



INSIDE STORIES

on climate compatible development

Climate & Development Knowledge Network

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Key messages

- City authorities and communities can become aware of future climate-related risks and manage them, known as 'future proofing' cities.
- Strengthening the blue-green infrastructure – the intricately networked water systems together with land-based habitats and natural ecosystems – is an effective way of reducing the impacts of climate change in the city of Madurai, India. Madurai's experience suggests that to deliver such an approach effectively, it is vital to engage multiple stakeholders to diagnose and prioritise issues and explore a range of actions.
- Intermediary organisations are essential for assisting government and communities in future proofing, because intermediaries can build platforms for stakeholder engagement at the provincial and urban local body levels. The Development of Humane Action (DHAN) Foundation has played such an intermediary role in Madurai.
- Future proofing calls for building a case to secure resources from the local to the global level, using available evidence and testimonies.
- It also calls for building the capacities of stakeholders – across government authorities, civil society organisations, the private sector and communities – to bring about effective, experience-based engagement, to leverage norms and rules, and to develop a common and shared mission. Such a multi-faceted approach also improves the chances that future proofing plans made together will be delivered and sustained.

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Future Proofing of an Indian City: Lessons from Madurai

Future proofing Indian cities is an innovative approach centred on engaging multiple stakeholders in strengthening the blue-green infrastructure of cities in the context of urbanisation and climate change. Blue-green infrastructure includes both natural and manmade infrastructure covering the hydrological or 'blue infrastructure', and land-based natural habitats, ecosystems and urban green space or 'green infrastructure'.¹

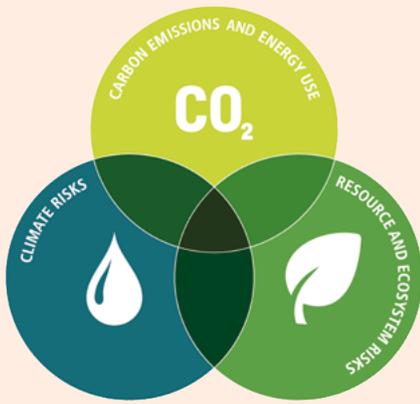
Atkins, a design, engineering and project management consultancy, has implemented the Future Proofing Cities² project in partnership with the Development and Planning Unit at University College London (UCL) and the United Kingdom's Department for International Development (DFID). In the city of Madurai, the DHAN Foundation is the delivery partner for the project and the Madurai City Corporation is the client. The Madurai Action Plan for Blue-Green Infrastructure calls for integration of the future proofing approach in city development plans.³ The aim of the Action Plan is to foster projects that address climate risks and vulnerabilities by strengthening blue-green infrastructure and to explore the scope for funding through different economic development sources. This brief illustrates the purpose of future proofing, its achievements, enabling factors, challenges and implications for policy-makers. It also highlights

the efforts of the DHAN Foundation in facilitating citizen engagement during the process of preparing and delivering the Action Plan.

The plan for future proofing the city of Madurai

Madurai is the second largest city in the state of Tamil Nadu, India. Built on the fertile plains of the Vaigai River, Madurai has a history that dates back more than 2,000 years, but the city now faces a range of climate-related hazards – particularly flooding⁴ – which are already affecting its people and physical infrastructure due to the city's hydro-geological situation. The flooding in Madurai is due to the blockage of storm water carriers and encroachment by slum communities around water bodies; these communities are also the worst-hit victims of the flooding. Madurai once had 46 water tanks, of which only seven are still in use.

Box 1. Integrated assessment framework⁷



Three groups of interrelated issues affect the city and its wider catchment:

Climate risks: For example, flooding and extreme heat events.

Resource and ecosystem risks: For example, water scarcity, food security and damage to vital ecosystems due to urban growth.

Carbon emissions and energy use: For example, from transport, domestic and commercial consumption, industry and waste.

In this context, the integrated assessment framework⁶ developed for the Future Proofing Cities project by Atkins in partnership with UCL and DFID was used to understand the interrelated issues arising from the risks and vulnerabilities which impact future development, and to prepare the Madurai Action Plan for Blue-Green Infrastructure (see Box 1).

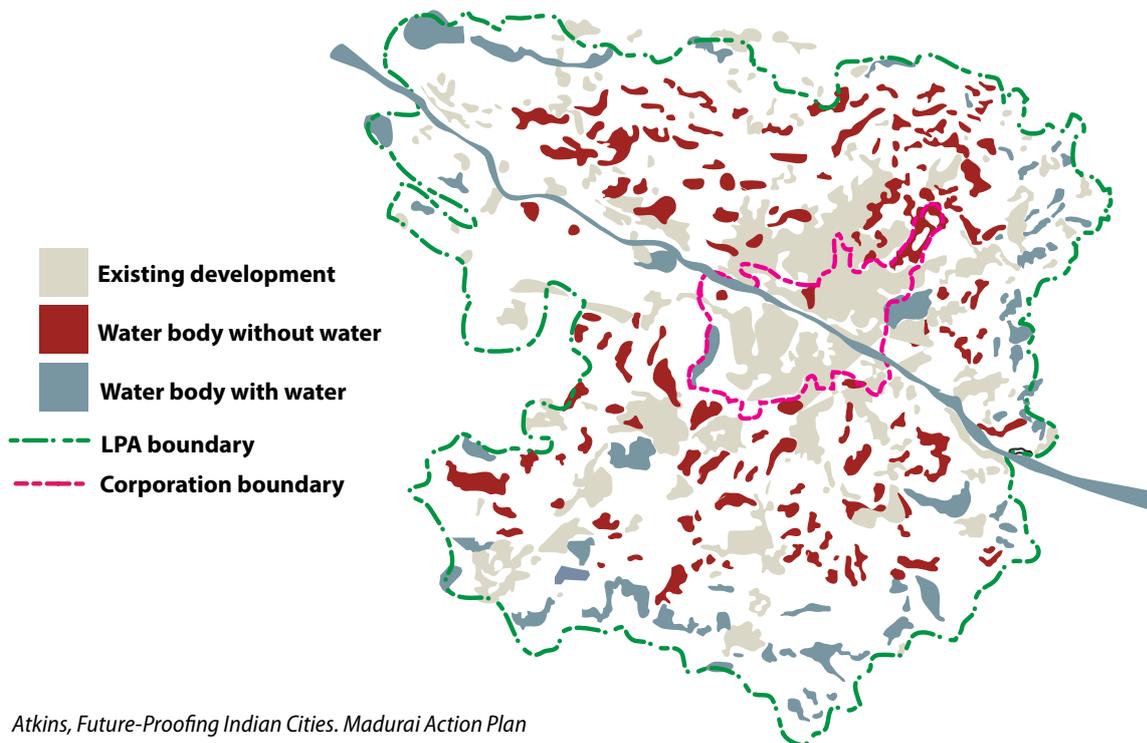
The Action Plan developed using this framework had the following objectives:

- a. To evolve priority themes based on the range of issues identified by multiple stakeholders.
- b. To identify short-, medium- and long-term programmes of inter-related actions for strengthening

The regional climate projections⁵ for 2030 anticipate an increase in annual mean surface temperature of 1.7–2 C°, a change in the timing of

the summer monsoon rainfall and reduced frequency of rainy days, all of which point to the necessity of future proofing the city of Madurai.

Figure 1. Water bodies in Madurai with and without water



Source: Atkins, Future-Proofing Indian Cities. Madurai Action Plan for Blue-Green Infrastructure, December 2014.

blue-green infrastructure, based on the selected themes (see Figure 1).

- c. To make a case for mobilisation of resources for funding the projects, including assigning roles and responsibilities for each element of the Action Plan to different implementing institutions.

The Madurai Action Plan for Blue-Green Infrastructure: Process and reach

The Future Proofing Cities project, implemented by Atkins in partnership with the Development and Planning Unit of UCL and DFID, has involved the DHAN Foundation as the delivery partner for the project in Madurai. This arrangement leverages DHAN's significant knowledge of working at the grassroots level and facilitates access to and engagement with urban local bodies, including the municipal corporation, the municipality, and the city council, as well as the district and state

Box 2. Blue-green infrastructure

Blue-green infrastructure refers to the intricately networked water systems in Madurai, including water tanks, rivers, channels, canals and ground water (i.e. the blue infrastructure) and the fundamental ecological infrastructure, including natural habitats, ecosystems and urban green spaces (i.e. the green infrastructure) on which life in Madurai depends.

government, academia, the private sector and communities. This partnership sets up the Action Plan for continuity and sustainability. The preparation of the Action Plan took several months, from February 2013 to November 2014. During this process, it was important to address the risks and vulnerabilities related to climate change. This took place in distinct stages: building platforms of engagement at the subnational and urban local body levels; the urban diagnostic stage; the prioritising issues stage; the planning stage; report preparation; and finally working out a knowledge management and dissemination strategy involving stakeholders. The timeframe for the plan covers the period up

to 2031, which aligns with the upcoming revision to the Madurai Local Planning Authority's Madurai Master Plan. Several key factors contributed to the process of successfully arriving at a complete, agreed Action Plan, as described below.⁸

Building a shared vision among diverse groups

Building different platforms for engagement at the subnational level has been critical to developing a shared vision⁹ reflecting the needs and aspirations of all stakeholders. In contrast to the usual top-down, expert-dominated approach to priority-setting and strategising, participatory cross-sectoral forms of decision-making were pioneered. For example, 'water walks' (also known in the vernacular as 'Nathivalam') that brought together community members with representatives from the government and local organisations were arranged to focus attention on the degraded river corridor and related issues.

This process led to the emergence of the concept of blue-green infrastructure for addressing environmental and infrastructural challenges in order to safeguard the long-term future of the city (see Box 2). On the 'water walks', participants came up with many new ideas.



Mr K. Phanindra Reddy IAS, Principal Secretary, Government of Tamil Nadu, Department of Municipal Administration and Water Supply, addresses Tamil Nadu Water Week, December 2014

The inclusion of the DHAN Foundation as part of the team enabled the project to undertake comprehensive consultations with a wide range of stakeholders, including the Tamil Nadu Slum Clearance Board, the local planning authority, state-level decision-makers as well as a range of local experts, academics, land owners and other community organisations. Building on its existing strength in promoting City Technical Advisory Groups (CTAGs) and City Voluntary Technical Corps (CVTC), DHAN's technical contributions on blue-green infrastructure strengthened the diagnostic analysis and shaped the development of the Action Plan.

Using convincing evidence to mobilise for change

In the context of data inadequacy and incomplete information about the infrastructure for water distribution, sewerage and drainage, engaging stakeholders was useful to synthesise a range of issues as part of the urban diagnosis. For example, interconnections between existing patterns of vulnerability in the city were reflected in the incidence rates of vector-borne diseases in areas that were not serviced with piped water and waste water systems and those that were most affected by extreme climate-related events such as floods and storms.

Themes and projects

In response to the issues identified as priorities by the stakeholders, 14 projects¹² were developed relating to six themes across three dimensions (see Figure 2). Each project proposal described the issues to be addressed, the desired outcome or goal, the key actions to be taken, the sub-components, budget, benefit/impact score card¹³ and details of how the project would be delivered. Many of the proposals have the potential to deliver climate change mitigation benefits as well as addressing climate risks. For example, implementation of the sewer rehabilitation project will enable greater use of gravity-fed

Figure 2. Madurai Action Plan: Three dimensions, six themes, 14 projects

The Themes	Enabling Infrastructure Improvements	Policy Regulatory Improvements	Strengthening Social Capital and Governance	
Sanitation including sewer system rehabilitation	Sewer system rehabilitation through mapping and completing gaps in the existing infrastructure	Channel and tank protection and management	Sanitation capacity building	Short-term vulnerability
Improved solid waste management	Install waste collection system, develop anaerobic digestion facility, develop waste recycling system		Develop waste management plan for city, raise community awareness	
Rehabilitation of channels and tanks, and green infrastructure improvements	Channel and tank restoration		Channel and tank community involvement e.g. through media and education	
Flood and surface water management	Flood and surface water infrastructure improvements		Community capacity building on the management of floods and surface water	
Water resources supply-demand balance	Water resources infrastructure improvements		Water resources management capacity building	
Future proofing land use planning	Proposals for blue-green infrastructure coordination		Green city plan linking to the city development plan masterplan	

Tackling risk and vulnerability together in Madurai requires integrated action across sectors. The 14 projects were developed by combining, linking and sequencing initiatives to address the needs and problems identified by stakeholders. Each number in the figure represents one project and shows the order in which it will be implemented, highlighting the nature of interconnectedness between the six themes and three dimensions.



Nathivalam (water walk)

conveyance of effluent and reduce the energy and emissions associated with pumping. Addressing leaks in the water supply network and enabling greater use of local water resources following restoration of tanks could also reduce the energy needed for pumping water.

Endorsement of the Action Plan

The Action Plan has been endorsed both at the city level, by the Madurai Municipal Corporation with the local

councillors, and at the state level during a round table, resulting in a commitment to explore all potential funding options. In the words of Mr C. Kathirvan, IAS, Commissioner of the Madurai Municipal Corporation: “The Corporation, working together with other partners in the city, will form a new city partnership and will use the plan to enhance upcoming projects, inform future plans for the city and use it as a tool to attract additional resources to address the needs of Madurai.”

Exploring funding and partnerships for implementation

Engagement with donors who could support large-scale action – Tamil Nadu Urban Infrastructure Services Finance Limited, City Development Initiative Asia, the Asian Development Bank and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) – was initiated by sharing the Action Plan with them with a view to mobilising support for projects identified in the plan. A resolution has also been made for Madurai to apply to participate in the 100 Resilient Cities programme supported by the Rockefeller Foundation (which would unlock funds and technical support to build resilience),¹⁴ and also to access funds through corporate social responsibility programmes and other philanthropic organisations.

Rivers were the cradle of civilisation. At the same time, uncivilised acts of the civilisation always posed serious threat to the existence of the rivers.

– Mr K. Phanindra Reddy IAS, Principal Secretary, Government of Tamil Nadu, Department of Municipal Administration and Water Supply, Tamil Nadu Water Week 2014



Vaigai River Pageant

The DHAN Foundation and the Madurai Municipal Corporation are exploring possibilities for taking forward the refinement and implementation of projects proposed under the Action Plan. The Principal Secretary of the Municipal Administration and Water Supply Department advised the governments of both the district and the municipal corporation to form a multi-stakeholder Vaigai River Restoration Trust, and he asked DHAN to act as a member-secretary in the steering committee.

Legal action

Unexpected support has been received during the project period from the Madras High Court

bench in response to the public interest litigation petitions filed by an advocate, K.K. Ramesh, to clear encroachments and clean up the Vaigai and Kiruthumal rivers. The ancient Kiruthumal River had essentially disappeared due to encroachments and pollution. A Division Bench, comprising Justices R. Sudhakar and S. Vaidyanathan, ordered notices¹⁵ on 2 December 2013 to the Secretary of the Public Works Department and the Collectors of Madurai, Sivaganga, Ramanathapuram and Theni districts relating to the illegal sand mining activities, pollution and encroachments on the Vaigai River which had affected agricultural activities. Taking action to clear

encroachments from the river calls for a strong will among the authorities, and preventing future pollution will require a strong sense of responsibility among the public.

Social capital

Building social capital around water bodies was one of the projects proposed under the Action Plan. This has become a reality with the formation of the Zonal Council,¹⁶ which has a mandate to restore the rivers to their natural state, and with the institutionalisation of the water walks. The water walks now take place every two weeks, as a way of generating local knowledge on blue-green infrastructure. They enable the city administration and

the line departments to take effective action and build trust with the communities. Sustaining the interest of stakeholders through arts and cultural events, such as the Vaigai River Pageant, has resulted in reviving the age-old relationship between the community and the river and brought all stakeholders together.

Incremental benefits

The future proofing process highlights how a programmatic approach to designing projects to address multiple interlinked issues can be effective in simultaneously delivering wider co-benefits. For example, alleviating flood risk through establishing a green space network can provide space for flood water on a temporary basis while addressing deficiencies in urban green space, which will thus be available during times when there is no flooding.

The process of developing the Action Plan has also initiated a process of building citizen engagement in future proofing the city against climate risks. This engagement now needs to be channelled into the implementation of projects envisaged under the future proofing Action Plan.

Enabling factors and challenges

Triggers and challenges drive the future proofing project, bringing out the best in all the stakeholders and ensuring the successful completion of project activities and deliverables. Taking a flexible approach – catering to the situation with patience and perseverance – was key to drawing out the details of the Action Plan.

The enabling factors and challenges experienced along the way are described below.

Change is constant

In the context of changing political environments and staffing changes, including senior technical and administrative leaders of the project, there were variations in the level

of support over the course of the project leading to lack of traction or loss of momentum at times. Strategies to engage and re-engage key stakeholders were necessary. For example, three different commissioners came and went during the preparation of the Action Plan. However, the future proofing project in Madurai benefitted from

The findings of a comprehensive future proofing urban diagnostics process by Madurai Municipal Corporation and CDKN partners in 2014 show that the city is facing a wide range of risks, such as water scarcity, climate change impact, growing traffic congestion and damage to important natural habitats. Basic data needed for green development were generated and shared in the public domain.

‘Is negligence of blue and green growth a systemic flaw?’ is the question being asked. The city government has now identified ‘blue-green infrastructure’ as the priority issue and is working with CDKN and its partners to demonstrate how to sustainably manage the interconnected set of challenges relating to surface- and groundwater management (including supply and quality), sanitation, solid waste management, flooding and conservation of natural ecosystems, in the context of the urban development trajectory of the city and its changing climate. The work so far offers the basis for planning skills development for the city’s youth. Together, we are finding that blue-green infrastructure is possible when the authorities listen to the citizens with care and creativity.

– Mihir Bhatt, Director, All-India Disaster Management Institute and Senior Advisor, CDKN

PUBLIC SURVEY ON PRIORITIES FOR SMART CITIES MISSION, MADURAI

Specific areas where basic infrastructure improvement, traffic, transportation, tourism and general area development can be carried out

- Vandiyur Lake and its surroundings
- Tiruppurankundram and its surroundings
- Meenakshi Temple and its surroundings
- Gandhi Museum and its surroundings
- Mariamman Teppakulam
- Residential areas along the Vaigal, including Sivan Temple at Puttuthoppu
- Vilangudi-Anaiyur area, including new ring road from Uthangudi to Samayanallur

Pan-city initiatives for common areas

Water supply	Underground drainage	Smart mobility transport	Storm water drains	Solid Waste management
Smart healthcare	Education	Public safety		
Urban environment	Power distribution			



Public fill up forms at the booth set up near Anna Bus Stand in Madurai on Monday, as Part of the Smart City initiative to assess the needs of people. PHOTO: R. ASHOK

support from state level officials at the initiation and completion of the project, which was a critical factor in gaining endorsement of the Action Plan. Institutional mechanisms have to be in place to deal with causes and effects of change on individuals, institutions and societies.

From inadequate data to 'enough'

Presentation and discussion of local data on climate change should be included in proposals for major capital projects. Where such data are not available, proposals have focused on building resilience and addressing service gaps and this has not been a barrier to strategy development. The Action Plan highlighted the data gaps, indicating where additional work would be needed to inform specific projects. However, DHAN's strategy of engaging knowledge partners from the City Technical Advisory Groups and the City Volunteer Technical Corps in the data gathering process was effective in facilitating discussion of the emerging findings and triangulating between data sources. Presentation of findings visually (e.g. using photos and maps) was important for reaching non-technical audiences.

From sector-focused orientation to future proofing orientation

Changing the mind set of the stakeholders from sector-focused planning to long-term integrated planning requires first building their understanding of the interconnectedness of problems and challenges. For example, as shown in the Kirdhumal case study,¹⁷ the project moved beyond a geography-based approach to understand the risk and vulnerabilities caused by the impact of urban growth on water systems. The challenge is to help individuals, institutions and organisational

SMART SUGGESTIONS

THE HINDU, MDU, SEPTEMBER 21, 2015

"UNBUILT SPACE IS AS IMPORTANT AS BUILT SPACE IN IMPROVING QUALITY OF LIFE"

HOW TO HOP ON SMART CITY BANDWAGON

A great city, whose image dwells in the memory of many, in the type of some great idea. Rome represents conquest, faith hovers over the towers of Jerusalem, and Athens embodies the pre-eminence of the antique world, art - Benjamin Disraeli. And Madurai, one of the oldest living cities of the world, is a combination of faith, art, valour and all other good things of life. It is one among the cities chosen for the Smart Cities Mission (SCM), which aims to bring about qualitative improvement in infrastructure, governance and, overall, the way people lead their lives. On September 15, Madurai Corporation had a 'people connect' to elicit views on implementation of the SCM.

The Mission, according to the Union Ministry of Urban Development, "has no universally accepted definition. It means different things to different people. The conceptualisation of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residence." This stand

effectively puts the ball in people's court. Madurai Corporation will accept people's suggestions till September 23. The city is already abuzz with smart suggestions as the focus has once again shifted to its infrastructure.

Salient features

Some of the salient features of comprehensive development listed out in the SCM are planning for "unplanned areas" and efficient land use, housing opportunities for all, creation of walkable localities by reducing congestion and air pollution; road network for vehicles, pedestrians and cyclists; preserving and developing open spaces, promoting a variety of transport options, making governance citizen-friendly and cost-effective giving identity to the city; and applying smart solutions to infrastructure and services in area-based development.

These are issues that have been raised periodically for an inclusive growth of Madurai, the gateway to the southern hinterland. One of the recent efforts is a comprehensive study on future proofing of Madurai, done by four agencies, including city-based DHAN Foundation. "Here, we have laid emphasis on blue-green infrastructure (water and environment). Climate change effects will increase average temperatures and rainfall variability, leading to wide-ranging effects on food, water systems, human health, buildings, transport, energy and ecosystems," says A. Madhan Kumar, Programme Leader, DHAN Foundation.

Transport zones

J. Kanagavalli, Programme Leader, buses for creation of exclusive public transport zones to bring down pollution and congestion. "The area within the Veli Streets should be made a public transport zone," she says. She looks at the SCM as an opportunity to retrieve lost water bodies of Madurai and the Kirdhumal, a defunct river. "Urban waste should be turned into compost and given to farmers. Storm water channels should not become waste dumping yards."

Madurai has so many things to showcase its identity through the SCM - Meenakshi Sundareswar Temple, rich remnants of the past, Madurai Malli, its food, 'Jallikattu' - the list is long. But people across the city feel that the bar should be raised for the SCM as the scale of development from Jawaharlal Nehru National Urban Renewal Mission has been disappointing.

WHAT IS SMART CITIES MISSION?

The objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of smart solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities.

THE CORE INFRASTRUCTURE ELEMENTS IN A SMART CITY INCLUDE:

1. Adequate water supply
2. Assured electricity supply
3. Sanitation, including solid waste management
4. Efficient urban mobility and public transport
5. Affordable housing, especially for the poor
6. Robust IT connectivity and digitalization
7. Good governance, especially e-Governance and citizen participation
8. Sustainable environment
9. Safety and security of citizens, particularly women, children and the elderly
10. Health and education

Source : Smart Cities Mission, Union Ministry of Urban Development

What is future proofing?

Future proofing is an approach to address the issues and challenges faced by cities in an integrated manner to respond to the challenges of urbanisation and climate change. It considers the risks facing cities now and in the future, alongside current and future patterns of vulnerability, and the capacity and potential for stakeholders to act to address these issues. It advocates future proofing of blue-green infrastructure.

What is blue-green infrastructure?

Blue-green infrastructure is the network of green spaces, natural elements and pathways that interperse and connect our cities, towns and villages. More than this, it is an ecosystem approach to planning for the natural and historic environment which acknowledges the multiple benefits and vital functions it provides for economy, wildlife and local people.

Water sources resource management, supply and quality

Sanitation

Solid waste management, fluvial and pluvial flooding. Preservation of natural ecosystems and provision of greenspace.

Graphics : R. Rajesh

WHAT THEY SAY?

Public transport zones should be earmarked and a rapid transport system put in place to ensure easy mobility and ease congestion.

J. Kanagavalli, Programme Leader, Dhyan Foundation

Madurai's streets and roads should be humanized and not motorized.

N. Ramalingam, Urban Planner

Removal of encroachments, especially on public spaces, should be a priority.

S. Raghavan, Senior Dhan

THE BIG PICTURE: Garbage dumped in the Vaigal along Kalpalam in Madurai not only clogs the waterbody but prevents a sorry picture of the city as well. (right) Mariamman Teppakulam Presents a picture of how administered civic body can keep a public space clean. In the Smart City scheme of things, water courses and public spaces need to be kept spick and span. - Photo: R. Ashok

Impact of preparation of Madurai Action Plan (Source: The Hindu, 21 September 2015)

cultures recognise and work with this interrelatedness and inter-dependency of all the relevant issues.

From individual action to collective endeavour

Institutions, such as corporations, the Public Works Department and Tamil Nadu Slum Clearance Board, are bound by their usual scope of work and their limited staff and specific skill sets; they are generally too preoccupied with business as usual and thus may fail to see the big picture of the current and anticipated effects of climate change. Busy citizens tend to be content to sign petitions relating to their problems and hope it will be resolved. The multi-stakeholder dialogues in the context of this project have facilitated coordination across sectors and have actively engaged local civil society partners to develop appropriate solutions. Now the challenge lies in implementing them.

Communication to build momentum for sustainability

The use of social media and community events, such as the Madurai Symposium¹⁸ and water walks,¹⁹ have helped to build and maintain momentum for action. Facilitating vibrant dialogue in the local language is the key to citizen engagement. DHAN, based on three decades of prior experience in the city, was able to inspire a wider audience to support this cause and engage in the implementation efforts.

From managing resources to leveraging resources

The Madurai Municipal Corporation has been managing the financial

resources for the project with the help of the state government. External support, capacity and strategies are needed to leverage resources from local and international communities to carry forward the Action Plan for future proofing the city. The project proposals under the Action Plan (including short- and long-term projects) must be shared with potential funders and facilitation is needed to guide the decision-making and investment process with the Madurai Municipal Corporation and other state-level bodies. The challenge is to have accountability among the stakeholders for the generation, management and conservation of blue-green infrastructure.

The challenges described here will require commitment and intense follow-up with all the stakeholders at different levels as future proofing demands a long-term view and an integrated approach. The DHAN Foundation, with its social capital, and the City Technical Advisory Groups and City Technical Volunteer Corps will strive to realise the plan.

Future proofing Indian cities

Future proofing Indian cities – Madurai and others – requires raising awareness about and understanding of the approach, leveraging the state and national-level programmes to sow the seeds of the concept and integrate the Action Plan's range of projects into the city's development plans. The prospects for achieving this are discussed below, with an emphasis on the further steps that actors can take to expand and realise the full potential of the future proofing approach.

Shaping 'smart cities'²⁰

Using the future proofing approach with stakeholders presents excellent prospects for shaping smart cities in India (see Box 3). Besides addressing the short-term needs, adaptation to the existing climate risks and available resources can be a starting point for setting the goals for the future progress of the city; this approach facilitates integration of many issues and opportunities, which will catalyse economic development and achieve multiple goals. DHAN has launched a range of initiatives to present the case for using the future proofing approach to develop Madurai as a smart city.

Regulatory support from the national and state governments and urban local bodies for effective action

The 74th amendment to the Indian Constitution calls for devolving powers to urban local bodies. In practice, however, the power remains with the state in matters of finance and development. Similarly, akin to *gramasabha* (village forums) in villages, the amendment calls for establishing *nagarsabhas* (city forums) in cities. These forums will create space for citizens to discuss their needs and set priorities, keeping in mind short-term and long-term perspectives on climate risk and vulnerabilities.

Using events and circumstances to shift gears

The people of India are subjected to climate-related extreme weather events each year, including flooding. While unfortunate and often tragic, these events can act as a catalyst for mobilising stakeholders to develop longer-term solutions, beyond disaster risk

reduction. Focusing on particular risk or vulnerable locations within cities can also be helpful in developing projects. For example, satellite cities promoted in peri-urban areas or relocation of slum dwellers can incorporate design elements that work with the blue-green infrastructure.

Manuals for guidance

Building on the experience of preparing the action plans in Madurai and Bangalore, other urban local bodies in the country can be motivated by national and state governments to explore the possibilities of adopting the future proofing approach to climate compatible development in cities.

Planning manuals and information, education and communication materials can be developed for wider dissemination, which will build on the development plans.

Land reforms based on blue-green infrastructure

Land reform is likely to be needed to fully achieve a planned and sustainable network of blue-green infrastructure. To safeguard risk areas (e.g. areas prone to flooding) and vulnerable citizens against climate risks, innovative methods such as land assembly and compensation will need to be developed to influence and assist the slum dwellers who are occupying the water bodies to move elsewhere.

Integration of departmental functions

State-level bodies can support cities in their thrust towards cross-sectoral working. They can change the terms of the debate and ensure that all relevant players are brought to the table, including line departments. Through application of policy at the national level, they can ensure that city programmes and projects are designed to deliver climate change mitigation and adaptation goals and alleviate poverty.

People matter

The project team proposed the formal establishment of a City Partnership Model,²³ which would provide a forum to coordinate and

Box 3: Madurai's development as a smart, clean and green heritage city

Madurai is often referred to as the 'Athens of the East' and is best known for its world-renowned Meenakshi Temple and many historical monuments that are technological marvels. The city is one of the most popular tourist destinations in South India and is also known for its textile industries and its harvests of jasmine flowers, which push ongoing economic growth in the region. The city is governed by the Madurai Municipal Corporation which comes under the Madurai Metropolitan Region. The population in 2011 was 1,017,865. The city narrowly missed making it onto India's first list of 20 Smart Cities (January 2016), a new government programme, but it is battling hard to make the cut in the second round of the Smart City Challenge.

The city's current smart city proposal includes two main components: (i) area-based development and (ii) the pan city proposal. The area-based development component of the proposal includes preservation and enhancement of heritage features, development of visitors' amenities and tourism infrastructure (including integration of information technology to aid tourists and citizens) and improvements to urban infrastructure. The city's blue-green heritage, especially the river, is very important to the city and citizens. Under this component, the Madurai Municipal Corporation has selected 3,100 acres around the Meenakshi Temple precinct for retrofitting. The pan city proposal component, on the other hand, includes: smart water and sewerage management systems; intelligent public transport, parking and traffic control systems; a street light monitoring and management system; an emergency response and surveillance system; a waste collection and transportation monitoring system; and an integrated platform for e-governance, which would make use of computerised city records to make it easier for citizens to pay taxes, obtain birth and death certificates, building approvals, and so on.²¹ These two components of the proposal support each other, and CDKN has offered technical support and knowledge inputs so that implementation of Madurai's smart city proposal will accelerate economic growth via climate compatible development projects.²² In many ways, urban climate compatible development work has helped citizens to think of Madurai in 2050 as well as to re-think the concept of planning to involve leadership by citizens in pursuit of equality and sustainability, with an optimal balance of quality and quantity.

Looking at the issues, challenges and opportunities, including current initiatives to develop Madurai as a smart city, it is important that the city is developed as India's first 'green and clean' heritage city. The city needs to demonstrate that it is 'smart' in preserving its natural, cultural and economic heritage in the context of the many problems and opportunities that urbanisation brings. Madurai is already a heritage city and its development must keep heritage at its heart.



Youth cleaning the river: where voluntarism matters

collectively agree on the urban development, infrastructure and environmental priorities. This model will be a platform for line departments to cut across sectoral boundaries, and it will include a community forum comprising City Technical Advisory Groups and City Volunteer Technical Corps to be the advisory and sounding board, while academic institutions will also come together for the

development of the city. The DHAN Foundation is spearheading the initiative to give shape to the model, establishing the Vaigai River Restoration Trust²⁴ and pursuing urban local bodies, the district and state government bodies to issue orders to manage the blue-green infrastructure of Madurai. Collectively, these efforts will go a long way towards building resilience and adaptive capacity.

Future proofing the city of Madurai against the risks posed by climate change calls for action at different levels, from community level to national and international policy level. The Future Proofing Cities project is a first step in this direction. The DHAN Foundation is building on these efforts to realise the Action Plan for Madurai through appropriate mechanisms and processes at different levels.



Endnotes

- 1 Madurai Corporation (2014) *Future proofing Indian cities: Madurai Action Plan for Blue-Green Infrastructure*. Epsom, UK: Atkins, p. iv. (www.atkinsglobal.com/~media/Files/A/Atkins-Corporate/group/services-documents/future-proofing-cities/FPIC_Madurai%20Action%20Plan_1214.pdf).
- 2 Atkins (2016) 'Future proofing cities'. Epsom, UK: Atkins. (www.futureproofingcities.com).
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