

Issue

Brief

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Governing Urban Wetlands in India: A Pathway to Sustainable Urbanisation

Snehashish Mitra

Abstract

Wetlands are important ecosystems that provide benefits such as flood control, water purification, and biodiversity conservation. In India, however, wetlands are threatened by pollution, encroachment, and rampant real estate development. This brief assesses the East Kolkata Wetlands to illustrate the challenges of preserving urban wetlands in India. It also presents recommendations to establish more comprehensive wetlands management and conservation practices in the country.

In recent years, India has experienced multiple extreme floods, highlighting the urgency of creating an ecologically sensitive governance mechanism for spatial geographies. In addition to economic losses, flooding has also resulted in the loss of lives across the country,¹ showcasing the perils of building cities (through land expansion, infrastructural activities, and other forms of urban development) without consideration for the region's socioecological history.²

Many present-day Indian cities, such as Kolkata, Allahabad, Pune, Ahmedabad, and Patna, were built along riverbanks. Others, like Mumbai, Chennai, and Kochi, have grown along coastlines. While the proximity to water bodies has historically played a key role in the formation and development of urban centres,³ contemporary urban planning disregards urban geography's connection to water bodies, floodplains, and catchment areas.⁴ Such urban transformation is largely driven by the idea of turning Indian cities into specimens of a 'world city', to emulate the functional and visual stature of cities like Dubai, Singapore, Shanghai, and London. As a result, Indian cities are expanding by transforming adjoining rural and peripheral areas with real estate development, while drastically altering environmental and biophysical conditions. India's urbanisation since the 1990s has been largely driven by capital-intensive interventions, characterised by "high risk multi-million dollar international loans and large-scale obligations of debt finance".⁵ Such interventions sharpen the tendency of capital to appropriate resources that have vague ownership status, and urban wetlands are a prime victim of such appropriation by capital in Indian cities.⁶

Wetlands are an area of land either covered with water or saturated with water.⁷ Wetlands are significant in terms of their ecosystem services, contributing to human health and wellbeing, and broader ecological and sustainability goals in a cost-effective manner. They perform critical ecological functions, such as groundwater recharge, carbon storage, and water regulation, which support wildlife habitat and serve as a vital interface between multiple forms of geography and environments (built and natural). Wetlands also help in flood control, natural sewage treatment, and fish production. Importantly, wetland management and conservation align with the Sustainable Development Goals (SDGs), particularly SDG-11 (sustainable cities and communities), SDG-6 (clean water and sanitation), SDG-13 (climate action), and SDG-14 (life below water).⁸

Still, across Indian cities, wetlands have been co-opted for real estate and construction activities in recent decades. Between 1970 and 2015, Chennai lost 90 percent of its wetlands, Hyderabad 55 percent, Mumbai 71 percent, Bengaluru 55 percent, Pune 37 percent, and New Delhi-National Capital Region lost 38 percent.⁹ The general lack of awareness about wetlands and their vital ecosystem functions also contributes to the governing agencies' negligible efforts to preserve wetlands. In addition, while the state wetland authorities (SWA) are the nodal agencies for wetland management in each state, multiple state and central agencies have wetlands under their jurisdiction despite wetland management not necessarily being a part of their agenda. For example, wetlands in Delhi are under the jurisdiction of the Delhi Jal Board, Delhi Urban Shelter Improvement Board, Public Works Department, Archaeological Survey of India, and Forest Department, but only the Forest Department and Delhi Jal Board have any expertise in wetlands management.

India is poised to see significant rapid urbanisation in the coming years, with over 50 percent of its citizens expected to reside in urban areas by 2050.¹⁰ India's ability to fulfil its climate and net-zero commitments will depend on how it governs its existing and emerging cities,¹¹ including making them livable for urban residents (for instance, by tackling hazards like flooding and heatwaves). Recent flood events in cities across India have highlighted the mismanagement of water resources, with the idea of economic growth driven by real estate value addition superseding ecological considerations.¹² Ecological and environmental governance in Indian cities has often been limited to the beautification of certain parts of the city, which may involve the eviction and displacement of marginalised groups, including those in informal housing.¹³ At the same time, cities like Delhi, Mumbai, Bengaluru, and Kolkata have experienced development driven by real estate, which often involved subverting the guidelines of environmental protection by taking advantage of the administrative grey areas generated by what is termed the 'informality of the state'.¹⁴ Notably, during flood situations, such as the 2005 Mumbai deluge or the landslides in the hill areas, the public discourse often implicates the informal housing practices of the poor and marginalised groups through the 'encroachment' narrative while mostly remaining silent about the state and capital-driven developments that significantly impact environmental resources, such as wetlands and water bodies, at a large scale.

Legislative Measures in India

In recent years, the Indian government has introduced multiple legislative measures to prioritise the conservation and management of wetlands. In 2016, the Wetlands (Conservation and Management) Rules 2010 was brought under the umbrella of the Environment (Protection) Act 1986 to strengthen the legal framework protecting wetlands while strengthening the institutional framework of SWAs.¹⁵

The Wetland (Conservation and Management) Rules (2017) stated that several different kinds of water bodies can be classified as wetlands, including marsh, fen, peatland or water, lakes/ponds, oxbow lakes, riverine wetlands, tanks, lagoons, and mangroves.^a

In 2018-19, the Ministry of Jal Shakti launched a census of water bodies across the country (published as a ‘census report’ in 2021),¹⁶ which was carried out alongside the Sixth Minor Irrigation Census.^b According to the census report, India has 24,24,540 water bodies, 97.1 percent (23,55,055) of which are in rural areas, with the remaining (69,485) in urban areas. About 55 percent (13,38,735) of the documented water bodies are owned by private entities, while 44.8 percent (10,85,805) are public. Among the Indian states, West Bengal has the highest number of ponds and reservoirs, Andhra Pradesh has the highest number of tanks, Tamil Nadu has the highest number of lakes, and Maharashtra has the highest number of water conservation schemes. The census report also noted that 1.6 percent of the documented water bodies were under encroachment,^c 95.4 percent of which were in rural areas and the rest in urban areas. Of the encroached water bodies, 67.6 percent (26,005) are ponds, 21 percent (8,082) are tanks, 4.5 percent (1,745) are water conservation schemes/check dams/percolation tanks, and the remaining 6.9 percent are lakes, reservoirs, and other water bodies.

In January 2021, the National Mission for Clean Ganga formulated a local stakeholders-focused toolkit for wetland management in cities to protect “the ecological processes that sustain water resources in urban settings,” “mainstream [the] protection of water bodies in the urban planning process,” and “provide a step-by-step approach to identify, prioritise and prepare an action plan for

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- a A marsh is an area of land where water covers ground for long periods (such as Pallikarainai Marsh in Chennai); fens are peat-forming wetlands that rely on groundwater input. Peatlands areas are characterised by the accumulation of partially decayed organic matter, forming layers of peats.
 - b Census on minor irrigation schemes refers to the enumeration of countrywide irrigation schemes involving both groundwater and surface water.
 - c The report considers illegal human activities as encroachment. These may include agriculture and construction activities.

Legislative Measures in India

protection of water bodies in urban areas”.¹⁷ The toolkit recognises wetlands’ productive biosystem that helps in “recharging groundwater, increasing the base flow of rivers, and helping in erosion control”.¹⁸ In essence, the toolkit seeks to help identify urban wetlands for conservation and create an action plan for these water bodies by involving urban local bodies.

The toolkit advocates using GIS and remote sensing technology for the “preparation of interactive databases of city, urban wetland/water bodies and its associated attributes”. The toolkit recommends the involvement of different departments and agencies in collecting data to map city-level information. For instance, administrative inputs (planning boundary, municipal boundary, ward boundary) and infrastructure and water demand inputs will be collected by the Municipality and Development Authority (MDA), and natural resource input (temperature, humidity, land cover and groundwater data) will be collected by the Indian Meteorological Department, MDA, Geological Survey of India, Soil and Land Use Survey of India, Central Ground Water Board & Central Ground Water Authority.

In 2023, the Ministry of Environment, Forest and Climate Change formulated the National Plan for Conservation of Aquatic Ecosystems (NPCA), which “seeks to conserve and sustainably manage wetlands across the country and aims to stem their continued loss and degradation by promoting a cross-sectoral policy, planning and decision-making environment.”¹⁹ The NPCA guidelines stress the formulation, implementation, progress, and review of an integrated management plan (such as the East Kolkata Wetlands Management Action Plan) for wetlands.²⁰

These initiatives align with the ‘Convention on Wetlands’, also known as the Ramsar Convention, that India became a party to in 1982. India has since designated 75 wetlands covering an area of 13,26,677 hectares as Ramsar sites. Ramsar sites are ‘wetlands of international importance’, designated as such based on nine criteria, including species and ecological communities, waterbirds, fish, and other taxa.²¹ Currently, India has the most Ramsar sites in Asia. Notably, declaring a wetland as a Ramsar site does not automatically guarantee wetland conservation as there is no binding legal obligation on governing agencies for wetland management; it merely requires the authorities to prepare a management plan within six months of the declaration.

Legislative Measures in India

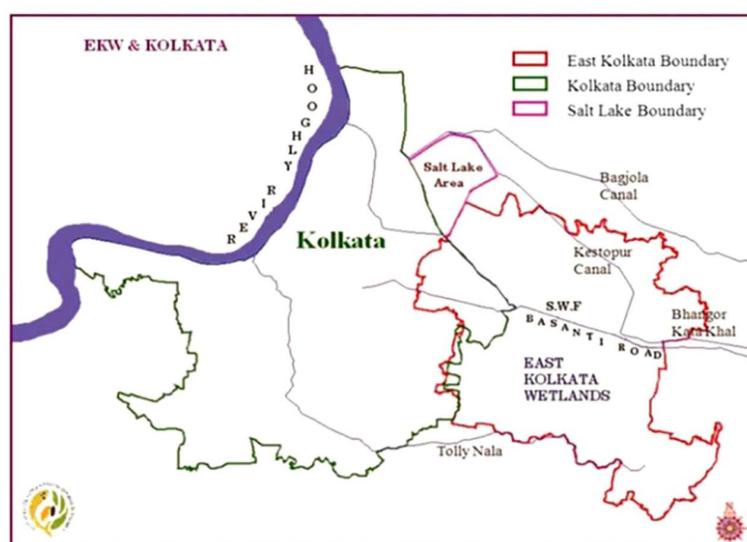
The Ramsar Convention acknowledges that urbanisation poses a significant threat to wetlands conservation and management in urban areas.²² To advocate and encourage efficient wetland management in the cities of the signatory countries, the convention has introduced a ‘wetland city accreditation scheme’ for cities to voluntarily showcase how they value their wetlands “to gain international recognition and positive publicity for their efforts”.²³ The scheme urges for wetlands to be considered as “prize land and not wasteland” and to be integrated into city development and management plans. Thus far, 43 cities worldwide have been accredited as wetland cities, but none are in India. Given that several of India’s Ramsar sites—such as Deepor Beer in Guwahati, Assam; East Kolkata Wetlands (EKW) in Kolkata, West Bengal; and Thane Creek in Thane, Maharashtra—are located within urban boundaries and play a critical ecological role for the city, India must aim to have at least one city recognised in the wetland city accreditation scheme to serve as a model for emulation across the country. Notably, Udaipur (Rajasthan) and Bhopal (Madhya Pradesh) have submitted proposals to the Ramsar Secretariat to be recognised as wetland cities.²⁴ Additionally, the Indian government’s new ‘Amrit Dharohar’ initiative aims “to promote unique conservation values of the Ramsar Sites in the country while generating employment opportunities and supporting local livelihoods” by focusing on species and habitat conservation, nature tourism, wetlands livelihoods, and wetlands carbon. Still, India’s urban wetlands face significant challenges. The rising incidents of urban flooding in multiple Indian cities in recent years have resulted from encroachment on wetlands by haphazard real-estate development.²⁵ In most cities, urban planning has disregarded the historical use of land and water bodies, adding to extreme climate events such as excessive rainfall and high summer temperatures.

“The Ramsar Convention urges for wetlands to be considered “prize land and not wasteland” and to be integrated into city development and management plans.”

Case Study: The East Kolkata Wetlands

The EKW are a collection of humanmade and natural wetlands located east of Kolkata. The wetlands, spanning 125 square kilometres, consist of settling ponds, sewage farms, agricultural fields, and salt marshes. Kolkata’s sewage is also treated in the wetlands, and the nutrients in the wastewater support agricultural and fish farms. The EKW was declared a Ramsar site in 2002 and is significant due to its critical role in treating and recycling solid and liquid waste generated by the city at no cost, and the livelihood opportunities generated by these processes (enabling around 50,000 farmers and fisherfolk to utilise the wastewater to cultivate crops and fishes).²⁶ The success of the EKW is due to the mix of colonial and post-colonial governance practices related to sewage management and property-making through the reclamation of water bodies for urban expansion.²⁷ Notably, the three sewage treatment plants in Kolkata have a combined capacity of 122.50 million litres/day, while the EKW treats 900 million litres/day organically where it is used for producing fish and vegetables.²⁸ The EKW’s fresh harvests are a crucial food supply for markets in Kolkata and the surrounding areas. Due to the utilisation of wastewater for agriculture and pisciculture, which are practised close to the major city markets, the production and logistics costs are minimal, making harvests affordable for most sections of society. However, despite the vital service provided by the EKW to the Kolkata metropolitan area, governing institutions such as the state government and Kolkata Municipal Corporation (KMC) have been unable to adequately protect and conserve the wetlands, even as some government initiatives, particularly those related to real estate development, have compromised the EKW and the livelihoods of many people.²⁹

Map 1: The Easy Kolkata Wetlands



Source: East Kolkata Wetlands Management Authority³⁰

Case Study: The East Kolkata Wetlands

The EKW was formed during colonial rule by excavating canals to facilitate trade through waterways and serve as a catchment area for the sewage generated by the expanding city.³¹ In the post-colonial era, the EKW was utilised to expand the city further. For instance, in the 1950s, Saltlake township developed on 44 hectares of reclaimed EKW land to create a township to rehabilitate refugees from Bangladesh (then East Pakistan).³² From the 1970s, other planned townships and infrastructure emerged along or on the EKW, including the Eastern Metropolitan Bypass that connected the newly built areas and other parts of Kolkata. A prime goal of Kolkata's current urban expansion plans is to leverage the potential of the vast undeveloped land on the city's eastern outskirts.³³ Such an approach has led to many developments in the form of hospital clusters, educational institutes, residential apartments, and country clubs along the Eastern Metropolitan Bypass. This development is mostly arbitrary, with no specific plan and design.

Civilian and environmental groups have repeatedly pressured the state government, KMC, and courts to act to protect and conserve the EKW, with some success. For instance, in the early 1990s, advocacy by the People United for Better Living in Calcutta stalled the construction of a World Trade Centre on the wetlands.³⁴ Similarly, in 2017, environmental activists halted a flyover project (that would have shortened the distance between the Kolkata Airport and southern parts of the city), claiming the proposal violated the East Kolkata Wetland Management Act (2006).³⁵

These events indicate that the governing agencies—the state government and municipality—are initiating development works that are detrimental to the health of EKW and have cascading impacts (such as floods) instead of upholding the vital ecological and livelihood services provided by the wetlands. Between 2000 and 2011, the EKW experienced a 13.16 km net loss due to urban development. During the same period, 2.12 km of wetlands were converted to green space and 4.76 km to agriculture, with most of the expansion occurring along the Eastern Metropolitan Bypass and in the vicinity of the main city.³⁶ Such constructions that encroach on the EKW have gradually pressurised the ecological and environmental functions performed by the wetlands and, consequently, are also impacting the livelihoods of numerous people dependent on it. The general population may be unaware of the vital functions performed by the EKW, and since there is no clear physical demarcation of the wetlands and its buffer zones, people often do not know if they are purchasing property on converted EKW land.³⁷ Other wetlands and water bodies in and around

Case Study: The East Kolkata Wetlands

Kolkata have also experienced increased pressure from real-estate plans and projects.³⁸ Although the courts and National Green Tribunal^d have directed the governing authorities to take action against such encroachments,^{39,40} these decisions are reactive and do little to preserve the functional viability of EKW.

Given these challenges, the East Kolkata Wetlands Authority (EKWA)^e established a five-year East Kolkata Wetlands Management Action Plan (EKWMAP) in 2008, which is an example of an integrated management plan. However, differences in the conditions of the Wetlands (Conservation and Management) Rules 2010 and the East Kolkata Wetlands (Conservation and Management) Act, 2006, based on the sewage disposal issue, saw limited funding from the central Ministry of Environment, Forest, and Climate Change. Subsequently, the EKWMAP was redrafted in 2021 upon the advice of the environment ministry's National Wetlands Committee.^{f41} The 2021-2026 EKWMAP chronicles the existing threats to the EKW, details risk and mitigation measures, and proposes monitoring and assessment parameters. In addition to providing a roadmap for institutional governance of the EKW by involving different stakeholders (such as farmers, fishermen, citizens, and developers), the action plan stresses a focus on 'water management of pollution abatement', 'species and habitats', and 'sustainable resource development and livelihoods'. It also names multiple government departments (such as the departments of land reforms and rural development) and specifies their role in the EKW conservation plan.

Some of the key actions outlined in the EKWMAP include reorganising and strengthening the EKWA with an efficient and results-oriented institutional structure, with a gradual shift from a more strategic role in wetland management; clear demarcation of wetlands boundaries (for instance, by placing geo-tagged pillars); publishing an annual ecosystem health report card and providing decision-makers and stakeholders with information on wetland monitoring; conducting research on carbon and greenhouse gas flux, nutrient budgets, and bioaccumulation; declaring the EKW region as a no-

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- d India's National Green Tribunal was established for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources, including enforcement of any legal right relating to the environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto.
 - e Established under the aegis of the East Kolkata Wetland Management and Conservation Act, 2006 (a West Bengal legislation), to ensure the conservation and management of the EKW. It is governed by a 13-member board comprising government officials (such as the chief secretary and secretaries of different departments) and experts from the domains of hydrology, fisheries, sociology, and economics. The board functions under the chairmanship of Bengal's environment minister.
 - f The National Wetland Committee guides state bodies on the integrated management of wetlands based on the wise-use principle and reviews the progress of integrated management of Ramsar Convention sites, among other roles.

Case Study: The East Kolkata Wetlands

plastic zone; regular monitoring the waterbird population at the significant congregation sites within and around the EKW; strengthening community health infrastructure and improving access to safe drinking water and sanitation facilities; and communicating, educating, and encouraging public awareness and participation through signs at major points, a webpage, a community advisory group, and public events. The action components aim to ensure the efficient use of sewage within the wetland, maintain biota diversity, reduce species invasion in fisheries, and reduce livelihood vulnerability.

The EKWMAP's proposed methodology for wetland management planning is based on the Ramsar Convention's guidelines for managing Ramsar sites and other wetlands.⁴² The action plan proposes the formation of units at the local level dedicated to wetland monitoring, engineering, community engagement, enforcement, communication, and outreach. While the action plan urges for adequate provisions in the state budget, it also suggests that the EKWMA should be able to consult wetland management bodies in other parts of India, which would also generate income for the body. In essence, the EKWMAP provides a comprehensive roadmap for the management of the EKW by involving state actors and private entities, with due focus on Kolkata's topography, geography, climate, and community livelihoods. It exemplifies how local specificities can be integrated with national wetland management and protection goals.

The EKWMAP framework can be replicated for other urban wetlands across the country. While management plans have been prepared for some other wetlands in India—such as Loktak (Manipur), Kolleru (Andhra Pradesh), Chilika (Odisha), Vembanad-Kol (Kerala), Kanwar Jheel (Bihar), Rudrasagar (Tripura), Hirakud Reservoir (Odisha), and Chandrabhaga (Gujarat)—these wetlands are in non-urban spaces, highlighting that urban wetlands in India are yet to receive the necessary governance focus. Although Mumbai's Climate Action Plan⁴³ recognises the importance of wetlands, it lacks a roadmap for wetland management and protection.

India will witness significant urbanisation and rural-to-urban migration in the coming years.⁴⁴ Therefore, it is imperative that India's urban planning and expansion is guided by the principles of sustainability and ecological viability through relevant stakeholder engagements. Urban policies must include viable climate action plans to further emerging concepts such as blue-green infrastructure (incorporating urban development with the principles of conserving natural resources like waterbodies and green cover in cities)⁴⁵ and sponge city (which urges the presence of waterbodies, including wetlands, in cities to absorb stormwater runaway).

The following overarching recommendations will help establish a more robust wetlands management framework across the country:

Comprehensive Urban Planning

Municipal bodies must be empowered to halt all illegal construction on and around wetlands and other natural resources. Cities must prepare climate action plans that consider wetlands and implement them with urgency. Such plans must be evaluated periodically to ensure ecological entities such as wetlands are adequately maintained and conserved. National and international policies pertaining to wetland management should be streamlined in urban governance, which would require empowering elected representatives and officials. The role of existing wetland management authorities at district and state levels must be strengthened to ensure the national-level mandate of wetland protection is implemented at the grassroots. To that end, administrative and research institutes (such as MCGM Centre for Municipal Capacity Building and Research and the Tata Institute of Social Sciences) will have a vital role in the capacity building of governing agencies. The municipal power structure may need to be reorganised to ensure greater fiscal autonomy and administrative powers for wetlands management.

Importantly, administrative and judicial reforms at the state and national levels may also be required to consolidate the governing mechanism for wetlands in the country. Across India, multiple departments and agencies oversee wetlands and water bodies, with many lacking environmental and water governance expertise. This leads to mismanagement, faulty policymaking, and the encroachment of wetlands. India should establish a nodal wetland governing agency to proactively manage the wetlands currently under the jurisdiction of multiple agencies.

Thorough Wetland Protection Measures

Given that India has already conducted a census of the water bodies in the country, there is a clear understanding of the spatial spread of wetlands across the rural-urban axis. Now, adequate protection measures must be formulated and implemented considering the anticipated expansion of urban and peri-urban areas where construction activities typically take advantage of arbitrary demarcations of wetlands.

In the future, the census report must aim to cover all towns and villages (as per the Census of India) to recognise and include wetlands that may have been excluded in previous iterations. The census must be attentive to the data collected by the state and other local agencies and incorporate them after a thorough verification. The report must also ensure the inclusion of a clear definition of wetlands. The census should also present a comprehensive list of encroached wetlands so that the concerned agencies can take adequate restorative measures.⁴⁶ Notably, the Ministry of Jal Shakti, which conducts the census, should collaborate with local governing institutions for all such surveys so that the data on wetlands is consistent across all agencies. The census can also be tallied with the National Wetland Information System (NWIS), a spatial database for the entire country.⁴⁷ Uniformity between the wetland census and the data uploaded in the Wetland Portals of India (an environment ministry undertaking that synthesises information regarding wetland sites of India) will add further credibility and accuracy to the census data.⁴⁸

Community Participation

Involving local citizens and students in wetlands management through awareness and engagement programmes will impart a sense of responsibility and purpose among the people towards conserving and protecting wetlands. The volunteer programme under the environment ministry's 'Wetland Mitra' scheme aims to encourage citizens to become involved in wetland protection and management.⁴⁹ Making urban wetlands viable for pisciculture would also create new employment opportunities for fishing communities such as the Kolis (in Mumbai) and Namasudras (in Kolkata and Guwahati). Additionally, reinforcing urban local bodies and municipalities with wetland management mechanisms can further deepen citizen engagement in wetland-related matters while keeping a check on potential encroachments. Developing cycling and tourism-centric arrangements, as are in operation in the EKW, will further citizens' knowledge of and interest in wetlands while generating awareness about wetlands' vitality for the urban ecosystem.⁵⁰

Conclusion

As a global power, and given its demographic pressures, India must ensure that its urban governance processes also focus on conserving critical urban natural resources such as wetlands. The outcome document released after the July 2023 meeting of the G20 environment and climate ministers (during India's presidency of the grouping) emphasised the need to prevent and reverse water degradation through wetland restoration while acknowledging that wetlands and other water bodies act as natural carbon sinks, and are, therefore, essential for climate change mitigation.⁵¹ India must ensure it adheres to these commitments. To that end, India's main task is to balance the development goals of its cities with different aspects of wetland conservation. The governing agencies must enforce wetland management plans while discouraging wetland encroachments. Importantly, any successful sustainable urban wetland management model that emerges from India will have lessons for densely populated cities worldwide, especially in the Global South. [ORF](#)

Snehashish is a Fellow (Urban Studies) at ORF Mumbai.

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20, Rouse Avenue Institutional Area,
New Delhi - 110 002, INDIA
Ph. : +91-11-35332000. Fax : +91-11-35332005
E-mail: contactus@orfonline.org
Website: www.orfonline.org