018
Risk assessment	The qualitative and/or quantitative scientific estimation of risks.	IPCC, 2018
Risk management	Plans, actions, strategies or policies to reduce the likelihood and/or consequences of risks or to respond to consequences.	IPCC, 2018
Risk perception	The subjective judgment that people make about the characteristics and severity of a risk.	IPCC, 2018

Smart City	*No UN definition or scholarly agreed upon definition available.* Example by Dameri (2012): "A Smart City is a well-defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development".	Allam & Newman, 2018
Social cost of carbon (SCC)	The net present value of aggregate climate damages (with overall harmful damages expressed as a number with positive sign) from one more tonne of carbon in the form of carbon dioxide (CO2), conditional on a global emissions trajectory over time.	IPCC, 2018
Social costs	The full costs of an action in terms of social welfare losses, including external costs associated with the impacts of this action on the environment, the economy (GDP, employment) and on the society as a whole.	IPCC, 2018
Socio-ecological systems	An integrated system that includes human societies and ecosystems, in which humans are part of nature. The functions of such a system arise from the interactions and interdependence of the social and ecological subsystems. The system's structure is characterized by reciprocal feedbacks, emphasising that humans must be seen as a part of, not apart from, nature.	IPCC, 2018
Transformational adaptation	Adaptation that changes the fundamental attributes of a socio- ecological system in anticipation of climate change and its impacts.	IPCC, 2018
Uncertainty	A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from imprecision in the data to ambiguously defined concepts or terminology, incomplete understanding of critical processes, or uncertain projections of human behaviour. Uncertainty can therefore be represented by quantitative measures (e.g.,	IPCC, 2018

	a probability density function) or by qualitative statements (e.g., reflecting the judgment of a team of experts).	
Urban agglomeration; urban area	A type of urban settlement defined by the de facto population contained within the contours of a contiguous territory inhabited at urban density levels without regard to administrative boundaries. It usually incorporates the population in a city or town plus that in the suburban areas lying outside of but being adjacent to the city boundaries.	UNDESA Glossary
Urbanization	Increase in the proportion of a population living in urban areas; and the process by which a large number of people becomes permanently concentrated in relatively small areas, forming cities.	UNDATA Glossary
Urban Sprawl	Expansion of an urban area to accommodate its growing population.	UNDATA Glossary
Urban Run-off	Storm water from city streets and adjacent domestic or commercial properties that contains litter, and organic and bacterial wastes.	UNDATA Glossary
Vulnerability	Measure of the extent to which a community, structure, service or geographical area is likely to be damaged or disrupted, on account of its nature or location, by the impact of a particular disaster hazard.	UNDATA Glossary
Vulnerability Analysis	Process of estimating the vulnerability to potential disaster hazards of specified elements at risk.	UNDATA Glossary

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