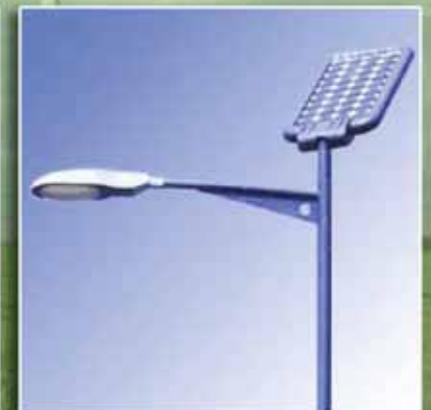


Proceedings of Workshop on Climate-Resilient Urban Development and Cities for All



Workshop jointly conducted by EPTRI & ICSD

Date: 27th November, 2015

Venue: EPTRI Campus, Gachibowli, Hyderabad

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INTRODUCTION

Urbanization is a natural consequence of economic development and it may be attributed to a country's shift from agrarian economy to industrial and service sectors because such agglomerations help realizing the benefits of the economy of scale. The world we live in is becoming urbanized at an unprecedented pace. In 2008, for the first time in history, more than half of the world's population, 3.3 billion, started living in towns and cities. Today, 54 per cent of the world's population lives in urban areas, a proportion that is expected to increase to 66 per cent by 2050. According to UN Department of Economic and Social Affairs (UN-DESA), as of 2014, worldwide there were 28 mega-cities with 10 million inhabitants or more, and of these 28 mega-cities, sixteen are located in Asia. By 2030, the world is projected to have 41 mega-cities with 10 million inhabitants or more. China and India alone are expected to contribute over one third to the world's urban population increase between 2014 and 2050, adding 292 million and 404 million people to their cities respectively.

The cost of delivering basic services is 30 to 40 percent cheaper in concentrated population centers in urban areas than in sparsely populated rural areas. Presently, Urban India accounts for about 63% of GDP and it is expected to account for 70% of net new jobs created between now and 2030. With an urban population of about 33%, India is at a point of transition where the pace of urbanization will speed up drastically. The number of cities and towns is also likely to witness a significant increase, with the number of million-plus cities expected to increase from the present 53 to close to 80 by 2030. The population projections by United Nations indicate that by 2030, India's urban population will grow to 590 million, accounting for nearly 40 percent of the total population.

Urbanization facilitates fast growth of service sector, comprising of people mainly from informal sector such as the rickshaw pullers and street vendors. However, such massive urbanization poses a major challenge in providing basic amenities like housing, water & sanitation, transportation, solid waste management etc. It is also a major challenge for entitlement-based development involving food, health and livelihood securities for the vulnerable groups.

The analysis of urbanization pattern and projections for the next two decades is indicative of the fact that a bulk of the urban population will be living in metropolitan regions. Agglomerations covering several municipal jurisdictions will emerge as a distinct feature of India's urbanization. The investments on roads and highways, telecom, railways etc., open new avenues for investment, especially on certain corridors having a mix of location of big, medium and small towns with work opportunities and quality of life supported by affordable urban infrastructure. To sustain the unprecedented urbanization in the recent times, urban infrastructure has to be strengthened among the following broad areas:

- Housing for the residential, commercial and industrial sectors

- Mass Rapid Transit Systems(MRTS) as lifeline for urban mobility – involving, Bus Rapid Transport System(BRTS), Metro Rail, Multi Modal Transportation etc.
- Integrated management of Power from generation through Transmission and Distribution
- Telecom Network including Wi-Fi
- Municipal Solid Waste Management (MSW)
- Water Supply and Sanitation
- Urban Disaster Management

URBANIZATION AND CLIMATE CHANGE

Urbanization also leaves a huge ecological footprint resulting in “*Urban Heat Island Impact*”, and causes massive greenhouse gas (GHG) emissions, thus contributing to climate change. Cities, though occupy only 2% of the Earth’s land, are responsible for 75% of carbon emissions and 60–80% of energy consumption. Cities are a key source of global warming through GHG emissions from buildings (between 40-70 per cent of emissions) industry (12-30%) and transport (13-18%).

While cities and urbanization contribute to climate change, they are in turn affected by climate change. Since cities have a high concentration of population density and economic activity, they are vulnerable to climate change. India’s cities are characterized by high density of population, housing stock, and poor infrastructure, which make them all the more vulnerable to climate change. Given that the most valued infrastructure is usually located in cities, the economic and social costs of climate change will be much higher in cities. For example, cities house valuable communications infrastructure besides physical infrastructure such as buildings, roads, bridges, and flyovers. As climate change impacts the physical assets and infrastructure used within cities, any climate change impacts in the form of damage will be quite expensive in urban areas. In addition, climate change can accelerate the pace of rural–urban migration, driven by increases in extreme events, greater monsoon variability, drought, flooding, and resource conflict, as well as loss of both livelihood opportunities and informal social nets in rural areas.

Although the rapid economic growth in the recent decades has brought many benefits to India, the associated environmental degradation costs India \$80 billion per year, or 5.7% of its economy. According to a survey by WHO in 2014, across the G-20 economies, 13 of the 20 most polluted cities are in India. A comparison of the government’s 1994 and 2007 data on the sources of emissions shows that roughly 45% of India’s total GHG emissions have urban origins

However large cities also offer technological innovations for mitigating the GHG emissions on one hand and institutional arrangements for adaptation to climate change. Low-emission development through intelligent and inclusive infrastructure alone can make our cities climate-resilient. Climate resilient development is defined



as “a ‘development first’ approach that minimizes the harm caused by climate impacts while maximizing the many human development opportunities presented by a low-emissions, more resilient, future”.

Social Implications of Urbanization

Unlike the developed countries, rapid urbanization in developing countries is taking place at a much lower GDP levels which would aggravate the emerging problems due to financial constraints in implementing various environment and development programmes. This obviously calls for adoption of comprehensive urbanization policies in developing countries by incorporating the concepts of resource conservation and management, environmental regulation, Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR). The broad implications of marginalization-led urbanization are:

- Higher concentration of unorganized labour,
- Heterogeneous educational attainments of population,
- High income disparity among the workforce,
- Greater chances for development of slums to meet the demands of the unorganized sector, and
- Land use planning will be more complex for the reasons of location of various heterogeneous tertiary activities.

Urban Vulnerability

Urbanized coastal areas are under greater risk because of the sheer number of people and livelihoods they support. The Low Elevation Coastal Zone (less than 10 m elevation) has less than 2% of the world’s land but supports 10% of its population. In such a scenario, a process of composite multi-hazard risk adaptation process should be taken up in the development of coastal towns and cities, focusing on the following:

- Temperature and precipitation variability
- Urban Storm Surges
- Flooding and extreme rainfall
- Cyclone and storm surge
- Sea-level rise
- Environmental health risk

The combined pressures of climate changes, increased urbanization and related issues together affect various sectors – mainly energy, transport, infrastructure, health, coasts, food, ecosystems, and water. Managing and climate proofing this growth, especially in terms of new construction of buildings and infrastructure to ensure resilience is a major challenge. Therefore, the potential action for building climate resilient cities should be the main focus of the emerging Smart City Concept.

NATIONAL MISSION ON SUSTAINABLE HABITAT (NMSH)

The National Mission on Sustainable Habitat (NMSH) as part of India's National Action Plan on Climate Change (NAPCC), approved by the Prime Minister's Council for Climate Change in June 2010, seeks to promote the below given objectives in urban areas, addressing the Mitigation of Greenhouse Gas (GHG) emissions that contribute to climate change on one hand, as well as Adaptation measures to live with climate change on the other, in urban areas:

- Improvements in energy efficiency in buildings through extension of the energy conservation building code - which addresses the design of new and large commercial buildings to optimize their energy demand;
- Better urban planning and modal shift to public transport - make long term transport plans to facilitate the growth of medium and small cities in such a way that ensures efficient and convenient public transport;
- Improved management of solid and liquid waste, e.g. recycling of material and urban waste management – with special focus on development of technology for producing power from waste;
- Improved ability of habitats to adapt to climate change by improving resilience of infrastructure, community based disaster management, and measures for improving advance warning systems for extreme weather events; and
- Conservation through appropriate changes in legal and regulatory framework.

The key deliverables of the Mission include:

- ✓ Development of sustainable habitat standards that lead to robust development strategies while simultaneously addressing climate change related concerns;
- ✓ Preparation of city development plans that comprehensively address adaptation and mitigation concerns in sectors like Solid Waste Management etc.;
- ✓ Preparation of comprehensive mobility plans that enable cities to undertake long-term, energy efficient and cost effective transport planning; and
- ✓ Capacity building for undertaking activities relevant to the Mission.

The SAPCC for the erstwhile state of combined Andhra Pradesh has identified issues of concern and also spelled out possible interventions and strategies for climate-resilient urban development, as listed below



4.1. Key issues and concerns in Urban Areas

- Increasing energy use in the urban areas due to the changing pattern of urban livelihood
- Increasing average temperature/extended summer every year
- Drainage of the cities not adequate to accommodate the precipitations during the heavy rains
- Demand on water resources due to the growth in the urban population and therefore increased pressure on the water supply infrastructure
- Consequent generation of large quantity of sewage
- Generation of huge quantum of solid waste
- Increased threat to urban health due to vector borne diseases
- Increased private transportation leading to huge pressure on the road infrastructure and the increased emissions

4.2. Interventions and Strategies for Urban Areas

- Safe water supply as per norms to the entire urban population
- 100% coverage of sewerage and sanitation for the urban population
- Study and remodel existing water supply, sanitation and sewerage systems to reduce climate change vulnerability
- Protection and restoration of existing water bodies in urban areas
- Creation of new water bodies in urban areas
- Scientific management of municipal solid waste in all municipalities and corporations
- Restoring efficiency of drainage network of all municipalities to enable quick evacuation of water and to avoid flooding
- Enforce spatial planning in cities and towns to reduce vehicular movement
- Mandatory rainwater harvesting in Government buildings, commercial establishments, offices, schools/colleges, academic/research establishments and industrial units
- Policy and incentives for rooftop solar power generation and provision of grid connectivity
- Rail based MRTS in emerging cities and expansion of existing MRTS
- Provision of safe footpaths, cycle tracks etc. to promote non-motorised transport
- Recovery of phosphates nitrates etc., from wastewater

ONGOING EFFORTS FOR CLIMATE-RESILIENT URBAN DEVELOPMENT

The following national missions/policies in India, for example, would galvanize urban sector reforms through up-gradation of the social institutions, financial/technological infrastructures and Basic Services to Urban Poor (BSUP) in the cities.

- ❖ Smart Cities Mission
- ❖ Atal Mission for Rejuvenation and Urban Transformation (AMRUT)
- ❖ Housing for All Mission in Urban Areas
- ❖ Swachh Bharat Mission in Urban Areas
- ❖ National Mission on Sustainable Habitat, under National Action Plan on Climate Change (NAPCC)

Unlike the resource/energy intensive development of conventional cities, the design of Smart Cities rely on the following salient features

- Shift to Renewable Energy Sources
- Enhanced Energy Efficiency
- Green Building Design
- Mass Rapid Public Transport
- Grid-connected Smart Meters
- MIS in Utility Services like Water Supply & Sanitation
- Innovative Technologies in Solid Waste Management
- Integrated Intelligent Traffic Management Systems
- Augmenting the water resource base, both from supply-side and demand-side.
- Environmental Sustainability, including City-Heritage Conservation

Smart cities are not homogeneous and based on their specific geo-climatic conditions, each city must have its own comparative advantage and core competence. Such core competence can be attained by developing the required infrastructures in technological, physical, economic, institutional and social spheres.

While urban development is a State Subject, the Government of India gives policy guidelines to Urban Local Bodies for resource mobilization and encourages ULBs to attract private investments in the form of Foreign Direct Investment (FDI) and Public Private Partnership (PPP) models for climate-resilient urban infrastructure development and basic services like public transport, solid waste management, sewage and sanitation etc.



While cities are a major source of GHG emissions, they also have great potential both for Mitigation of and Adaptation to climate change. In light of the above, and in the run-up to ensuing Climate Change Summit in Paris (UNFCCC – CoP-21), **Intercooperation India** and Environment Protection Training & Research Institute (EPTRI) have conducted a One-Day Joint-Workshop on “**Climate-Resilient Urban Development and Cities for All**” on **27th November 2015, Friday**.



The workshop was attended by Chief functionaries and Senior Government officials, Green Entrepreneurs, Industries and International Development Agencies (List of participants is enclosed in Annexure 2) for brainstorming deliberations on three broad domains pertaining to climate-resilient urban development – viz., *Urban Infrastructure & Green Building*, *Integrated Solid Waste Management and Sanitation (Swachh Bharat)* and *Environmental and Social Impact Assessment (EIA & SIA) in Urban Development*, in detail.

AGENDA OF THE WORKSHOP

The workshop started with a welcome address by Dr. Joy Elamon, CEO, Intercooperation India. He elaborated on various components of climate change action regimes in urban context including loss & damage, mitigation, Adaptation, climate resilience, low-emission development etc. He introduced the agenda of the workshop emphasizing the need to integrate both mitigation and adaptation measures in the urban combat on climate change.

The workshop was formally inaugurated by Mr. B. Kalyan Chakravarthy, IAS, Director General-EPTRI, with his key note address touching various climate change hotspots in Urban Development. He advocated for a systems approach in urban climate action plan, right from the planning stage itself. He stated that smart

interventions, innovative technologies and stakeholder participation are key to climate-resilient urban development.



Picture 1: Welcome Address by Dr. Joy Elamon

The workshop was moderated by Dr. C.K. Rao, Intercooperation India. In the forenoon, there were four sector-specific technical presentations.

Dr. Rajeswar, Senior Subject Specialist on Climate Change & Environment, Intercooperation India, explained the current trends and future scenarios of rapid urbanization in developing countries like India and its impact and implications to climate change. He also elaborated on how cities are more vulnerable to climate change in terms of Hazard Risk and Vulnerability Analysis (HRVA) for Cities, manifestations of Urban Heat Island Impact etc. He further enlisted sector-specific interventions like Green Building design, Public Transportation and Integrated Solid Waste Management for climate-resilient urban development. He opined that cities are the real frontlines in the combat on climate change with make-or-break implications; while cities are major sources of GHG emissions, they also offer great potential for low/no-emission development, simultaneously addressing social equity and inclusive growth. He concluded that innovative technologies and Smart City concepts would open a windfall of investment opportunities for GHG emission reductions from urban areas. ULBS would attract private investments in FDIs and PPP. They also mobilize resources from taxes besides devolution of federal funds to ULBs.

PRESENTATIONS

Mr. Dheeraj, Architect & Planner, CII – Sohrabji Godrej Green Business Centre advocated for Green Building Movement in urban infrastructure. He demonstrated how Green Building frame work in designated parameters – right from (i) *Site Selection and Planning*, (ii) *Water Conservation*, (iii) *Energy Efficiency*, (iv) *Building Materials & Resources* and (v) *Indoor Environmental Quality* would mitigate GHG emissions, not only from major lifeline buildings, but from all residential, commercial and industrial units. He explained further the Indian Green Building Council (IGBC) Rating Systems that rank buildings into Platinum, Gold and Silver ratings based on their design for resource/energy efficiency and indoor environmental quality.



He illustrated how Green Building standards could be achieved, not only in the greenfield projects but also in brown field projects through retrofitting. He also demonstrated that Green Building design need not be expensive, meant only for large scale constructions; it can be implemented for individual households as well.

Cost of Green Building - Indian Experience

Building	Year awarded	Built-in Area (sq.ft)	Rating Achieved	% increase in cost	Payback (Yrs)
CII-Godrej GBC, Hyderabad	2003	20,000	Platinum	18 %	7 years
ITC Green Centre, Gurgaon	2004	1,70,000	Platinum	15 %	6 years
Wipro, Gurgaon	2005	1,75,000	Platinum	8 %	5 years
Technopolis, Kolkata	2006	72,000	Gold	6%	3 years
Spectral Services Consultants Office, Noida	2007	15,000	Platinum	8%	4 years
Kalpataru Square	2008	3,00,000	Platinum	2%	2 years
Suzlon One Earth, Pune	2010	8,00,000	Platinum	2%	2 years

❖ Cost showing a decreasing trend over the years

❖ Incremental Cost lower if base design has already factored normal Green features

The next technical presentation was given by Major Shiva Kiran from Sukuki Exnora, Hyderabad, on Decentralized Solid Waste Management & Community Role. He enlightened the participants on the need for active participation of communities as stakeholders in solid waste management. He suggested that a vast amount of solid waste can be composted and recycled whereby landfill and incineration would be the last resort. He appealed for a change in lifestyle with emphasis on **Reduce**, **Reuse** and **Recycle** in the same order of preference. Decentralized solid waste management does not require capital/technology intensive interventions, where major part of the waste generation can be avoided first place and whatever waste generated can either be composted or recycled.

Maj. Shiva Kiran explained that in Hyderabad for example, about 4,000 Tonnes per Day (TPD) of primary waste is being collected presently from 20 lakh households, using Tricycles and Auto Trolleys. He further suggested continuance of Tricycles in place of the proposed 2500 Swachh Autos which would cover 75,000 km per day, with associated carbon footprint. Continuance of tricycles would not only mitigate GHG emissions but also give livelihoods to Tricycle Peddlers who cannot afford Auto Trolleys for collecting waste. He also emphasized the need for Community Composting and Dry Waste Collection Centres (DWCC) involving Town

Level Federations (TLF) and Slum Level Federations (SLFs). He further suggested that through Decentralised Waste Management System involving Source Segregation, Composting and Recycling, 50 % of the transportation cost can be reduced, besides Carbon Footprint reduction.

The fourth and the last technical presentation was given by Dr. Joy Elamon, CEO, Intercooperation India, on Health Implications of climate change. He has explained how climate change and urbanization have a direct bearing on human health and how the physical and mental wellbeing of people is central to development and productivity. He demonstrated correlation between climate-induced weather extremes and increasing Morbidity and Mortality in cities. He elaborated on how climate-induced weather extremes like heat/cold waves, drought, cyclones, and floods will have a direct bearing on Air-borne, Water-borne, Vector-borne and Food-borne diseases, weather-induced stress and morbidity, malnutrition, respiratory disorders, cardiac problems etc.

He summarized that the health implications of climate change have to be addressed with a proactive and systems approach in health sector, involving water supply & sanitation services, waste management mechanism, protective vaccines and life-saving drugs. It also requires a true synergy between meteorological information and information about other determinants. He further opined that damage and disruption of health system infrastructure, facilities and services is yet another threat from weather-induced disasters which has to be addressed to build resilience.

OUTCOME OF THE WORKSHOP

After technical presentations, participants were divided into three working groups for brainstorming deliberations. The working-groups deliberated on three broad domains pertaining to climate-resilient urban development – viz., *Urban Infrastructure & Green Building*, *Integrated Solid Waste Management and Sanitation (Swachh Bharat)* and *Environmental and Social Impact Assessment (EIA & SIA) in Urban Development*, and the following suggestions/recommendations were made under each domain.

1. Urban Infrastructure & Green Building

- ❖ Potential for scaling up Green Building principles in the “Housing for All”
 - ◆ Retrofitting of existing affordable houses
- ❖ Enhanced Energy/Water Use Efficiency in Commercial and Lifeline Buildings
 - ◆ Effective enforcement of (Energy Conservation Building Code (ECBC)
 - ◆ Reducing the carbon footprint
 - ◆ Rooftop Rainwater Harvesting
 - ◆ Roof Gardening
 - ◆ Bringing behavioural and attitudinal changes
- ❖ DELP – LED Lighting
 - ◆ Awareness Creation through IEC



- ◆ Making LED affordable and cost-effective
- ❖ Facilitating Public Transport and Non-Motor Commuting
 - ◆ Car Pooling with Last male- first male boarding
 - ◆ Car free day
 - ◆ Dedicated cycling lanes
 - ◆ FOBs at necessary places
 - ◆ Street Safety
- ❖ Protection and Conservation of Urban Water Bodies, along with the feeder canals and catchment area
 - ◆ Rainwater Harvesting through Percolation Pits
 - ◆ Control/Regulation of Groundwater Exploitation
 - ◆ Urban Forestry
 - ◆ Vegetation shade along the bunds of tanks and other water bodies to prevent evaporation
 - ◆ Citizen involvement
- ❖ Urban Storm Water Management and Flash Flood Mitigation
 - ◆ Prevention of encroachments in lakebeds and riverbeds
 - ◆ Effective maintenance of storm drains
- ❖ GIS based City Disaster Management Plan
 - ◆ Preparation of GIS Base Maps for all ULBs in States for identifying climate-vulnerable hotspots
- ❖ Resource Mobilization
 - ◆ PPP
 - ◆ Direct Taxation

2. Integrated Solid Waste Management and Sanitation (Swachh Bharat)

- ❖ Effective Source Segregation of Waste
 - ◆ Two bins to be given to each household (HH)
 - ◆ Naming and Shaming
 - ◆ Once in a week dry waste collection
 - ◆ 5% property tax rebate
 - ◆ Community empowerment
 - ◆ Incentives like mobile recharge for HH
- ❖ Income generation for TLFs/SLFs in D2D Collection and further segregation at Dump Yards
 - ◆ User fee- fining no. of hh's as unit
 - ◆ Material recovery facility- Tie up with industries
 - ◆ Money saved on transportation to be given back to SW collectors
 - ◆ Pune Model- Swachh co-operatives

- ❖ Life Cycle Approach to Solid Waste: Composting, Recycling and lastly, generation of power from waste
 - ◆ Composting
 - ◆ Recycling
 - ◆ Power generation
 - ◆ Mini process units- draw mills should be established
 - ◆ Reuse useful articles
- ❖ Innovative options in Public/Common Toilets through PPP
 - ◆ Solar flushing
 - ◆ Revenue through ADs
- ❖ Achieving 100 percent IHTs Individual Household Toilets
 - ◆ Bio- toilets as in railways- less space
- ❖ Challenges in achieving 100 percent ODF towns/cities
 - ◆ Place
 - ◆ Maintenance

3. Environmental and Social Impact Assessment (EIA & SIA) in Urban Development

- ❖ GIS mapping and geo-tagging of all natural resources and heritage sites
 - ◆ GEO Tagging for natural resources, heritage sites and other man-made structures like bore-wells, IHTs etc. in coordination with all line departments
- ❖ Social Fencing of the boundary at Full Tank Level (FTL), around ponds and lakes against encroachments
 - ◆ Active involvement of local communities like walkers associations, SHGs, street vendors etc.
- ❖ Community Based Disaster Management and peacetime preparations
 - ◆ IEC activities
- ❖ Enforcing Environmental Regulations in urban development
 - ◆ Strict enforcement of environmental regulations, before clearing projects
 - ◆ Formation of M & E Committees
 - ◆ Expediting environmental grievances through dedicated grievance cells
- ❖ Awareness creation and Empowerment of Stakeholders
 - ◆ Effective Environmental education in schools & colleges
 - ◆ Imparting training to key stake holders in TLFs and SLFs
 - ◆ Conducting mock drills

It has been decided in the workshop to forward all suggestions and recommendations inferred in the workshop, to the Government for needful action.



Annexure I: Agenda

**27th November 2015, Friday, EPTRI Conference Hall
Workshop Schedule**

Time	Topic / Activity	Speaker
10:00 am- 10.30 am	Registration & Introduction of Participants	-----
10.30 am – 10.40 am	Welcome Address & Introduction of Workshop	Dr. Joy Elamon CEO, ICSD
10.40 am - 11.00 am	Inaugural Address	Mr. B. Kalyan Chakravarthy, IAS Director General, EPTRI
11.00 am - 11.20 am	Climate-Smart Cities: Challenges and Opportunities	Dr. J. Rajeswar Senior Subject Specialist, Climate Change & Environment Intercooperation Social Development India (ICSD)
11.20 am - 11.40 am	Green Building Movement	Mr. Dheeraj, Architect & Planner CII – Sohrabji Godrej Green Business Centre
11.40 am – 11.50 am	Tea-Break	
11.50 am – 12.20 noon	Decentralized Solid Waste Management & Community Role	Maj. Shiva Kiran Sukuki Exnora
12.20 noon – 12.40 pm	Health and Climate Change	Dr. Joy Elamon CEO Intercooperation Social Development India (ICSD)
12.40 pm – 1.00 pm	Description of Three Thematic Areas and dividing participants into Working Groups into 1. Urban Infrastructure & Green Building 2. Integrated Solid Waste Management and Sanitation (Swachh Bharat) 3. Environmental and Social Impact Assessment (EIA & SIA) in Urban Development	-----
1.00 pm – 1.45 pm	Lunch	
1.45 pm – 2.30 pm	Parallel Working Group Discussions	
2.30 pm – 2.40 pm	1 st Working Group Presentation	
2.40 pm – 2.50 pm	2 nd Working Group Presentation	
2.50 pm – 3.00 pm	3 rd Working Group Presentation	
3.00 pm – 3.15 pm	Summary of Findings of Workshop for Policy Recommendations	
3.15 pm – 4.00 pm	Valediction followed by Tea & Snacks	

Annexure II: Participants List

Name	Designation	Organisation	Email ID and Contact No.
1 Mr. Subba Rao Gaddan	TPA	DT & CP, AP Animal Husbandry	ARCHITECT_SUBBU@YAHOO.CO.IN saii@doctor.com
2 Dr.M.Saibutcha Rao	VAS	Intercooperation	joyelamon@intercooperation.org.in
3 Dr. Joy Elamon Dr.N.Surya Durga	CEO	Medical & Health	Surya354@gmail.com
4 Prasad	P.O	TNREDC	infotnredc@gmail.com
5 Mr. D.Ashok Kumar	DGM	WWH-India, Hyderabad	deepton@gmail.com
6 Mr. Deepak.R	FREO Architect green	CII-IGBC	dheeraj.a@cii.
7 Mr. A.Dheeraj	Buildings Knowledge Manager	CGG	avinash.venkata@cgg.gov.in
8 Mr. Avinash Venkata	Director	ICSD	nanditaray@yahoo.com
9 Mrs. Nandita Ray	Head- Rural Economy	ICSD	9849033406
10 Mr. Mustak khan Mr. B.Viswanadha	Urban env specialist	APMDP	ss.apmdc@cdma.gov.in 965222512
11 Raju	by CF	HMDA British High Commission	krivemula@yahoo.com naren.pusupullah@fro.gov.in
12 Mr. V.Krishna	Climate Officer Asst Director of ASN	CGG, HYD	padmaja.k@cgg.gov.in
13 Mr. P. Naren	Consultant Senior Subject Specialist - Climate Change and Environment	CGG, HYD	kirankumar.g@cgg.gov.in
14 Ms. K.Padmaja	Senior Advisor	ICSD	rajeswar@intercooperation.org.in
15 Mr. Kiran Kumar.G	Adv Tech Environment Scientist	EPTRI	raoventi@gmail.com narsing@gmail.com
16 Dr. Rajeswar	Team Leader	EPTRI	kavithaeptri@gmail.com
17 Dr. C K Rao	S C	TRAC	theretipally_nandi@yahoo.com
18 Mr. Narsing Pawar	E E	TRAC	gautham_naru@yahoo.com rajashekar.kataram@gmail.com
19 Ms. S.Kavitha	A D	Shalivahana Ground water dept	9393856245 hansraj.1962@reddiffmail.com
20 Ms. T. Nanditha	By Director	GWD, Hyd	narenburra@gmail.com
21 Mr. G.Gautham	DEO	Sukuki Exnora DTCP. GOV OF TS	9849047827 bhavanirani@gamil.com
22 Mr. Rajashekar	ADTP,DTCP AD (AH)	A H Dept	dahsupc@gmail.com 9989932544
23 Mr. T.Hans raj			
24 Mr. B.Narender			
25 Major Shiva Kiran			
26 Ms. Bhavani rani			
27 Dr. A.S.C.Rao			

