EXPLAINER

Sustaining Tourism and Increasing Resilience through Better Planning of Coastal Cities

Given the enormous economic significance of coastal tourism, new approaches are imperative for urban policy implementation and infrastructure planning. Photo credit: ADB.

As a way forward for coastal cities, this article explores the potential of system of systems approaches for integrated planning and management of coastal assets using nature-based solutions that engage communities.

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Introduction

With long coastlines of white sandy beaches, warm waters, and unique flora and fauna, coastal cities in developing Asian countries have become some of the world's most popular tourist destinations. Every year, millions of visitors from Europe, North America, East Asia, and a growing number of local tourists descend upon these cities to enjoy sun, sea, sand, and recreational activities. This tourism surge has resulted in the exponential growth of the tourism sectors of Thailand, Indonesia, and the Philippines in recent decades and contributed significantly to economic growth, as seen in Table 1. Viet nam for example, saw a 756% rise in tourism just in the past decade. In 2016, travel and travel and tourism were credited for contributing 5.1% of the Republic of Korea's GDP and 28% in the case of Cambodia. These trends indicate that countries with higher biodiversity and a predominance of natural ecosystems attract

more tourism.

Table 1: Data Showing the International Tourism in the Given Indian Ocean Rim Association (IORA) Countries (IORA ranking in brackets)

Country	Length of Coasline (km)	International Tourists Arrival (2016)	International Tourist Receipts ($ million)	Travel and Tourism Industry % GDP	Travel and Tourism Projected GDP Annual Growth Rate (2013-2022)
Thailand	3,219 (6)	32,588 (1)	49,871 (1)	9.0 (3)	6.7 (1)
Indonesia	54,716 (1)	9,963 (7)	11,349 (7)	3.1 (12)	5.3 (9)
Malaysia	4,675 (5)	26,757 (2)	18,074 (6)	7.2 (4)	4.4 (12=)
Mauritius	177 (21)	1,275(13)	1,572 (12)	11.3 (2)	4.4 (12=)
Sri Lank	1,340 (15)	2,051 (10)	3,518 (10)	3.9 (10)	6.1 (4=)
India	7,000 (3)	14,569 (4)	22,427 (3)	2.0 (19)	6.4 (2)

Notes: For most countries, arrivals and receipt data are for 2016 (but when unreported for 2016, the most recent available data are included). For India, international tourism arrivals are increased by the inclusion of day visitors, which would not be classified as tourism in most countries.

Source: United Nations (2010).

But this growth has also brought fragmented, disorganized, and unplanned development in coastal areas and cities, which in turn has led to the deterioration and degradation of the same beaches, coral reefs, and ecosystems the tourists come for, which are sometimes irreversible.

Asia's Tourism Boom: The Flip Side

Booming tourism has spurred the relentless rise of resorts, hotels, restaurants, even malls, along Asia's coastlines to meet the demands of the rapidly growing industry. Untreated discharge of wastewater and sewage, and increasing waste and plastic pollution, largely from tourism-related activities, have caused adverse impacts on coastal ecosystems, some of which may be irreversible.

This has also compromised the sensitive ecosystem in these dynamic coastal areas, which combined with human pressures and infrastructure development, have become increasingly vulnerable to natural disasters.

Famous examples include Pattaya, Thailand, where the unregulated development of bars, nightclubs resorts, and massage parlors along the 300-meter long coastline led to precious wetlands being converted into open sewers due to poor wastewater management and inadequate infrastructure for treatment.

Also, in Thailand, despite overwhelming evidence of tremendous environmental destruction of Maya Bay in the Ko Phi Phi islands, there was a reluctance to close it because of the almost 10 million pounds in tourism dollars that it generated a year. It was finally closed indefinitely in 2018 and will re-open for tourism only once the ecosystem of the beach is completely restored.

Similarly, Goa in India has suffered irreversible changes in land use, damaging coastal aquifers, the sand dune systems, and mangrove vegetation due to the unrelenting construction along its coastlines.

# Managing Coastal Cities: A Delicate Balancing Act

Coastal zones and cities are complex, intricate, and highly vulnerable, and comprise multiple ecosystems, processes, boundaries, stakeholders, and sector interests.

Figure 1: Interface between Subsystems
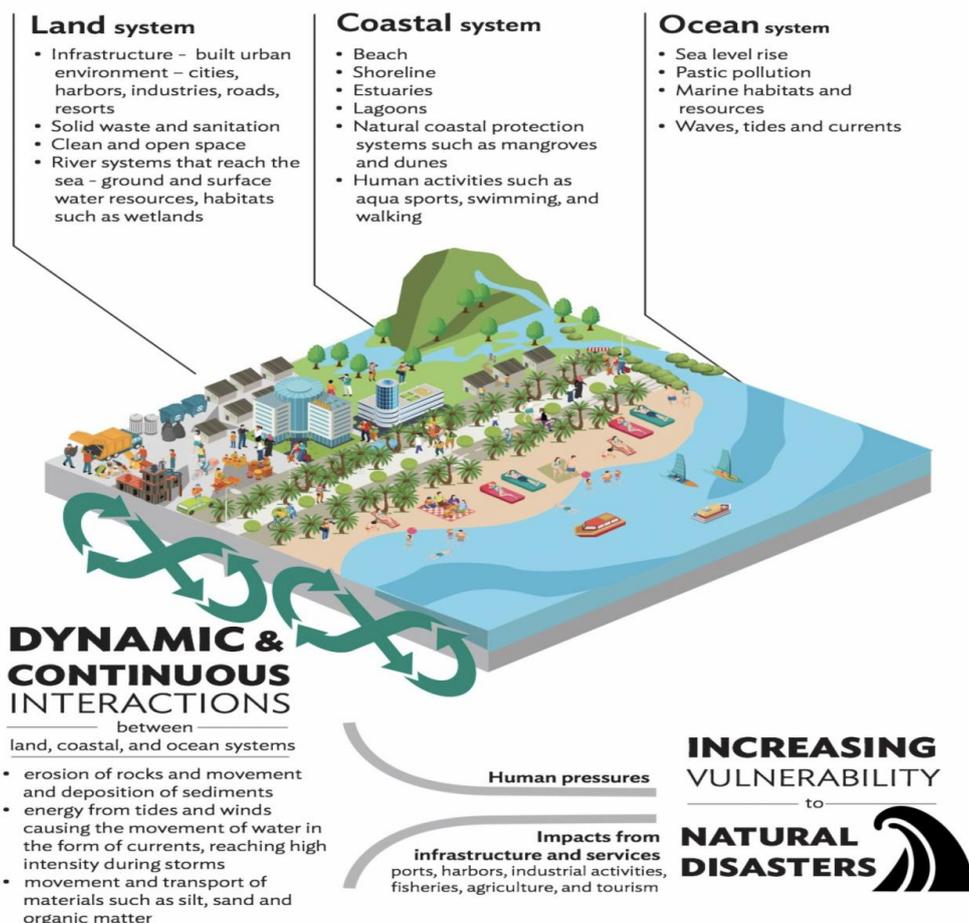
Source: Keisuke Taketani.

Figure 2: Conceptual Representation of the Dynamic Interface between Subsystems and their Interdependencies
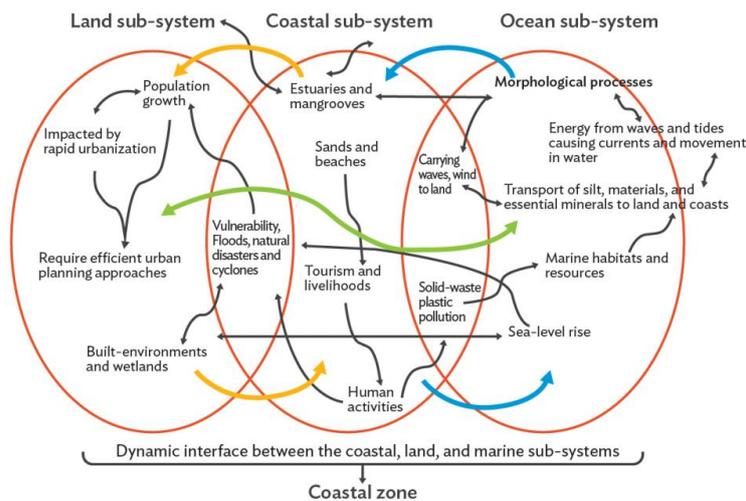
Source: Vedanti Kelkar.

As seen in Figures 1 and 2, there is a dynamic interface between Coastal, Land, and Marine Subsystems which are all interdependent.

This poses unique operational and managerial challenges for decision-makers, and city managers to balance trade-offs while bringing convergence, and improving governance in planning for city infrastructure, tourism, and the management of environmental and climate risks together with benefits to local populations. Sustainability is at the confluence of these elements.

How can then other coastal cities avoid going down the path of Pattaya, Maya Bay, and Goa?

How can they manage the natural ecosystems, maintain tourism revenues, and increase the resilience of their communities and infrastructure amidst growing populations and urban pressures, potential sea level rises, and other impacts of climate change?

A Three-Pillared Approach

In light of these questions, a review of secondary literature and actual experiences and analysis of coastal ecosystems across three broad pillars: (i) city management, (ii) pollution and climate change risks, and (iii) coastal tourism have identified a potential way forward for Asia's coastal cities:

System of Systems Approach: City-wide management

The System of Systems approach (SoS) offers a city-wide management strategy for enhancing tourism, minimizing environmental damage, improving service and infrastructure efficiencies and enhancing over-

all livability.

Because coastal cities are rooted in multiple, complex systems comprising numerous processes and stakeholders, they need to be managed as a network of interventions that integrates land, coastal, and ocean systems that intersect with science, governance and the civil society. Treating a coastal city as a "System of Systems", i.e. a combination of systems with operational independence from its individual components offers a cross-cutting and foundational management strategy.

Figure 3: SoS Schematic Encompassing the Various Systems and Stakeholders
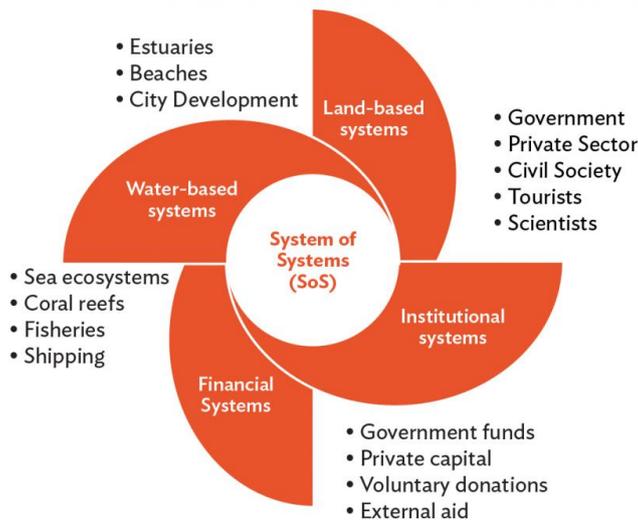
Source: Vaideeswaran S.

The SoS approach takes the concept of integration to a deeper level by unpacking each system and process. Economic, social, and environmental parameters and their individual elements are used to "unpack each system" to find contextual solutions. All the elements need to be in tune with each other. Invariably, there will be one or two weak elements that will pull down performance. It is these weak elements that need to be focused on.

Each intervention will have individual systems embedded within it. For instance, a bus stand or rail station is an intervention critical to tourism which is linked to land-based systems. The associated water-based systems waste management and the provision of drinking water, among others. This will also require financial and social systems. With this approach, the weak links are identified and actions will need to be taken to address them. That helps enable the effective performance of intervention within its system.

Systems thinking makes it holistic and integrated. It goes beyond independent initiatives, highlights the importance of interactions between different systems, and emphasizes the synergies that need to be embedded in the planning.

The Hybrid Approach: Integrate nature-based "green" solutions with engineered "grey" infrastructure

As coastal cities adapt to the "new normal" of rising sea levels, potential storm surges, and other climate threats, more physical or hard-engineered "grey" infrastructure such as seawalls are being planned and built. This can adversely affect natural assets and aesthetics such as the beaches, reefs, and mangroves that attract tourists and tourism dollars. Nature-based solutions—such as the conservation, restoration, and sustainable management of natural ecosystems or using nature-inclusive infrastructure, or "building with nature" can be used and integrated with grey infrastructure. These emerging solutions can offer cost-effective protection while delivering "co-benefits" such as reduced greenhouse gas emissions, improved food, and water security and increased opportunities for livelihood and recreation, and ensure that tourism values are preserved, even enhanced.

Figures 5 and 6: Examples of Hybrid Approach
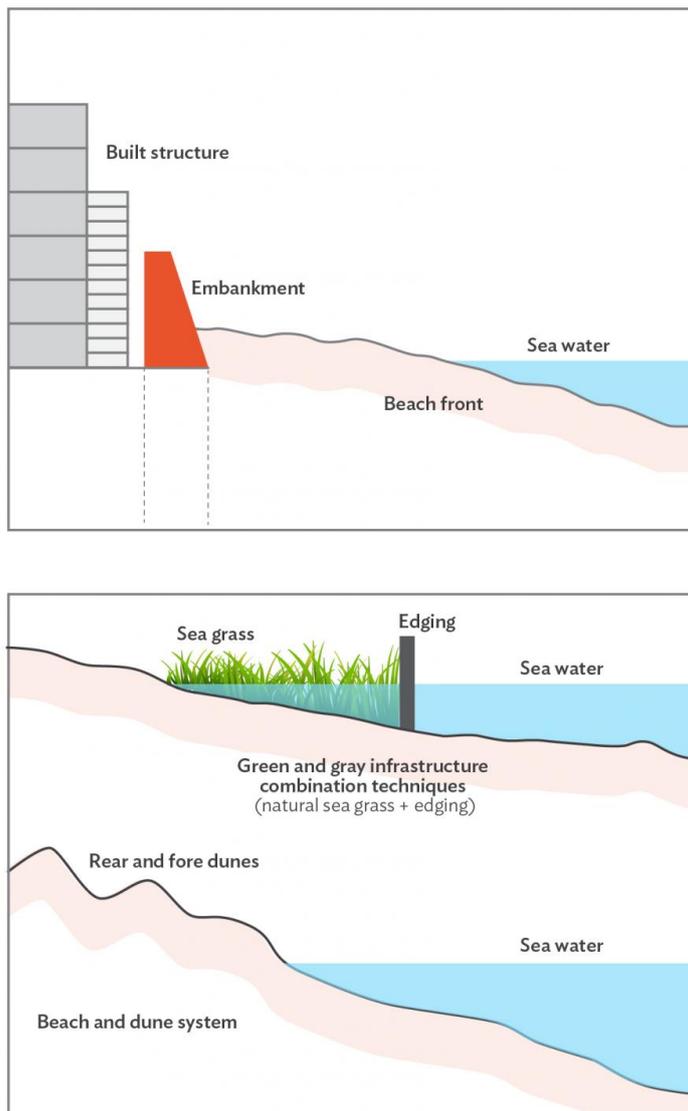
Green and gray infrastructure approaches using elements such as seagrass, edging, beach and dune system.
Source: Vedanti Kelkar

Evidence-based interventions: Use data, tools, and technology to better inform and integrate coastal tourism planning.

There is a growing wealth of evidence, tools, technology, and case studies that can be used to better plan coastal tourism interventions and infrastructure. Likewise, assessing the full impacts of poorly designed grey infrastructure on natural assets such as habitats and biodiversity can show the true costs of projects. It needs to be ascertained whether the draw of tourists justifies the direct operation and maintenance costs.

Building tourism infrastructure without providing an ongoing budget for operation and maintenance is not sustainable. Intrinsic ecological values should be recognized, documented, and publicized to interest and involve lay visitors, local communities, as well as nature experts.

Once these interventions are complete, it is required to track how these are drawing tourists. Tourism revenue data can inform further capital investments and priorities. Ongoing cooperation and knowledge exchange among coastal cities with similar interventions and experiences must be carried out and for solutions to have the right references. Creating indicators for such monitoring is also critical.

Moreover, emerging data science tools can be leveraged to achieve educated assessments and development solutions. These include data analytics, geographical information system, artificial intelligence, and machine learning which can all be integrated with various disciplines. For example, ADB-developed Spatial Data Analysis Explorer (SPADE) is a Geospatial Web platform that supports the preparation of assessments of land use, socio-economic, safeguards, climate risk, and vulnerability to inform the country, regional and city plans and strategies. This has the capability of informing the location, design, construction, and performance of infrastructure investments by project visualization and assessment of institutional overlaps and risks.

Resources

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Vedanti is an urban planning and development professional. Her expertise includes design, implementation, capacity building, research, and project management on topics such as water, sanitation, land, housing and resilient cities. She has contributed to various publications, implemented capacity building programs in developing Asian countries, and presented at leading international conferences.

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