Climate & Development Knowledge Network

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FUTURE PROOFING CITIES

Atkins in partnership with

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UCL

dpu Development Planning Unit

Climate & Development Knowledge Network

ATKINS

Action plan for Building Blue Green Infrastructure at Madurai, Tamil Nadu, India

- Content.
- About DHAN Foundation (www.dhan.org)
- Status of Water bodies and Slums
- Case study of Water Channel – System approach
- Approach to Action Plan
- Deliverables of Action Plan

DHAN Foundation core purpose is

To reduce poverty through thematic institutions and people institutions

Works in rural, urban , tribal and coastal context –

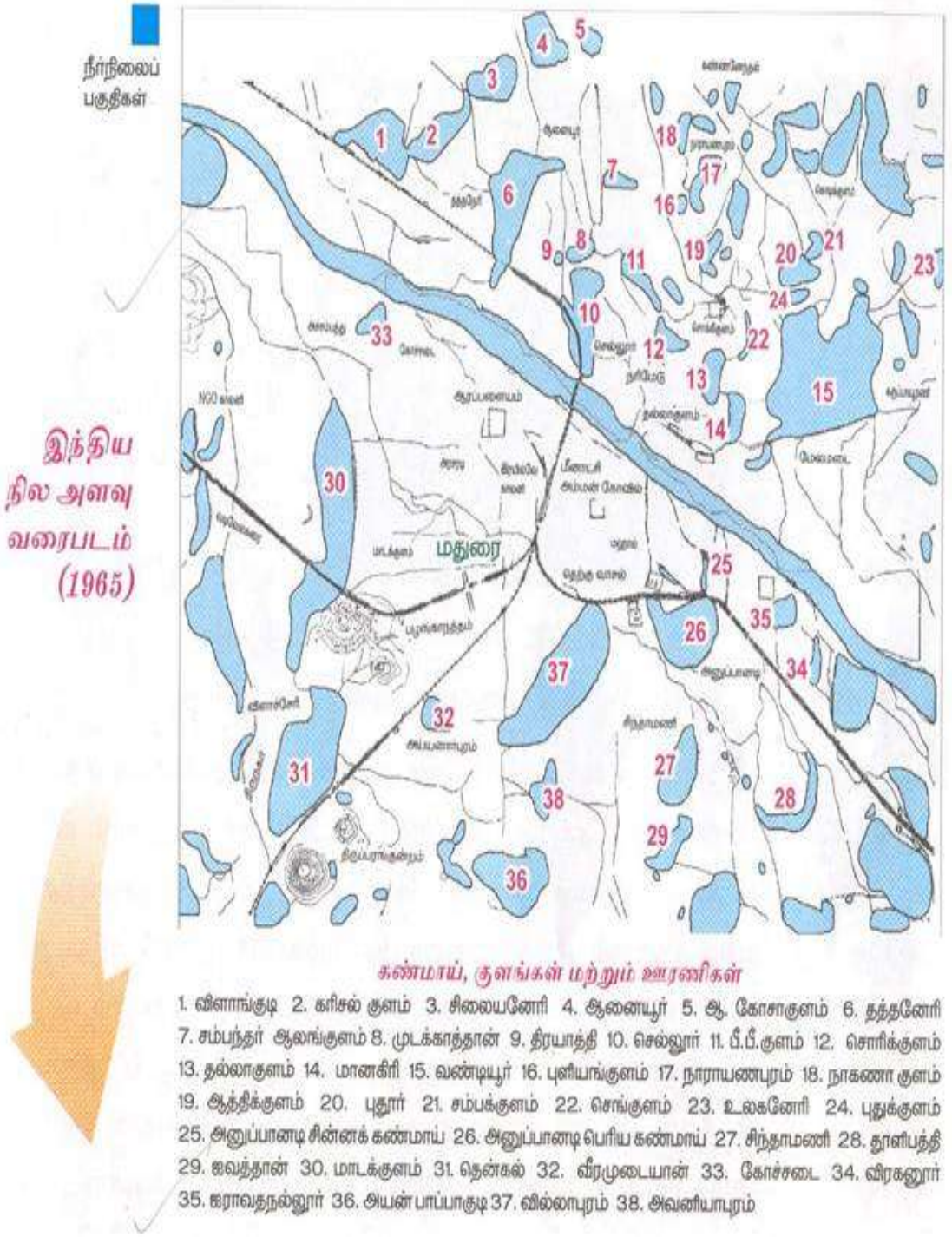
Tamil Nadu, Andhrapradesh, Karnataka, Kerala

Pondicherry, Orissa, Maharasthra, Madhya Pradesh

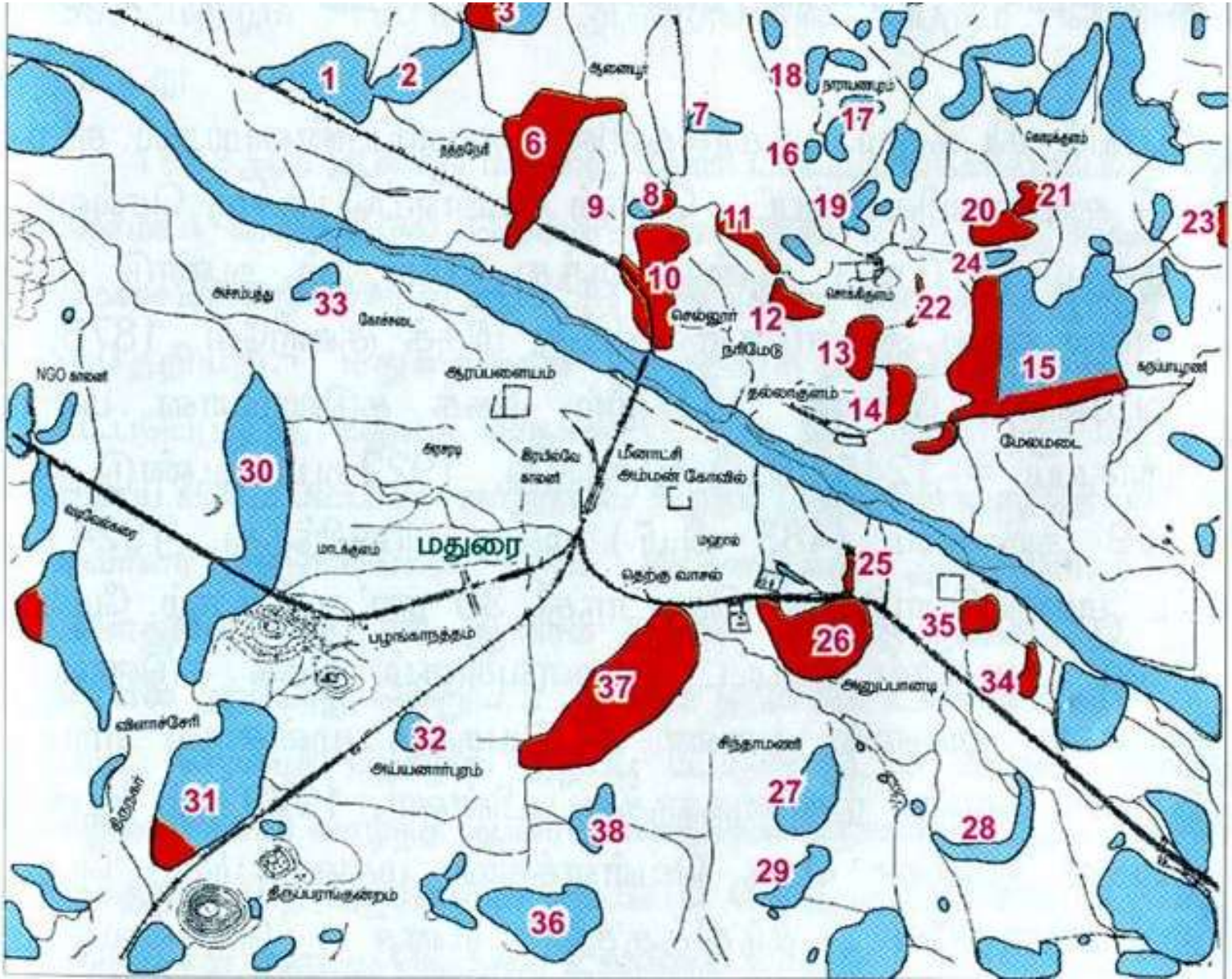
Rajasthan, Jharkand, Bihar, Assam

Reach	As on March'13
No. of Families	12,48,038
No. of Villages	15.844
No. of Districts	66
No. of States	12
No. of Professionals	356
No. of Programme Staff	438
No. of People Functionaries	2,140
Funds in operation (Rs. in million)	7064

Madurai and its Tanks in 1969



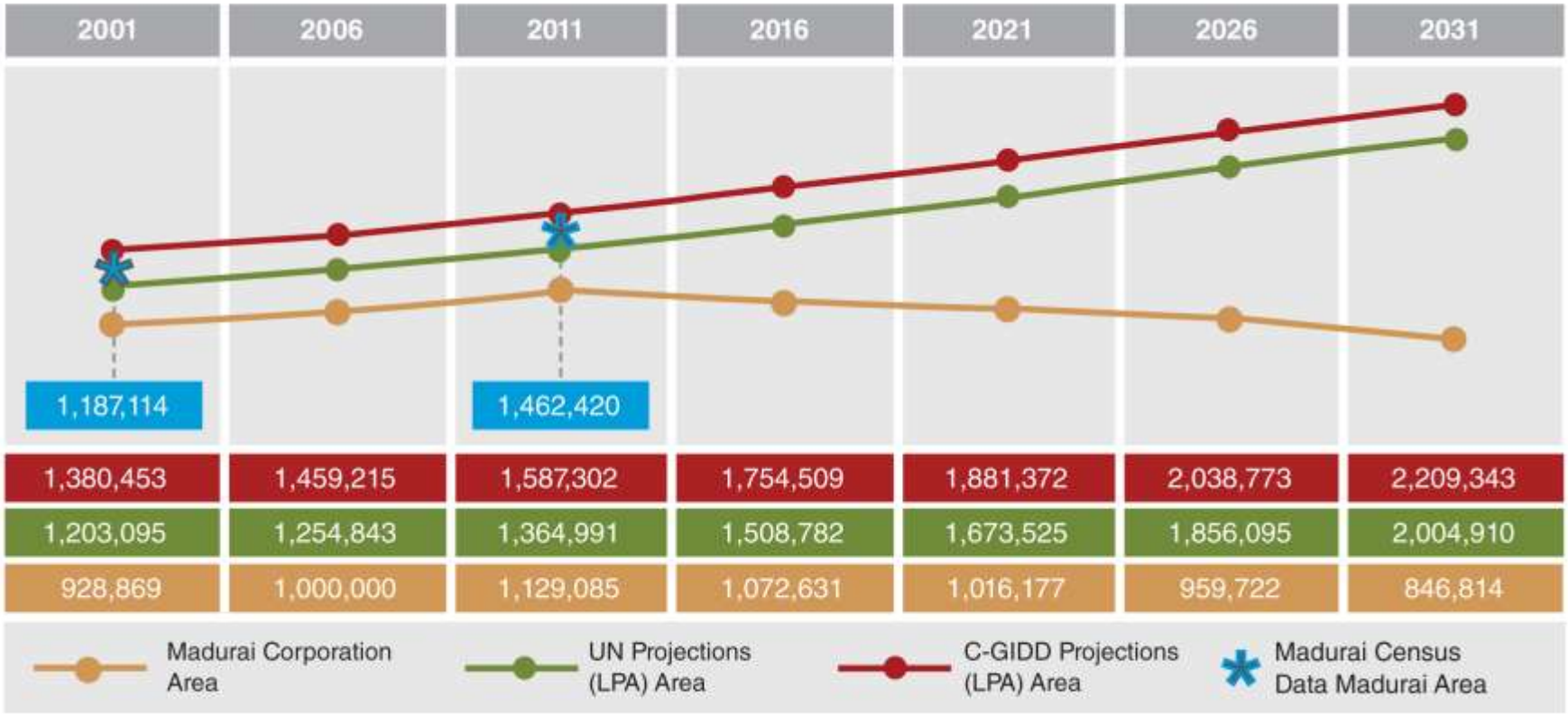
Encroached Tanks in Madurai



Slum areas are often most vulnerable

Impacting quality of life – increasing vulnerability

An additional 600,000-800,000 residents by 2031. Where and how will growth take place?



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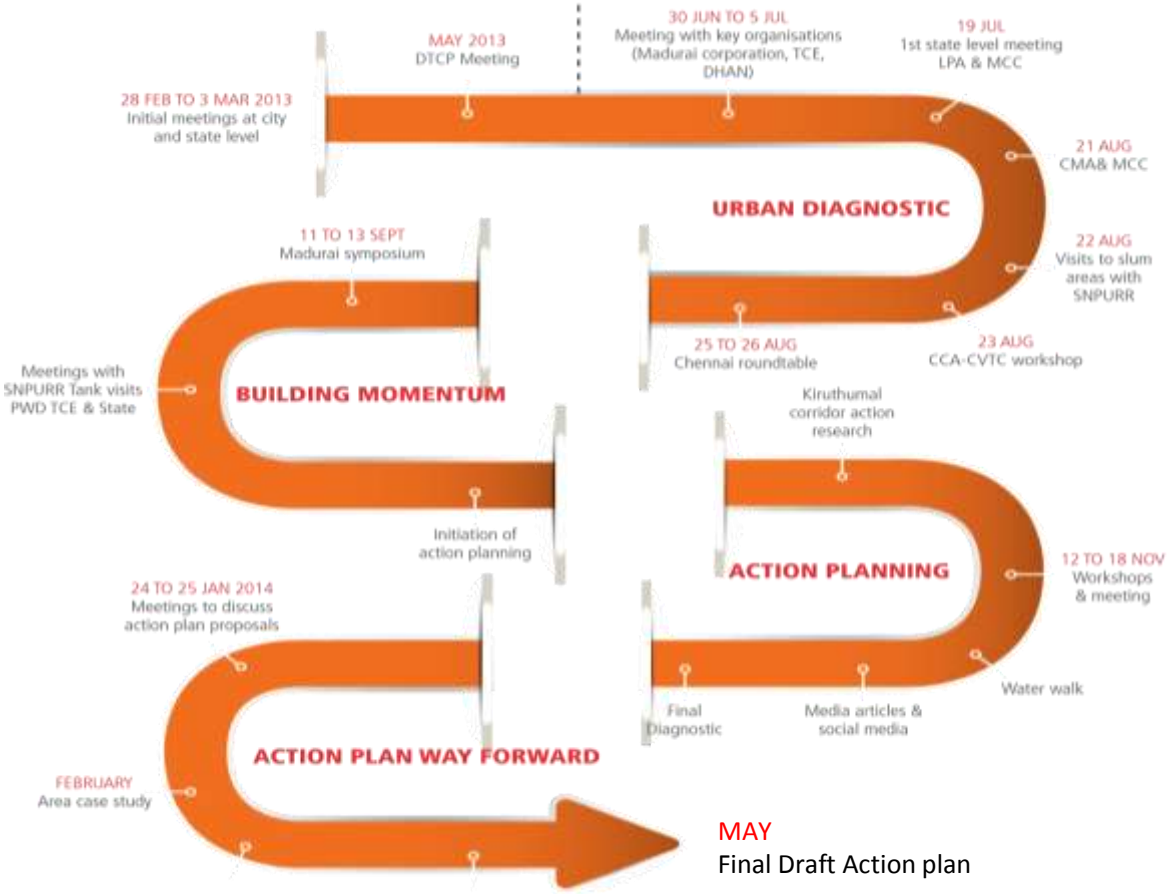
Action Plan Purpose

- **Address identified risks**, including multiple risks to generate 'win-win' and 'triple win' environmental benefits
- **Mobilise action**, target specific vulnerabilities and deliver change on the ground that will benefit a wide range of stakeholders, including those in multidimensional poverty
- **Define a programme of integrated action** to help unlock currently stalled projects in Madurai and address the future needs
- **Make the case for the mobilising resources** to address issues and infrastructure gaps in Madurai
- **Input to CDP** - Results contribute to the forthcoming revision to the CDP and master plan
- **Be implementable**, in the context of other existing plans, capacities and incentives

Action Plan process

- In-depth documentation of case study
- Public interactions during documentation
- Focus group discussions with informal settlements
- Public Awareness Campaign
- Water Walk
- Multiple media interviews and outreach
- Developing products for media dissemination

Process



MAY
Final Draft Action plan

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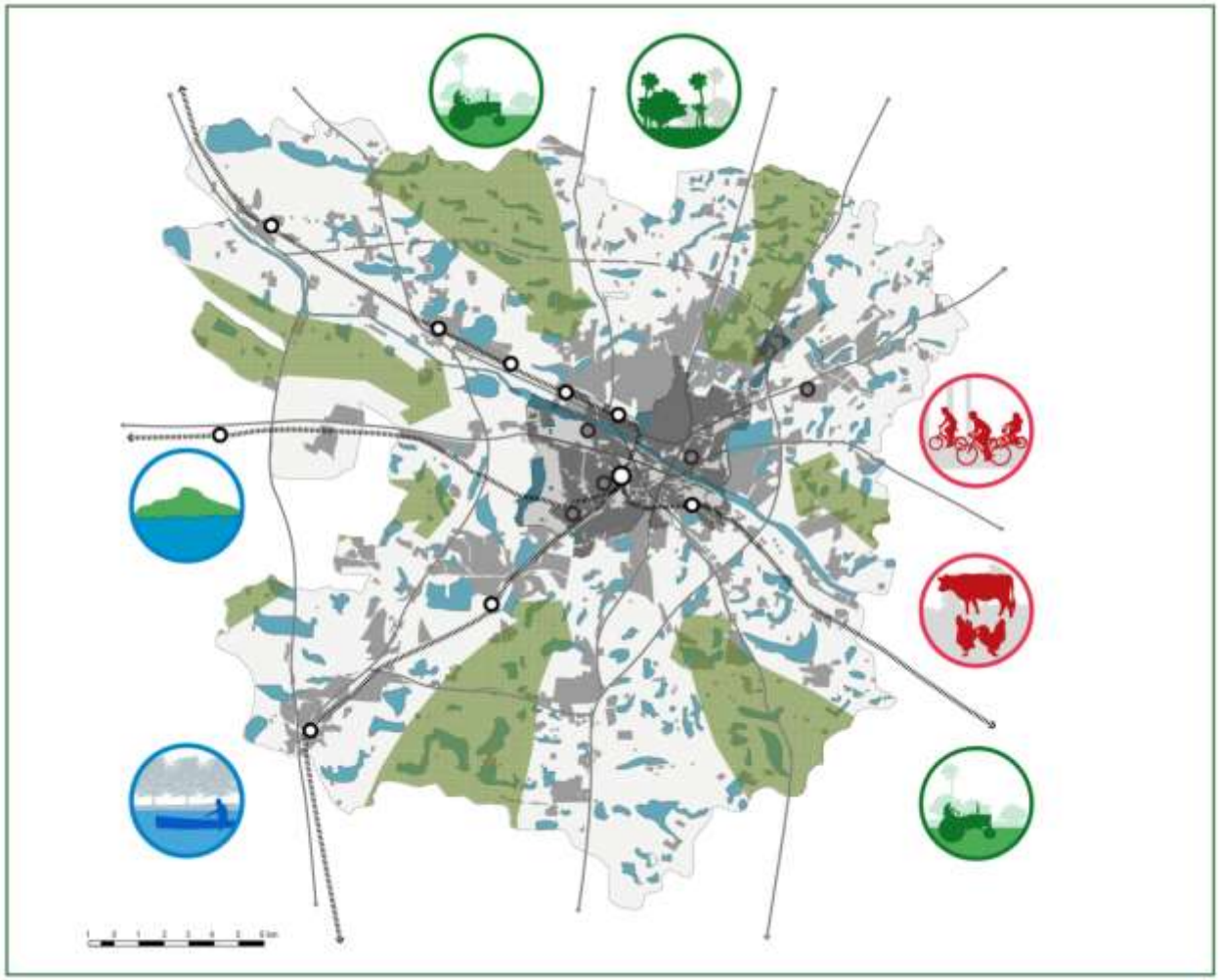
Blue-green corridor approach



- Yannamalai hill and lake
- Water bound recreation on large water bodies
- Farming
- Cycling and walkways along and across the region
- Agriculture and Farming
- Natural green to be retained as essential green lung

City scale: Green infrastructure network – Madurai

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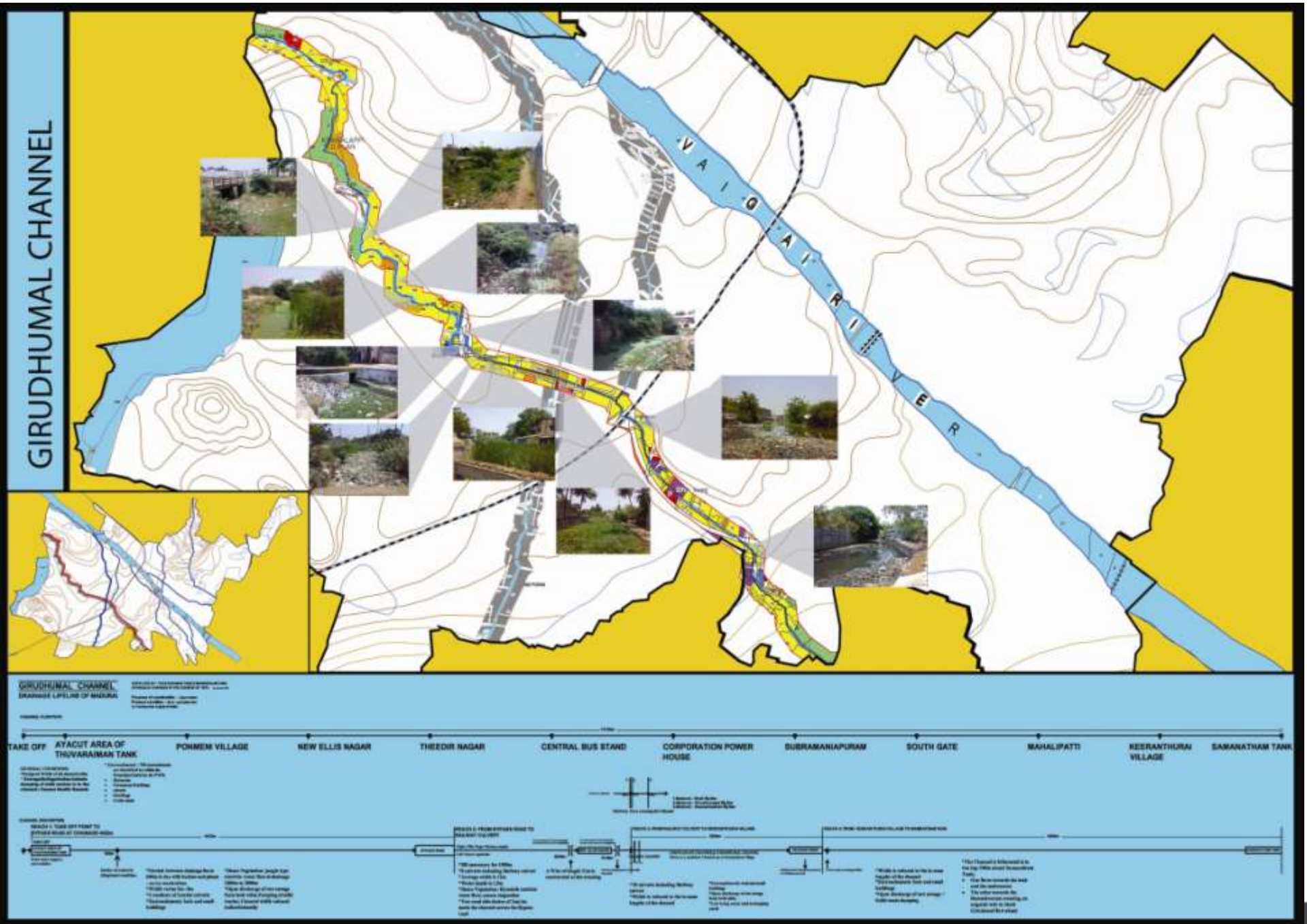
GIRUDHUMAL CHANNEL
V A I G A I R I V E R
GIRUDHUMAL CHANNEL
DRAINAGE LIFELINE OF MADURA
TAKE OFF
AYACUT AREA OF THUVARAIMAN TANK
PONMENI VILLAGE
NEW ELLIS NAGAR
THEDDIR NAGAR
CENTRAL BUS STAND
CORPORATION POWER HOUSE
SUBRAMANIAPURAM
SOUTH GATE
MAHALIPATTI
KEERANTHURAI VILLAGE
SAMANATHAM TANK

Status of Girdhumal river

1965

2014

Garbage dumping

Health issues
Frequent fever
Cough,
Skin infections
Pollution of ground water/
Depletion of ground watertable

Focused Group Discussion with communities

FGD with Experts NGO

FGD with Bureaucracy

FGD with CTAG

Multi Stakeholder Workshop

- Planning sustaining water corridors
- Strengthening water and sewage infrastructure
- Rehabilitation of informal settlements and health and livelihood amelioration
- Visioning of land and water use for posterity
- -Strategic context, Policy options, Design/ Engineering/Maintenance solutions/People participation and awareness programmes

Consultation in process






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The Strategy – 14 Interlinked projects

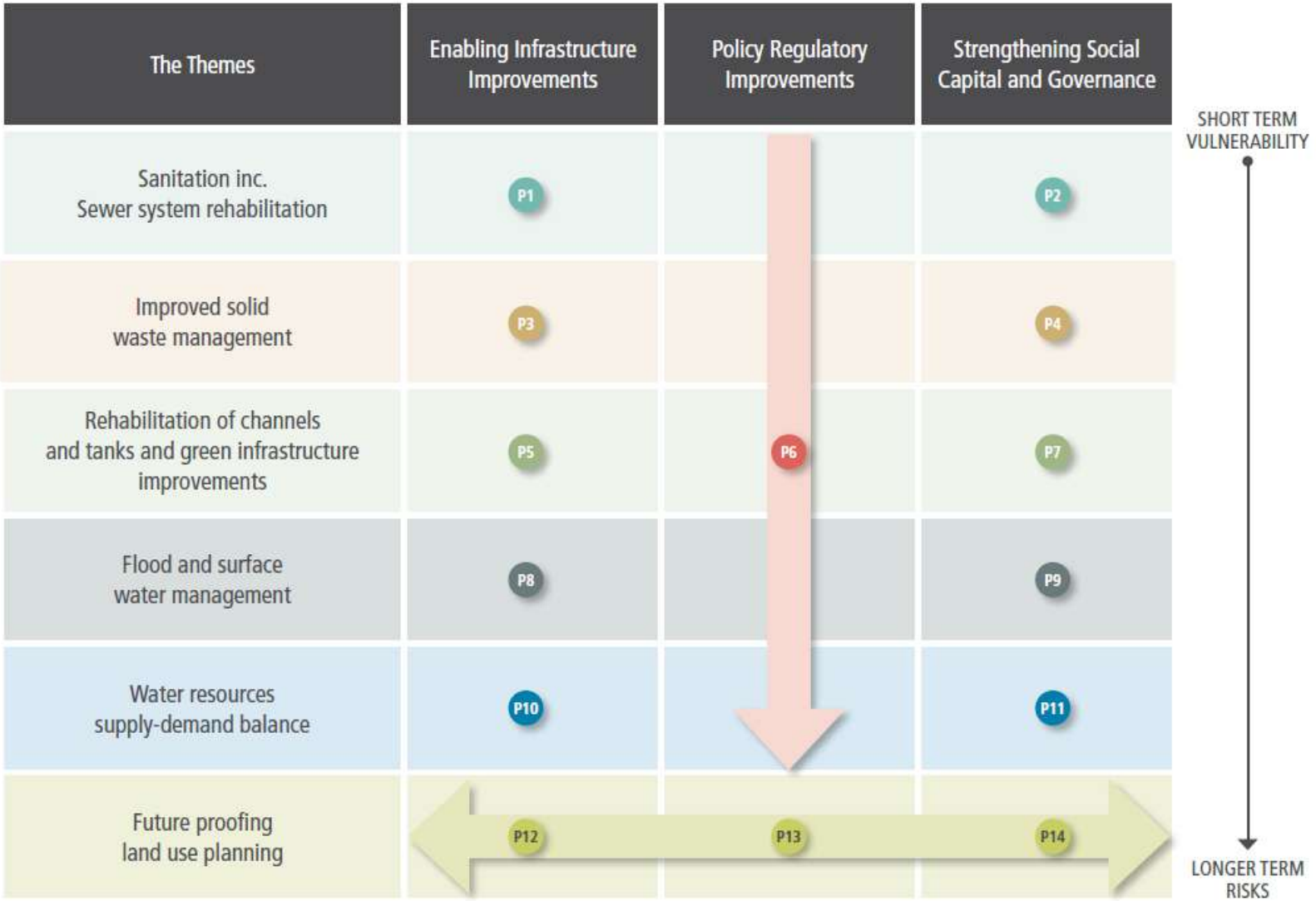

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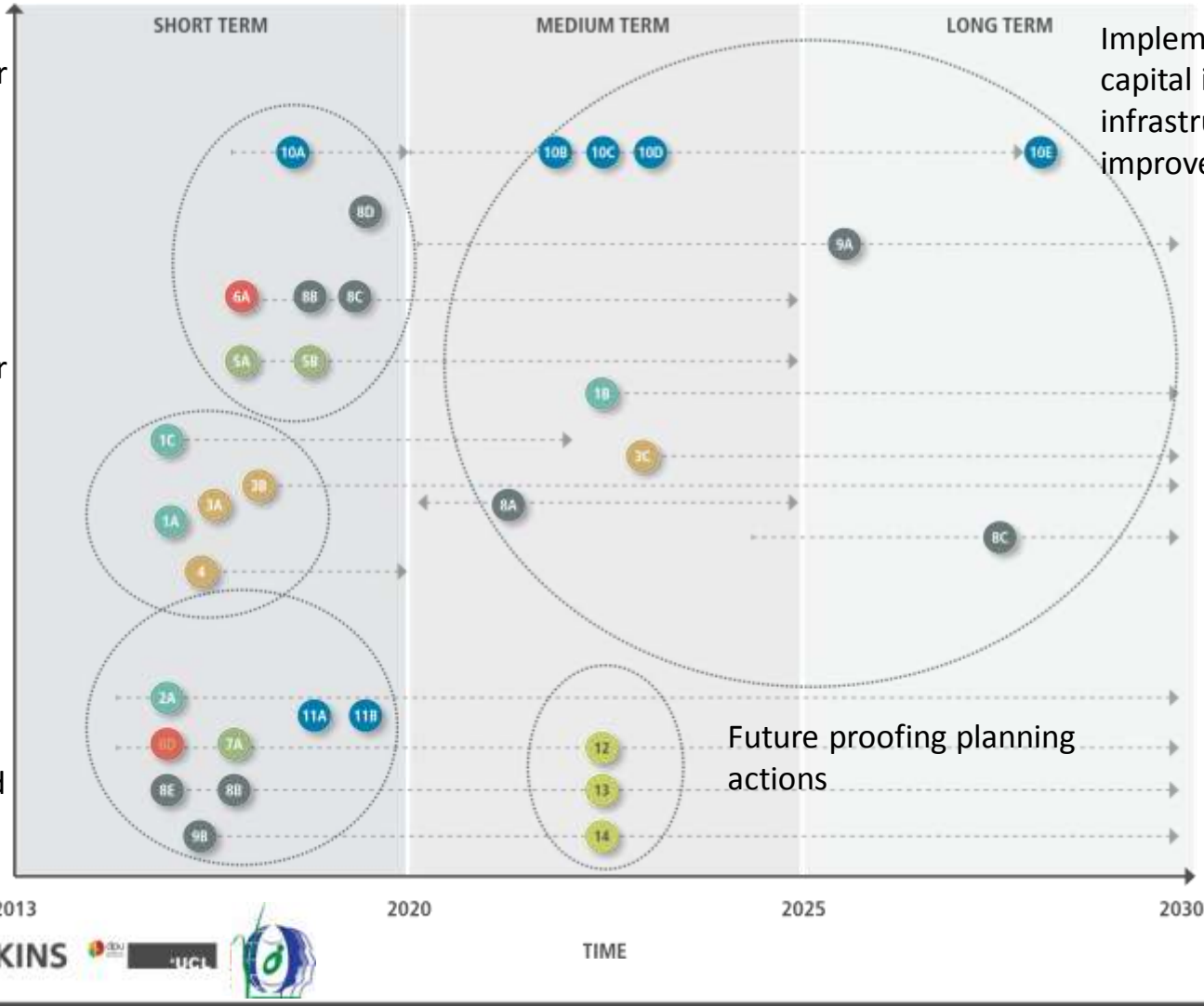
Figure 4 – Tackling risk and vulnerability together in Madurai

Sequence of Actions

Enabling actions for channel and tank restoration, flood risk mitigation and water resources

Enabling actions for sanitation, sewer rehabilitation and solid waste management

Social Capital building and Community based initiatives



Implementation of more capital intensive infrastructure improvements

Future proofing planning actions

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P1 Project 01: **Sewer system rehabilitation**

RATIONALE:

Outcome: The sewer system is a contained system, collecting all sewer waste and delivering it to the treatment works without contamination of the environment. Future capacity and related infrastructure constraints are understood and considered as part of rehabilitation works; this will also consider the implications of climate change e.g. on capacity.

Proposal: Three sub components are required: a study to better understand the current infrastructure condition and to identify future capacity requirements; completion of the sewer infrastructure; building of improved toilets to avoid water pollution and to minimise health risks.

Issues addressed: Pollution of watercourses including River Vaigai; health risks; under-utilisation of treatment works and outputs.

KEY ACTIONS:

- Better understand the current infrastructure condition and future capacity requirements and constraints through mapping and analysis
- Complete the sewer infrastructure
- Build community toilets to serve slum communities and ensure these are resilient and serviced

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P3 Project 03: **Improved solid waste management**

RATIONALE:

Outcome: Enabling Infrastructure Improvements

Proposal: Development of solid waste infrastructure

Issues addressed: Increased community outreach and collaboration and improvements in sanitation through reduction of wild dumping and informal scavenging. Production of renewable energy from organic waste and compliance with MSW 2000 Handling Regs.

KEY ACTIONS:

- Waste Collection
- Anaerobic Digester
- Recycling Infrastructure

P4 Project 04: **Improved solid waste Management**

RATIONALE:

Outcome: Strengthening social capital and governance to improve sanitation and solid waste management across the city.

Proposal: Increased governance and awareness of solid waste management activities.

Issues addressed: Improved data collection to improve understanding of waste management and to facilitate development of a city-wide integrated waste management plan. Engagement with community at various levels.

KEY ACTIONS:

- Waste data collection
- Community awareness and education
- Formalizing the informal
- Integrated waste management plan

P5 Project 05: Channel and tank restoration

RATIONALE:

Outcome: The channels and tanks are restored to in order to function more naturally, thus providing a number of supporting services to the city.

Proposal: This project contains two sub components. Firstly, a mapping exercise will be undertaken to provide a common understanding of the interaction of the channels and tanks. Secondly, a programme of restoration will be designed and implemented in order to maximise the supporting services.

Issues addressed: Pollution of watercourses; water resource deficits; groundwater recharge; flood risk; health risks; opportunities for local agriculture; under-utilisation of treatment works; provision of high quality open green space.

KEY ACTIONS:

- map and document a common understanding of the operation of the tanks and channels
- restore the tanks and channels, taking into account operational practice and climate change impacts

Figure 23 – Many of the water bodies which could play a role in providing water for the city are polluted from untreated sewage and pollutants from dumping.

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P6 Project 06: Channel and tank protection and management

RATIONALE:

Outcome: The restored channels and tanks are actively managed and protected from future deterioration.

Proposal: This project contains four sub components: (1) Establishment of operational rules (2) Abstraction management (3) Discharge regulation and management (4) Encroachment management.

Issues addressed: Pollution of watercourses including River Vaigai; water resource deficits; health risks; opportunities for local agriculture; under-utilisation of treatment works; provision of high quality open green space.

KEY ACTIONS:

- Establish or refine operational rules
- Manage abstraction through enforcement of appropriate existing allocation rules and further regulation
- Regulate and manage discharges
- Limit encroachment

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Everyone should play a role

- City partnership
- Pooling resources
- Engaging the community

Indicative Budget Plan

Estimate Combined Cost broad range is between $1 Billion and up to $2.5 Billion
(dependent on cost of infrastructure delivery)

Project	Part	Description	Cost range
Project 1: Sewer System Rehabilitation	A	Mapping of sewer system	up to $1million
	B	Completion of the sewerage infrastructure	$100 million
Project 2: Sanitation community capacity building	A	Community capacity building	up to $1million
Project 3: Improved Solid Waste Infrastructure	A	Introduce PPP approach for both primary and secondary waste collection	Offset through PPP but Corporation may need to pay some 'service-fee' (~$5-8 per tonne)
	B	Development of Anaerobic Digestion facility for managing organic waste	Potentially offset through PPP but could cost >$5m
	C	Developing basic recycling infrastructure	Potentially offset through PPP but could cost up to $500,000
Project 4: Improved Solid Waste Management	A	Waste data collection	up to $250,000
	B	Community awareness and education	up to $100,000 (annually)
	C	Formalising the informal	up to $100,000 (annually)
	D	Integrated waste management plan	up to $500,000 initial set up and development Ongoing internal annual costs

Project 5: Channel and tank restoration	A	Further mapping of channel and tank system, and improved understanding of interactions and operations	$1-$10 million
	B	Restoration of channels and tanks, especially south of the River Vaigai. To incorporate potential climate impacts	$10-$100 million
Project 6: Channel and tank protection	A	Establishment or refinement of operational rules	$1-$10 million
	B	Abstraction management	$1-$10 million
	C	Discharge regulation and management, to prevent discharge of sewerage and industrial effluent into channels and tanks	$1-$10 million
	D	Encroachment management	$1-$10 million
Project 7: Channel and tank community involvement	A	Channel and tank community involvement	up to $1million
Project 8: Flood and surface water infras improvements	A	Separation of sewers and storm drains	$1-$10 million
	B	Construction of adequate surface drainage	$10-$100 million and over
	C	Flood storage	$10-$100 million
	D	Flood defences	$10-$100 million and over
	E	Green infrastructure improvements: areas	$1-$10 million

Project	Part	Description	Cost range
Project 9: Flood and surface water capacity building	A	Rural soil erosion management	up to $1million
	B	Flood risk awareness	up to $1million
Project 10: Water resources infra improvements	A	Study to examine the feasibility of reusing waste water	up to $1million
	B	Provision of local water treatment facilities	$10-$100 million
	C	Mains replacement	$10-$100 million and over
	D	Pressure management	$1-$10 million
	E	Metering	$10-$100 million and over
Project 11: Water resources capacity building	A	Water Safety Plan. Development of a Water	$1-$10 million
	B	Rain water harvesting. This is mandatory	$10-$100 million
	C	Education on water sources and hygiene (linked with sanitation training)	$1-$10 million

Project 12: Green Blue Infrastructure Co-ordination	A	Establishment and enablement of agreed City Partnership co-ordination structures	$250,000-$500,000
	B	Infrastructure standards and co-ordination procedures to enable effective infrastructure delivery	$250,000-$500,000
Project 13: Green City Plan Linking to the City Development Plan and Masterplan	A	Policies on channel and tank protection	$250,000 - $500,000
	B	Identification of zoned areas/overlays for flood protection areas and supporting policies	$500,000- $1,000,000
	C	Identification and zoning of natural habitat areas and establishment of management norms	$250,000 - $500,000
	D	City greenspace plan with design and management standards	$250,000 - $500,000
Project 14: Platform for community participation to develop and deliver city plans	A	Establishment and enablement of agreed community participation platform	$100,000

Next Steps

- Finalise and launch plan
- Share with potential funders to explore funding of particular projects
- Take forward initial community led project actions
- Formal endorsement and links with planning process.

Sensitization through Walkathon

Vayalagam Movement