

സെപ്റ്റംബർ 2025



ലക്കം 7

അമൃത വാർത്താ പത്രിക

ദോഷമുക്തം സിദ്ധം





പാലക്കാട് മുനിസിപ്പാലിറ്റിയിൽ അമൃത് 1.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി നിർമ്മാണം പുരോഗമിക്കുന്ന എഫ്.എസ്.റ്റി.പി.





അമൃത് വാർത്താ പത്രിക

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ഹൈഡ്രോ ജിയോളജിസ്റ്റ്

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സാവിത്രി സജി ഇ.ആർ.



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യൂണിറ്റ് (അമൃത്)

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എഡിറ്റോറിയൽ

നഗരങ്ങളുടെ അടിസ്ഥാന സൗകര്യങ്ങൾ മെച്ചപ്പെടുത്തുന്നതിനും വികസിപ്പിക്കുന്നതിനും ലക്ഷ്യമിട്ട് നടത്തി വരുന്ന അമൃത് 1.0 പദ്ധതികൾ എല്ലാം തന്നെ പൂർത്തീകരണ ഘട്ടത്തിലാണ്. 9 അമൃത് നഗരങ്ങളിലും പദ്ധതി പ്രവർത്തനങ്ങൾ ത്വരിത ഗതിയിൽ പുരോഗമിച്ചു വരുന്നു. വളരെ ചിട്ടയുമായ പ്രവർത്തനങ്ങളിലൂടെ 2229 കോടി രൂപയുടെ വികസന പ്രവർത്തനങ്ങളാണ് അമൃത് നഗരങ്ങളിൽ നാളിതുവരെ പൂർത്തീകരിച്ചിട്ടുള്ളത്. ഈ വികസന പ്രവർത്തനങ്ങൾ നടത്തിയതിനോടൊപ്പം നഗരസഭകളിലെ പ്രവർത്തനങ്ങളിൽ കേന്ദ്ര സർക്കാർ അനുശാസിച്ചിട്ടുള്ള പരിഷ്കരണ നടപടികളിൽ ഭൂരിഭാഗവും കൈവരിക്കാനായതും അതുവഴി നഗരസഭയിലെ സേവനങ്ങൾ ആയാസരഹിതമായി പൊതുജനങ്ങളിലേയ്ക്ക് എത്തിക്കാനായതും അമൃത് മിഷന്റെ നേട്ടമാണ്.

ജല ഭദ്രത ലക്ഷ്യമിട്ട് നടപ്പിലാക്കി വരുന്ന അമൃത് 2.0 പദ്ധതികൾ സംസ്ഥാനത്തെ എല്ലാ നഗര തദ്ദേശ സ്ഥാപനങ്ങളിലും കാര്യക്ഷമമായി നടന്നു വരികയാണ്. അമൃത് 2.0 യുടെ അനുബന്ധ പദ്ധതിയായ അമൃത് മിത്ര പദ്ധതിയ്ക്ക് വലിയ സ്വീകാര്യതയാണ് നഗരസഭകളിൽ ലഭിക്കുന്നത്. സ്വയം സഹായ സംഘങ്ങളുടെ സഹായത്തോടെ നടപ്പിലാക്കുന്ന ഈ പദ്ധതി നഗരങ്ങളുടെ മുഖഛായ മാറ്റുന്നതിനും ദാരിദ്ര്യ ലഘൂകരണ പ്രവർത്തനങ്ങൾക്കും ഒരു മുതൽക്കൂട്ടായി മാറിയിരിക്കുകയാണ്.

കേരളത്തിലെ നഗരങ്ങളുടെ നഗര നയവുമായി ബന്ധപ്പെട്ട് നവകേരള അർബൻ പോളിസി കമ്മീഷൻ രൂപീകരിക്കുകയും, വിവിധ സിറ്റിംഗുകൾ നടത്തി ഉരുത്തിരിഞ്ഞ ആശയങ്ങൾ ക്രോഡീകരിച്ച് നവ കേരള നയം പ്രസിദ്ധീകരിക്കുകയും ചെയ്തു. ഈ ആശയങ്ങൾ പ്രാവർത്തികമാക്കുന്നതിനും അവ പൊതുജനങ്ങളിലേയ്ക്ക് എത്തിക്കുന്നതിനുമായി ഈ മാസം കൊച്ചിയിൽ വെച്ച് നടത്തപ്പെടുന്ന അർബൻ കോൺക്ലേവ് ഒരു ചരിത്ര സംഭവമാക്കി മാറ്റുവാനും ഈ കോൺക്ലേവിൽ പങ്കെടുക്കുവാനും ഏവരെയും സ്വാഗതം ചെയ്യുന്നു. ഏവർക്കും സന്തോഷവും സമൃദ്ധിയും നിറഞ്ഞ ഓണക്കാലം ആശംസിക്കുന്നു.

മിഷൻ ഡയറക്ടർ



കൊല്ലം ജില്ല - ദിശ മീറ്റിംഗ്



അമൃത് പദ്ധതിയിൽ ഉൾപ്പെടുത്തി നവീകരിച്ച ഗുരുവായൂർ മുനിസിപ്പാലിറ്റിയിലെ മിച്ചഭൂമി കുളം



അമൃത് വാർത്താ പത്രിക

ഉള്ളടക്കം



- 5 നെഹ്രു ട്രോഫി ഫുട് ബാൾ ബ്രിഡ്ജ് ഉദ്ഘാടനം ചെയ്തു
- Kerala Urban Conclave 2025
"Kerala Urban Policy 2025-2050: Aspiring Cities, Thriving Communities"
- Urban Renaissance Technical Managers Training Program for Urban Planning and design conducted by NIT, CALICUT
- 12 Seminar on Recycling Used Water – Beyond Conventional Technologies
- 13 അമൃത് മിത്ര, മരട് മുനിസിപ്പാലിറ്റി
- 15 Brief Article on the Risk and Vulnerability assessment towards the potential impact of climate change on the WASH (Water, Sanitation, and Hygiene) sector in Urban Regions including informal settlements in Kerala State.



അമൃത് പദ്ധതിയിൽ ഉൾപ്പെടുത്തി നവീകരിച്ച ഗുരുവായൂർ പട്ടണത്തിലെ തിരുമുളി കുളം





നെഹ്രൂ ട്രോഫി ഫുട്ബോൾ ഓവർ ബ്രിഡ്ജ് ഉദ്ഘാടനം ചെയ്തു

ആലപ്പുഴ നഗരസഭയിൽ അമൃത് 1.0 പദ്ധതിയിലെ അർബൻ ട്രാൻസ്ഫോർട്ട് സെക്ടറിൽ ഉൾപ്പെടുത്തി നിർമ്മിച്ച നെഹ്രൂ ട്രോഫി സ്റ്റാർട്ടിംഗ് പോയിന്റിൽ നിർമ്മിച്ച നടപ്പാലം ബഹു. തദ്ദേശ സ്വയംഭരണ വകുപ്പ് മന്ത്രി ശ്രീ. എം.ബി. രാജേഷ് ഉദ്ഘാടനം ചെയ്തു. എം.എൽ.എ. മാരായ ശ്രീ. പി.പി. ചിത്തരഞ്ജൻ, ശ്രീ. എച്ച്. സലാം, നഗരസഭാ ചെയർപേഴ്സൺ ശ്രീമതി കെ.കെ. ജയമ്മ, ജനപ്രതിനിധികൾ, ഉദ്യോഗസ്ഥർ തുടങ്ങിയവർ ചടങ്ങിൽ പങ്കെടുത്തു. നിർമാണത്തിലെ വൈവിധ്യം കൊണ്ട് ഏവരുടെയും ശ്രദ്ധ ആകർഷിക്കുന്ന രീതിയിലാണ് പാലത്തിന്റെ നിർമാണം. ഇതിനോടകം തന്നെ ഒരു സെൽഫി പോയിന്റായി പാലം മാറിയിട്ടുണ്ട്. അമൃത് 1.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി 3.5 കോടി രൂപ ചെലവിലാണ് പാലത്തിന്റെ നിർമാണം പൂർത്തീകരിച്ചത്. നെഹ്രൂ ട്രോഫി വാർഡിലെ 650 ഓളം കുടുംബങ്ങളുടെ യാത്രാ ദുരിതത്തിനാണ് പാലം പൂർത്തീകരിച്ചതിലൂടെ അവസാനമാകുന്നത്.





Kerala Urban Conclave 2025

"Kerala Urban Policy 2025-2050: Aspiring Cities, Thriving Communities"

Background

The primary purpose of the **Kerala Urban Conclave**, a forum by the **Local Self Government Department, Government of Kerala**, is to provide a platform for the germination of innovative strategies to further bolster the foundations of democratic engagement in the state. Moreover, the Conclave serves as an opportunity for Kerala to showcase its achievements in policy-led and place-based innovations as well as municipal governance and urban planning to a global audience. Such diversity of people, ideas and institutions will result in meaningful dialogues and cross-fertilisation of ideas that will have far-reaching consequences for all the represented fraternities. As such, the ability to harness global knowledge is a key draw of the Conclave, which will help establish within the attendees a more nuanced understanding of the global trends, challenges and opportunities for urban and regional development and how it relates to the Kerala context. At the same time, one of the more pragmatic outcomes of the **Kerala Urban Conclave** would be to create an ecosystem of interdisciplinary teamwork. Here, experts from seemingly disparate fields can be brought together on common issues, such as coming up with innovative ways to establish a business-friendly and professional system of urban governance in the global South. This can be achieved through the exhibition of innovative technologies, best practices and publications from the various sectors present, which will add to the possibility of a creative engagement between people and ideas that upon coming together will imbue the matter of governance with an energy it deeply requires.

Reflecting Kerala's evolution as a diverse, multi-ethnic, multi-faith, and multi-linguistic society influenced by modern urbanisation, Kochi will host the first **Kerala Urban Conclave** from September 12-13, 2025. This will facilitate a national and global outreach for the '**Nava Kerala Nagara Nayam**' (New Kerala Urban Policy), which has consciously ingrained the principles of participatory democracy to shape Kerala as an inclusive, plural and resilient society. The proposed 'Kochi Declaration' can be a great rejoinder to this year's theme for World Day for Cultural Diversity for Dialogue and Development.





Key Challenges

While Kerala is rightly lauded for its achievements in the social sector, its unique position within the larger Indian social framework has revealed certain fault lines and challenges to its model of development. These challenges are both familiar and novel in nature, particularly since Kerala often deviates from conventional paths of progress. Currently, the most significant obstacles for Kerala are the environmental and demographic risks, including the propensity for extreme weather events such as flooding and drought, as well as the stunted social development of its youth, a significant portion of whom struggle with unemployment and lack growth opportunities. Kerala faces a socially and environmentally demanding situation that requires a conscious policy extending beyond the typical business model to ensure a stronger commitment to the efficient functioning of systems, institutions, and the safeguarding of our future. Urban resilience embodies a 'politics of necessity'.

Kerala is now at a transformative juncture, moving beyond past challenges in policy design to embrace a future-driven approach. While urban development once unfolded in a less structured manner, there is now a growing emphasis on **design convergence** and sustainable planning, paving the way for more resilient and well-planned cities. This evolving landscape presents a unique opportunity to unlock the entrepreneurial potential of Kerala's population. By fostering a creative localised economy and equipping the youth with high-value skills aligned with global market trends, the state can harness its dynamic and talented workforce to drive innovation and economic growth. Moreover, strengthening fiscal health at the local level is becoming a priority, enabling local bodies to invest in productive and forward-thinking initiatives. With the right strategies in place, Kerala is poised to build a thriving, inclusive, and sustainable urban future.

Kerala stands at a pivotal moment, with the opportunity to break free from past cycles of socioeconomic stagnation and embrace a more inclusive and forward-thinking approach. While challenges have at times fostered an exclusionary mindset, the state is now poised to **cultivate a more welcoming and diverse society**, recognising the immense contributions of people from different backgrounds, including migrant workers seeking opportunities. A shift towards **collective spatial engagement** can help redefine Kerala's urban landscape, moving beyond the traditional homestead-centered mindset to a more integrated and community-driven vision. Strengthening governance through **enhanced digitisation** will also play a crucial role in bridging gaps, fostering solidarity among communities, and ensuring that local governance institutions can effectively engage with all residents. By fully mobilising its people within governance frameworks, Kerala has the potential to drive **systemic transformation**, leveraging its strong social indicators to create a more **inclusive, sustainable, and progressive** society.

Ten Policy Pillars

To address the multifaceted challenges of urban development, the Kerala Urban Policy Commission was entrusted with designing targeted policy frameworks to tackle key pressure points. To streamline this ambitious initiative, the Commission had structured its work around ten policy pillars, each focusing on critical areas essential for sustainable urban growth: **Spatial Planning and Urban Development, Climate Resilient Urbanisation, Habitat and Built Environment,**

Sustainable Infrastructure and Basic Services, Health and Wellbeing, People, Culture and Heritage, Growth Drivers for Urbanisation in Kerala, Local Economic Development Framework, Innovative and Sustainable Urban Financing, and Collective Local Self Governance. With such a comprehensive scope, the commission ensured that no aspect of urban transformation was overlooked. Comprising a diverse group of **academics, practitioners, policy experts, and civil servants**, the commission brought together **decades of real-world experience** to craft a policy that would shape a **sustainable, inclusive, and resilient** future for Kerala.

Riskscape to a Resilient Society

Kerala is strategically poised to capitalise on the several advantages present in its geography, demography and cultural ethos. However, as events in the recent past have shown, these advantages can quickly turn into liabilities if the risks inherent to the overarching environmental and social structures are not resolutely addressed. These risks become apparent in the face of an existential crisis such as the Kerala Floods and the ongoing challenge of heatwaves in the urban areas. As such, it is essential to transition from a risk-prone social setup to a proactive society that prioritises resilience in the face of global uncertainty. Resilience, therefore, has been made a key objective of the Kerala Urban Policy Commission, which looks to consciously engage the environmental, economic and social substrate that Kerala provides to inform a holistic policy framework that engenders a sense of security in the face of existing risks.

Policy, Planning and Design Convergence

Traditionally, statecraft in the global South has been largely reactive, with policies emerging as responses to pressing challenges rather than proactive planning. This approach, often reliant on ad-hoc committees and short-term fixes, has struggled to withstand shifts in the political and economic landscape, leading to inconsistent policy execution. Recognising these limitations, Kerala has taken a pioneering step by establishing the Urban Policy Commission, setting a precedent within India and the global South, for structured and forward-thinking plans for urban governance. What sets this initiative apart is its dedicated focus on urban spaces, highlighting Kerala's commitment to planned, sustainable urban development. More importantly, the commission bridges the gap between policy theory and practical implementation, ensuring that policy decisions are not just well-conceived but also aligned with real-world urban planning and design needs. By supporting an enlightened, strategic planning process, the Commission aimed to drive cohesive, long-term urban transformation, reinforcing and reorienting Kerala's leadership towards progressive and sustainable urban governance. To facilitate the institutionalisation of sustainable and inclusive practices, there is a need for greater convergence across institutional systems and scales through regular exchanges between policies, planning and designing strategies. Since Kerala has key sectoral policies/strategies such as industry, housing, tourism, higher education and design apart from the new urban policy, the state can be a showcase model for this convergence.

Embracing Global Trends & Nurturing Kerala's Creative Potential

Staying ahead in the global skill market is not just about maintaining a competitive edge—it is about unlocking the creative potential within a society and channelling it into productive avenues that benefit the community. Kerala, with its strong social institutions,





has long been recognised for its commitment to investing in the welfare and capacity of its people. This dedication is reflected in the rich cultural landscape of the state, exemplified by events such as the Kerala Literature Festival, the Kerala Film Festival, and numerous dance and theatre celebrations. Kerala's creative excellence has also earned international recognition, with Kozhikode and Thrissur recently designated as UNESCO *Cities of Literature and Learning*, reinforcing the state's active engagement in the creative economy. While challenges remain, Kerala's youth-driven creativity and entrepreneurial spirit continue to break barriers. The state's emergence as a *leading start-up ecosystem* is a testament to this resilience. The **Kerala Urban Conclave** will serve as a platform to celebrate these achievements and explore how they can be further leveraged to enhance the vibrancy and sustainability of cities in Kerala.

Advancing Governance Through Digitally Enabled Society

One of the special areas taken up by the Commission was Digital Planning and Governance. Under the advice of the Commission, a Task Force was constituted under the Chairmanship of the Director, NIT Calicut. It underscored the urgent need to integrate digital technologies into governance. In an era when seamless digital adaptation is key to societal success, Kerala is committed to ensuring its people can fully engage transparently with evolving digital platforms. One of the most transformative impacts of technology lies in streamlining governance—eliminating myopic bureaucratic silos that have traditionally hindered effective spatial governance. By embracing digital tools, Kerala aims to declutter administrative processes, enabling more efficient and responsive urban management. As similar initiatives gain momentum across India, Kerala continues to stay ahead of the curve, aligning with national digital advancements while reinforcing its leadership in governance and digital transformation. Information Kerala Mission, an autonomous body under LSGD, has implemented a pioneering initiative called 'K-Smart' Kerala Solutions for Managing Administrative Reformation and Transformation). As a highly informed society with a deep permeation of digital technologies, the state can harness 'hyperlocal data' for modernising spatial planning and local governance. In all, the democratisation of Data across all parastatal institutions will be imperative to advance informed development.

Fiscally Healthy Local Governments: Strengthening Decentralised Governance

While concerns about Kerala's fiscal health persist, it is essential to recognise the rationale behind its expenditure model. Unlike any other state in India, Kerala has prioritised people-centric development, often described as 'welfarism'. This approach has resulted in unparalleled progress in health, education, and social welfare, setting Kerala apart from the rest of the country. However, ensuring the long-term fiscal health of local governments goes beyond budgetary concerns. The key lies in empowering local bodies by enhancing their capacity for independent action, aligning with Kerala's tradition of democratic decentralisation.

The Kerala Urban Conclave will serve as an ideal platform to explore innovative solutions for strengthening local government finances. One promising avenue is engaging Kerala's global diaspora, leveraging their expertise and resources to contribute meaningfully to local governance and economic sustainability. By fostering such collaborative models, Kerala can reinforce its leadership in progressive, decentralised governance while ensuring fiscal resilience at the local level.

Inclusive, Plural and Thriving Communities

Societies which have been seeking exclusivity are compromising on long-term progress. Around the world, exclusionist attitudes have led to social discord, i.e., South Asians, Travelling Communities, and Hispanic labourers. To prevent such divisions, inclusivity must be a guiding principle across policies, plans and designs, ensuring that diversity is consciously and compassionately integrated into cultural and political frameworks. One powerful tool for fostering inclusivity is language sensitivity. In an increasingly diverse society, language can either be a source of division or a bridge to mutual respect and social cohesion. However, inclusion extends beyond culture—it also involves physical ability, gender, and age, all of which must be systematically addressed to create an equitable and welcoming environment. The key shift needed is in the narrative around diversity—moving away from seeing ‘the other’ as a burden and instead recognising diverse populations as valuable assets that contribute to a society’s strength, resilience, and innovation. By embracing pluralism, Kerala can continue to build thriving, inclusive communities that set a model for the rest of the world.



Engaged Governance: Bridging Policy and People

Governance systems worldwide often struggle with bureaucratic distance, resulting in both democratic and political deficits, making it difficult to remain truly connected to the people they serve. Recognising this challenge, Kerala’s Urban Policy Commission was established with a core mandate: to ensure constant engagement with stakeholders at the ground level, allowing their voices to shape policy outcomes. This model of engaged governance ensures that no section of society is overlooked, fostering a truly collective and collaborative decision-making process. It reaffirms governance as a dynamic

exchange between policymakers and citizens rather than a top-down approach. The **Kerala Urban Conclave** will serve as a global platform to identify areas for strengthening citizen participation and explore ways to integrate these insights into governance structures. A more involved and empowered population will enable governance systems to align with the aspirations of the people, transforming them from administrative regulators into active enablers of progress and opportunity.



Prospective Stakeholders and Audiences: A Global Collaborative Effort

The Kerala Urban Conclave is an ambitious and collaborative initiative designed to bring together leading voices across various geographies and collectives. The event will serve as a convergence point for diverse contributors, fostering cross-sector partnerships and global-local knowledge exchange.

Key Institutional Partners

Partner City : Kochi (Kochi Municipal Corporation)

Anchor Institutions : School of Urban Governance, Kerala Institute of Local

Administration (KILA) & Department of Architecture and Planning, National Institute of Technology Calicut (TBC)

Global Policy Partners(TBC) : The World Bank, KfW, AFD, Unicef, UN-Habitat, UNESCO-MGIEP

National Academic Partners : All Academic Institutions collaborated with KUPC, Niti Aayog, Capacity Management Commission, NIUA (TBC)

Industry Partners (TBC) : CII Kerala and FICCI Kerala, Infosys (TBC), CRISIL

Diverse Stakeholder Representation

The Conclave will engage academia, industry, media, and global policy leaders, ensuring that perspectives from all critical domains contribute to the intellectual and practical dialogue.

High-Level Global Participation

- ♦ Heads of State, Ministers, and Mayors from Asia, Africa, Latin America and Europe
- ♦ Representatives from global organisations such as the UN and World Bank
- ♦ Diplomatic Missions in India focusing on urban diplomacy

Bridging Global Insights with Local Realities

To ensure global best practices are tailored for India, the Conclave will directly engage with national and local ministers, who will help synthesise impactful policy solutions grounded in on-the-ground realities. This strategic approach fosters an inclusive, multi-perspective governance model, ensuring that policymakers, practitioners, and global experts collaborate on practical, scalable solutions for democratic decentralisation and sustainable urban development.



Urban Renaissance Technical Managers Training Program for Urban Planning and design conducted by NIT, CALICUT

The Ministry of Housing and Urban Affairs (MoHUA), under the Government of India, launched an ambitious initiative to establish up to five Centres of Excellence (CoEs) focused on urban planning and design. Each selected institution receives an endowment amount intended to build India-specific knowledge and offer certified training in urban planning and design, spanning over the long term (typically 25 years). After a rigorous selection process conducted by a high-level committee (comprising MoHUA, the Department of Higher Education, NITI Aayog, AICTE officials, and domain experts), **whereby four academic institutions were finalized as CoEs: viz... CEPT University, Ahmedabad, IIT Kharagpur, School of Planning and Architecture (SPA), Delhi and National Institute of Technology (NIT), Calicut.**

The prime purpose is to foster multi-disciplinary research, capacity building, and innovation in urban planning and design—helping to tackle pressing urbanization challenges and guide city-level development initiatives.

The training programme is split in to Foundation Course followed by Elective course in the second phase as per the domain of Subject Expertise.

Accordingly, Three Experts viz. Murali Kochukrishnan (Environmental Expert cum Hydrogeologist), Sathi Kumari (Capacity Building Expert) and Sijo V.S.(Municipal finance Expert) from AMRUT SMMU have attended the Urban Renaissance Tech Program for Urban Managers, Held during 24–25 August 2025 (Batch 1) for Foundation course at Oshin Hotels, Calicut, Kerala.



The prime Goals of the Training Programme is to

- ♦ Build a National Talent Pool of skilled URTMs capable of spearheading urban transformation.
- ♦ Foster better coordination across sectors and urban agencies'
- ♦ Develop a knowledge repository featuring best-in-class capstone projects and practices.

The various thematic areas covered under the foundation course are:

- ♦ Introduction to Disaster Management,
- ♦ Introduction to Geo-Spatial Techniques for Disaster Management,
- ♦ Introduction to Climate Resilient Cities,
- ♦ Introduction to AI (Artificial Intelligence) and Machine Learning),
- ♦ Urban Mobility and Integrating Public Transportation with Land-use Planning
- ♦ Urbanization in India-Trends and contemporary issues and challenges
- ♦ Urban Renewal & Brownfield Redevelopment-Monetization of Land Assets
- ♦ Current Evolution in Urban Planning Applications of AI & Digital Twin
- ♦ Water Supply, Sewer & Storm Water Management
- ♦ Water Systems & Resilient Urbanization in Hill Towns
- ♦ Municipal Contract Management
- ♦ Financing Cities and PPP

Further, the Elective course will be attended by the three experts as per their Domain expertise in due course of time.



*Seminar on
Recycling Used Water – Beyond Conventional Technologies
Jointly Organized by
SCMS Water Institute
and Ovivo India*





അമൃത് മിഷനും ദേശീയ ഉപജീവന മിഷനും കുടുംബശ്രീയുടെ പങ്കാളിത്തത്തോടെ നടപ്പാക്കുന്ന അമൃത് മിത്ര പദ്ധതിയിൽ വൻ മുന്നേറ്റം നടത്തിയിരിക്കുകയാണ് മരട് നഗരസഭ “ണമലേളു ഉഴു ണ്ാലി” എന്ന ആശയം ഉൾക്കൊണ്ട് നഗരസഭയിലെ കുടുംബശ്രീ സ്ത്രീകളുടെ പങ്കാളിത്തത്തോടു കൂടി നടപ്പാക്കുന്ന അമൃത് മിത്രയിൽ 3 പ്രവർത്തികളിലായി 30 ലക്ഷം രൂപയുടെ പദ്ധതികളാണ് നടപ്പാക്കുന്നത്.

നഗരസഭയിലെ 100 എം.എൽ.ഡി. ജല ശുദ്ധീകരണ പ്ലാന്റും പരിസരവും പരിപാലനത്തിനായി 10 ലക്ഷം രൂപയുടെ പദ്ധതിയാണ് നടപ്പാക്കുന്നത്. മരട് ഈസ്റ്റ് സി.ഡി.സി.യുടെ ചുമരലയിൽ 7 കുടുംബശ്രീ അംഗങ്ങളുടെ പങ്കാളിത്തത്തോടെ 2024 നവംബർ മാസം ആരംഭിച്ച പദ്ധതിയുടെ ഭാഗമായി ഉപയോഗ ശൂന്യമായി കിടന്നിരുന്ന പ്ലാന്റിന്റെ പരിസരം പച്ചക്കറി തൈകളും പൂച്ചെടികളും വെച്ച് പിടിപ്പിച്ച് മനോഹരമാക്കി. ഓണം വിപണി ലക്ഷ്യമാക്കി നട്ട പച്ചക്കറികൾ വിളവെടുപ്പിന് പാകമായി. നഗരസഭയിലെ വിവിധ പാർക്കുകളുടെ പരിപാലനവും പദ്ധതിയുടെ ഭാഗമായി നടത്തി വരുന്നു.





Brief Article on the Risk and Vulnerability assessment towards the potential impact of climate change on the WASH (Water, Sanitation, and Hygiene) sector in Urban Regions including informal settlements in Kerala State.

Introduction:

Climate change poses a growing threat to essential services in urban regions, especially in vulnerable urban informal settlements like slums. The WASH (Water, Sanitation, and Hygiene) sector is critically exposed to rising temperatures, erratic rainfall, and extreme weather events. These disruptions intensify water scarcity, contaminate sources, and overwhelm inadequate infrastructure or at times flooding would also be a real cause. Populations in urban and informal settlements face heightened risks due to poor access, overcrowding, and limited resilience. A Risk and Vulnerability Assessment (RVA) analysis may help identify specific hazards, exposure levels, and adaptive capacities. Such assessments are vital for evidence-based planning and prioritizing inclusive adaptation strategies. They reveal systemic gaps and social inequities that amplify climate-related WASH challenges. Integrating local knowledge with scientific analysis strengthens the relevance and impact of any interventions proposed. This note outlines the key risks, vulnerabilities, and actionable insights for the WASH sector in affected communities with an ultimate goal to build resilient, inclusive systems that safeguard public health in the face of climate change. Climate change brings forth new hazards and vulnerabilities and allied socio-economic impacts. Such phenomena are having a devastating impact on the living conditions of people, particularly in areas where the poor and vulnerable population live in urban system.



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Climate change and its Impact on Water Cycle:

The impacts of climate change are felt through the impacts on the Water cycle. Climate change exacerbates various water scarcity issues in many regions inclusive of Kerala state affecting the availability (quantity and quality) of water for residents in Urban and its informal settlements. Changes in precipitation patterns, including increased frequency of droughts bring forth stressed condition affecting the basic infrastructure. Anthropogenic activities have significantly increased the number of drought years, a trend which is expected to continue due to climate change.

Irregularities in dry weather due to extreme drought can cause a severe imbalance in water cycles, resulting in low surface water volumes and groundwater recharge, thus affecting the hydrological systems on which some sanitation systems rely up on. At the user-interface level, in conditions of drought and reduced water availability, securing sufficient volumes of water for the normal operation of flush toilets may be challenging. Likewise, climate change has intensified the frequency and severity of floods in many regions inclusive of Kerala. Erratic monsoons and rising sea levels have disrupted traditional weather patterns. Widespread deforestation and unplanned urbanization worsen flood impacts across the state. Communities face recurring displacement, water contamination, and loss of livelihoods.

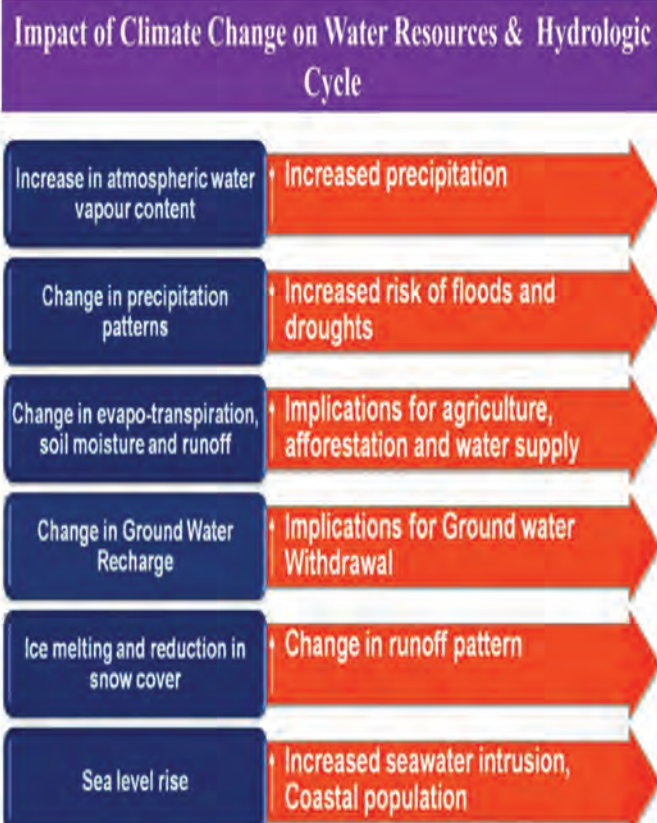


Figure:1 Various Impacts of Climate change on Water Resources and Hydrological cycles

Impact of climate change on Human Health:

while the Sanitation Infrastructure Vulnerability is concerned, Informal settlements in urban regions often lack adequate sanitation infrastructure/facilities, and climate change-related events such as flooding or extreme weather events has further degraded the existing facilities. **Event of Flooding overwhelm pit latrines and sewage systems, leading to contamination of water sources and increased risk of waterborne diseases and other diseases.**

There is substantial evidence that continued anthropogenic related global warming has led to an increase in the occurrence, magnitude, and volume of heavy precipitation events. Changes in precipitation alter surface water flows, ground water levels, and storm events leading to floods, which are among the most damaging and costly natural disasters. Onsite sanitation facilities are vulnerable to flooding and consequently increase the risk to public health and the environment. When flooded, the contents of containment systems (e.g., pit latrines, septic tanks) enter the environment, polluting flood waters, groundwater and surface water with contaminants and pathogens, leading to infectious **waterborne diseases such as cholera, typhoid fever, and Hepatitis A**. This in turn increases **morbidity and mortality rates of populations within these flood prone areas along informal settlements due to compromised water and sanitation systems**. Poor hygiene practices and inadequate access to clean water amplify health risks, particularly among vulnerable populations such as children and the elderly. Further raising Sea levels as a result of climate change, especially in tropical and subtropical regions bring forth a high level of risk, expected to experience inundation, flooding, and erosion. Coastal areas experiencing sea-level rise may become uninhabitable and face water scarcity due to saline intrusion. As sea levels rise, coastal communities experience flooding. Sanitation infrastructure in these areas is at risk of damage and inundation, potentially reducing access to sanitation and increasing exposure to public health hazards as is the case of Kerala state.

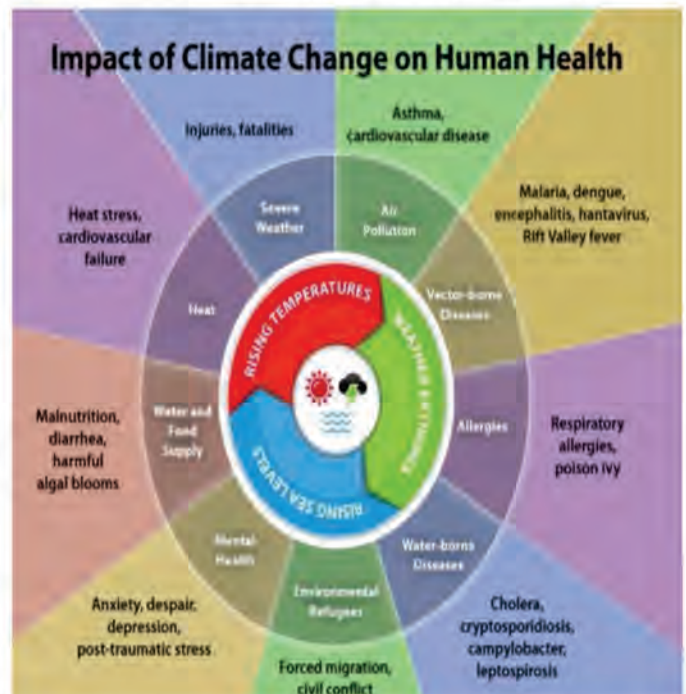


Figure:2 Impact of Climate change on Human Health. (Reference: J.Patz)

Climate Impact	Impact on Wash Sector
Decrease in Precipitation: Drought	Reduce in raw water availability for drinking water supplies, reduced flow in Rivers, less dilution/ increase concentration of Pollutants in water, challenge to hygienic practices
Increase in precipitation (severe weather) Flooding	Pollution of wells, inundation of wells, inaccessibility to of water sources, flooding of latrines, damage to infrastructure, landslides and disturbance of ground-water flows, sedimentation and turbidity challenges to sustainability of sanitation and hygienic behaviours and water borne diseases.
Increase in Temperature: heat waves	Damage to infrastructure, increase in pathogens in water leading to increased risk of diseases. Seasonality of River flows affected leading to reduction in water availability in summer
Table:1 Climate related Impacts on WASH Sector	

Adapting of WASH programmes prevalent to climate change in Urban and its informal settlements/slums pose significant challenges. Limited resources, weak governance structures, and competing priorities may hinder the implementation of climate-resilient WASH interventions. Additionally, community engagement and participation are crucial for the success of adaptation strategies to achieve among marginalized informal settlements.

The approaches to be adopted towards addressing the impacts of climate change on WASH in urban and informal settlements/slums should be through an integrated approach that considers the interconnectedness of water, sanitation, and hygiene services with broader environmental and socio-economic factors. The Sustainable solutions to be adopted should involve incorporation of climate-resilient infrastructure, capacity building, and community-based adaptation measures.

Effective policy and planning frameworks that are essential for mainstreaming climate change considerations into WASH programmes at the local (micro), regional (Meso), and national levels (Macro levels). Strengthening coordination among relevant stakeholders, including government agencies, non-governmental organizations, and community representatives, is critical for fostering climatic resilience and sustainability of efforts in informal settlements.

In the context of WASH, the policy framework should integrate climate-resilience in WASH infrastructure and services which are to be reflected in the four national WASH related policies viz...Swachh Bharat Mission-SBM 2.0 or Clean India Mission 2.0, Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0, Jal Jeevan or Water for Life Mission to strengthen judicious drinking water supply system, scientific methods of waste management and improved grey and black water management. Further ensuring 100% drinking water supply coverage of 4,700 cities and provide 100% sewerage-septage management to 500 cities of India.

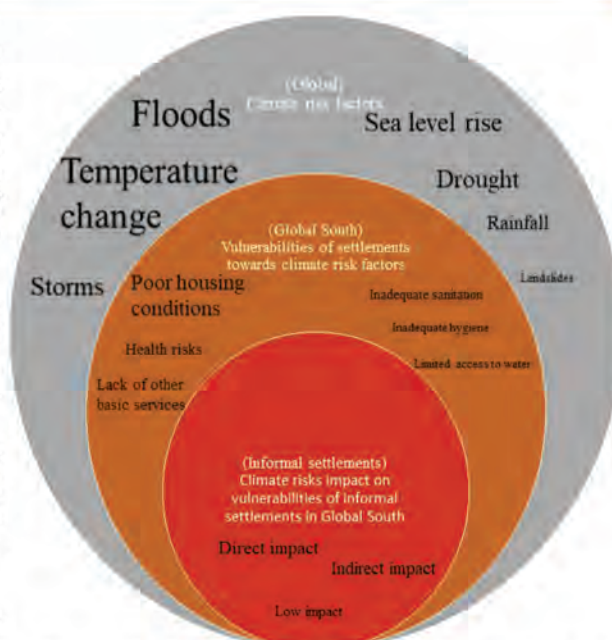


Figure: 3: Depicting the contextualizing aspect of climate risks:

Conceptualization of Framework Towards Climate risk factors:

Tailoring the global settlement findings to the unique landscape of informal settlements. The intensity of colours detailed indicates the degree of importance and specification, while the size of the text signifies the significance of each term.

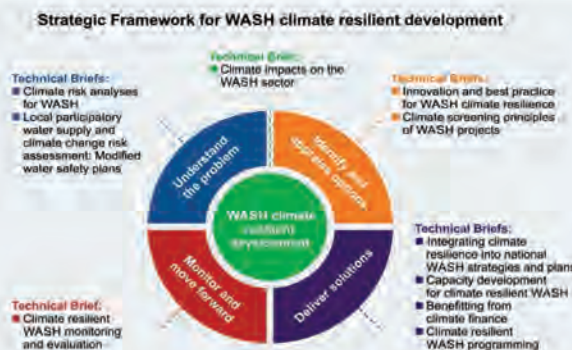
Urgent Climate-Resilient Planning and Ecosystem restoration for WASH Sector is essential for Kerala's Future:

Urgent climate-resilient planning and ecosystem restoration are essential to safeguard Kerala's WASH sector. Frequent floods, saline intrusion, and water resources depletion threaten water availability and quality. Informal settlements face the brunt of poor drainage and inadequate sanitation. Strengthening water sources through watershed management and wetland rejuvenation is vital. Climate-proof infrastructure must be prioritized to withstand extreme events. Nature-based solutions like rainwater harvesting, green buffers, and decentralized waste treatment can enhance resilience. Integrated urban planning should address the needs of vulnerable communities. Early warning systems and adaptive hygiene practices are crucial in disaster-prone areas. Policy coherence and multi-stakeholder coordination are key for sustainable outcomes. A climate-resilient WASH system is foundational to Kerala's public health, dignity, and future development.



Figure: 4 WASH related climate resilient developments

Our objective is to establish universal access to **WASH services in the urban and its informal settlement (slums)**, with a distinct emphasis on inclusivity and catering to all marginalised groups. This effort particularly concentrated on meeting the unmet needs of vulnerable populations, including **persons with disabilities, single women, the elderly, socio- economically disadvantaged communities, as also sexual and gender minorities (Transgenders).**



Source: GWP and UNICEF 2014

Fig.5: Strategic Framework for WASH – Climate Resilient Development (Ref: UNICEF 2014)

The proposed phase wise approach should focus on advancing safe and sustainable WASH practices in slums while proactively addressing climate impacts. The pivotal aspect elaborated towards the proposed study on Climate Risk Assessment, which identifies vulnerable slum areas and assesses potential climate impacts, its critical findings, prioritization of Intervention, and various adaptive measures that needs to be implemented. Beyond infrastructure, the approaches emphasise climate resilience, contamination prevention, and system reliability, particularly during extreme climatic conditions. The initiative seeks a more people-centric and inclusive strategy that navigates the complexities of climate change while addressing community vulnerabilities. The study overview special emphasis on understanding the key vulnerabilities of women, children, specially-abled, and so on from the gender and social inclusion lenses.

Proposed Methodology of Study:

The methodological framework proposed for the study should follow a mixed method approach including secondary literature review on the intricacies of WASH and climate change followed by field level assessments in the urban and informal settlement/slum areas of proposed area of study through qualitative and quantitative surveys.

i. Desk review of secondary data and literature.

Relevant research papers and reports on impacts of climate change on WASH, loss and damages caused by disasters and its relevance to WASH sector, previously conducted Vulnerability Assessment, City Resilience Strategies, Hazard Risk and Vulnerability Analysis (HRVA) of concerned ULB of Study, Climate documentation from the Meteorological Centre, Indian Meteorological Department, Government of India. Guidance Notes from Global Water Partnership (GWP) if any UNICEF, and other bodies on climate change has to be referred to during the desk review approaches.

Policy documents such as **State Action Plans on Climate Change for the Kerala state** to be reviewed along with related State Disaster Management Plans for broad insights into the areas of intervention and sectoral planning as envisaged by the state government.

ii. Primary Data Source to be collected:

1. Yearly and half-yearly water testing reports basically of pre and post monsoon seasons should be in place.
2. Depth to water levels of groundwater pre and post monsoon seasons.
3. Sanitation coverage data, solid and liquid waste management data.
4. Drinking water coverage details in all the urban region and its informal settlements.
5. Field-collected primary data, using semi-structured questionnaire and Focus Group Discussions (FGDs).
6. Key Interviews with stakeholders engaged in WASH services.

This comprehensive desk-based review should provide insights into climate change and disaster management perspectives at various levels viz... National, state, district, and city. This foundational understanding will bring forth information suitable for decision-making and the formulation of effective strategies to tackle climate risks and enhance resilience in the selected study areas.

iii. Analytical Hierarchy Process Methodology:

The Analytical Hierarchy Process (AHP) methodology needs to be employed in the proposed study aiming to achieve systematically assess and prioritize key indicators related to Socio-economic Vulnerability (SeVI) and WASH services. This method will facilitate the identification of influential factors and its relative importance, contributing to a comprehensive understanding of community resilience and vulnerabilities especially during extreme climate events. The AHP process consisted of the following steps:

Variable Selection and Redundancy Removal:

Initially, a set of variables can be considered for the assessment, encompassing both socio-economic indicators and WASH-related indicators from Census of India, 2011/ the projected population justified for 2023. Redundant variables should be identified and removed from the analysis to ensure focus on the most relevant indicators.

Indicator Ranking: The remaining indicators should then be subjected to a comparison process according to pairs. Each indicator should be compared to every other indicator to determine its relative importance in influencing vulnerability.

Calculation of Weights: The comparisons of generated matrix values according to pairs. These values should be synthesized to derive the relative weight of each indicator.

Priority Calculation: The priority percentage of each indicator should be computed based on the derived weights. **Higher priority percentages indicated greater vulnerability or importance of the indicator in influencing the phenomenon being studied.**

Application to SeVI and WASH-SeVI: The priority percentage of indicators obtained through the AHP process should be applied to calculate both the **Socio-Economic Vulnerability Index (SeVI)** and the **WASH-related SeVI**. These indices integrated the 'weighted' indicators to quantify vulnerability and resilience in terms of socio-economic conditions and WASH services.

The AHP-generated priorities should be used to interpret and understand the implications of each indicator on vulnerability. This informed decision-makers mark the relative significance of each factor shall guide the identification of targeted interventions. The use of AHP in both SeVI and WASH-SeVI calculations will help to tailor interventions to address specific challenges in the context of climate change and other stressors on the existing WASH services in the urban and selected informal/ slums settlements.

iv. Risk Scoring Method for Hazard, Vulnerability and Exposure:

The methodology to be employed is to derive the **hazard, vulnerability, and exposure indices** involved a systematic process of selecting and analysing key indicators that contribute to the hazard, vulnerability, and exposure of communities in the context of climate-related risks. Indicators for these were carefully chosen based on **guidance provided by the Joint Report of the Global Water Partnership and the United Nations Children's Fund (GWP and UNICEF, 2017).**

The methodology for deriving the '**Risk Scoring**' should be followed as structured process involving hazard classification based on frequency and intensity, data collection for various exposure types, and assigning confidence scores to vulnerability components and assessment factors. This approach ensures a comprehensive understanding of vulnerabilities within the framework of climate-related risks and hazards.

Initially, hazards should be classified based on their occurrence frequency and intensity. Data can be further organized by exposure type, and separate records maintained for hazards with multiple exposures. Additionally, the hazards sharing the same exposure were treated individually, and confidence scores allocated

to vulnerability components in the high-level vassessment and assessment factors in the detailed climate assessment. These confidence scores signify the level of risk associated with specific components or factors.

The hazard scoring considered aspects such as current and projected occurrence frequency, changes in frequency, and relevance to specific hazards. Exposure scoring involved criteria like critical infrastructure importance, population density, water source availability, and relevance to particular hazards. Vulnerability scoring encompasses factors like social network strength, risk awareness, adaptive capacity, and alignment with specific hazards. The above criteria shall be further adapted to suit the context and needs of the assessment, thereby **facilitating informed decision-making and targeted interventions to enhance resilience and disaster preparedness within socio-economic and WASH-related vulnerabilities.**

V. Qualitative and Quantitative Field Assessments:

After the secondary data collection and information analysis, the study should further focus on qualitative and quantitative assessments in the selected ULB and its informal settlement (slums) to understand people's perceptions (vulnerable groups) and experiences in the climatic variations in the last couple of decades and its impacts on WASH systems in their communities. Special emphasis should be laid on understanding Climate Change- induced WASH vulnerabilities in women, children, especially- abled groups, and so on. Gender and social inclusion lens should also be used to draw inferences during the qualitative study. This should be followed by a questionnaire-based spot survey conducted in the same locations. Based on the findings of climate data analysis and qualitative study information, a structured questionnaire should be designed. The enumerators in the field should be trained in data collection and compilation.

VI. Sampling Methodology for Field Assessments:

The qualitative and quantitative survey employed a combination of **systematic and purposive sampling techniques** to ensure a comprehensive representation of the target populations. Wards should be systematically selected based on the vulnerability and alignment with the research objectives. In order to give immediate attention to areas of higher vulnerability and prioritize interventions, specific priority wards should be identified. Purposive sampling should be employed to select households within these priority wards, ensuring a focused approach to address pressing issues.

Within these selected wards, vulnerable groups such as the **Elderly, Persons with Disabilities (PwDs), Sexual and Gender Minorities, Single Women / Widows, Sanitary Workers, along with the General Population should be identified to participate in the FGDs and informed decision making.**

The combination of systematic and purposive sampling techniques shall be derived for both structured representation of households (6%) across wards and slum settlements, as well as a targeted engagement with specific vulnerable groups through the FGDs. This approach ensured that the survey captures a wide range of perspectives and insights related to water, sanitation, livelihood challenges, and WASH-related issues, leading to a more comprehensive understanding of the community needs and vulnerabilities related to climate change.

VII. Data Analysis and Report Compilation

After the qualitative and quantitative surveys, the data and information gathered should be analysed and synthesized to compile the report.

The brief gist of data to be collected are as detailed below:

- ♦ Population, growth trend and population density.
- ♦ Climatic scenario (*Rainfall, Temperature, Humidity, Evapotranspiration, Relative humidity, Wind Velocity etc*)
- ♦ Past climatic trends and future climate projections.

Table 2: Projected Climate Change and Variability in the selected ULB.

Changing Climate Condition	Amount of Expected Change	Geographical Area	Rate of Change	Extent of Variability
Precipitation Change				
Temperature change				
Extreme events				

S.No:	Indicators	Rationale of inclusion.
1	Age	
2	Marginalised (SCs and STs)	
3	Lack of Education	
4	Marginal Workers	
5	Condition of Houses used as Residence.	
6	Source of Drinking Water	
7	Electricity Connection	
8	Availability of latrine	
9	Availability of drainage	
10	Type of Fuel used for Cooking	
11	Availing of Banking Services	
12	Availability of Radio/Television and cable network.	
13	Availability of Mobile	
14	Ownership of the House	
15	% of household with treated drinking water supply	
16	% of household with drainage facility	
17	% of house hold with sewerage/septage system	

Table : 3 . List of Selected Indicators for SeVI and WASH-SeVI Assessment:

S.No	Hazard Index mapping for selected ULB/ informal settlements
1	Flooding
2	Water Scarcity/ drought.
3	Heat wave
4	Groundwater depletion/ contamination
5	Disease outbreak
6	Tropical Cyclone
7.	Land slides or Earthquake prone zones

Table :4. Hazard index mapping:

Table: 5: Exposure Index mapping:

S.No	Component	Possible Indicators of Exposure
1	Physical Infrastructure	Critical Infrastructure
2	Environmental	Location of settlements
		Ground Water contamination
		Prevalence of extreme weather events
3	Human	People affected
		Quality of water
		Open drainage
		Open Defecation
		Maintenance of the system
		Disease outbreak
4	Financial/ Economic	Effect on livelihood: Source of income disruption

Note: The risk index values represent the level of risk associated with each exposure, with higher values indicating higher risk.

Table: 6. Vulnerability Index Mapping:

S.No	Component	Possible Indicators of vulnerability
1	Physical Infrastructure	Technology for WASH infrastructure. Construction standard of WASH infrastructure Design standard for water supply Water storage infrastructure
2	Environmental	Water quality Protected water sources Alternative sources of water Alternative source of sanitation
3	Social	Access to social safety nets Community-based risk assessments Community engagement in early warning systems
4	Human	Percentage (%) of young people Understanding of local hazards Understanding of WASH benefits
5	Financial/ Economic	WASH sector investment Livelihoods

Note: The risk index values represent the level of risk associated with each vulnerability, with higher values indicating higher risk.

Table: 7. Performa for Risk Assessment for selected/proposed ULB: Hazard, Exposure, Vulnerability, and Risk Scores.

Risk Assessment for ULB: Hazard, Exposure, Vulnerability, and Risk Score work out performa				
Description		Risk score		Rank
Hazard	Exposure	Vulnerability	Hazard x Exposure x Vulnerability	Calculated from Risk score
Tropical Cyclone	Physical	Physical		
Tropical Cyclone	Financial/ Economic	Financial/ Economic		
Groundwater	Physical	Physical		
Groundwater	Environmental	Environmental		
Flooding	Physical	Physical		
Flooding	Environmental	Environmental		
Tropical Cyclone	Environmental	Environmental		
Heat wave	Physical	Physical		
Heat wave	Financial/ Economic	Financial/ Economic		
Groundwater	Human	Human		
Disease outbreak	Environmental	Environmental		
Disease outbreak	Financial/ Economic	Financial/ Economic		
Groundwater	Financial/ Economic	Financial/ Economic		
Flooding	Human	Human		
Flooding	Financial/ Economic	Financial/ Economic		
Tropical Cyclone	Human	Human		
Heat wave	Environmental	Environmental		
Disease outbreak	Human	Human		
Water scarcity	Physical	Physical		
Disease outbreak	Physical	Physical		
Water scarcity	Environmental	Environmental		
Water scarcity	Human	Human		
Heat wave	Human	Human		
Water scarcity	Financial/ Economic	Financial/ Economic		

QUALITATIVE ASSESSMENT:

- ♦ % of access to clean drinking water.
- ♦ % of sanitation infrastructure
- ♦ % of adequate drainage system
- ♦ % of sewage management systems
- ♦ Level of Groundwater contamination/ quality aspects.
- ♦ % of hygienic living conditions,
- ♦ Reliability of other water sources...
- ♦ WASH Vulnerabilities for Specific Vulnerable Groups.

QUANTITATIVE ASSESSMENT:

- ♦ Spatial location of slums:
- ♦ Sources of Drinking water and Coverage:
- ♦ Access to latrine facilities and area of coverage:
- ♦ Water source access to latrines:
- ♦ Types of drains and its coverage:
- ♦ Status of Handpumps: if any,
- ♦ Status of open wells: if any
- ♦ Status of borewells if any:
- ♦ Status of water supply, if any
- ♦ Availability of groundwater and its categorisation,
- ♦ Surface water availability its quality and quantity:
- ♦ Involvement of communities in managing WASH services:
- ♦ Type of cooking fuel:
- ♦ Awareness on Climate Change:
- ♦ Perceived understanding of climate change:
- ♦ People's perception on local environment:
- ♦ Information on extreme weather conditions:
- ♦ Changes occurred due to extreme weather events:
- ♦ Impact of climate change on communities:
- ♦ Emergency shelters availability at times of disaster:
- ♦ Environmental concerns due to climate change:
- ♦ Health vulnerabilities due to climate changes:
- ♦ Perceptions on linkage between WASH services and diseases:
- ♦ Affordable Monthly medical expenditure:
- ♦ Inclusion of WASH issues in local Election manifestos:

Table: 8. Impacts of Climate Change Variability on WASH in the Surveyed Settlements:

Climate Change Variability	Manifestation	Impacts on WASH	Example to be elaborated from the Surveyed urban and informal Settlements.
Lesser rainfall	Lack of water availability, especially during summers	1. Limited water for toilets and bathing 2.Reduced frequency of washing/bathing 3. Contaminated drinking water 4.Increased reliance on alternative water sources	
Shifting rainfall patterns	Changes in the timing and intensity of rainy seasons	1. Water scarcity during non-traditional rainy seasons 2. Challenges in water storage and management	
Extreme weather events (heatwaves, heavy rainfall)	Intensified heatwaves and Flooding/ Waterlogging	1. Contaminated water pipelines due to waterlogging and flooding 2. Water sources becoming turbid 3. Spread of waterborne diseases due to stagnant water 4. Overflow of drains leading to mixing of drainage and storm water, resulting in groundwater and surface water contamination 5. Limited water availability due to extreme heat and increased evaporation	
Erratic rainfall	Waterlogging and overflowing drains	1. Contaminated water entering houses and toilets 2. Increased disease spread 3. Damage to sanitation facilities	
Scanty rainfall spans	Water sources drying up during summers	1. Reduced water availability for all purposes 2. Health and hygiene challenges due to limited water	
Enhanced rainfall intensity events	Open drains and open defecation	1. Compromised hygiene and sanitation 2. Increased risk of waterborne diseases 3. Impact on overall community health	
Heat Wave	Rising diseases and disrupted livelihoods	1. Economic strain due to medical expenses 2. Challenges for daily wage workers during extreme weather 3. Impact on vulnerable groups like children and elderly	
Extreme rainfall, strong winds	Absence of pre-announcements during disasters	1. Limited disaster preparedness and communication 2. Increased vulnerability during extreme events	

Erratic rainfall	Contaminated water pipelines	1. Reduced access to clean and safe water 2. Heightened health risks due to contaminated water	
Scanty rainfall, Lesser rains during monsoon	Inequitable sharing of water resources	1. Increased conflicts over water 2. Unequal access to water resources	
Unpredictable weather	Impact on Livelihoods	1. Challenges for livelihoods and collection of water from long distances dependent on weather conditions 2. Economic instability due to incurring more money on collecting and managing water and sanitation	
Erratic rains	Contamination due to improper disposal of waste	1. Increased disease transmission due to poor sanitation 2. Impact on overall community health	

Table: 9. Tabulation towards Prioritization of Wards Based on Socio-economic, Water, Sanitation, and Climate Change Impact Parameters

Ward Number	Parameters for Prioritisation.			
	Socio-economic	Water	Sanitation	Climate Change Impacts

CLIMATE RESILIENT ACTIONS FOR WASH:

- ♦ Factoring climate risk into situational analysis.
- ♦ Strengthening WASH systems for climate resilience: **(Achievement of the SDG 6 is dependent on a strong WASH system)**
- ♦ Ward-level micro planning on WASH,
- ♦ Introducing the Saniclimiwall (Within the framework of Saniclimiwall), community monitoring will play a crucial role in tracking and overseeing climate-informed WASH services) **"Saniclimiwall" is a term referring to a public dashboard or tool used for managing climate-resilient water, sanitation, and hygiene (WASH) services, particularly within communities. It seems to be an evolution or adaptation of the concept of a "Saniwall," with "Saniclimiwall" specifically focusing on climate resilience. The tool is designed to be community-driven and empowers local residents to manage and monitor their own WASH infrastructure.**
- ♦ Integration of desludging services.
- ♦ Linkage with policies and programmes:
- ♦ Develop and retrofit water supply systems to withstand floods, cyclones, and droughts.
- ♦ Promote decentralized rainwater harvesting systems in households, schools, and public buildings.
- ♦ Construct elevated and sealed toilets in flood-prone areas to prevent overflow and contamination.
- ♦ Implementing low-cost decentralized wastewater treatment units like DEWATS (Decentralized Wastewater Treatment Systems) in peri-urban/Urban and informal settlement areas.
- ♦ Installation of real-time sensors to monitor water quality and issue alerts during contamination or climate-related disruptions.
- ♦ Strengthen basin-level planning to manage water resources equitably during periods of scarcity and also in excess.
- ♦ Promote groundwater recharge structures and maintain traditional water bodies (ponds, tanks).
- ♦ Encourage composting toilets and urine diversion toilets to reduce water usage and ensure sustainability.

- ♦ Run continuous climate-linked WASH awareness programs, especially in schools, slums and especially to disaster-prone communities.
- ♦ Form and train local WASH response teams for emergency water and sanitation services during climate events.
- ♦ Mandate the use of durable and non-corrosive materials for water and sanitation infrastructure.
- ♦ Improve drainage systems to reduce waterlogging and integrate solid waste segregation to prevent blockage and pollution.
- ♦ Conduct regular water security and vulnerability assessments, especially in coastal and hilly regions.
- ♦ Collaborate with startups and NGOs for affordable, tech-driven solutions in water purification and sanitation.
- ♦ Ensure that Kerala's WASH policies explicitly integrate climate adaptation and allocate targeted funds.

Conclusion and Way Forward:

As climate patterns change and impact up on WASH services, the experience of urban as well as informal slum residents tackling the climate change and its resilience is an important scenario to be analysed from the perspective of managing resources to preserving health, adaptive strategies that empower vulnerable communities' needs should be captured. The narrative to be captured from different slum areas for comprehensive understanding of how climate change worsens vulnerabilities related to WASH services. The resident's interpretation of shifting weather patterns directly affects their daily lives and reveal the difficulties they encounter in accessing **clean water, proper sanitation, and maintaining hygiene**. Community members observation towards changes in weather patterns, including increased **day temperatures, heat waves, and heavy rainfall needs to be captured during a participatory assessment. Further, assessments in terms of heavy rainfall, in particular, impacting water supply systems, causing pipeline water to become muddy and unsuitable for consumption. As a result, how are residents forced to rely on alternative sources like close by open wells or lorry-based supplies need to be captured.**

Inadequate drainage systems, especially during monsoons, contribute to waterlogging and overflowing drains. This results in unhygienic conditions, spread of disease, and contamination of water sources. Poor drainage systems cause drain water to enter houses and backflow into toilets, further exacerbating the risk of waterborne diseases. The lack of proper sanitation facilities, including open defecation in some instances of few states, adds to the challenges faced by these communities. Hence, the above aspects need to be thoroughly assessed with the community participation and logical way forward has to designed. The direct impact of shifting weather patterns, heat waves, and increased temperatures affects people's health and livelihoods. Construction workers and labourers, who rely heavily on outdoor work, face difficulties in earning a living during extreme weather conditions. Climate-related disasters like cyclones and floods exacerbate these challenges, as lack of proper water and sanitation facilities pose severe risks to safety and well-being. Many of the Urban informal slum settlements are located in low-lying areas, making them susceptible to flooding. Poor infrastructure exacerbates the impacts of extreme weather events, causing damage to water supply and sanitation facilities. During heavy rains and floods, drainage systems often fail, resulting in contaminated water entering houses and toilets, heightening health risks. Hence, necessary remedial measures need to be worked out in consensus with the community. Likewise, Extreme weather events like floods and droughts disrupt the availability of clean drinking water. While water scarcity increases during droughts, flooding often contaminates existing water sources, leaving communities without access to safe water. Changing weather patterns, such as increased temperatures and unpredictable rainfall, directly affect water sources like wells and hand pumps, worsening water scarcity during dry periods. Such situations are also to be tackled in close coordination with the affected communities.

The community's collective perceptions should be given an urgent importance to address WASH vulnerabilities in the context of climate change impacts. These vulnerabilities further underscore the importance of comprehensive solutions that consider equitable access to clean water, improved sanitation facilities, and adaptive strategies to mitigate the impact of shifting weather patterns. It is evident that the voices of the residents provide valuable insights that can guide effective interventions to build climate resilience and ensure the well-being of marginalised communities.

comprehensive and integrated support from local authorities, Government agencies and non-government agencies are crucial to effectively address the concerns and vulnerabilities with respect to climate change on WASH. The impact of climate change on WASH services demands certainly demands immediate attention, innovative solutions, and a collective commitment from various stakeholders for a sustainable future not only in Urban informal but also in formal Urban settlements.

Overall, addressing the potential impacts of climate change on WASH in Urban and informal settlements requires a multi-dimensional approach that integrates climate adaptation, disaster risk reduction, and sustainable development principles to enhance the resilience of vulnerable communities and ensure equitable access to essential services.

“A comprehensive Risk and Vulnerability assessment is vital to build climate-resilient WASH systems in Kerala’s urban and informal settlements. It lays the foundation for adaptive strategies that safeguard public health and Water Security amid growing climate uncertainties”.

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31.08.2025

AMRUT PROGRESS

AMRUT-1.0



AMRUT-2.0





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