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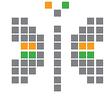


Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany



Ministry of Housing and Urban Affairs
Government of India



Smart City
MISSION TRANSFORM-NATION



Training on Urban Green Planning in Climate Smart Cities

Training Manual

Supported by

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

lifu
Deutsches Institut
für Urbanistik

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Climate Centre for Cities

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List of Abbreviations

ADB	Asian Development Bank	LST	Land surface temperature
AMC	Ahmedabad Municipal Corporation	MOEFCC	Ministry of Environment, Forest & Climate change
AMRUT	Atal Mission for Rejuvenation and Urban Transformation	MoHUA	Ministry of Housing and Urban Affairs
BMC	Biodiversity Management Committees	NBSAP	National Biodiversity Strategy & Action Plan
BMI	German Federal Ministry of Interiors Building and Community	NBA	National Biodiversity Authority
BMU	German Federal Ministry of Environment, Nature Conservation and Nuclear Safety	NCAP	National Clean Air Plan
BMZ	German Federal Ministry for Economic Cooperation and Development	NDC	Nationally Determined Contributions
CBD	Convention of Biological Diversity	NGO	Non Government Organisation
CIM	Centre for International Migration and Development	NHB	National Housing Bank
CSC project	Climate Smart Cities Project	NIUA	National Institute of Urban Affairs
CSCAF	ClimateSmart Cities Assessment Framework	NPCA	National Plan for Conservation of Aquatic Ecosystems
CO₂	Carbondioxide	NRSC	National Remote Sensing Center
Difu	German Institute of Urban Affairs	O&M	Operation and Maintenance
DPR	Detailed Project Report	OECD	Organisation for Economic Cooperation and Development
GIS	Geographic Information System	PBR	People's Biodiversity Register
GIZ	Deutsche Gesellschaft für internationale Zusammenarbeit GmbH	PPP	Public-private Partnership
EUR	Euro, currency of the European Union	RWA	Residents Welfare Association
GDP	Gross Domestic Product	SBB	State Biodiversity Boards
GHG	Green House Gas	SDG	Sustainable Development Goals
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH	SK:KK	Service and Competence Center: Local Climate Action
HUDCO	Housing and Urban Development Corporation Limited	SOUL	Saving Open Space and Urban Lakes and Cultural rejuvenation of Twin City of Hubli-Dharwad, Karnataka
IDFC	International Development Finance Club	SRFDCL	Sabarmati River Front Development Corporation Limited
IKI	German International Climate Initiative	TSGs	Technical Support Groups
IL&FS	Infrastructure Leasing and Financial Services Limited	TU Berlin	Technical University of Berlin
IT	Information Technology	UGP	Urban Green Planning
KUIDFC	Karnataka Urban Infrastructure Development Finance Corporation	ULB	Urban Local Body
LBSAP	Local Biodiversity Strategy & Action Plan	UN	United Nations
		URDPFI	Urban and Regional Development Plan Formulation and Implementation guidelines
		USD	US Dollar, currency of the United States of America
		VCF	Values Capture Financing
		W-Lan	Wireless Local Area Network
		WHO	World Health Organisation
		WWF	World Wildlife Fund
		ZAK	Zoo Authority of Karnataka

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Introduction

Objective

The intent of this training manual on Urban Green Planning (UGP) is to inform about the relevance of urban green for general urban development, specifically with regards to the challenges of climate change. Training participants will be enabled to analyse the current situation of urban green in their respective cities, devise an integrated plan to improve the condition of urban greens, and take first steps to implement such plans.

Furthermore, the training will familiarise participants with the ClimateSmart Cities Assessment Framework (CSCAF) developed by the National Institute of Urban Affairs (NIUA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) along with the Ministry of Housing and Urban Affairs (MoHUA), Government of India, and lay out the benefits of applying this framework to improve livelihoods and living conditions in Indian cities. Specifically, this training manual focusses on three indicators within this framework, 1) the proportion of green cover, 2) rejuvenation of waterbodies and open spaces, and 3) urban biodiversity.

Content of the Manual

The manual is designed for the training of operative staff in the field of UGP as well as decision makers at Urban Local Body (ULB) level. The methodology of the training sessions focuses on practice-oriented and interactive learning. They help to reflect the content and, whenever possible, deepen the learnings. After the training, participants will be able to independently perform some of the analyses required for the CSCAF and have all required information to tender out more detailed assessments where necessary.

The sessions are divided into sections. Each section starts with a general description and background information, exercises follow that reflect the content to increase the participants' knowledge and experience. Instructions on how to move from planning to implementation are described subsequently.

About Climate Smart Cities Project

The training on UGP is facilitated within the framework of the Climate Smart Cities (CSC) project (2018-2022). The CSC project is funded under the German International Climate Initiative (IKI), by the German Ministry of Environment, Nature Conservation and Nuclear Safety (BMU) in cooperation with the German Ministry of Interiors Building and Community (BMI) and coordinated by GIZ jointly with MoHUA, Government of India. Implementing project partners are the German Institute of Urban Affairs (Difu), NIUA and the Technical University of Berlin (TU Berlin). The CSC project attempts to anchor climate-friendly solutions within the Smart Cities Mission.

The project contributes to the achievement of the Nationally Determined Contributions (NDCs) to the Climate Goals as well as the Sustainable Development Goals (SDG). It acts as a facilitator in promoting cooperation between national and subnational actors by technically supporting international advisory and exchange formats and by supporting the implementation of measures.

The project works with three Indian Smart Cities of Bhubaneswar, Coimbatore, Kochi and their respective state governments of Odisha, Tamil Nadu and Kerala, in the planning and implementation of smart and climate-friendly measures for infrastructure and area-based development, as well as the measuring and monitoring of their Green House Gas (GHG) emissions.

Partners

GIZ – As a service provider in the field of international cooperation for sustainable development and international education work, GIZ is dedicated to shaping a future worth living around the world. We have experience in a wide variety of areas, including economic development and employment promotion, energy and the environment, and peace and security. The diverse expertise of our federal enterprise is in demand around the globe – from the German Government, European Union institutions, the United Nations, the private sector, and governments of other countries. We work with businesses, civil society actors and research institutions, fostering successful interaction between development policy and other policy fields and areas of activity. Our main commissioning party is the German Federal Ministry for Economic Cooperation and Development (BMZ).

The commissioning parties and cooperation partners all place their trust in GIZ, and we work with them to generate ideas for political, social and economic change, to develop these into concrete plans and to implement them. Since we are a public-benefit federal enterprise, German and European values are central to our work. Together with our partners in national governments worldwide and cooperation partners from the worlds of business, research and civil society, we work flexibly to deliver effective solutions that offer people better prospects and sustainably improve their living conditions.

The registered offices of GIZ are in Bonn and Eschborn. In 2019, we generated a business volume of around EUR 3.1 billion. Our 22,199 employees, almost 70 per cent of whom are national staff, work in around 120 countries. As a recognised development service provider, we currently have 556 development workers in action in partner countries. Furthermore, in 2019, the Centre for International Migration and Development (CIM), which is run jointly by GIZ and the German Federal Employment Agency, placed 262 integrated experts and 515 returning experts with local employers in our partner countries, or provided them with financial support, advice or other services.

GIZ in India – For over 60 years, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has been working jointly with partners in India for sustainable economic, ecological, and social development.

India is fast emerging as an economic and industrial power. Despite the country's rapidly growing economy, poverty and other socio-economic issues remain a challenge. The burgeoning population and accelerated urbanisation in the country have resulted in an environment at risk and greenhouse gas emissions that continue to spiral upwards.

The thematic areas of GIZ in India are:

- Energy;
- Environment, Climate Change and Biodiversity;
- Sustainable Urban and Industrial Development;
- Sustainable Economic Development.

The Government of India has launched numerous important initiatives to address the country's economic, environmental and social challenges, and GIZ is contributing to some of the most significant ones. For example, it supports key initiatives such as Smart Cities, Clean India and Skill India. GIZ, in close cooperation with Indian partners, devises tailor-made, jointly-developed solutions to meet local needs and achieve sustainable and inclusive development.

NIUA – The National Institute of Urban Affairs is one of the implementing partners of the CSC Project. It is India's leading national think tank on urban planning and development. As a hub for the generation and dissemination of cutting-edge research in the urban sector, NIUA seeks to provide innovative solutions to address the challenges of a fast urbanising India and pave the way for more inclusive and sustainable cities of the future.

NIUA was appointed as an apex body to support and guide the Government of India in its urban development plans in 1976. Since then, it has worked closely with the MoHUA, alongside other government and civil sectors, to identify key areas of research, and address the lacunae in urban policy and planning. With a team spanning planners, engineers, researchers, architects and analysts, the Institute provides cross disciplinary expertise and technical assistance for city and state-level projects, as well as developing toolkits and customised training programmes to strengthen the capacity of local and regional, and governing agencies. In its aims of enriching and expanding urban knowledge bases within the country, its work today addresses 5 major thematic concerns:

- Urbanization & Economic Growth
- Urban Governance & Finance
- Urban Infrastructure & Built Environment
- Environment, Climate Change & Resilience
- Social Development

The skills, resources and deep-rooted knowledge NIUA has accumulated in the urban sector also make it the first port of call for international donors and institutions seeking to develop meaningful partnerships in the country. Whilst helping bolster India's urban narrative at the global level, NIUA is also committed to aligning its efforts in accord with the UN SDGs, ensuring that global targets are achieved through locally adapted and integrated urban frameworks.

Difu – The German Institute of Urban Affairs is the largest urban research institute in Germany and is a central research, advanced training and information institution for cities, municipalities, administrative districts, municipal associations and planning departments. Founded in 1973, the institute is an independent, non-profit limited liability company and is based in Berlin and Cologne. Difu's main task is it to help cities deal with their complex day-to-day tasks, while identifying long-term prospects and developing urban action programs. The non-profit institute is supported by more than 100 cities, municipal authorities and planning bodies in Germany.

The institute is subdivided into four research and practice-oriented work areas. The research areas "Urban Development, Law and Social Affairs", "Infrastructure and Finance", "Mobility" and "Environment" prepare empirically substantiated research reports, studies, work aids and other materials and conduct experimental projects in cooperation with cities and municipalities.

This work is shaped by

- constant dialogue with the municipal practice,
- the objective of aligning empirical studies with transferable conclusions that may be useful to other cities,
- the implementation of research projects and other activities in various forms of cooperation with cities (for example, in case studies, joint research projects, surveys or in project-accompanying working groups), the German Association of Cities (DST) as well as federal and state ministries.

Other work areas at Difu are responsible for training and knowledge transfer. As a research institute focussing on municipal and urban affairs, Difu contributes to the continuous provision of information to cities and communities in Germany. For meanwhile more than 10 years, Difu operates the "Service and Competence Center: Local Climate Action (SK:KK)", and publishes the well-known practitioners' guide "Climate Mitigation in Communities".

Since 5 years the issue of Smart Cities has become an important focal point of Difu's research activities. Studying the activities of the 200 biggest German cities is the basis for projects on conceptual approaches and the impact assessment of concrete measures within a network of partners from municipalities, ministries, the telecommunication sector and consultants. In this capacity, Difu has also been involved in the development of the German Smart City Charta.

ClimateSmart Cities Assessment Framework

MoHUA launched the CSCAF under the Smart Cities Mission in February 2019 jointly with GIZ and NIUA. The CSCAF serves as a tool for cities to assess their present situation and provides a roadmap for cities to adopt and implement relevant climate actions. It is the first city assessment framework on climate relevant parameters in India.

The ClimateSmart Cities Assessment Framework 2.0 aims to capture the progress made by cities since the Phase-1. The framework has been revised considering the feedbacks provided by the cities and sector experts and learning from the first phase of assessment. The Assessment Framework 2.0 is based on an integrated scoring system which could help evaluate cities across various sectors and intend to rank them in order of their performance.

The CSCAF 2.0 is broadly categorised into 5 sectors with 28 indicators (see figure 1). Each of these indicators has a maximum of 5 levels representing different stage of development each with a corresponding weightage:

1. Energy and Green Buildings,
2. Urban Planning, Green Cover and Biodiversity,
3. Mobility and Air Quality,
4. Water Management, and
5. Waste Management.

The framework provides assessment of both, mitigation and adaptation measures. The indicators are progressive in nature to support cities in assessing where they stand and encourage them to adopt appropriate actions enabling them to improve their score in the future and consequently build climate resilience.

In terms of mitigation, sectors such as transportation, waste, energy consumption and green cover are most important while for adaptation, sectors such as water, biodiversity, urban planning and land-use play an important role.

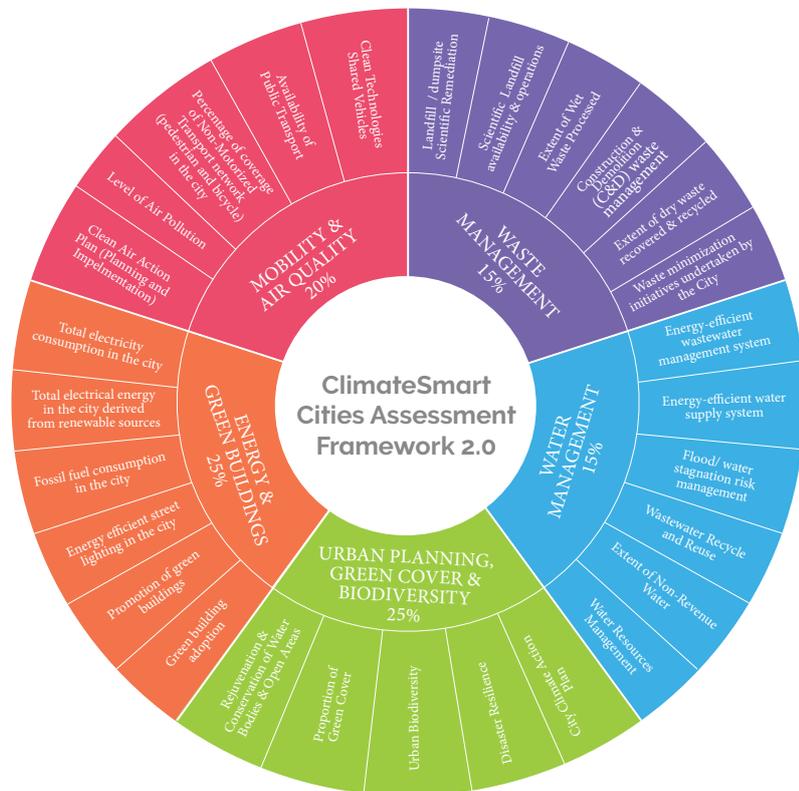


Figure 1: Indicators of the ClimateSmart Cities Assessment Framework 2.0; NIUA

Online Hosting¹

Technical requirements

Device – The first and foremost requirement for an online training is a terminal device connected to the internet. For compatibility reasons and ease of performing the exercises in this training, using a desktop PC or Laptop is advised.

Administration rights – The training is conducted through an online conferencing software tool. While most of such tools allow direct access via an internet browser (e.g. Microsoft Edge, Google Chrome), some require the installation of browser plug-ins or local installation of a software application. Administration rights or the IT department for support might be required to perform such installations. This is also the case for the exercise in chapter 3 which requires the Google Chrome browser and an installation of Google Earth Engine.

Headset – Most devices have an in-built microphone and speakers. However, external headsets with microphones greatly increase the sound quality and suppress surround sounds. Using a headset is optional but highly recommended.

Camera – A Webcam is nice to have for the trainers and other participants to see who else is attending the workshop and create a sense of community. However, it is no problem if no camera is available.

Offline material – It is possible to follow the training using only digital tools. Nonetheless, it is highly recommended to use pen and paper alongside a computer to take quick notes, especially if several colleagues follow the training on one device.

Technical constraints

Bandwidth – Video streaming puts a heavy strain on internet bandwidth. To ensure smooth connection, it is advisable to use cable (Ethernet) instead of wireless (W-Lan) to connect with the internet if possible. Participants are asked to turn off their cameras during the training to save bandwidth. Exceptions to this rule apply during work in small groups (so called break-out sessions) and at the beginning and end of the sessions.

Connectivity – The connection can sometimes become weak and shaky. Usually, this is a momentary condition that stabilizes after a while. If continued interruptions occur in sound or image over a longer period, please notify the moderators through the chat function in the online conferencing tool. If such problems make it impossible to follow the training altogether, the organisers should be notified before leaving the virtual room.

Lack of resources – In case the technical setup does not support the required software to run the exercises, it is still possible to follow the training and gain an understanding of the technologies and tools presented. Also, all presentations and training manuals will be provided to learn all aspects of this training individually.

Interaction during the workshop

Focus – Attending an online training can be more strenuous on concentration than any in person workshop. Nonetheless, participants are requested to stay focussed and avoid performing other tasks during a session, such as reading emails or taking calls. An adequate number of breaks between sessions are provided.

¹ Due to the Covid 19 situation, the training was delivered as online Webinar. An online format provides the advantage of time effectiveness, flexibility, and removes the need to travel. While all presentations and exercises can also be delivered offline, the online setting brings about some specific requirements.

Interaction with other participants – The chat function included in most online conferencing tools allows for public and personal chats. The chat function must only be used as indicated by the organisers. There will be specific times to comment and ask questions. This is to ensure the focus of all participants on the presentation, as topical discussions in the chat can distract participants. If a conversation with a specific participant during an exercise or presentation is required, the 'personal chat' function can be used.

Reducing noise – To reduce environmental noise and sound disturbances, it is requested to keep microphones turned off unless asked otherwise (so called 'mute' function). There will be specific times when microphones can be turned on to ask questions and express opinion and feedback directly.

Section 1:

Introduction

Key content:

- Need and purpose of the training
- Introduction of the concepts to integrated Urban Green Planning
- Urban Green Planning in the CSCAF

Learning goals:

- Learn about the topic and its various dimensions
- Understand Urban Green Planning in the context of India and the CSCAF

Purpose of the training on Urban Green Planning in Climate Smart Cities

The federal government of India launched the Smart Cities Mission in 2015 to ensure sustainable and inclusive development through, among other aspects, a clean and sustainable environment and the application of 'Smart' Solutions. While the smart city concept is often exclusively associated with applying technology, smart does not necessarily imply only digital approaches but an efficient use of available resources. UGP can unlock such locally available resources and provide cost-efficient benefits and core services of urban live. By utilizing urban nature, it can increase a city's resilience to climate change and improve the livelihood of urban citizens. While technology certainly plays a large part in improving the quality of UGP, to be 'smart' about it does not only rely on technology, but also on basic principles on how to approach the planning process and ensure successful implementation. To this end, NIUA has developed an assessment framework to identify the status quo, opportunities and challenges that can be addressed through UGP.

Not only does urban green play a crucial to mitigate the impacts of climate change and increase adaptive capacity and the quality of life in cities; it also provides unique entry points to approach urban planning in an integrated manner. It offers the opportunity to break down silo thinking, foster collaboration between different administrative units, and empower citizens to participate in their city's development. Following these opportunities, urban green contributes to a smart future urban development.

This training provides hands-on guidance to apply technologies such as up-to-date satellite imagery, Geographic Information System (GIS) spatial analysis tools and easy to perform stakeholder mapping to devise action-oriented plans to improve the condition of urban greenery, waterbodies and biodiversity.

Introduction of the Concepts to Urban Green Planning

Traditionally, UGP was used to provide for recreational green spaces for urban dwellers. Today, the practice has expanded in scope towards concepts of climate resilience, green infrastructure and ecosystem services in cities. The benefits of urban nature, green² and blue³, are nowadays understood as an integral part of urban infrastructure that provide essential services to ensure a good quality of life and need to be considered accordingly throughout planning processes. These new approaches always follow a set of principles that help to widen a planner's perspective on how to plan and implement urban green in a modern city.

² Green urban nature entails all flora in a city, including lawns, green roof, street trees and undeveloped plots.

³ Blue urban nature describes all waterbodies in a city, including lakes and ponds, rivers and streams or coastal areas.

Multifunctionality – is a key element that should always be adhered to. An urban park can not only provide much needed recreational space in a dense city, but also serve as a runoff area for heavy rainfall to take pressure off the drainage system, mitigate the heat island effect and decrease air pollution. To consider co-benefits of urban greenery helps to gain approval for UGP against competing economic interests for urban space.

Green-Blue-Grey integration – The contemporary approach to UGP includes water issues and emphasizes the connection between urban green and water management. From rainwater retention to maintaining good water quality in water bodies, the impact of greenery on a city's water resources must be considered. Moreover, it has become common practice to integrate green elements into the development and retrofitting of grey infrastructure. From water runoffs along streets to greening rooftops; when planning grey infrastructure, the potential benefits of adding green and blue elements are paramount to increase the climate resilience of cities and should be a mandatory requirement for project development.

Connectivity – Green and blue spaces should not be seen in isolation, but how they connect to the wider city system. For instance, parks can function as fresh air aisles to provide much needed cooling for adjacent dense districts. An open waterbody can be used to retain rainwater and provide irrigation for urban green in dry seasons. To consider the connection of green and blue (and grey) infrastructure across the entire planning area (city, ward, and district) is important to ensure their resilience and to maximize benefits.

Social inclusion – UGP has a particularly strong social component. When done right, it increases social cohesion in a city by providing equal access to open space and the various benefits mentioned. To this end, it is vital to include a diverse set of social groups in the planning process and consider the needs and challenges of inhabitants that live in the area. Public participation can greatly increase the success of a green planning process.

Maintenance – An often-overlooked aspect of UGP is to account for maintenance requirements. A treelined street provides shade and enables pedestrian traffic in hot areas, but requires irrigation, trimming and biomass disposal. Such maintenance requirements need to be considered throughout the planning process to ensure long lasting benefits and a successful implementation.

Urban Green Planning in the ClimateSmart Cities Assessment Framework

UGP emphasizes on implementation of an interconnected system of urban environment comprising green spaces, recreational places, biodiversity, and natural conservation areas. It focusses on implementing integrated policies and plans for more resource efficiency, mitigation and adaptation to climate change as well as disaster resilience. While targeting economic growth, infrastructure development and empowering the poor, the country must remain committed to minimise the emission intensity of Gross Domestic Product (GDP) and creating carbon sinks. Therefore, in order to address the increasing needs of urban areas, the CSCAF approach to UGP attempts to anchor climate friendly solution with regards to 5 indicators:

1. Indicator 1: Rejuvenation and Conservation of Water Bodies and Open areas
2. Indicator 2: Proportion of Green Cover
3. Indicator 3: Urban Biodiversity
4. Indicator 4: Disaster Resilience
5. Indicator 5: Climate Action Plan

UGP includes various aspects of urban environment such as water bodies, open areas, green cover, urban biodiversity, and integration between the same plays a critical role in adopting mitigation and adaptation strategies to combat climate change. Adopting UGP solutions could reduce the impacts of human activities on climate. It helps city level and zonal/district authorities to protect, conserve and manage biodiversity, ecosystem services, and enables them to take informed actions by the ULBs/ Planning authorities for combating challenges and effects of climate change. It also allows planning authorities to assess the implementation status of such projects and their effectiveness.

The relevance for Indian cities:

Today, climate change has the potential to adversely affect development and developing countries despite having an insignificant contribution to the same. In 2014, India accounts for about 6.5% of the Global Greenhouse Gas emissions and hence plays a crucial role in combating climate change⁴. In 2017, India is second to Puerto Rico in terms of extreme weather deaths (2736 deaths), severe economic losses (USD 13.8 billion), and is also ranked 6th among the 10 most affected countries in the world as per the Global Climate Risk Index, 2016. The changing climate makes our cities vulnerable and imposes huge risks towards increased water stress, heat island effect, increased frequency and severity of extreme weather events such as urban flood and droughts. Further, air quality deterioration poses serious challenges for city administrators. In 2020, India ranked third most polluted country in 2020⁵. The eight Indian cities have worst air quality in the world⁶. For catering to these challenges, the Government of India has committed towards the SDGs. In 2016, India ratified the Paris Agreement and committed under its NDCs, among others, to reduce the emission intensity of its GDP. India promised to reduce it by 33-35% from 2005 level by 2030, and improve upon various parameters, like increase the share of non-fossil fuels-based electricity and enhancing forest cover. Though India's emissions are only 1.8 tonnes of Carbon dioxide (CO₂) per capita, which is much lower than the world average of 4.2 tonnes, these emissions have been growing steadily with an average growth rate over the past decade of 6% where urban sectors have been contributing significantly⁷. It is reported that nearly 44% of India's rapidly growing carbon emissions have urban origins, emanating from transport, industry, buildings, and waste⁸.

To achieve targets, cities need to take steps towards one single aim of combating impacts of climate change. Thus, the CSCAF will guide Indian cities towards climate actions and helps to make them more responsive and less vulnerable to climate change.

As shown in figure 2, UGP indicators carry the maximum weightage in the CSCAF at 25% of the total, considering the extent of impact that aspects of this sector have on mitigation and adaptation to tackle climate menace.

⁴ (United States Agency International Development, September 2018)

⁵ (The Hindu, 2021)

⁶ (The Hindu, 2021)

⁷ (Andrew, 2018)

⁸ (Chowdhury, et al., 2020)

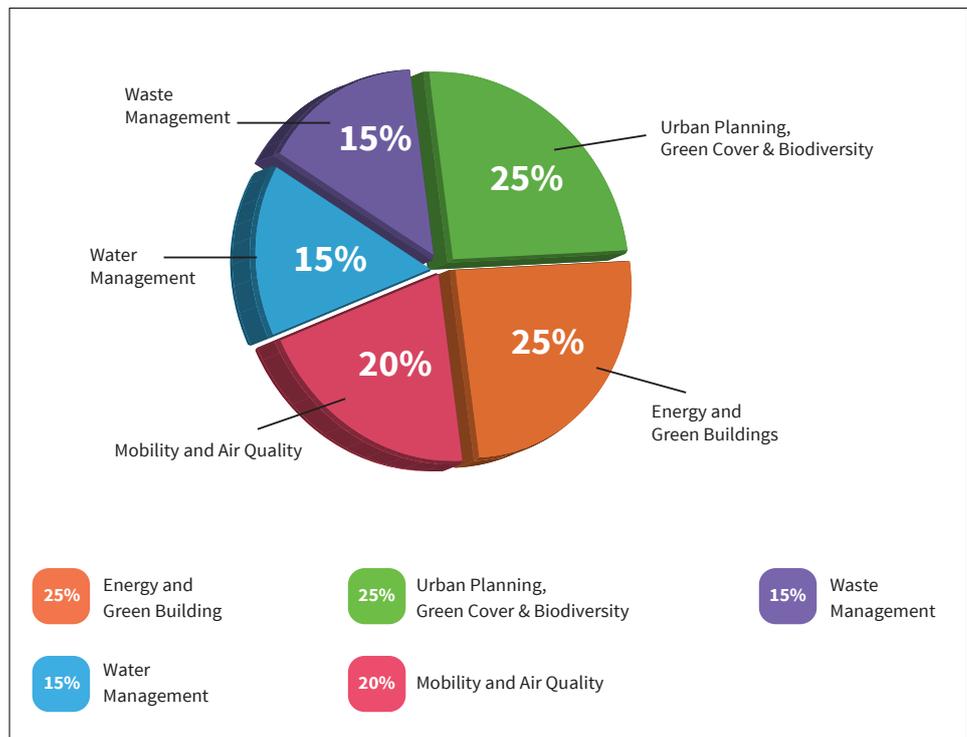


Figure 2: Sector-wise weightage of sectors in the ClimateSmart Cities Assessment Framework 2.0.; NIUA

Legal framework for Urban Green Planning in India

There is a well-developed legal framework related to UGP in India, and a number of Acts are in place at the National level. In addition, there is a large pool of guidelines to help cities carry out actions. The ones relevant to each indicator are detailed in the subsequent chapters.

Some of the main acts and guidelines are⁹:

- Urban Green Guidelines 2014, Town and Country Planning Organisation, MoHUA
- Advisory on Urban Green Cover and Biodiversity, World Wildlife Fund (WWF), 2019
- The Biological Diversity Act, 2002
- Wetland Management Conservation Rules 2017
- Guidelines for National Lake Conservation Plan
- Advisory on Conservation and Restoration of Water Bodies in Urban Areas
- Urban and Regional Development Plan Formulation and Implementation guidelines (URDPFI), 2014

Further, different ministries have missions that pertain to issues of green planning. Some of which are:

- Green India Mission, Ministry of Environment, Forests & Climate Change (MOEFCC)
- National Mission on Strategic Knowledge for Climate Change, Department of Science and Technology
- National Cyclone Risk Mitigation Project, National Disaster Management Authority
- Atal Mission for Rejuvenation and Urban Transformation, National Heritage City Development and Augmentation Yojana and Smart Cities Mission of Ministry of Housing and Urban Affairs

⁹ Find the links to the above and more information in the CSCAF 2.0 Technical Document at: https://smartnet.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf

Session 2:

Overview - Thematic Background

Key content:

- Thematic Introduction into the integrated approach
- Implementation strategies for Urban Green Planning at different levels

Learning goals:

- Gain theoretic background knowledge on the scope of the topic, and the aims and benefits of an integrated approach to urban green planning
- Awareness of the various steps required for implementation

Introduction into Integrated Approach

The purpose of an integrated approach to UGP is to go beyond a focus on increasing the amount of greenery in a city. Urban green can provide a wide range of economic, environmental and social benefits which can be realised, when considered early on in the planning process.

The goal of an integrated approach to UGP is to **develop ways of linking green spaces, biodiversity, and people in order to meet the major urban challenges related to land use conflicts, climate change adaptation, demographic changes, and human health and wellbeing.** (GREEN SURGE project, 2013¹⁰)

Positive impacts of UGP may include:

- UGP can play a key role in strategies **for climate change adaptation** and – to a lesser degree – mitigation, by delivering multi-functional ecosystem services
- Increasing the quantity of urban green can play a role in **countering the urban heat island effect**
- Increasing green space may **reduce overall urban density** and **create energy-efficient cities**
- Planned adaptation is **more cost effective** than emergency measures and retrofitting
- **Reducing the consequences of climate change** – coastal erosion, flooding from heavy rainfall, heat extremes, drought, effects on health, higher energy demand for heating and cooling, and reduced availability of water and food

¹⁰ Hansen, R., Rall, E., Chapman, E., Rolf, W., Pauleit, S. (eds., 2017). Urban Green Infrastructure Planning: A Guide for Practitioners. GREEN SURGE. Retrieved from <http://greensurge.eu/working-packages/wp5/>

To approach UGP in an integrated manner, planning for urban green cover can be broadly categorized into three interdependent dimensions, as shown in the following figure:



Figure 3: The dimensions of Urban Green Cover; own compilation

In order to succeed, an integrated approach needs to consider the various levels of planning for a city, as shown in figure 4, and ideally address all of them. Specific steps for implementation are described further in this chapter.

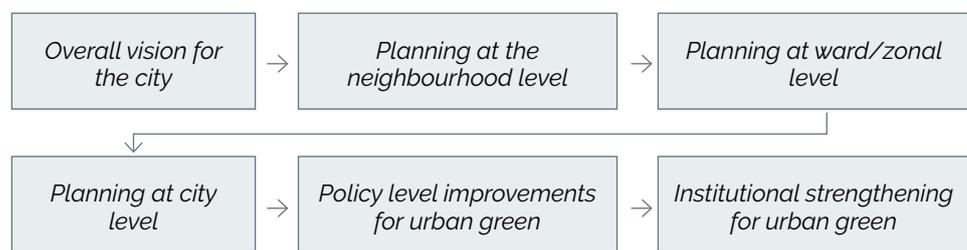


Figure 4: The different planning levels regarding Urban Green; own compilation

Integrated Approach and CSCAF

ClimateSmart means anchoring climate actions within activities catering to urban development. This includes municipal services such as water supply and solid waste management, but also infrastructure projects such as housing, planning and land development, etc. ClimateSmart development responds to the changing climatic conditions and fosters sustainable actions which could help in increasing the ease of living within cities.

In this context, UGP cannot be viewed in isolation, but is understood as a part of the larger purview of urban development in India. As climate sensitive planning is not restricted to any one sector, green spaces are one of the many aspects of this integrated approach. It is directly linked with other sectors such as mobility and air quality, waste and water management.

This integrated approach towards planning is at the foundation of the CSCAF, in which the 5 sectors are interlinked with the same goal.

Implementation Strategies

Referring back to the integrated approach, UGP requires certain strategic elements in order to make it easier to implement the planned measures in the cities (see figure 5). Urban green spaces not only contribute to the quality of environment but also contribute to social, economic, recreation, cultural, visual aspects, and commercial developments in the cities. In order to implement urban green strategies at the city level, it is vital to consider implementation measures early on in the planning process.

As a first step, the city has to define (or take an existing definition, if available) of what constitutes as "urban green" and then understand the spatial extent, both quality and quantity, of the same and categorise them. It is helpful to keep the following principles regarding spatial analysis in mind:

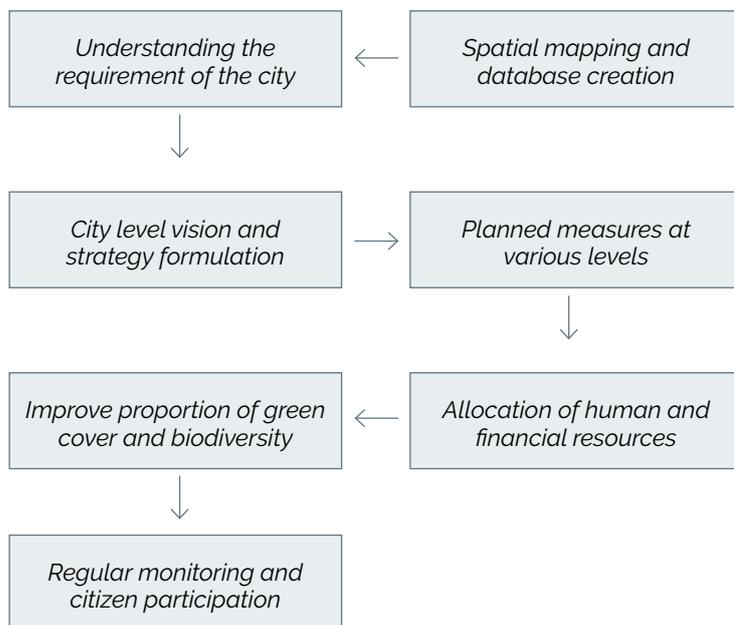


Figure 5: Steps to progressively improve the conditions of urban green through the CSCAF; own compilation

Mapping and preparing inventories

Preparing GIS-based base maps assists in inventorising the spatial extent of green cover at the city level and in turn, helps in analysing the distribution per capita and quality of the green spaces. This is the most crucial step in UGP.

Create new / improve existing green and open space

Strategise how to create and/or improve green and open spaces according to the requirements of your own city. Using benchmarks like the World Health Organisations (WHO) standards or the URDPFI standards give a clear idea how much green is needed. The base map helps in the decision-making process on the design and implementation of the improvement plan.

Promote multi-use and functional diversity

Given the size and density of Indian cities, it would be rather difficult to earmark green spaces within the city boundaries. It is prudent for city administrations to acknowledge that constraint and work towards creating more multi-functional and diverse green spaces that actually promotes health and well-being and at the same time improves the quality of other land uses surrounding it.

Create connected green space systems

Most plans for urban green and open spaces tend to look at the specific plots of land available for greening and do not take into consideration how it would impact the city as a whole. Creating connected green systems not only makes it easier to manage them but also bridges the gaps between other infrastructure services.

Integrate green with blue and grey infrastructure development

It is easier to integrate green spaces with blue¹¹ and grey¹² infrastructure in cities as that can increase green cover quite a bit without even creating new parks or playgrounds. Combining different types of infrastructure allows for effective use of urban space and financial resources.

Stimulate cooperation and alliances

To implement the strategies as described below and to do so with various stakeholders in cities, it is crucial to create cooperation and alliances with both government and community organisations¹³.

Further, it is of crucial importance to tailor the integrated plan to the specific situation of your city. Understanding of the existing situation should reflect:

- The approach for green planning will depend on the **specific locality** in a specific city-region.
- It should be adapted to the **geo-physical and climatic setting** of the urban area.
- It should be based on theoretical as well as practical knowledge of implementing and delivering integrated plans **on different administrative scales**.

Institutional Strengthening Strategies – Examples

Implementing integrated UGP requires capacities, both human and financial. City governments need to enhance the capacities (knowledge and understanding) of engineers, planners, landscape architects working in the administration. Working with various stakeholders and citizens and planning urban green areas with respect to the requirements of the city has to be based on a better understanding of the nuances of such integrated planning. Traditionally, cities in India do not have any particular department with respect to managing urban green; hence such institutional challenges have to be addressed by local bodies. Implementing plans with a specific focus on improving quality and/or quantity of urban green also requires planned budgetary allocations. This also requires certain knowledge and understanding of municipal finances and generating revenue streams for multi-functional green spaces in the city.

The urban local bodies also have to collaborate with various stakeholders for regular monitoring of planned activities and for citizen engagement. Capacities to do so over a period of time are also required by the engineers and planners. Institutional strengthening should include such awareness aspects.

Policy Level Strategies

As already discussed above, there are policy level challenges in Indian cities that deter the UGP approach in a holistic way. Most often, the urban local bodies do not have much say in the spatial planning of the cities (Master Plan, Development Plan, etc.) and they must abide by those plans and support implementation. This creates a loophole where city-specific requirements are often not addressed specifically for UGP. Most importantly, in the urban planning context in India, there is no precedence of an integrated approach for UGP that can be found. Hence, policy frameworks at the state and national level need to be improved for such a development to happen at the local level.

¹¹ Blue infrastructure refers to water elements, like rivers, canals, ponds, wetlands, floodplains, water treatment facilities, etc.

¹² Grey infrastructure refers to any human-engineered solutions in the city infrastructure that often involve concrete and steel

¹³ Source: GREEN SURGE project, 2013

Additionally, there are many other city level plans, such as Climate Action Plans and Disaster Management Plans that need to be prepared at the city level. It is a great opportunity for the integrated UGP to incorporate aspects of such plans and implement them as part of climate resilience and sustainability.

Spatial Strategies at Various Levels – Examples

At the spatial level, the following strategies can be pursued at different levels:

Strategies at neighbourhood level	Strategies for ward/zonal level	Strategies for city level
<ul style="list-style-type: none"> • Developing well distributed neighborhood parks – social, environmental and ecological gains • Residence Welfare Associations (RWA) managing tot-lots and neighbourhood parks/gardens • Green roofs in private and public plots • On-plot greening in private and public plots • Development regulations can be enhanced to increase the green in private plot by having special regulations and giving incentives. 	<ul style="list-style-type: none"> • Road-side plantation • Afforestation on vacant/waste land • Making various gated green spaces accessible - Allowing the use of large institutional plots for public use as garden or recreation purpose. • Parks and gardens adoption policy - Through caretaker policies or through Public-private partnership (PPP) 	<ul style="list-style-type: none"> • Proposing special eco-sensitive zones • Creating hierarchy of networked green and recreations spaces - Eg: - Tot-lots, neighbourhood parks, community gardens, biodiversity parks, city parks, sports complexes, etc. • Annual Green Action Plan • Database and information management - Eg: - creating a website, crowd-sourcing information, tree – census, etc. • Active community engagement and citizen participation - Awareness, outreach, recognition

Figure 6: Examples of Spatial strategies at various levels –; Prepared by GIZ under the Urban Green Cover Framework for Coimbatore (2020)

Section 3:

Proportion of Green Cover

Key content:

- Presentation of the indicator CSCAF 'Proportion of Green Cover'
- Mapping Exercise in Google Earth Engine
- Implementation strategies to increase the proportion of green cover

Learning goals:

- Understand the indicator, how its calculated and measured
- Understand the importance of green cover and measures to increase the proportion of green cover

Introduction into Indicator 1: Proportion of Green Cover

Sufficiently large and protected greenspaces reduce the impact of human activities on climate. The ecosystem services provided by the urban green spaces help the city in general and its citizens to adapt to the adverse effects of climate change and disasters.

This indicator aims to understand the extent to which the city is developing and increasing its green cover. Green cover, defined as natural or planted vegetation covering a certain area of terrain, functioning as protection against soil erosion, protecting the fauna, and balancing the temperature. For the purpose of this indicator, green areas are defined as man-made city level and zonal/district level greens: and reserved/protected areas as per MoHUA's Urban Green Guidelines, 2014 and protected areas under the Wildlife Protection Act, 1972.

This indicator has to be put in context in order to understand the impact of what is measured. Therefore, also learn to measure green cover over time, about the concept of and how to map Land surface temperature (LST), and how to correlate the three to draw conclusions.

How to Measure the Indicator

Data available on area of urban greens can be analysed from satellite imagery. Recent imagery can be procured from the state or National Remote Sensing Center (NRSC). The baseline year is 2019. Comparative analysis using the formula given below on a yearly basis will help to understand the increase/decrease over time. This data is also being reported by cities for the Ease of Living Index and may be sourced from there.

Formula:

Green Cover in sq.km /Municipal area in sq.km x 100

Unit: %

Maximum Score: Total score for the indicator is 100. Cities will be marked in 5 levels with scores ranging from 0 – 100. The different performance evaluation levels are shown in figure 7. In this indicator, certain bonus marks will be provided for cities that are taking additional desirable measures towards protection of green cover. Additional 10 marks for reporting on additional qualitative data – list of native tree species, tree density, and tree canopy density. (Applicable for levels 1 to 4)

1. Additional 10 marks for developing the strategy for increasing Green Cover in the city in line with the National Clean Air Plan (NCAP). (Applicable for levels 1 to 4)
2. Additional 5 marks for providing evidence on action initiated for points 1 and 2 above. (Applicable for levels 1 to 4)

Performance Evaluation Levels: Table 4.8: Green Cover					
	1	2	3	4	5
Progression Levels	0% to <5% Green Cover	5% to < 9% Green Cover	9% to < 12% Green Cover	12% to < 18% Green Cover	≥ 18% Green Cover
Evidence/ Data sources	• Map of green cover within municipal boundary for this year as a .kml file (polygon geometry)				
Responsible Department/ Agency	National Remote Sensing Centre, State Remote Sensing Centre, Urban Planning or Development Authority, Forest Department				
Reference	Advisory on Urban Green Cover and Biodiversity, WWF, 2019 https://tinyurl.com/v4b7tn Water Conservation Measures Guidelines of MoHUA under Jal Shakti Abhiyan http://mohua.gov.in/upload/uploadfiles/files/Guidelines%20for%20Urban%20water%20conservation%20Jal%20Shakti%20Abhiyan.pdf Urban Green Guidelines 2014, Town and Country Planning Organisation, MoHUA http://mohua.gov.in/upload/uploadfiles/files/G%20G%202014(2).pdf				
Score	0	25	50	75	100

Figure 7: Performance Evaluation Levels of the CSCAF Indicator 1: Proportion of Green Cover; NIUA

Exercise: Proportion of Green Cover

In this section you will learn about the general concepts and requirements for the exercise. Step-by-step instructions are provided in the Annex-1 if you would like to perform the exercise independently.

Technical Requirements:

Google Account – a valid google account is a requirement for this exercise. If you already have one, please make sure to log-in before the session. If you don't use a google account, yet, please sign up (for free) at:

<https://accounts.google.com/SignUp?hl=en>

Please take note that there are options for private users and business accounts. Make sure to check with your IT department about your institution's policy regarding google accounts.

Chrome Browser – The tool used in this exercise only works with the google chrome webbrowser. If you usually work with a different browser (e.g. Microsoft Edge, Mozilla Firefox), please make sure to have google chrome downloaded and installed before the session. You find the download here:

<https://www.google.com/intl/ind/chrome/>

Google Earth Engine – This is the tool for spatial analysis in this exercise. It is webbased (in Google Chrome browser) and does not require local software installation. However, you need to sign-up to the tool before the session at:

<https://signup.earthengine.google.com/#!/>

Specific Requirements

Shapefile – The shapefile format is a geospatial vector data format for geographic information system software. It stores geometric location and associated attribute information.

The main file (.shp)¹⁴ contains the geometry data.

Shapefiles for this exercise are provided with your pre-training email

Java Script – JavaScript is mainly used for web-based applications and web browsers. JavaScript is used to manipulate the contents of a web page and to allow users to interact with web pages without reloading the page. JavaScript frameworks are collections of JavaScript code libraries that provide developers with pre-written code to use for routine programming features and tasks – literally a framework to build websites or web applications around.

A Webpage like Google Earth Engine has space on the same window to type and run a JavaScript and the effects of the script can be simultaneously seen reflected in the map window below it. This type of simultaneous operation on a single webpage can only be done using JavaScript. An example of the Google Earth Engine with JavaScript on the same webpage is shown in figure 8.

Java scripts for this specific exercise are provided by the trainers, but you will not learn Java script coding in this training for other applications and calculations. If you require further Java scripts, you will need help from either specialized colleagues, or tender the task to external service providers as explained in the next section.

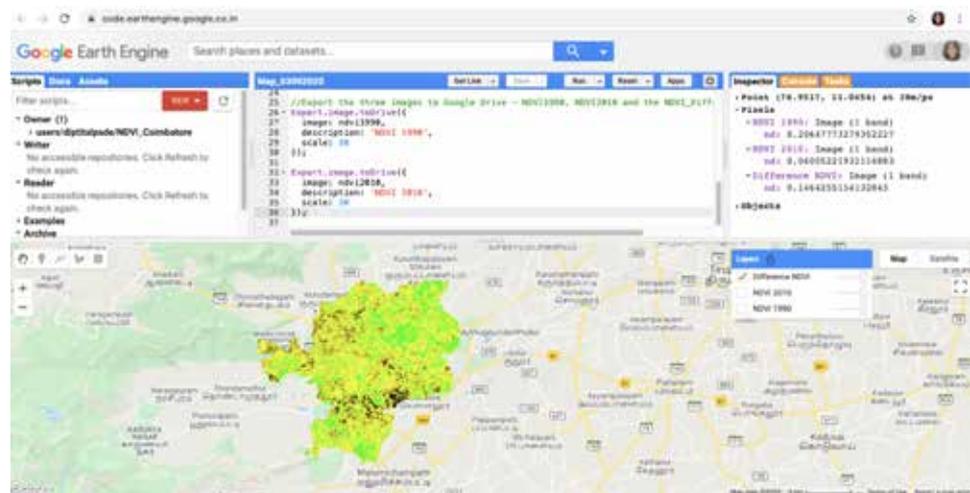


Figure 8: Example of webpage of Google Earth Engine where JavaScript is needed to run and view the result of the script on the same webpage; GIZ

 **Mastering HTML, CSS & JavaScript Web Publishing, BPB Publications, 2016;**
<https://www.hackreactor.com/blog/what-is-javascript-used-for>

Tender – In order to prepare GIS-based plans or Master Plans, cities might require outsourcing these tasks to external agencies. There are standard guidelines and templates available from the MoHUA to assist the cities in doing this task seamlessly. Currently they are available for 500 cities of Atal Mission for Rejuvenation and Urban Transformation (AMRUT). Below are the links to the website and reference documents:

 **Report of the Sub-Committee on Financing Urban Infrastructure, MoHUA, 2012;**
http://mohua.gov.in/upload/uploadfiles/files/5%20Sub%20Scheme_Formulation%20of%20Plans_S%20Surendra.pdf

¹⁴ This format should not be confused with the AutoCAD shape font source format, which shares the .shp extension. These files are used on desktop and web GIS based software such as ArcGIS, Quantum GIS, GeoBase, GRASS GIS, SAGA GIS and Google Earth Engine among other products.

Formulation of GIS based Master Plan for Amrut Cities, MoUD, 2015;

[http://amrut.gov.in/upload/uploadfiles/files/AMRUT-SubScheme_Guideline\(4\).pdf](http://amrut.gov.in/upload/uploadfiles/files/AMRUT-SubScheme_Guideline(4).pdf)

Formulation of GIS based Master Plan for Amrut Cities – Design & Standards, MoUD, 2016;

[http://amrut.gov.in/upload/uploadfiles/files/designandStandards_AMRUT\(3\).pdf](http://amrut.gov.in/upload/uploadfiles/files/designandStandards_AMRUT(3).pdf)

Mapping Green Cover and Landsurface temperature – Instructions; GIZ, 2019; Annex-1

Note: These templates and guidelines can be used by any city for similar tasks, and not necessarily only for preparing Master Plans. These are supporting documents that need to be adapted by each city depending on their requirements and budget.

Implementation Strategies

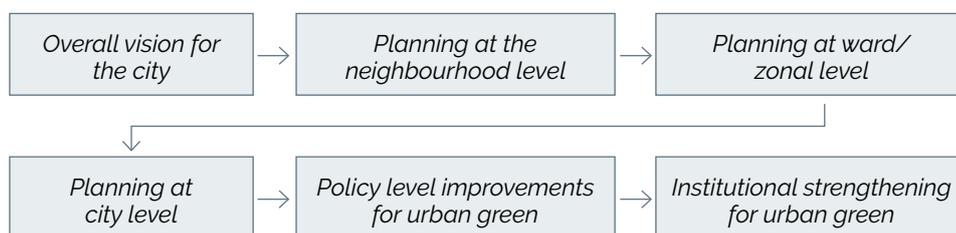


Figure 9: Different Planning levels for implementation strategies to increase the proportion of green cover; Prepared by GIZ under the Urban Green Cover Framework for Coimbatore (2020)

Planning for the proportion of green cover requires consideration of the different planning levels within the city (see figure 9). It would be pertinent to remember the following key messages while planning for improving the urban green cover in the cities.

Defining what “green cover” means for your city. Ideally green cover can be defined by all visible vegetation natural or planted as seen from the satellite. Broadly it includes forests, agriculture, vegetation along water bodies, along streets, dedicated parks-gardens, reservations on plots and vegetation on building roofs or vertical surfaces¹⁵

Mapping and understanding the green cover and its impact on city's climate. Any loss in green in and around the urban area has a direct impact on the rising temperature and in turn impacts the local climate. Understanding the changes in the Land Surface Temperature gives an indication on the changing weather patterns and frequent hot days impacting the macro-climate of the city. Mapping the green cover and correlating that with LST would provide for better diagnosis and action plan.

Understanding the institutional set up and other stakeholders that contribute to the city's green cover. There are multiple stakeholders working in the city and which are engaged in some way or the other to plan various measures related to urban planning including green cover. These include the state Environment Department, Municipal Corporations, the Horticulture Department, the Town Planning Department, etc. It is important to understand and list down all the relevant stakeholders that are involved in this work. For a structured approach to mapping and understanding stakeholder, please read the exercise part of chapter 5 of this manual.

¹⁵ Refer to Urban Greening Guidelines, 2014 and Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines for benchmarks and definitions

Greening Initiatives in Thane City

Thane city witnessed fast depletion of the green cover. More than 6 lakhs aka, in English? were planted within four years in the Thane city limits involving local leaders, celebrities, NGOs, and students.



Figure 10: Community participation during plantation drive; Tree Authority and Garden Department, Thane

For further information: see Annex-2

Analysing the policies and regulatory framework that contribute to the city's green cover.

Any plan that ought to be implemented in the urban context will require the framework of existing policy and regulatory guidelines/laws. It is important to have a thorough knowledge of such framework conditions in the context of UGP.

Providing recommendations to improve the urban green cover of a city will be based on the spatial and policy analysis. Any plans that would be drawn up from these analyses require a clear road map for implementation. Strategies should be short, medium, and long term and identify the stakeholders who will be able to implement them and also follow the usual principles of preparing Detailed Project Report (DPR) and Policy recommendations, along with financial budgeting for both capital expenditure and Operation and Maintenance (O&M).

Section 4:

Rejuvenation and Conservation of Water Bodies and Open Areas

Key content:

- Presentation of the indicator CSCAF 'Rejuvenation and Conservation of Water Bodies and Open Areas'
- Mapping Exercise in Google Earth Pro
- Implementation strategies

Learning goals:

- Understand the indicator, how its calculated and measured
- Understand the importance of Waterbodies and open areas
- Gain knowledge on the various measures to successfully preserve and rejuvenate waterbodies and open areas

Introduction into Indicator 2: Rejuvenation and Conservation of Water Bodies and Open Areas

Urban Environment consists of many aspects including water bodies, open spaces and built-up area. From a climate adaptation and mitigation perspective, all three aspects play a critical role. Rejuvenation of water bodies is significant to combat water crises. Water bodies are essential as reservoirs for drinking water, as retention basins for groundwater recharge, for protection in case of floods and for maintaining biodiversity. Having local sources of fresh water decreases the dependence on energy for pumping purposes. Open spaces, namely recreational spaces, organised green and other common spaces, in any city play a critical role in terms of climate mitigation and adaptation, by decreasing local temperature and helping recharge groundwater. Increase in built up areas and decrease of water bodies and open spaces lead to an increase in the local temperature within a city, called the urban heat island effect.

The indicator aims to understand the efforts of the city towards rejuvenations and conservation of water bodies and open areas thus trying to combat heat island effect. The various departments that are responsible to undertake tasks are the urban Local Bodies, Development Authority, Town Planning Department, National Remote Sensing Agency, State Remote Sensing Agency, Horticulture department', Environment officer.

How to measure the Indicator

The current extent and status of water bodies and open areas can be mapped using the data sources from the concerned departments. The figure is to be compared with the existing master plan. Total score for the indicator is 100. Cities are marked in 5 levels with scores ranging from 0-100. In this indicator the level 3 and 4 have been merged taking into consideration the initiation of rejuvenation work and allocation of budget that goes hand in hand. Out of the total 50 marks allocated, cities will receive incremental scores ranging from 1-25 based on the evidence(s) provided for actions initiated. Similarly, for evidence(s) provided on fund allocation and expenditure for the actions, cities will receive another 1-25 marks. Finally, cities scoring a total of >25 and >50 marks will be considered in level 3 and level 4 respectively. For the requirements of the different measurement levels, see figure 11.

	1	2	3/4	5
Progression	No Action Initiated	Assessment of urban water bodies and open areas	Allocation of Budget and Implementation	Monitoring, Review & Maintenance
Levels				
Evidence/ Data sources	No Action Initiated	<ul style="list-style-type: none"> Mapping of water bodies which includes their location, area, depth, volume and current status (ownership, encroachment, protected/ conserved/ maintained as per prescribed guidelines) has been carried out for the current year. Mapping of open areas (planned greens) with details of current status (including ownership, encroachment, protected/ conserved/ maintained as per prescribed guidelines) has been carried out for the current year. Urban heat island map for the city has been prepared 	<ul style="list-style-type: none"> Informed actions for rejuvenation and conservation of water bodies and open areas have been initiated (with supporting documents: photographs, proof of contracts, etc.) based on mapping and assessments conducted at level 2. Proof of fund allocation and expenditure for conservation and rejuvenation 	<ul style="list-style-type: none"> Monitoring, review & maintenance mechanisms in place for long-term sustainability of rejuvenation & conservation actions Evidence on change/ improvement in status and quality of open areas and water bodies; as per relevant guidelines Map of rejuvenated & conserved water bodies & open areas as a .kml file (polygon geometry)

Figure 11: Measurement levels of the CSCAF Indicator Rejuvenation and Conservation of Water Bodies and Open Areas; NIUA

Exercise: Mapping of Water Bodies

Mapping of water bodies and open spaces aids in understanding the efforts taken, or are required to be taken, for the rejuvenation and conservation of the same. The spatial information provided by the maps not only helps in urban planning but also in monitoring the various indicators during and after the implementation of initiatives.

Objective of Exercise:

- Mapping water bodies and open spaces to assess their location and area.
- Extent to which the land use and land cover has changed over the years especially focusing on the water bodies and open spaces

Requirements: The exercise requires access to a computer that is connected to the internet with Google Earth Pro. The following figure gives a step by step instruction to map the water bodies in Google Earth Pro:

Steps to work on the exercise in Google Earth Pro

Step 1	Click on the search tab and enter a region/city
Step 2	Locate a water body or open space of interest and zoom in using the slider
Step 3	From the tool bar, click on 'Add Polygon' and edit the specification as per the requirements. Rename the polygon.
Step 4	Select multiple points around the waterbody or open space and close the polygon/outline by selecting the starting point again.
Step 5	In the dialog box, click on 'Measurement' tab and note the area.

Step 6 On the 'Places' window, right click the name of the water body/open space and save file as .kmz

Step 7 From the tool bar, select the option to print and save file as pdf

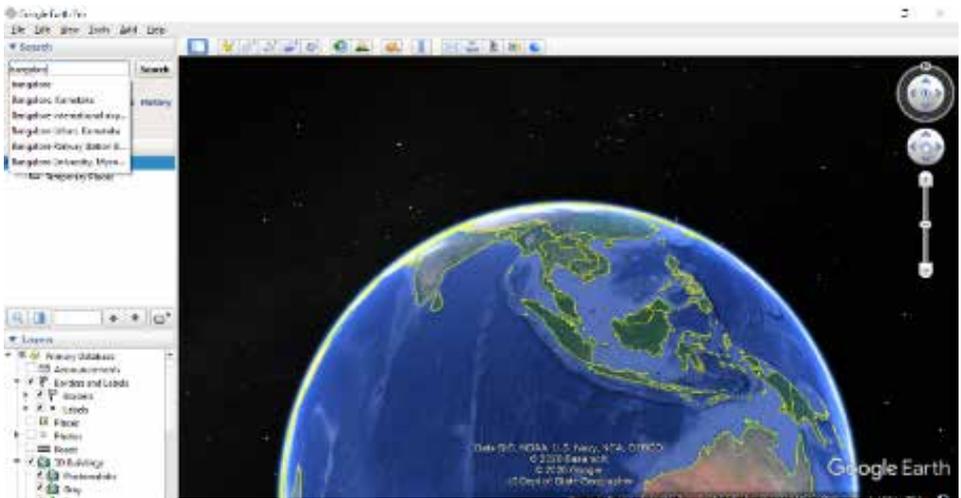
Steps to assess changes

Step 1 Click on the tab for historical imagery at the bottom left of the window

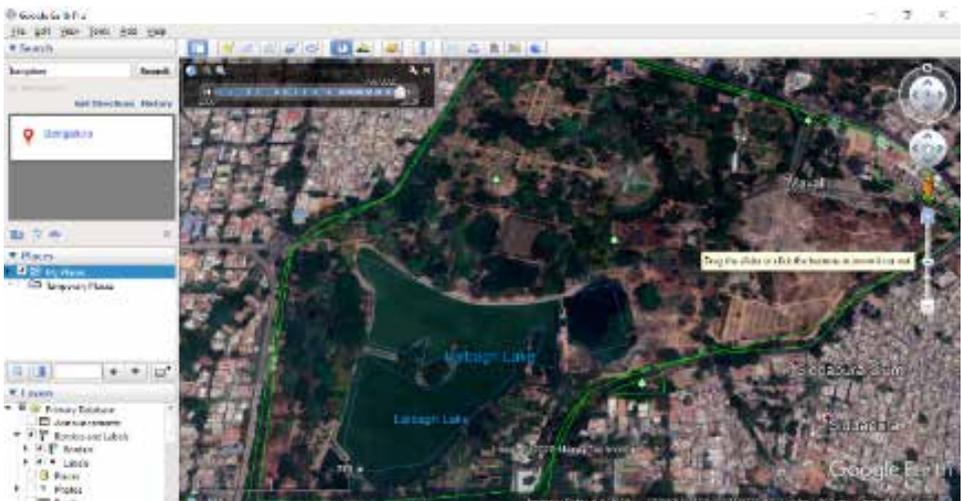
Step 2 Select the timeline to from the bar at the top right corner to view the images

Figure 12: Step by step instruction to map water bodies in Google Earth Pro; own compilation

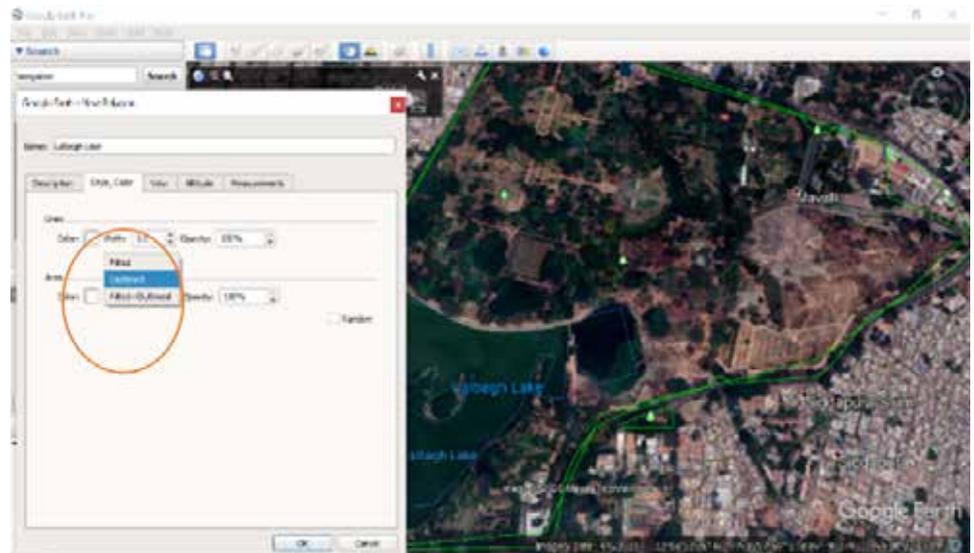
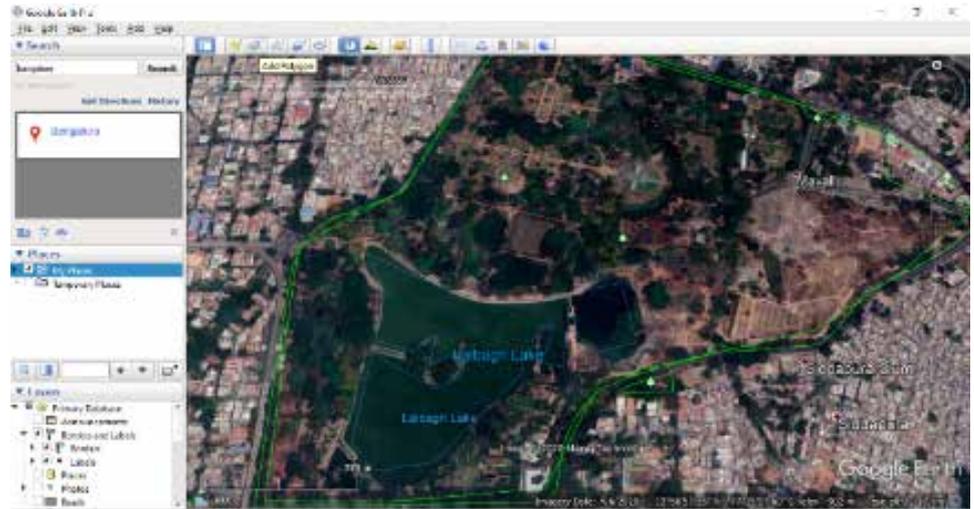
Step 1: Click on the search tab and enter a region/city



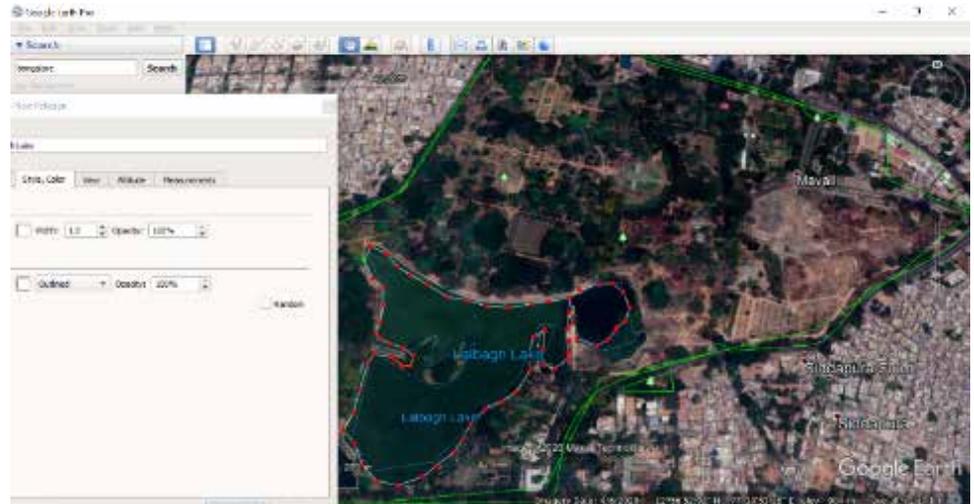
Step 2: Locate a water body or open space of interest and zoom in using the slider



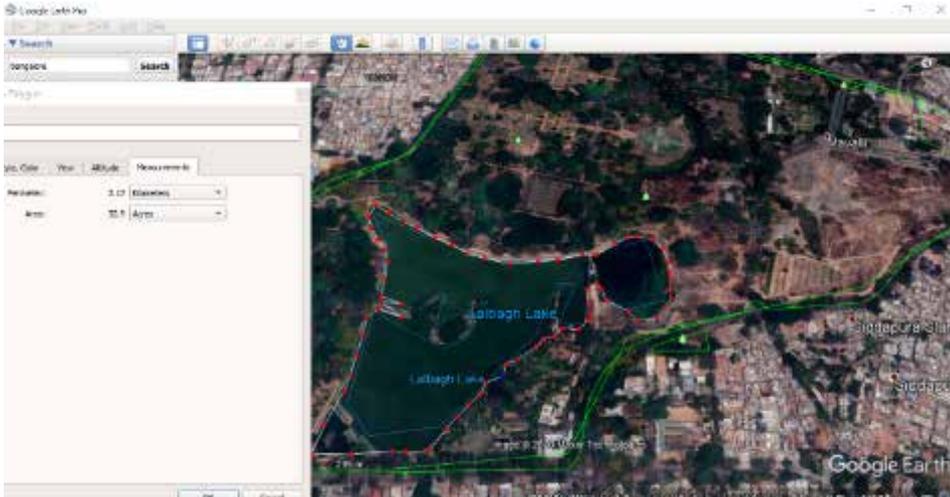
Step 3: From the tool bar, click on 'Add Polygon' and edit the specification as per the requirements. Rename the polygon.



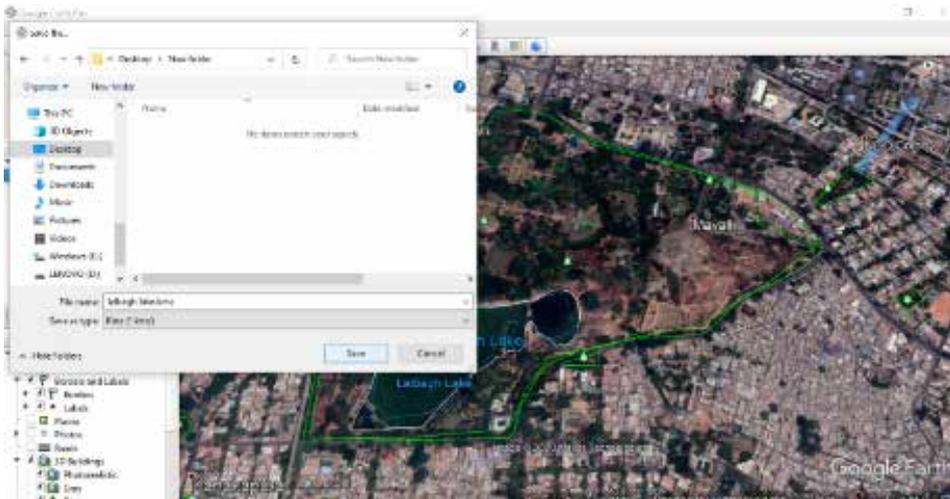
Step 4: Select multiple points around the waterbody or open space and close the polygon/outline by selecting the starting point again



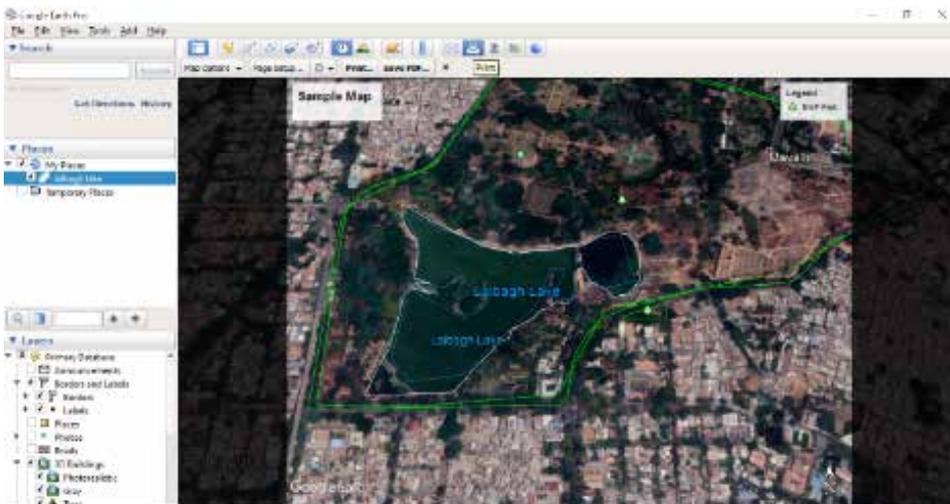
Step 5: In the dialog box, click on 'Measurement' tab and note the area.

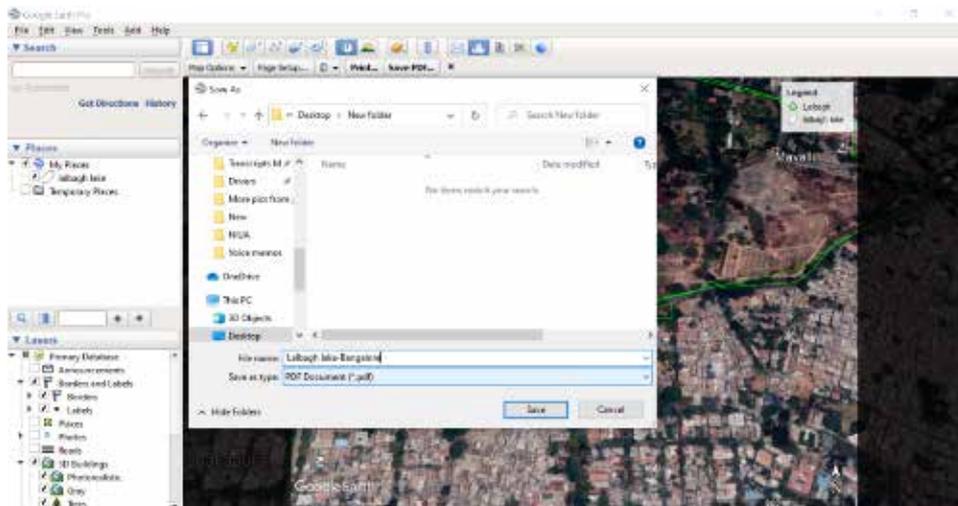


Step 6: On the 'Places' window, right click the name of the water body/open space and save file as .kmz.



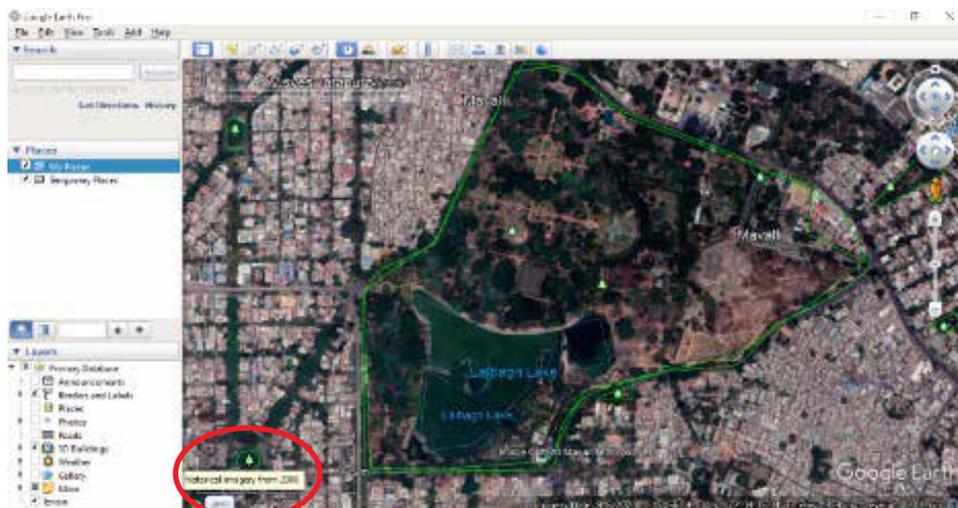
Step 7: From the tool bar, select the option to print and save file as pdf.



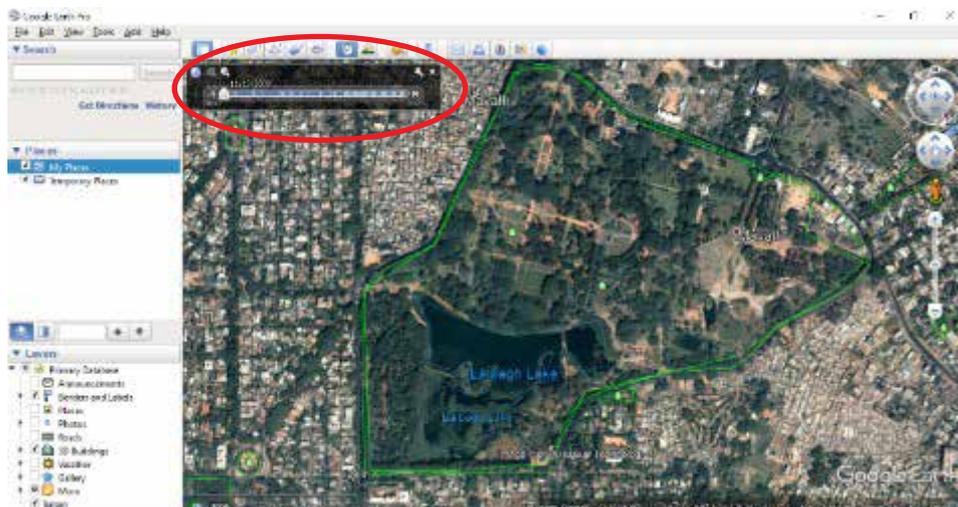


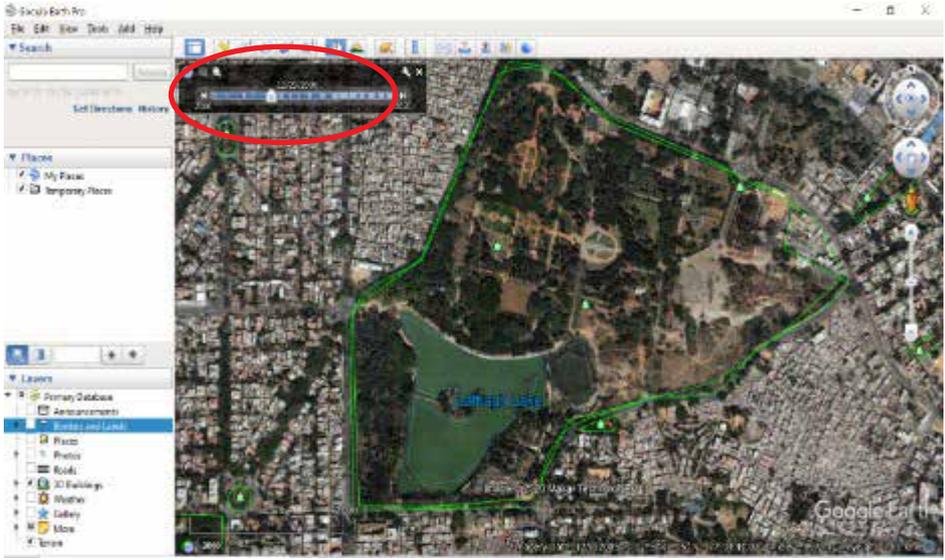
To assess the Change

Step 1: Click on the tab for historical imagery at the bottom left of the window



Step 2: Select the timeline to from the bar at the top right corner to view the images





Implementation Strategies

In the face of rising urbanisation and increasing threats of climate change, it is essential to incorporate measures to management of urban environment. The implementation measures need to integrate the aspects of sustainability and quality of life into urban planning while aligning technological advancement with that of local government capacities. The various such strategies to mitigate urban heat island effect, and to rejuvenate open spaces and water bodies are described below.

Urban Agriculture in Japan

The presence of agricultural landuse in the urban landscape is a common feature in Japan, despite being a highly industrialised country. Apart from providing agricultural produce, the urban agricultural land provides an open space for disaster management (evacuation space during earthquakes) and green space for recreation and well being



Figure 11: Urban Agriculture

Source: <https://unu.edu/publications/articles/japan-s-urban-agriculture-what-does-the-future-hold.html>

Strategies for Mitigating the Urban Heat Island Effect

The strategies to mitigate the urban heat island effect includes greening measures by the provision of shade to the building surfaces and deflecting radiation from the sun. The strategies to mitigate urban heat island can be broadly categorised into Urban Plantation, Cool/green roof Measures, and Anthropogenic Heat reduction measures

Urban Plantation

Vegetation helps in reducing the air and surface temperatures by providing shade, minimising ground temperature differences and through evapo-transpiration. Evapo-transpiration alone, as well as when combined with shading can reduce the summer temperatures by 1-5 degree Celsius. Shading reduces direct solar radiation from getting absorbed by the urban impervious surfaces. When planted in the strategic locations, the trees and vegetation thus act as a mitigation strategy for the urban heat island. In addition, the trees capture the atmospheric CO₂ and also reduces the anthropogenic emissions by decreasing the energy demands required for thermal comfort^{16,17}.

Green Roof Atop in Chicago

The green rooftops in the city of Chicago provide multiple benefits. While they help in regulating temperature and saving energy. They brought back the fauna that were displaced due to urban development and also complement the supply of vegetables and herbs from local vendors and farms.



Figure 12: Green Roof Atop in Chicago

Source:<https://inhabitat.com/green-roofs-for-healthy-cities-award-2008/10830>

Cool roof/Green roof measures

Green roof or cool roof measures help in reducing the surface and air temperature and thus contributes towards energy savings and reduced emissions. Green roof is a cover of vegetation on a roof top that provides shade, reduces air temperature and temperatures of the roof surfaces. The temperatures of such roofs can be up to 4 degree Celsius lower than the conventional roofs and can reduce energy use of

¹⁶ TERI: The Energy and Resources Institute. Final Report on Urban Planning Characteristics to Mitigate Climate Change in Context of Urban Heat Island Effect, Bangalore, 2017, p. 82

¹⁷ Jain, G. & Sarkar, S.: Urban Heat Island: Causes, Effects & Mitigating Strategies. IJIR, Vol. 3(5), 2017, p. 2098-2103.

a building by 0.7%¹⁸. Apart from lowering energy demands for cooling, reducing air pollution and Greenhouse gasses emissions, green roofs also enhance the aesthetic value and helps in storm water management by reducing run offs¹⁹.

Cool roofs are the roofs that are built from materials that are highly reflective and emissive. These roofs are coated with materials that retain less heat by reflecting more sunlight and are therefore cooler than the conventional roofs; this keeps the temperature inside the building cooler. Cool roofs help in reducing indoor temperature to up to 5 degree Celsius as compared to the conventional roofs²⁰. These roofs thus save energy costs and reduce cooling load of a building and therefore carbon emissions. Different materials that are used are: coated cool roofs that involve coating with high reflectivity paints that are made up of lime wash or acrylic polymer or specific pigments. Mostly they are white in colour; Membrane cool roofs use prefabricated materials such as membranes or sheets like polyvinyl chloride or bitumen based to cover an existing roof; Tiled cool roofs involve white coloured mosaic tiles on top of existing roof.

Anthropogenic Heat Reduction Measures

Anthropogenic heat like that emitted from vehicles get trapped in urban canyons that lead to increasing temperatures. So, the mitigative measures include steps to reduce the anthropogenic heat by promoting public transportation, switching to cleaner fuels and e-vehicles, promoting pedestrians and cyclists. This would help in reducing air pollution as well as reducing urban temperatures.

Bicycle and Pedestrian Bridge in Copenhagen

Copenhagen has been at the forefront in building bridges meant for cycling so as to enable efficient and easy cycling and promoting bicycle usage as daily means of transport.



Figure 13: Bicycle and Pedestrian Bridge in Copenhagen

Source: <http://www.cycling-embassy.dk/>

¹⁸ <https://www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands>

¹⁹ <https://www.epa.gov/heatislands/using-cool-roofs-reduce-heat-islands>

²⁰ <https://www.nrdc.org/sites/default/files/india-cool-roofs-faq-20200527.pdf>

Strategies for Rejuvenation of Water Bodies

The strategies for the rejuvenation of the water bodies includes measures to prevent pollution and treatment of catchment areas to ensure removal of obstruction in inlet and outlet of water bodies. The strategies can be categorised into:

- A) In-situ conservation
- B) Area Treatment
- C) Quality
- D) Restrictions and Awareness

In-situ Conservation

In-situ conservation measures involve prevention of pollution in the water body like cleaning of water bodies. This includes de-silting, de-weeding, aeration, removal of invasive plant species and reduction of nutrients. Some of the measures are:

- *Bioremediation*: It is the process of breaking down the toxic pollutants of water bodies into less or non-toxic elements by the help of naturally occurring micro-organisms like yeast, fungi and bacteria. The process includes steps like physical cleaning, aeration and by use of specifically cultured products, containing beneficial bacteria and/or enzymes
- *Bio-manipulation*: This process helps to control the eutrophication in the waterbodies through biological engineering. This involves selective removal or encouragement of growth of herbivorous fishes which can be graze algae in the water bodies.
- *Sedimentation Basin*: The first flush of storm water brings in organic content and silts into the lake, which change the water chemistry as well and is hazardous in nature. Sedimentation basins are created to arrest this content to enter the lake at the space before the entry point using a biological approach.
- *Green Bridge*: This measure includes formation of bridged using Cellulosic or fibrous materials like coconut coir or dried-up water hyacinth and strengthening them by stones or sand. The bridge helps in trapping the coarse pollutants thereby maintaining the turbidity of water of the water bodies.
- *Rainwater Harvesting*: Harvesting storm water is a practice for in-situ augmentation. The rainwater can be collected from the catchments and by creating storm water storage in the flow accumulation points.

Area Treatment

The strategy includes treatment of the catchment area and area around the waterbodies. The catchment area treatment is done through afforestation, silt traps, storm water drainage management and ensuring removal and avoidance of obstruction in the inlet and outlet of the waterbody. Area around the water bodies need to be maintained by beautification of the waterfronts, plantation of trees to maintain biodiversity, and create habitation of natural flora and fauna. The encroachment around the waterbody boundary spread area should be removed to avoid further degradation and bunds and fencing to be provided or strengthened. Wetland plantation would enhance the filter of water naturally as soon as it enters the lake or water bodies.

Quality

The flow of industrial, domestic, and agricultural effluents into the waterbody leads to deterioration of the quality of water. This decline in the quality leads to growth of algae that reduce the oxygen content. Apart from making water non-potable it also leads to death of the aquatic organisms. Therefore, the quality of water bodies needs to be monitored regularly and efforts are to be taken to ensure maintenance of the same as per the given standards. Any outfall of domestic/industrial sewage into the waterbody should be prevented and ensuring only disposal of effluent treated as per the effluent standards of the state pollution control board into the water bodies. The monitoring of water quality should be conducted on a regular basis, weekly, by the urban local bodies to take measures to improve or take actions towards maintaining. For religious or cultural festivities like Ganesh Chaturthi and Durga Puja that involve immersion, a separate tank should be.

Restrictions and Awareness

To ensure the sustainability of measures taken for the rejuvenation and conservation of water bodies, public participation is a crucial aspect. This also involves raising awareness of citizens and imposing restrictions to prevent pollution and ensure maintenance. To generate awareness among people, notice boards with the prohibitions and activities allowed to be displayed near water bodies. The creation of walking tracks and recreational activities for the public can help raise awareness. Awareness programmes through various seminars and workshops can be organised to promote community participation in activities like cleaning, beautification, and conservation of water bodies. Certain restrictions and prohibitions that need to be imposed are:

- Declaring the land around waterbodies and at a certain distance from shore as eco-sensitive zones.
- Dumping of waste into eco-sensitive areas to be made a punishable offence.
- Imposing bans on the usage of potable water for purposes other than drinking and water from other purposes should be made available through re-cycling and re-use considering the feasibility and health implications.

Strategies for Rejuvenation of Open Spaces

Rejuvenation of open spaces in the urban areas can be categorised into area treatment that involves plantation measures and maintaining and conserving the existing open green spaces.

Area Treatment

Area treatment includes a plethora of activities that involve greening measures inclusive of plantations, maintenance, and conservation. Development and maintenance of parks is one of the measures to enhance the green cover in an urban region like district parks, neighbourhood parks, tot lots and playgrounds. Impermeable surfaces lead to loss of moisture and lack of air and restricted plant growth. The excessive loss of trees due to construction as well as uprooting of trees due to storms at the street sides calls for greening of urban streets. Landscaping and beautification of areas adjacent to heritage buildings will add both aesthetic and economic value. Provisions of conserved areas, natural landscape areas, and social forests are to be made within the cities. Various other measures include development of green squares, green belts, greenways, city/urban forests.

- *Green Belts*: These are the large open areas or space in and around cities where urban development is prohibited through zoning, public ownerships, easements or development restrictions. They play an important environmental role by reducing air pollution and providing habitat for biodiversity. Examples are Delhi Ridge forests, Sanjay Gandhi National Park in Mumbai, Guindy National Park in Chennai, and Maidan in Kolkata
- *Greenways*: Greenways are the vegetated corridors used for improving environmental quality, while also providing recreation services and alternative transportation routes for bicycles and pedestrians.
- *City forest*: These are the forested areas located within the boundaries of cities or within close proximity. Activities related to wood production are prohibited in these regions.
- *Green Squares*: These are compact green spaces surrounded by residential and public buildings.

Maintenance and Conservation

- Conservation of green areas and ensuring certain areas are not encroached or subject to construction such as areas around flood plains, coastal zones in case of coastal cities or towns, in case of hilly towns, area under mountainous slopes, and area around natural drains.

- To enhance the accessibility of green spaces for the public, different open spaces need to be inter-linked by providing connectivity and should be maintained in an integrated manner.
- Public participation is one of the major aspects for the rejuvenation and conservation of the greens. Involving Resident Welfare Associations, students and other groups to enhance public participation for maintenance of green helps in sensitising people about the importance of urban green and open spaces.

Key Measures of Implementation Strategies

A successful strategy for rejuvenation and conservation of waterbodies and open spaces in urban areas is a function of various key measures. These measures include translation of legislations into practice, understanding the baseline, and essential components to be included in documents pertaining to the projects.

Supportive policy and Institutional Environment

The various guidelines, rules, acts and policies for urban planning or rejuvenation have been formulated at the national and state levels (see figure 13). These legislations or guidelines are to be translated at the regional levels as per the context and socio-economic and ecological conditions of the region. These guidelines also provide benchmarks to be followed while designing strategies and act as a guiding document for urban local bodies for a holistic understanding of the process of implementation.

Acts/Guidelines, and Plans for Urban Environment
<ul style="list-style-type: none"> • Environmental Protection Act, 1986 • National Water Policy, 2002 • National Water Mission Under National Action Plan on Climate Change, 2008 • National Mission On Sustainable Habitat, 2009
Indicator Specific Guidelines/Plans
<ul style="list-style-type: none"> • Guidelines for the National Lake Conservation Plan, 2008 • Advisory On Conservation and Restoration of Water Bodies in Urban Areas, 2013 • Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines, 2014 • Model Building Bye Laws 2016 • Urban Greening Guidelines • Guidelines for Urban Water Conservation • National Plan for Conservation of Aquatic Ecosystems (NPCA), 2019

Figure 14: Acts/Guidelines, and Plans for Urban Environment; own compilation

Assessment of Baseline Status

A baseline assessment is always required before the execution of the project to understand the current status of the water body or the open/green space to be rejuvenated or conserved and the reasons for the deterioration. The assessments are often carried out by preparing maps to compare the data of the current status and the status of the same area 10-20 years back. This helps to understand trends of the past decades and identifying reasons like encroachments and changes in settlements in the surrounding regions. The baseline status also includes assessing the quality of water and soil to understand the extent of degradation by comparing it with the prescribed norms, sources of pollution or degradation like disposal of waste, physical conditions like growth of weeds or invasive species, socio-economic, social, and aesthetical aspects of the area to be rejuvenated.

Jharkhand Building Bye Laws, 2016: "No construction shall be allowed within the boundary of the river" Guwahati Building Construction (Regulation) Byelaws, 2014 specifies the "The minimum distance of any building from the edge of natural drainage channel".

Constituting a Committee

Implementation of rejuvenation strategies require coordination and close collaboration of multiple government departments, non-government stakeholders such as civil society organisations, developmental organisations, academic and research institutes as well as members from the communities. The committee formation aides in better planning, ease the intra-, as well as inter-departmental coordination and communication within the government machinery involved and also between government departments and non-government entities.

Project Execution and Monitoring

A systematic analysis of information based on planned activities and set targets during the implementation of the rejuvenation initiatives is required to measure progress. Evaluation exercises have to be conducted to compare actual outcomes and impacts against the agreed strategic plan (or Master Plan) at different stages of their implementation. Continued and direct communication with community members, local Non-Governmental Organisations (NGOs) and government representatives to monitor project implementation, keeping track of project priorities and results are required to initiate course correction, as necessary. A comprehensive project report provides an overview of the fields of action and priorities. What should be included in such a report is listed in figure 15.

Components of Detailed Project Report
<ul style="list-style-type: none">• Project Background: Introduction, Project Purpose, Objectives, Scope and Relevance of Work• Existing Condition: Mapping and assessment, Socio-economic assessment, land use pattern, Rainfall pattern etc.• Statutory and Legal Framework: Legislations, rules, guidelines, plans at National and State Level• Benchmarking and Gap: Existing status VS benchmarks mentioned in guidelines• Impact of Actions: Social, Economic, and Environmental Impacts• Detail Design: Project Components, Strategies, master plan etc.• Cost Estimation: All relevant cost components of the proposed interventions• Implementation and Management arrangements: Institutional Capacity and framework, Implementation schedule, investment schedule, Monitoring mechanism• Operation & Maintenance Plan: Proposed Mechanism

Figure 15: Components of a detailed project report; NIUA

Financial Mechanism

The finances of the urban local bodies can be categorised as conventional and Innovative financial mechanisms. While conventional mechanisms are the funds that are allocated generated through various sources, innovative mechanisms offer alternative routes to access funds for the implementation of the projects. Some of the innovative mechanisms include:

- 1. Issuance of Municipal Bonds:** Municipal bonds and debentures issued to the general public or specific institutions at fixed long term interest rates. These bonds can either be taxable or tax free. E.g. Pune Municipal Corporation raised INR 200 crore through the sale of municipal bonds to finance water supply projects under the Smart Cities Mission.
- 2. Operations and Management:** Factoring in O&M cost in financial plans helps to allocate separate funds for the same. Another mechanism is to implement user charges for the operations and management that can enhance the revenues of urban local bodies. E.g. Kankaria Lakefront Development project had imposed user charges.

3. **Value Capture Financing (VCF):** This mechanism ensures that the private land and buildings that benefit from public investments in infrastructure and policy decisions of the government, should pay for it. E.g. The Ahmedabad Municipal Corporation (AMC) loaned money to Sabarmati River Front Development Corporation Limited (SRFDCL), was supplemented by AMC's investment in the share capital of SRFDCL. Housing and Urban Development Corporation (HUDCO) also provided a loan for the Riverfront Project. A small portion of the reclaimed land will be sold for commercial development, to generate adequate resources to pay for developing the riverfront and managing it.
4. **Public-Private Partnership:** An arrangement between a government or statutory entity or government owned entity and a private sector entity for the provision of public assets and/ or related services for public benefit, through investments being made by and/or management undertaken by the private sector entity for a specified. E.g. The AMC has outsourced several recreational activities as well as activities like housekeeping, operations & maintenance and security to qualified private sector parties.
5. **Loans from financial institution:** Specialized financial institutions e.g. International Development Finance Club (IDFC), National Housing Bank (NHB), Housing and Urban Development Corporation (HUDCO) and Infrastructure Leasing and Financial Services Limited (IL&FS) are some agencies which provide loans and a variety of instruments for infrastructure financing or from multilateral funding agencies like various United Nation (UN) bodies, World Bank, Organisation for Economic Cooperation and Development (OECD), Asian Development Bank (ADB). E.g. In the case of Karanji lake restoration in Mysore Assistance was sought from the Asian Development Bank, the Karnataka Urban Infrastructure Development Finance Corporation (KUIDFC) and the Zoo Authority of Karnataka (ZAK).

If processes and tasks are outsourced to external consultants, figure 15 provides an overview of the requirements of request for proposals and the preparation of tender documents.

Preparation of Tender Documents/ Request for Proposal
<ul style="list-style-type: none"> Instructions to Consultants: Criteria and sub-criteria, Cost of Bidding, Language of Bid, Currency of Bid, List of Deliverables and Duration, Terms of payment Technical Proposal: Brief background of the applicant firm, letter of intent, Profile and Business licenses, Evidence of undertaking similar work, latest audited financial statement, Certificates and accreditation, Summary of methodology and timelines Financial Proposal: Cost breakdown; Per-deliverable, by Cost component Terms of References

Figure 15: Components of tender documents; NIUA

Monitoring and Maintenance

Setting up a monitoring system is essential to assess the changes in the context of urban water bodies and open spaces over a period of time. It entails collecting information in order to assess whether progress is made towards the envisaged results. It also gives the key stakeholders regular feedback and indicators of progress (or lack of) and therefore an opportunity to review the assumptions and strategies at key junctures to assess their validity. Management of rejuvenation initiatives include actions or provisions for long term sustainability of the actions: This long-term sustainability can be ensured through engaging the community throughout the process from planning to implementation and raising awareness through organising programmes. The management of the initiatives can also be allocated to private entities to undertake operations and maintenance of the parks or water bodies rejuvenated.

Saving Open Space and Urban Lakes (SOUL) and Cultural rejuvenation of Twin City of Hubli-Dharwad, Karnataka

Suffering from degeneration due to the drying of lakes, pollution of parks, encroachments, sewage and garbage disposal, the deputy commissioner took the initiative to rejuvenate the city by restoring its open spaces and urban lakes in 2008.



*Figure 16: Rejuvenated green space after the invention; Centre for Innovations in Public System
For further information: see Annex-2*

Section 5:

Urban Biodiversity

Key content:

- Presentation of the indicator CSCAF 'Urban Biodiversity
- Stakeholder Mapping Exercise
- Implementation strategies to establish a local Biodiversity Management Committee

Learning goals:

- Understand the indicator, how its calculated and measured
- Understand the importance of biodiversity in urban contexts
- Identify relevant stakeholders and important groups
- Engage with these groups to form institutional working bodies to preserve and improve the state of urban biodiversity

Introduction into Indicator 3: Urban Biodiversity

The term *Biodiversity* is often linked to wildlife sanctuaries, natural parks, etc., but existence of biodiversity in urban areas is one measure which needs to be actively enhanced and promoted. According to the definition given by the Convention of Biological Diversity (CBD), it refers to all the variety of life that can be found on Earth (plants, animals, fungi and micro-organisms) as well as to the communities that they form and the habitats in which they live²¹. Biodiversity in cities plays a far more important role and is not just greenery and some birds and animals. It is an indicator of the ecological health of an area. It provides ecosystem services, which would otherwise be sought from outside the city at a cost and increase in the ecological footprint.

The value of wildlife in cities is often underestimated. Nature in cities is not only a matter of cultivated and managed biodiversity such as urban parks, gardens and lawns, but also in areas like urban wetlands, abandoned industrial sites, roadside verges, vacant lots, derelict lands, ruins, allotment gardens and cemeteries which are increasingly recognized as potential reservoirs of urban biodiversity together with arboreta, residential gardens and villas, botanic gardens and individual balconies. Cities harbour a surprisingly high proportion of Earth's species biodiversity. Many of them are native or even endemic to their region²². It also provides significant ecosystem services contributing to climate change mitigation and adaptation, such as carbon sequestration, air and water purification, mitigation of impacts of environmental pollution, noise reduction, and regulation of microclimate. High biodiversity increases the resilience of the city.

Legal Foundation

On June 5, 1992, India signed the Convention on Biological Diversity at Rio de Janeiro which provides a framework for the sustainable management and conservation of our country's natural resources. Ten years later in India, the Biological Diversity Act was enacted in 2002 in order to conserve biodiversity, manage its sustainable use and enable fair and equitable sharing benefits arising out of the use of biological resources with the local communities²³. Section 41 of the Biodiversity Act provides the scope

²¹ CBD, C. o. B. D., 2006. Convention Text. [Online] Available at: <https://www.cbd.int/convention/articles/?a=cbd-02>
CBD, C. o. B. D., 2012. City Biodiversity Outlook, Montreal: s.n.
National Biodiversity Authority, 2002. Biodiversity Act 2002. [Online] Available at: http://nbaindia.org/uploaded/act/BDACT_ENG.pdf

²² CBD, C. o. (2012). City Biodiversity Outlook. Montreal.

²³ <http://nbaindia.org/content/25/19/1/act.html>

to Municipal Corporations and gram-panchayats to perform all the activities relevant to its overall Biodiversity Management and constitute a Biodiversity Management Committee within its area of jurisdiction. The Biological Diversity Act envisages a three-tier system for implementation, with the National Biodiversity Authority (NBA) headquartered in Chennai at the apex, State Biodiversity Boards (SBB), and Biodiversity Management Committees (BMC) in local bodies (see figure 17).



Figure 17: Stakeholders on different implementation levels; Implementation of India's National Biodiversity Strategy & Action Plan (NBSAP), pp. 19

How to measure the Indicator

Municipalities have to establish a Biodiversity Management Committee (BMC) which would take the cities to the level 2 of the CSCAF indicator. The BMC would be responsible for preparing the People's Biodiversity Register (PBR) and that would ensure the cities to reach level 3 which also includes the baseline assessment of the status of the existing flora and fauna thriving in the city. After establishing the baseline, a local biodiversity action plan has to be prepared, proposing the list of measures to increase the biodiversity in the city. These measures and actions should be further incorporated into the master plan for development of the city for their effecting

implementation along all other city level planning interventions (see figure 18).

	1	2	3	4	5
Progression	No Action Initiated	Institutional Set-Up	Baseline Assessment	Urban Biodiversity Improvement Measures	Implementation of Actions
Evidence/ Data sources	No action initiated	<ul style="list-style-type: none"> Establishment of City Level Biodiversity Management Committee (as per Biological Diversity Act, 2002; City council resolution; announcement to State Biodiversity Board) 	<ul style="list-style-type: none"> People's Biodiversity Register (based on the Biological Diversity Act, 2002, Letter of State Biodiversity Board validating register) Inventory of urban ecosystems and species (including International Union for Conservation of Nature, IUCN listed species) 	<ul style="list-style-type: none"> Funds/ Municipal Budget allocated Identification of measures to increase biodiversity within master plan/ greening plans/ rejuvenation plans 	<ul style="list-style-type: none"> Calculation of City Biodiversity Index (Report with the calculated index) Evidence on implementation of measures identified in level 4 Evidence on change/ improvement in species diversity (species list of various taxa) Map of areas where measures to increase biodiversity have been taken as .kml files (polygon geometry) wherever applicable

Figure 18: Performance Evaluation Levels of the CSCAF Indicator 3: Urban Biodiversity; NIUA

Exercise: BMC Stakeholder Mapping

The stakeholder's mapping exercise related to urban biodiversity aims to identify the relevant stakeholders in the city to conduct biodiversity management and finding out how and at what levels they can be involved (see figure 19). In this training, the online platform mural is used to carry out the exercise as it allows multiple users to work on a single screen with each other. The user's views can be collected, and responses can be discussed during the exercise based on their activities. The following steps need to be undertaken during one of the online mural exercise:

1. Identification of stakeholders
2. Type of Engagement
3. Mode of Engagement
4. Classifying the findings into various CSCAF levels

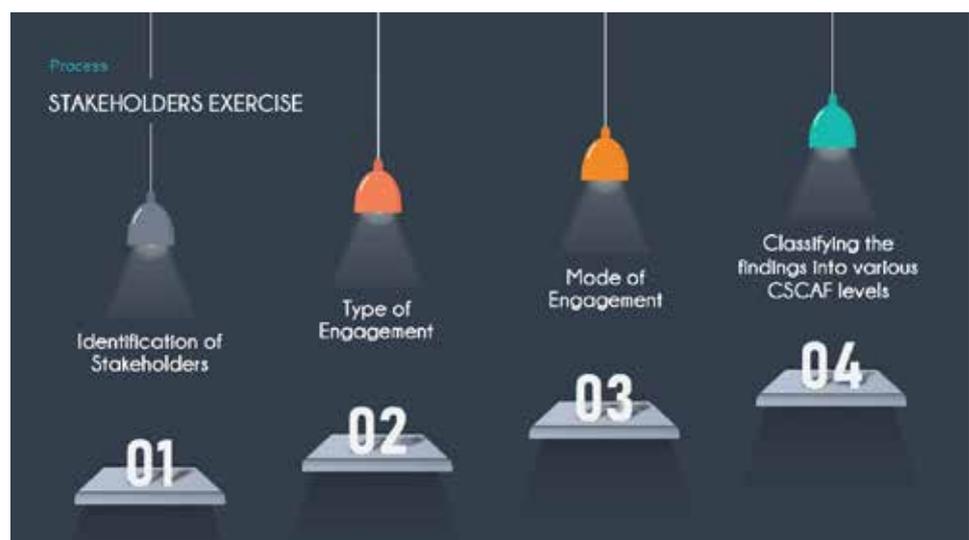


Figure 19: Steps of a stakeholder exercise; NIUA

Step 1: Identification of the Stakeholders

Relevant Stakeholders need to be identified and distributed into three different levels, national/international, state and city level. Write the type of stakeholders on the prepared digital 'sticky note'²⁴ and place them in the respective section on the mural template.



Figure 20: List of local level stakeholders; results

Step 2: Classify type of Engagement with the stakeholder

All the local stakeholders which were identified in the previous step need to be classified into the type of engagement depending upon the different activities related to urban biodiversity mapping and conservation. Copy the digital 'sticky notes' into the respective section of the template.



²⁴ Sticky note: These are digital small sheets/labels which can be used to write upon, drag and drop to various places on the screen limits. They are available on left side bar panel on the Mural platform. <https://www.mural.co/blog/sticky-notes-revamped>

The Yamuna Biodiversity Park

185 hectares of degraded land with heavily silted marshes was reinstated, using ecological restoration principles. Today, it provides recreation for residents and improves urban biodiversity in New Delhi



Figure 24: Shallow wetland at Yamuna Biodiversity Park; Delhi Biodiversity Foundation DDA, 2016

For further information: see Annex-2

Documentation includes photographs (including digital images), drawings, audio and video recordings and other records like printed material.

As per the PBR booklet, format 29 & 30 is to be used for filling the details for flora (plants) and fauna for urban biodiversity (see figure 25). Separate format should be used for

- Road side plantation
- Parks and Gardens
- Housing estate
- Commercial buildings
- other institutional areas,
- Private club premises
- Aquatic (water) habitat and
- Terrestrial (land) habitat

Format 29: Flora

1.	2.	3.	4.	5.	6.	7.
Sr. No.	Local Name	Scientific Name	Type of Plants	Habitat	Flowering Season	Remarks (Rare / Common etc.)

Format 30: Fauna

1.	2.	3.	4.	5.	6.
Sr. No.	Local Name	Scientific Name	Type of Animals (Mammals / Birds / Fish / Insect etc.)	Habitat	Remarks (Rare / Common etc.)

Figure 25: Official Formats for Flora and Fauna; People's Biodiversity Register 2013 (National Biodiversity Authority), pp. 39

Section 6:

Reflection, Outlook and Feedback

Key content:

- A formal template to plan specific follow-up steps and set goals
- An informal exercise to set ambition
- Reflection exercise to consolidate the learnings from the training and provide feedback

Learning goals:

- Gain the tools to formulate an action plan and implement measures
- Reflect on the training, provide feedback and clearly formulate key take-aways

Outlook Exercise: Easy Action Plan

This simple exercise the creation of a first action plan, before introducing a specific measure into a formal planning process. As with most project planning, the success of a UGP process depends on considering all necessary steps, the involvement of all important stakeholders and the right timing. The template can be used below to gain a quick and easy overview of what is required. This can serve as a first step to begin planning any urban green and blue project.

Filling in the template should follow these four dimensions:

- First, identification what exactly should be done to realize a specific measure or project
- Second, identification who needs to be involved and engaged with early on
- Third, decision what exactly is the very first step for that particular task
- Fourth, definition of an overall timeline based on all necessary individual steps

Instructions

Framework –the political responsible person or body has given the task to come up with ideas for better urban green. The indicators of the CSCAF indicate potential for improvement in the city. The report is due in a short time.

Possible Situation – Considering the learnings of this training and previous experience, one or several areas that should be addressed have to be chosen. What next steps should be taken to:

- a. Improve urban green planning in the city? or
- b. Initiate integrated urban green planning? or
- c. Start/improve urban green in a development project?

Exercise

1. Please choose one option and start to elaborate the first steps. Be as precise as possible.
2. Present your first steps to your colleagues and ask for feedback.
3. Identify the three most convincing arguments for UGP in the city.

Step	What exactly should be done	Who is responsible	Who else is involved	How to get started	When	Remarks, things to be considered
1						
2						
3						
...						

Figure 26: First steps checklist; own compilation

Reflection Exercise: Letter to my future self

A less formal approach to plan ahead and define some goals to work towards is to write a letter to your future self. A personal tone may be chosen, as well as writing in the style of a project report that summarizes the successful implementation of a plan to improve urban green. The template above may be used for brainstorming.

Such a letter can help define ambition with regards to UGP in the city, and a timeframe to achieve such goals. To create some level of public or peer pressure, the letter may be shared within the planning department or other colleagues in advance. One option is to send the letter to yourself via email after a year (tooltip: <https://www.futureme.org/>), as a reminder in a calendar system, or to simply store it away for the appointed time.

Going back to the letter after the chosen time has passed (e.g. 1 year) helps to assess successes against the initial plans. If some parts did not work, reconsider what was initially planned and look into the reasons for why it may not have worked this way.

The letter should contain certain elements:

Date in the future – decide on when the letter should arrive, depending on the type of action needed to achieve the defined goals. (e.g. 6 months to perform the CSCAF assessment, 1 year for implementing smaller projects, 5 years for major developments)

Goals – specify what is the outcome to achieve and how to get there. (e.g. advance one level on the CSCAF indicator on proportion of green cover by increasing the amount of city trees by x%).

Actions – describe the activities that led to achieve the goals and in which order they did occur. (e.g. in February, the new tree plantation plan was proposed to the council).

Next steps – describe how to move forward from previous success. What will be possible to achieve based on what has been built already?

Feedback Exercise

To solidify the learnings from this training, please briefly reflect on the content and structure of the sessions. This helps to identify specific learnings, where more information is needed and what may not be suitable for a particular situation. Sharing these reflections with the organisers serves to improve the training in the future.

An easy method to structure the reflection is the five-finger exercise (see figure 27). Each finger represents one aspect to consider, a full hand provides a comprehensive picture. Please write down your findings and share them with your colleagues and the organisers.

Thumb – thumbs up for something you really liked about the training.

Index finger – point at something that you think really was really important or surprising.

Middle finger – What did you not like or would like to challenge or criticise?

Ring finger – Define one specific aspect or practice you will integrate into your work in the future

Little finger – What did you miss or what has not been covered sufficiently?

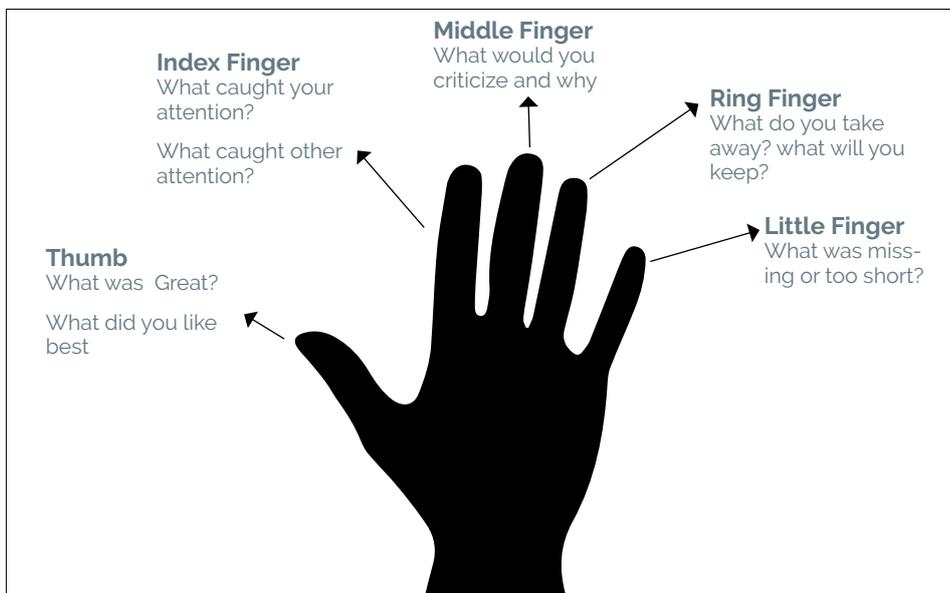


Figure 27: The Five Finger Method: Difu

List of Annexure

Annex 1 – Step by step exercise google earth engine

Annex 2 – Case studies

Greening Initiatives in Thane City

Thane city, located in the Maharashtra State of India, **witnessed fast depletion of the green cover.** To cope with the implications of concretization, Thane Municipal Corporation launched a plantation drive intending to plant 5 lakh trees in 3 years with 1 Lakh of Indigenous Species. Considering the scarcity of the land within the city, in association with the Forest Department Thane Municipal Corporation identified the degraded forests within the city limits for the plantation. A tri-party agreement was established between the Forest Department, Forest Development Corporation of Maharashtra and Thane Municipal Corporation. More than 6 lakhs were planted within four years in the Thane city limits involving local leaders, celebrities, NGOs, students, citizens, on degraded forest lands, roadsides, reservation plots, dividers, etc.



Figure28: Plantation drive; Tree Authority and Garden Department, Thane

For further information:

Tree Authority and Garden Department, accessed at <https://garden.thanecity.gov.in/view/en/treeplantations>

<https://smartnet.niu.org/csc/assets/pdf/urban-planning/CS3.pdf>

Saving Open Space and Urban Lakes (SOUL) and Cultural rejuvenation of Twin City of Hubli-Dharwad, Karnataka

The twin city of Hubli-Dharwad is the second-largest city and second most populous urban area in the state of Karnataka. Even though the city has been blessed with natural resources but the state of the assets started to degenerate due to the drying of lakes, pollution of parks, encroachments, sewage and garbage disposal. The deputy commissioner took the initiative to rejuvenate the city by restoring its open spaces and urban lakes fearing the loss of open and recreational space in the year 2008. The efforts aimed at not only towards sustainable development but also to reinstate the trust of the citizens in the development authorities. The other key initiative was also to restore the cultural legacy of Hubli-Dharwad – the Hindustani Music



Figure 29: Restored and rejuvenated green space after the intervention; Centre for Innovations in Public System

For further information:

1. Source: Department of Administrative Reforms and Public Grievances <http://iidmindia.com/report-pdf/13-innovative-initiatives-awarded.pdf>
2. Centre for Innovations in Public System <http://www.cips.org.in/dbinnovativepractices?id=183&category=Urban+Governance>

Yamuna Biodiversity Park, New Delhi

The Yamuna Biodiversity Park, situated at 28° 44'N and 77° 12'E on the west-bank floodplains of the Yamuna River in Delhi, a joint collaborative programme of Delhi Development Authority and CEMDE, Delhi University. An area of 185 hectare of degraded land with heavily silted marshes was taken up for the establishment of YBP with objectives to restore the riparian and wetland communities of the Yamuna River Basin using applicable ecological restoration principles.

About 64 hectares of this area is located in the inactive floodplain, which was cut-off due to an embankment where the entire area was highly saline with pH up to 9.2. The remaining 121 hectares is still in the active flood-zone which is flooded annually connected with a corridor. Entire Yamuna floodplain along with desilting of wetlands which is now functional by rainwater harvesting and sub-soil water.

Restoration Process: Site was examined to check how deep aquifers were and what plants might grow well on it. Area was desilted to allow rainwater to flow. Sages and aquatic plants were planted to further purify water. Several resident and migratory birds like pochards, herons and shovelers started arriving to the waterbody, breeding there and cleaning up the water surface that became a rich breeding ground for insects as well. Different species of grass and shrubs were planted for soil better holding and for increasing biomass. Different ecosystems were created such as deciduous forest, evergreen forest, sub-tropical evergreen, moist tropical deciduous forest etc.



Figure 30: One of the mound at Yamuna Biodiversity Park; NIUA (PC Neha Sinha)
More information: <http://www.delhibiodiversityparks.org/yamuna-biodiversity-park.html>



Figure 31: Shallow Wetland at Yamuna Biodiversity Park; Delhi Biodiversity Foundation, DDA
More information: <http://www.delhibiodiversityparks.org/yamuna-biodiversity-park.html>



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