INTERACT-Bio
Integrated action on biodiversity

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Local Governments for Sustainability

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Cities Biodiversity Center
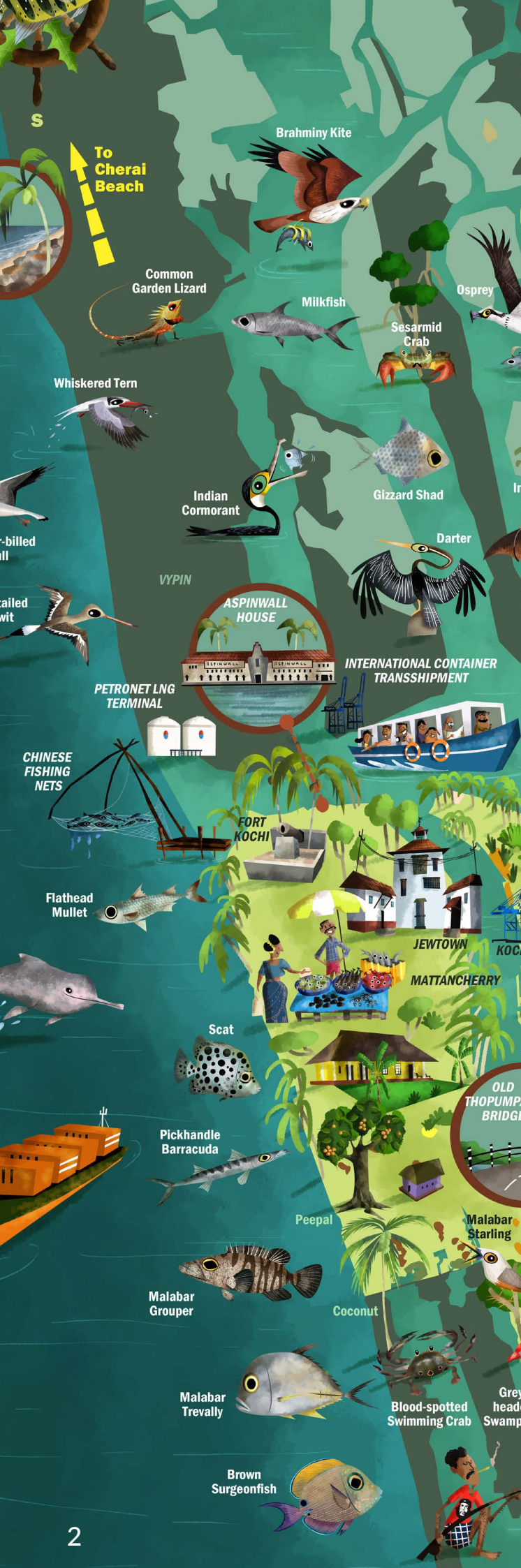
ILLUSTRATED NATURAL ASSET MAPS

A NOVEL TOOL TO COMMUNICATE THE IMPORTANCE OF NATURE IN CITIES

Illustrated Natural Asset Maps are uniquely powerful visual tools that simplify, represent and communicate information about complex ecosystem structures, functions and services in a geographic area. The maps support local governments to integrate biodiversity conservation and ecosystem management into urban planning and community involvement for sustainable development and improved quality of life.

Urban nature provides diverse life-supporting and life-enhancing benefits to city dwellers even if they are not aware of it. Illustrated natural asset mapping is a spatially stimulated, innovative mapping technique which combines geographic information systems, science, culture and art to represent the ecological, social and cultural assets of an area. The maps combine information from geo-referenced natural asset maps with socio-cultural and ecological landscape information, generated through scientific studies and local knowledge, in a visually appealing artistic fashion. Illustrated natural asset maps can contribute towards raising awareness of the critical role of urban nature in supporting a healthy and balanced urban life. It can also bring about local accountability towards nature, thus contributing to meeting Aichi Target 1.

S
To Cherai Beach

Brahminy Kite

Common Garden Lizard

Milkfish

Osprey

Sesarmid Crab

Whiskered Tern

Indian Cormorant

Gizzard Shad

Darter

-billed ll

ailed wit

VYPIN

ASPINWALL HOUSE

INTERNATIONAL CONTAINER TRANSSHIPMENT

PETRONET LNG TERMINAL

CHINESE FISHING NETS

FORT KOCHI

Flathead Mullet

JEWTOWN

KOC

MATTANCHERRY

Scat

Pickhandle Barracuda

Peepal

Malabar Starling

Malabar Grouper

Coconut

OLD THOPUMPA BRIDGE

Malabar Trevally

Blood-spotted Swimming Crab

Grey headed Swamp

Brown Surgeonfish

The importance of illustrated natural asset maps as planning and awareness tools

The natural environment in cities, also referred to as urban nature, provides valuable and free services that contribute directly to human well-being and livelihoods. Although crucial to the sustainability of cities, urban nature is often undervalued. This can be attributed to a general lack of awareness among urban planners, decision makers and residents. Both Aichi Biodiversity Target 1 and India's National Biodiversity Target 1 recognize the importance of awareness raising to ensure that the value of biodiversity is reflected in conservation efforts and sustainable use of natural resources.

Mapping enables spatial data storage, information anaylsis, idea generation, hypotheses testing and presentation of results in compelling, visual forms (Kitchin et. al 2011). Natural asset mapping identifies, visualizes and determines existing natural resources or assets in a defined geographical area, which are important to the communities living there. Mapping and evaluating natural assets is critical for economic development, public health, safety and aesthetics and is a good step towards raising awareness of the critical role that urban nature plays in supporting healthy and balanced urban lives (Ferguson 2017). Illustrated natural asset maps take this a step further by presenting all of this complex information in an artistic, fun and visually appealing manner, supporting awareness generation on natural ecosystems and their significance to health, economy, aesthetics, livelihoods and overall well being.

KOCHI: QUEEN OF THE ARABIAN SEA

Kochi, often referred to as the Queen of Arabian Sea with its all-weather natural harbour, serene backwaters, beautiful lagoons, wooded isles and magnificent seascape, is the epicentre of fast emerging developmental activities in Kerala state.

It is the second most important port city on the western coast of India and is the financial, commercial and industrial capital of the state of Kerala. Spread over an area of 94.88 km², the city's environs include the Vembanad Lake, the largest Ramsar site in Kerala, the coastal elements of the Arabian Sea and a network of backwaters and canals linking the lake and sea. Kochi's recent history has witnessed the large-scale replacement of natural ecosystems such as backwaters, wetlands and mangroves, with built-up areas (ICLEI South Asia, n.d.). The changing land use has put the city and its surroundings under increased pressure from resource scarcity, degraded air and water quality, and reduced green space. However, the local government is aware of the importance of protecting ecosystems in the city region and is working to mainstream biodiversity conservation.

Facts and figures

Local government name
Kochi Municipal Corporation (KMC)

Country and province
India, Kerala

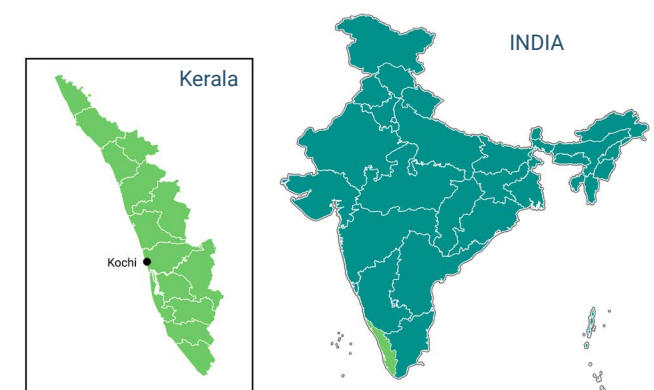**Population (2011)**
0.677 million

Total area
94.88 km² (2006)

Municipal Budget
9,875.7 million INR (2019-2020)

GHG inventory available since:
2019

Kerala

Kochi

INDIA

Using art to simplify science: a tool for urban education

Kochi is one of eleven global cities that has worked with ICLEI to map its natural assets through the INTERACT-Bio Project. The city followed a five step process (detailed on the right) which resulted in an illustrated natural asset map. The map combines spatial information represented in the natural asset map, with local information on the natural, biodiversity and cultural assets of that area in an artistic illustration.

The main purpose of developing illustrative natural asset maps is to facilitate understanding and awareness around the biodiversity and ecosystems within the area of interest, which in this case is a city. The map can also be used by local authorities as a decision making tool as well for the area's green and blue infrastructure and related investment opportunities.

The innovative process of developing illustrated natural asset maps is participatory, and incorporates elements of shared local and traditional knowledge to produce outputs that are not just visually stimulating, but which may also enhance accountability of citizens towards their local environment.

Steps of the illustration proccess

1 Natural asset mapping

Land use and land cover maps are developed, which highlight areas that provide ecosystem services within the area of interest. The mapping process uses high-resolution, remotely sensed, spatial data and modern Geographic Information System (GIS) based on a posteriori land classification scheme. The land classification scheme should be reviewed for accuracy in a participatory manner with the help of local experts as well as Global Positining System (GPS) based land use surveys.

2 Cultural asset mapping

A list of cultural assets such as museums, stadiums, traditional livelihoods, gardens, monuments, and important protected natural areas such as wildlife sanctuaries and national parks within a set radius of the local administrative area are prepared in consultation with local experts and authorities. The selected cultural assets must be surveyed to produce a photo database and a subsequently, a cultural asset map.

3 Species and ecosystem selection for the illustration

A representative list of (preferably) native flora, fauna and ecosystems of the area must be prepared, taking into consideration socio-cultural values of the region. The list can be developed from reliable references such as the People's Biodiversity Register (which can be accessed only after written approval from the Biodiveristy Management Committee), City Biodiversity Index, published scientific articles and web databases. This list must be vetted by local experts.

4 Illustration

This step combines the information generated from the steps above in the form of an illustrative natural asset map with the help of a skilled illustrator. The base map of the illustration should be a scaled natural asset map of the administrative area.

5 Verification and finalization

The draft illustrative natural asset map prepared should be verified by local stakeholders before finalization.

Outcomes

Depending on the local context, socio-cultural elements, the vision of the local stakeholders and the artist, the output map will vary. Thus, the final image can be rendered in different styles, colour tones, and themes.

The examples of Kochi, Panaji and Gangtok show how cultural and historical elements have resulted in different map outputs for each city.

Kochi Municipal Corporation, in collaboration with ICLEI South Asia, is now preparing to showcase the illustrated natural asset map of Kochi at various spots in the city such as on billboards, near the airport, in a nature interpretation center at Subash Bose Park and in Nehru Park as well as in the Municipal Corporation office. By promoting a visual representation of the city's biodiversity, the local government believes that residents will gain awareness of the natural assets within the city and begin to take ownership of how their actions affect that biodiversity.

The use of illustrated natural asset maps as innovative tools to generate awareness of a city's biodiversity is unique. These maps are visual reminders of the diversity of lifeforms and ecosystems in a city that tie in with local culture and history. They bring out what a city must co-exist with and preserve in order to align with the sustainable development goals.

The illustrated natural asset maps can also generate revenue for the city through the development of merchandise or use in tourism initiatives.

KOCHI
Our City, Our Nature, Our Future.

Application of Illustrated Natural Asset Maps in Kochi

The map depicts the ecosystem and biological diversity in Kochi, ranging from marshes and paddy fields, to estuaries, beaches, mangroves and hills. Important protected areas like the Mangalavanam Bird Sanctuary, a mangrove forest in the heart of the city, Periyar Tiger Reserve and Eravikulam national park are illustrated with iconic fauna found within them.

The city's network of backwaters and its aquatic diversity which play a significant role in Kerala's culinary traditions are also highlighted as well as Kochi's hill forests which host many insects and birds endemic to southern India. Important infrastructure and cultural icons such as Jew street, Marine drive, Chinese fishing nets, Aspinwall House, Kochi port, Subash park, Kochi Municipal Corporation, Hill palace museum, Kerala History Museum and Kochi Metro rail are also depicted. The compass pays homage to the State Fish of Kerala, the Pearl Spot, and at the very top, is a Kathakali (the classical dance form of Kerala) dancer who animatedly surveys the map with a pair of binoculars.
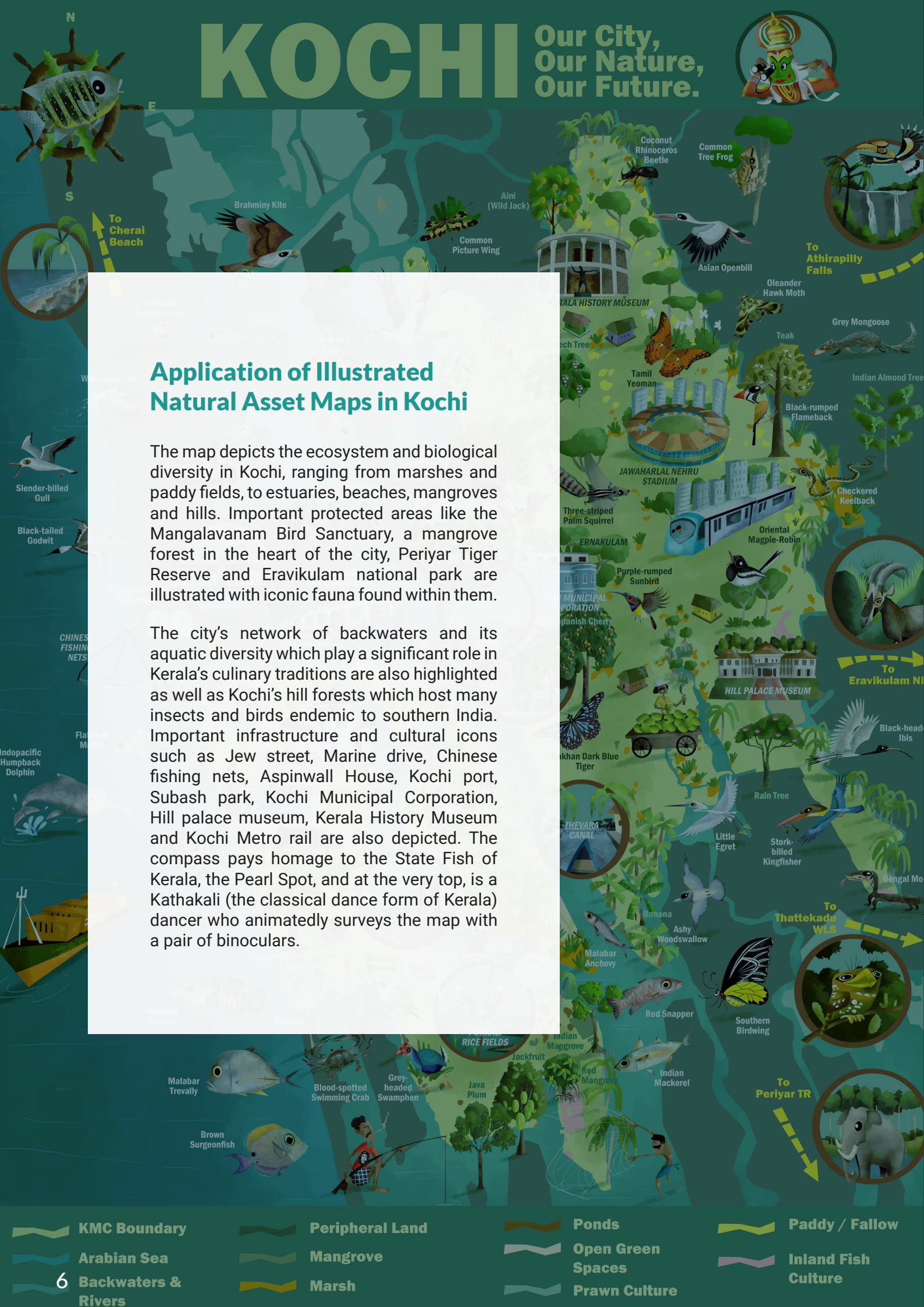
Legend
- KMC Boundary
- Arabian Sea
- Backwaters & Rivers
- Peripheral Land
- Mangrove
- Marsh
- Ponds
- Open Green Spaces
- Prawn Culture
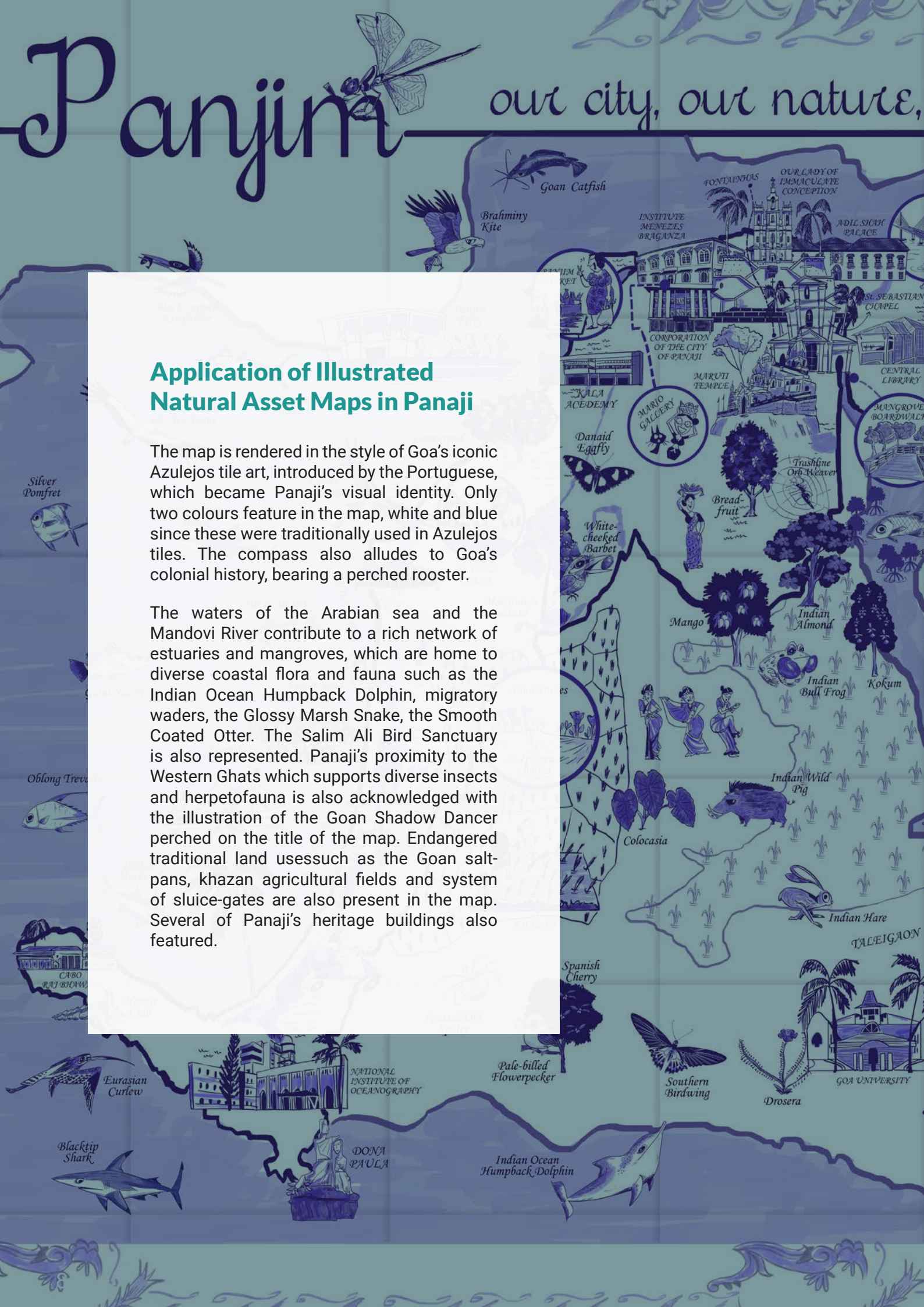- Paddy / Fallow
- Inland Fish Culture

GANGTOK
Our city, our nature, our future

Application of Illustrated Natural Asset Maps in Gangtok

Gangtok, being a mountainous city in the State of Sikkim, was illustrated in cool color tones, to highlight its climatic patterns. The entire map is drawn in the style of the dominant artform of Sikkim, Thangka. Gangtok's fragile mountain ecosystems, are represented along with its waterfalls, rivers and endemic biodiversity.

The map also highlights elements of agrobiodiversity like the terrace or step farms where paddy and other crops are grown, the yak, Sikkim mandarins. Protected areas like Fambonglho Wildlife Sanctuary, Kyongnosla Alpine Sanctuary within the vicinity of the city are represented along with important tourist spots like Tsongmo Lake, Natula Pass and Mt. Kanchenjunga. Important administrative and religious buildings such as Raj Bhavan, Sikkim Legislative Assembly, Rumtek Monastery, Tsuklakhang Palace are also featured. Gangtok's spiritual image is further represented in the 8 lucky signs of Vajrayana Budhhism on the compass and the prayer wheels on the top. Cultural representations from the three original ethnicities of the city, the Lepchas, Bhutias and Gorkhas, dance forms and livelihoods are also present.

Legend
- Sparse Vegetation
- Agriculture
- Homesteads with Mixed Cultivation
- Urban Areas
- Playgrounds

Panjim — our city, our nature,

(illustrated map labels: Goan Catfish, Brahminy Kite, Institute Menezes Braganza, Our Lady of Immaculate Conception, Adil Shah Palace, St. Sebastian Chapel, Corporation of the City of Panaji, Central Library, Kala Academy, Mario Gallery, Maruti Temple, Mangrove Boardwalk, Danaid Eggfly, Trashline Orb-Weaver, Breadfruit, White-cheeked Barbet, Indian Almond, Mango, Indian Bull Frog, Kokum, Silver Pomfret, Oblong Trevally, Colocasia, Indian Wild Pig, Indian Hare, Taleigaon, Spanish Cherry, National Institute of Oceanography, Pale-billed Flowerpecker, Southern Birdwing, Drosera, Goa University, Eurasian Curlew, Cabo Raj Bhavan, Dona Paula, Indian Ocean Humpback Dolphin, Blacktip Shark)

Application of Illustrated Natural Asset Maps in Panaji

The map is rendered in the style of Goa's iconic Azulejos tile art, introduced by the Portuguese, which became Panaji's visual identity. Only two colours feature in the map, white and blue since these were traditionally used in Azulejos tiles. The compass also alludes to Goa's colonial history, bearing a perched rooster.

The waters of the Arabian sea and the Mandovi River contribute to a rich network of estuaries and mangroves, which are home to diverse coastal flora and fauna such as the Indian Ocean Humpback Dolphin, migratory waders, the Glossy Marsh Snake, the Smooth Coated Otter. The Salim Ali Bird Sanctuary is also represented. Panaji's proximity to the Western Ghats which supports diverse insects and herpetofauna is also acknowledged with the illustration of the Goan Shadow Dancer perched on the title of the map. Endangered traditional land usessuch as the Goan salt-pans, khazan agricultural fields and system of sluice-gates are also present in the map. Several of Panaji's heritage buildings also featured.

Replication

An output like the illustrated natural asset maps created in Kochi, Panaji and Gangtok requires the following resources:

Capacity

Staff with adequate knowledge of GIS and remote sensing tools to generate accurate land-use land cover maps is a basic requirement. Should this not be available, cities can partner with consultants or NGOs for this support. In several Indian cities, there is a paucity of biodiversity documentation hence, in this case, cities must partner with relevant experts from academic institutions, NGOs or consulting firms to develop this information.

Finance

A small budget which can come from sources like Corporate Social Responsibility (CSR) funds, or budgets under government schemes that aim to raise awareness generation can cover the costs of the artist's and other consultant fees, based on the city's capacity. To ensure widespread dissemination of the map within the city, local authorities must also plan a dissemination strategy which may require investment in assets such as billboards, local art installations or tourism materials.

Stakeholder Engagement

This is key in ensuring that the map is current, relevant and an accurate representation of the ecosystems, culture and biodiversity in the area. The map development is a participatory process and all steps require support from local experts and city officials. This is also essential in garnering commitment and ownership of the output
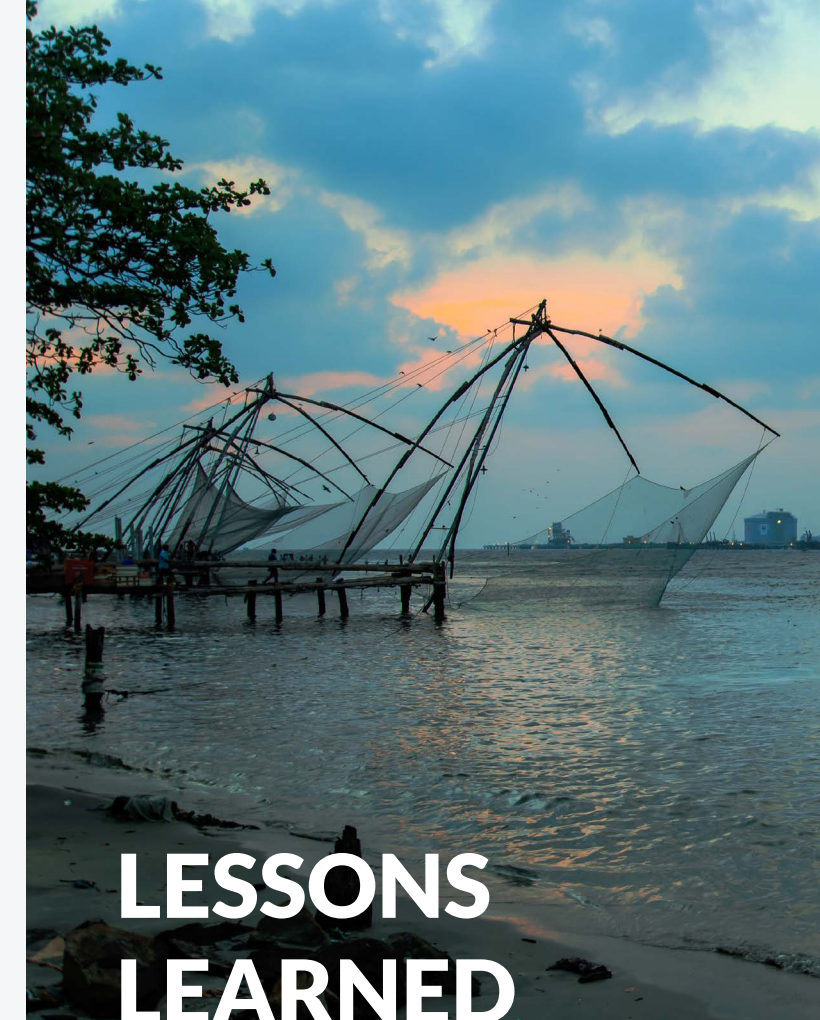
LESSONS LEARNED

- **Illustrated natural asset maps are a strong communication tool.** Seeing the illustrated natural asset maps of Kochi, Panaji and Gangtok, ICLEI South Asia has been approached by several other cities to help them in developing the same.

- **Participation is key in ensuring relevance and ownership of the map output.** City officials and local experts must be involved in every step that requires data gathering and verification. Since the map is an integration of the local spatial information with primary and secondary information sources, it requires substantial inputs from stakeholders and local experts.

- **Comprehensive secondary research, backed by onground verification generates maps of value.** The illustrated natural asset map combines the information in geo - referenced maps with social mapping in the form of an artistic output. Therefore, it is necessary that a robust scientific literature review, supplemented by onground verification and primary information surveys be carried out.

References

- Ferguson, L. (2017). Mapping and Managing Natural and Cultural Assets: Sustainable Heritage Areas: Partnerships for Ecotourism Deliverable DT2.1.1.

- ICLEI South Asia (n.d). City Resilience Strategy, Kochi. Funded under the Asian Cities for Climate Resilience Network Project. New Delhi.

- Kitchin, R., Dodge, M., & Perkins, C. (2011). Conceptualising Mapping. The map reader: Theories of mapping practice and cartographic representation, 1-7. John Wiley & Sons.

- Global Communications Team. (2019, May 07). Biodiversity in cities: How natural asset mapping helps cities protect livelihoods and address climate change impacts. Retrieved May 08, 2020, from https://talkofthecities.iclei.org/biodiversity-in-cities-how-natural-asset-mapping-helps-cities-protect-livelihoods-and-address-climate-change-impacts/

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