CLIMATE RESILIENT KERALA

STAKEHOLDER RECOMMENDATIONS FOR KERALA STATE ACTION PLAN ON CLIMATE CHANGE

Thiruvananthapuram, Kerala
2017

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Thanal is a public interest research, education, campaign, action and policy advocacy organization focused on environmental health and justice with a vision "People, Planet and Sustainability" and with a mission "Crafting the Change for the Future". Thanal is heading programmes on Food Sovereignty, Climate Change and Zero Waste, Chemical Safety, Living Ecosystems. Thanal was found in 1986 as an informal voluntary association for environmental education and later evolved into a formal registered Charitable Trust.
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Climate Action Network South Asia (CANSA) is a coalition of over 160 civil societies organizations working in 8 South Asian countries to promote government and individual action to limit human-induced climate change in a manner that promotes equity and social justice between peoples, sustainable development of all communities and protection of the global environment.

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Executive Summary

This report is a compilation of two roundtable discussions organized in Kerala during the September 2016 – January 2017 period by Thanal, Climate Action Network South Asia, Phia and UNICEF's climate change and disaster risk reduction programme. The objective of the roundtables was to secure recommendations through dialogue between various state actors, government departments, universities, civil society organizations and media to strengthen Kerala's State Action Plan on Climate Change (SAPCC) based on learning and latest best practices since 2014.

The process was started by Thanal by circulating a concept note (see Annexure 1) to key officials and policy makers of the State Government and inviting their participation for a dialogue on building a Climate Resilient Kerala (CRK). Following enthusiastic response from key state department officials, two roundtables were conducted to discuss climate change impacts on Kerala and how best to prepare future adaptation, mitigation and disaster risk reduction plans for integration with state planning process at all levels of governance.

Both the roundtables were graced by the presence of Hon. Ministers for Finance, Women and Children, Disaster Management and Risk Reduction, Health, Solid Waste Management, Agriculture and Panchayath Raj Institutions. The gathering was also attended by Heads of State-level Missions, Secretaries to the Departments and representatives of NABARD. From these discussions women and children were pointed out as a specific area of interest for the SAPCC to focus on, continuing with the spirit of recently forming a new department focused on their welfare.

The process invoked a larger debate on the status of implementation of State Action Plan on Climate Change as well as its effectiveness and the Directorate of Climate Change decided to go for a wider consultation for strengthening SAPCC in the last quarter of 2016.

The CRK roundtables emphatically conclude that women and children are especially vulnerable to climate change and natural disasters, and therefore, need a special focus in the revised Kerala SAPCC through special programmes, policies and budgetary allocations.

The key findings and recommendations to the government of Kerala are as follows:

1. Women and children are most vulnerable to impacts of climate change – The revised state action plan on climate change (SAPCC) must recognize vulnerabilities of children and women and ensure their inclusion in design and implementation of all future mitigation, adaptation and disaster risk reduction programmes.

2. Decentralization and local action are key in design and implementation of SAPCC – The revised SAPCC must ensure involvement of all levels of Local Self Governments (LSG) at all times to research and design locally suitable strategies and programme implementation.

3. People's participation is key to building climate resilience – all mitigation and adaptation projects being taken up in the state should be participatory, people-driven with community buy-in and social acceptability.

4. Women can play a decisive role in design and implementation of the SAPCC – the SAPCC must recognize the role of women in decision making on strategic action plans and their management and implementation should include women.

5. There are serious knowledge gaps about climate change impacts on Kerala – the SAPCC must be revised on latest information and multi-sectoral knowledge to inform its design.

6. Water security and forest protection measures, transport solution and green building practices need to be included in the revised SAPCC.




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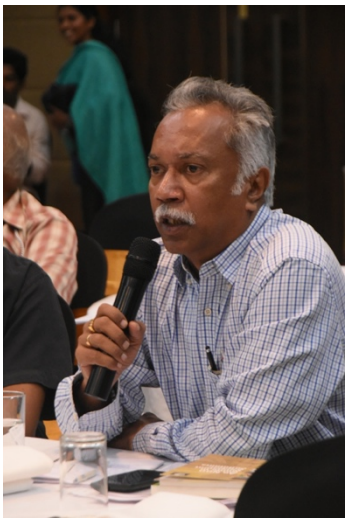


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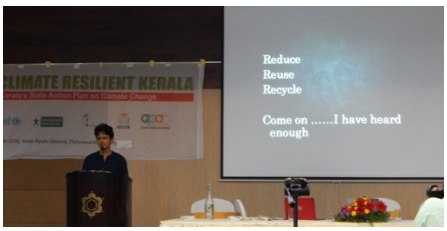
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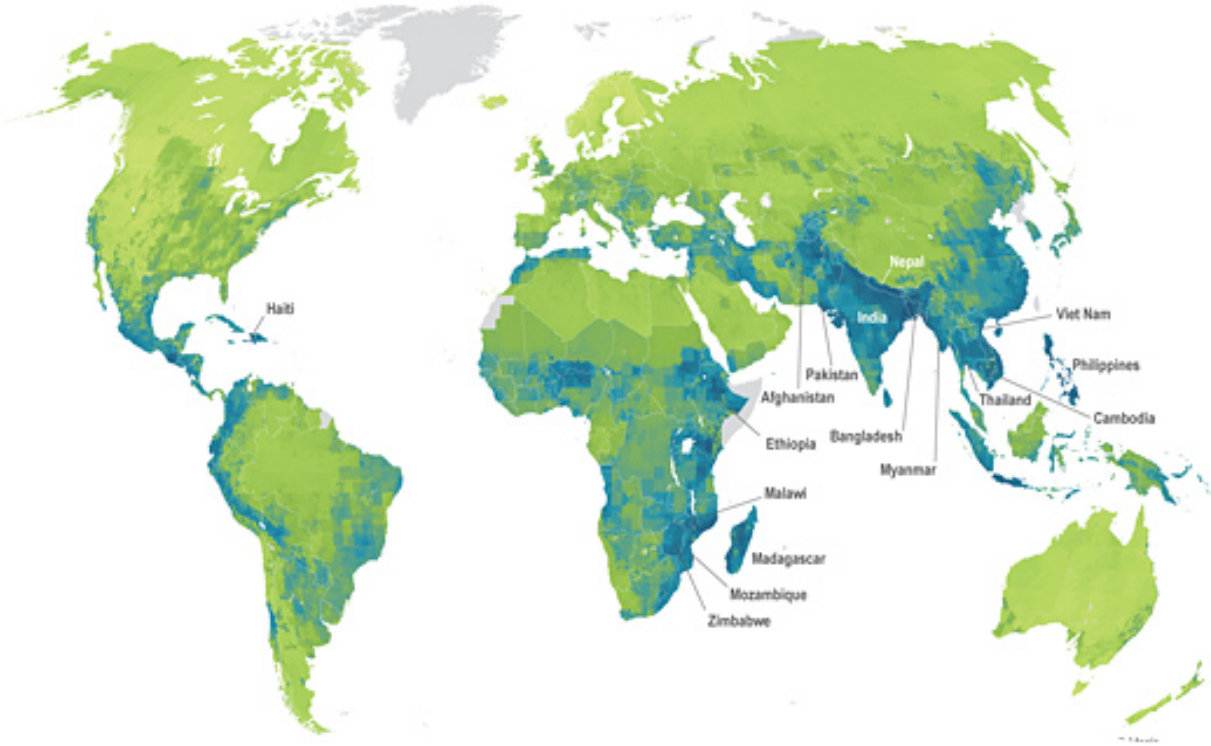
Reuse
Recycle
Come on .....I have heard
enough

Glossary

1. CRK = Climate Resilient Kerala
2. DRR = Disaster Risk Reduction
3. GHG = Green House Gases
4. KSDMA = Kerala State Disaster Management Authority
5. KSREC = Kerala State Remote Sensing and Environment Centre
6. LSG = Local Self Governments
7. NAPCC = National Action Plan Climate Change
8. PCN = Project Concept Notes
9. SAPCC = State Action Plan Climate Change

1. Background on Kerala and Climate change

Climate change is a global as well as regional phenomenon which poses extreme risks in near to long term to social and economic development gains achieved in past decades as well as natural resources on land, in rivers and oceans. The rise in greenhouse gases (GHGs) in the atmosphere from burning fossil fuels causes rise in temperature which in turn leads to unpredictable weather including flash floods and drought, as well as rise in sea level. India has been identified as highly vulnerable to climate change because of high physical exposure to climate related disasters and dependence on climate-sensitive sectors such as agriculture, forests, tourism and fisheries.



Source: Maplecroft

*India was **ranked 2nd** in the 2011 Climate Change Vulnerability Index (CCVI), released by global risks advisory firm Maplecroft, that evaluates 42 social, economic and environmental factors to assess national vulnerabilities across three core areas, namely, exposure to climate-related natural disasters and sea-level rise; human sensitivity, in terms of population patterns, development, natural resources, agricultural dependency and conflicts. Thirdly, the index assesses future vulnerability by considering the adaptive capacity of a country's government and infrastructure to combat climate change. India is already one of the world's power brokers, but climate vulnerability could still adversely affect the country's appeal as a destination for foreign investment in coming decades. Almost the whole of India has a high or extreme degree of sensitivity to climate change, due to acute population pressure and a consequential strain on natural resources. This is compounded by a high degree of poverty, poor general health and the agricultural dependency of much of the populace.*

The state of Kerala is specifically vulnerable to the changing climate dynamics owing to its location along the sea coast and steep gradient along the western slopes of the Western Ghats. The current climate change impact of the state of Kerala can be summarized by the following points made by the CRK discussion:

i) Sea level rise: Climate change induced sea level rise will result in widespread salinity affecting the availability and quality of groundwater for drinking and agriculture purposes in Kerala. Sea level rise will also result in coastal erosion leading to loss of land and livelihoods, sinking coastal towns and cities.

ii) Erratic monsoon: Climate change has affected the monsoon patterns as evidenced by changing spatial and temporal data recorded in Kerala. Rainfall intensity is lower which provides inadequate recharge for ground water and rivers. It is also observed that increase in raindrop size has resulted in increased erosion and infrastructure (like roads) getting damaged faster. Wetlands are adversely affected due to such changing patterns.

iii) Extreme temperatures: Maximum and minimum recorded temperatures have shifted from usual trends and has also led to decrease in agricultural productivity. Studies link every one-degree Celsius rise in temperature to 6% reduction in paddy production.

iv) Droughts: Water scarcity will affect food security; 72% water in the state is used for agriculture, of which 40% is from ground water. Wayanad district has recorded a decrease in rainfall where 76% people depend on agriculture.

v) Water sources: Some rivers in Kerala could start drying up entirely during summers within the next 15 years. The carrying capacity of Vembanad Lake has declined by 78% due to increased sedimentation and shrinkage in depth and area, with predictions that the lake will disappear in next 50 years. Micro level changes in climate of high-altitude regions like Munnar have also been observed.

vi) Women & children: Women and children make up 70% of victims who are affected by any climate disaster. Children are especially vulnerable in many ways – for instance, crop failures result in lack of food, which affects nutrition intake of children (less milk and vegetables consumed). This in turn affects cognitive abilities, IQ, physical traits (stunted growth) etc. Increased incidence of vector-borne diseases primarily affects children. Loss of learning days also affects education in the long term especially in times of disasters like droughts. Diphtheria cases are back in Kerala and recorded in high numbers, although its link to climate change is yet to be established.

2. Kerala State Action Plan for Climate Change

In response to the climate change impact, India released the National Action Plan for Climate Change (NAPCC) in October 2008. The State Action Plans for Climate Change (SAPCC) are formulated to implement the national plan at state level, and find local-global solutions for the state-specific challenges. Thus, the SAPCC is supposed to build on the existing policies of the state government by taking into consideration the ongoing programmes and schemes being implemented at the state level as well as the NAPCC. The SAPCC will have to be integrated into the state level planning process so that the resource allocation for the implementation of identified adaptation and resilience measures can be made with the objective to achieve the development goals of the state government.

Kerala SAPCC was formulated by Department of Environment and Climate Change with the technical support of UNDP India as Government of Kerala's strategy for action in the state in response to climate change. It is supposed to identify specific vulnerabilities and plan appropriate responses keeping those in focus through integrated climate and development planning process in the state.

The strategic possibilities for dealing with the climate change situations in the state are proposed by the SAPCC through an assessment of vulnerabilities of and possible impacts on natural resource base and key human development aspects followed by options for response actions. Based on climate change vulnerabilities, a few key sectors are specifically relevant for state action, namely Agriculture, Animal Husbandry, Fisheries and Coastal Resources, Forests and Biodiversity, Waters Resources, Health, Energy, Urban and Transport and Tourism.

For measuring the effectiveness of implementation of the SAPCC, it is necessary to have a monitoring and evaluation framework. In the context of Kerala, monitoring and evaluation framework will need to be placed at state, sectoral and lowest governance unit levels.

3. Identified Improvement Areas & Recommendations in SAPCC & DRR Planning

The roundtable discussions in September 2016 and January 2017 identified gaps in the current SAPCC and state planning to address climate change before bringing out suggestions for improvement. The further scope to strengthen the SAPCC in meeting current and expected challenges was found to be quite high. In addition to this, the CRK pointed out women and children as being specifically vulnerable to climate disasters.

3.1. Climate Resilience Knowledge Management

Up-to-date, localized and reliable data on climate trends and its impacts along with in-depth studies seems to be unavailable in most sectors (for example, river flow data used in a recent government led study was prepared by PWD in 1974). There is an identified need for prioritizing research studies for solutions planning and design, implementation and capacity-building. Convergence among various independent agencies needs to be facilitated. A centralized repository of data, best practices, guidance notes, and implementation tools is required. Existing frameworks by and large neglect inherent knowledge from women, children and traditional systems, and fail to transfer essential life skills and resilience-building information to grassroots, especially during disasters. There is a clear need to 'upscale' and upgrade localized solutions and appropriate technologies in the current climate context.

Recommendations – Investment should be made in addressing the knowledge gap and action-based research must be commissioned to feed back into policymaking. Knowledge gathering / knowledge transfer efforts need to more organized and given more importance. Steps to build capacity and bring onboard resource persons are crucial for ensuring informed decision making. Mediums like art, literature and culture, and behaviour change campaigns need to be pursued to mainstream climate resilience actions among the citizens of Kerala.

3.2. Climate-responsive Local Governance

Role of Local Self-Governments (LSG) remains understated in strategic climate resilient planning. Lack of readily available expertise and knowledge tools at LSG level brings down their decision-making capabilities, despite the crucial role they play during implementation of projects. LSGs remain largely uninformed of global climate negotiations and innovations, failing to catch up with the fast-changing trends in CCA and DRR. Limited legislative powers also make it difficult to empower LSGs as the stewards of their local ecology, often making it too late to prevent damage like contamination of water sources (rivers / ground water / ponds / oceans and lakes), illegal tree felling, quarrying etc.

Recommendations – There is a need for district, block and LSG level empowerment, so that implementation can be done locally with increased citizen engagement. Key participants in the making of SAPCC must be the LSGs as they have accurate knowledge of the practical issues during implementation. In all such stages of policy design and planning, the LSGs and state government must ensure including women and children, civil society, experts, the

'Malayali diaspora', local knowledge institutions and media. Instead of creating specialized departments for climate change, every department must be provided with a 'checklist' of project requisites in alignment with SAPCC during planning and implementation.

3.3. Finance Mobilisation for Climate Resilience

Funding is being inadequately mobilized for climate action projects and instead gets underutilized in low-priority or low-impact areas. Climate funding also often seems to be channelled into projects unsuitable to local context (for example, centralized waste to energy projects and plastic incinerators have been allotted budget provisions in the current SAPCC document. Instead improvement of supply chain management and material recovery social sector in the state is needed).

In Kerala, because of effective decentralization, LSGs are already allocated good amount of funds for their projects. Enterprising initiatives and innovations at LSG levels, like the upcoming Carbon Neutral Meenangadi project, are the State's flagship programmes in building climate resilience.

Recommendations:

- NREGA funds can be effectively used for executing climate adaptation strategies in agriculture, waste management and livelihoods.
- Union Government has CSS schemes for development activities part of which can be channelled for conservation activities as well. State Governments may prepare Project Concept Notes (PCNs) in consultation with NABARD to tap into National Adaptation Fund and similar funds.
- There needs to be a mechanism under which institutions/businesses using local resources heavily can provide compensatory payment to the LSG for the resources it is using. Building a business model around the action plan helps create solutions that are sustainable, participatory and responsible, such as Local Adaptation Plan funding models seen in Bhutan and Nepal.

3.4. Legislation and Policies for Climate Resilience

Existing laws need to be revised as per latest climate data to realize the need and urgency for ecological conservation and community resilience. For instance, the existing building regulations were formulated in 1994 having outdated provisions and this code often ends up as an impediment to environment conservation. Similarly, judicial provisions regarding 'Unreserved Forests' were historically formulated to cater to the interest of the Princes of Kerala in a pre-industrial/capitalist setup. In current system, these laws now damage the valuable ecosystems that end up being used as any other revenue land in the State for construction, mining etc. In the case of extremely eco-sensitive zones like the Western Ghats, it is not even identified as a single entity under law and unless a clear definition as well as legal status is given to it, its conservation will be challenging.

Trivialization of climate efforts at various levels of government bodies gets reflected in the policy making process. Departments are fragmented in terms of holistic policy and planning procedures which causes serious drawbacks at implementation level. Also, on a larger perspective of a climate resilient planning framework, Kerala state efforts are found to be inadequate in terms of participatory and inclusive consultations as well as informed and in-depth analysis to back such documents.

All future development planning and activities must consider an integrated approach based on the Sustainable Development Goals, Sendai Framework of Disaster Risk Reduction and the principles of United Nations Framework for Climate Change, for ensuring a Climate Resilient Kerala (CRK). More importantly prioritize intervention areas and action plans with State's planning based on above guiding frameworks.

3.5. Women and Child Development

The Gender Equality and Women Empowerment Policy was approved by the Government of Kerala in 2015. Based on this policy the Department of Economics and Statistics came up with a Report on Gender Statistics 2015-16. The report observes that the women participation in the economic realm and in decision making in the public sphere is low even though as per 2011 Census, 52.02% of total population of the State is women and they are facing negative consequences due to migration and water stress. Progress in Gender Equality and Women empowerment can be accessed by three dimensions – 1. Security and freedom from violence, 2. Strengthened women's access, ownership and control over resources and capabilities, 3. Enhanced participation and voice of women in formal as well as informal social, political and economic institutions.

Recommendations:
Policymaking and implementation should involve women as the encouragement for lifestyle changes, considered crucial for combating climate change, would likely come from women. The new Kerala SAPCC should ideally have a separate chapter on women and children as they utilise resources differently than men. For example, a child may want to have a pond in an area while an adult would want to fill it for making a playground.

Some specific recommendations are:

- Education system needs to focus on overall health and preparedness of a person;
- Policies and programmes such as 'Harithasree' for leasing land for farming together with 'Kudumbasree' scheme helps women to earn livelihoods. The government needs to build on such existing best practices in the State based on analysis;
- Adopt "0 D + 0 D" *(zero disease + zero days lost in school)* for school safety with the aim of making all schools resilient to / adapt to disasters *(climate-linked or man-made hazards)*;
- Climate change and mid-term (10 to 20 years) impacts should be included in the school curriculum to indicate the situation when children will grow into adults.

3.6. Disaster Risk Reduction Data

Kerala State Disaster Management Authority (KSDMA) has been managing hazards, vulnerability and disasters in the state since 2007. The authority has created State and District-level Disaster Management Plans, flood and drought susceptibility maps, hazard vulnerability and risk analysis of five city corporations in Kerala and Idukki District. KSDMA is now working on strengthening emergency response capabilities of differently abled.

To address the emerging challenge of climate change, data gap remains a stumbling block in anticipating and developing scientific models for weather patterns and impacts in a warmer world. Data resolution of 1:50,000 is currently available in the state. However, running models at higher resolution is a pre-requisite to anticipate climate impacts and develop plan of action. Current risk assessment standards are not up to standard – indicators (both socio-economic and ecological) need to be carefully thought out and contextualized to ground realities.

Recommendations:

- Mainstreaming of DRR into development agenda is ongoing in the state's Environment department and this needs to be emulated in other departments and their budgets;
- Matrix of department budgets, programmes and their salient features for effective planning and cross-departmental coordination along with budget interpretation is needed to find funds to undertake climate adaptation and DRR initiatives;
- Disaster management department has made a list of most vulnerable places which now needs to be addressed through prioritization in resilience development planning;
- Intensive and extensive risk analysis needs to be done. For example, small scale disasters affect only small households though these localized incidents are not accounted for adequately in studies and social protection system do not help as these incidents go under the radar of news;
- How climate change risks affect differently abled people and elderly needs to be studied and included;
- Higher resolution data needs to be made available for spatial analysis and developing models that will be useful in preparing robust climate action plans;
- A state climate training network needs to be set up with participation of civil society and involvement of state institutions such as KILA, Climate Change Centre etc.

3.7. Engagement with PRIs and recommendations

In order to enable/empower Panchayats to take action on climate change, practical, clear and strategic recommendations are needed. Simplification of climate change science is necessary for bureaucrats, farmers, Panchayat and policy-makers to take action. The proposed activities and actions need to be included in the planning methodology at Panchayat level. In addition, the panchayats need to be informed in a crisp manner which activities and actions should to be avoided. PRA exercises can be done to assess climate change at Panchayat level. Solutions exchange is proposed at grassroots level which provides pertinent solutions provided by issue experts to the solution seeker.

Community based approach is possible through Kudumbasree. Climate change can be implemented through 40 lakh SHGs in Kerala by sensitising them and building their capacity to undertake action. The sensitisation drive can be initiated in schools through tests on environment, etc.

Carbon neutral panchayats (two each) should be developed in different agro-ecological zones, ecosystems and regions to test the concept and later can be replicated in other areas. The activities conducted in MGNREGS can be divided into carbon neutral, positive and negative. The panchayats can be advised to take up desired activities and to avoid undesirable activities. The decentralised governance system allows resource groups to work with panchayats. The resource group could be an opportunity to integrate climate change issues into development work.

4. Identified intervention areas in key sectors

The roundtable discussions also identified gaps in approaches to address climate change impacts on key sectors as well as proposed suggestions for improvement.

4.1. Resilient Agriculture and Food Security

Current Scenario

Agriculture is an important subsector of the primary sector in Kerala accounting for more than 80% of the State GDP generated within the primary sector and 33% of the overall State GDP. Also, majority of the population in the state is dependent directly or indirectly on agriculture. Climate change such as increased temperatures has multiple and devastating effects on agriculture which is under research and data downscaling is underway in the agriculture university. Crop behaviour under different climatic conditions, seasonality and modelling on water requirement for farming in different temperature scenarios is also underway in the university.

Recent increase in production of organic vegetables in Kerala has got implications for climate change mitigation – it means less transportation from neighbouring states, less fossil fuel consumption, reduced GHG emissions and decreased use of chemicals fertilizers. It also has implications for adaptation due to sustainable water and soil management.

Farmers, experts and government officials are still informed by learning from the 'green revolution' era be it policies, techniques and technologies; for example, the push to increase irrigation believing it leads to higher yield, which in reality is a wastage of water and financial resources. Studies are not conducted periodically to support or validate such practices. Considerations for local varieties of many crops that perform better than hybrids and are more climate resilient are not recorded properly. Erosion of coastal region and accretion is partly because sand does not reach the ocean from rivers. Also, the nutrient flow from rivers to ocean is affected. This in turn affects to fish population and the fishermen community.

Recommendations

- Agroecology can play a major role in climate change adaptation. An agroecology policy is not the same as organic policy. Agriculture and food security policies based on agroecology can ensure equitable gender rights (including land holding for women and recognition of their agricultural knowledge) and livelihoods;
- Promotion of practices such as cultivation of multiple crops on the same farm and also supporting other species (for example: fish cultivation along with paddy) at the same time can lead to increased profit and productivity;
- Localized food production suitable to local climate can ensure that diversity in food is restored;
- Energy efficiency and subsidy policy for agroecology has direct impact on water use management;
- Around 13.46% of forest land is used for plantations in Kerala. The State lacks a formal land use policy. A change in policy associated with plantations will enable converting

existing plantations to mixed crop areas and community managed/protected forest areas that will lead enhanced food security, biodiversity, rainfall and water security;

- Funding such projects will be lucrative because this will be a major step in boosting Kerala's economy, saving expenditure and increasing eco-cultural-tourism.

4.2. Water Security

Current Scenario

Micro watershed-based land and water conservation is being practised and integrated watershed management programme with local participation is being carried out.

Further Scope

- Decentralized purification system with natural methods will be cost-effective and save precious water;
- Protection of drinking water sources locally by preserving local water bodies is essential;
- Healthy flowing rivers are crucial for survival so periodic maintenance/clean-ups of river systems is required. Old, weak and damaging dams need to be decommissioned after making a long-term plan to provide alternatives and build capacity in those areas which are depending on these dams for various purposes;
- Geo-texturing using coir can be used for handling soil erosion and for protecting embankments of slow rivers, lakes and ponds which is a sustainable working model.

4.3. Forest Protection and Afforestation

Current Scenario

Due to failed participatory forest management programmes, as seen in Idukki, today there is a trust deficit and non-cooperation from indigenous people to government. Laws and policies take much time to come into effect and by that time, the destruction usually has occurred. For example, for tourists that are destroying the grasslands by driving over them, the Forest Department is building amenities and constructing access roads for them to drive in the grasslands. This is a new land use pattern and no laws are in place for stopping this because it is a recent trend.

Recommendations

- Indigenous communities and forest dwellers can be technologically equipped with cameras, and GPS instruments to aid in identifying illegal mining and quarrying activities, monitoring wildlife and tracking poaching, and data collection of forest resources. Budget provisions need to be adequately made to include this;
- Forest coverage needs to be increased to conserve biodiversity of the state. This will minimize the impact of climate change because different species have different resilient qualities that will collectively enable the ecosystem as a whole to adapt;
- Land acquisition needs to be pursued for forest protection and conservation. For example: Mangroves (important in the context of Kerala' environment) area has

reduced from 700 sq. km to below 20 sq. km. They are under private land which has also led to increased human-animal conflicts in such areas due to habitat destruction;

- Nature-based solutions such as promoting jackfruit trees and other local varieties in the forest borders to address elephant conflicts need to be implemented. Research on similar methods should be commissioned for immediate implementation;
- There must be a mechanism to quickly intervene in new challenges posed to environment.

4.4. Integrated Resource and Waste Management

Current Scenario

The spreading of scattered waste in public areas and near citizens' homes have serious consequences for health, local environment and groundwater. There are health implications since outbreaks of vector-borne diseases such as malaria, dengue, chikungunia are enhanced putting additional pressure on state health department. Outbreaks of diseases affects workforce productivity and economy.

Solid waste is an important issue to tackle in Kerala. The rapid urbanisation with new consumption patterns are not being met by a system of how to deal with outcomes of trash, garbage and food waste. As per data compiled by the Clean Kerala Mission, approximately 6,000 tons of solid waste is being generated daily all across Kerala at 0.178 kg per capita with a very high variation from 0.034 kg in Koothuparamba to 0.707 kg in Thalassery. Inadequate management of waste segregation, recovery, and landfills is also a significant contributor to GHG emissions.

Clean Kerala Mission has the objective of a garbage free Kerala but there has to be other initiatives alongside to tackle the problem of solid waste management. Decentralised waste management is implemented in some of the programmes under the Suchitwa Mission (Green Protocol for National Games) which has saved transport costs and reduced landfill emissions. International best practices should be brought to waste management to Kerala. Zero waste policy including waste minimization needs to be a reality in the state.

Recommendations:

- 'Extended Producer Responsibility' framework should be brought to Kerala which has been mostly implemented in developed nations;
- A visionary document and Act for solid waste management and minimization is necessary for the state that could drive action and aspiration. The Ministry of Urban Development has a policy for Swachh Bharat Mission and the framework will be a valuable input for policymaking and to fill the knowledge gap;
- Composting needs to be promoted which in turn promotes kitchen gardening and small-scale farming for a single house;
- Material recovery facility – instead of new materials, Kerala needs to promote resource recovery activities through incentives which in turn reduces load on natural resources and transport related pollution. Ideas such as thrift stores (as seen in Kannur) promote reuse of materials and products. Government should enforce a buy back policy for

certain complex waste streams and hazardous substances, for example, batteries, tube-lights, e-waste etc.;
- Government should incubate green business models to support green initiatives and enterprises;
- Steps for toxic free living have to be adopted. Toxins in various products are harming the micro ecosystem in many places. Grey water from homes is not treated at all. All of the toxins in products directly affect the ecosystem and ground water.

4.5. Health

Current Scenario

Climate change poses new challenges to public health around the world. Communicable along with vector borne diseases have been a health issue in Kerala. Malaria, dengue fever, chikungunia, diarrhoeal diseases and H1N1 are all pointed out by the Kerala State Action Plan on Climate Change as diseases caused and/or increased due to climate change. Climate change is linked with rising instances of these diseases in the state, for instance through higher temperatures, water scarcity and flooding.

Kerala State Remote Sensing and Environment Centre (KSREC) is envisaged to have a GIS based portal where spatial data can be analysed. Health Department is the first department in the state to have a Disaster Management Plan. Standard operating procedure for epidemiology is being prepared which will be embedded into decision making processes. Epidemic preparedness planning is undertaken before start of monsoon season every year in cooperation with Panchayat, ward level health and sanitation committees. Evidence building for climate change vulnerability and communicable disease is being undertaken by a small group of experts in the health department. Preparation of health-related vulnerability map is underway which connects climate change with communicable and non-communicable diseases.

Data is a challenge and it can be improved upon once more research and fine-tuning is conducted as data assimilation is a continuous process. A system to generate data on GHG emissions and carbon footprint is not available in the state though NGOs and other global agencies are developing it.

Recommendations:

- Benchmarking of data is vital to demonstrate changes made due to climate action;
- Traditional adaptation activities need to be brought back for building resilience. Evidence-based models built on data and case studies is needed for vulnerability assessments. The evidence needs to be taken to people for ownership and action;
- Good governance network is needed within the state departments. While implementing Haritha Keralam, cross-departmental integration of climate change planning and execution is required. Knowledge network is needed to draw upon experiences and knowledge from each other;
- Pro-environment bias is there in the state which is reflected in state policies. Participatory and voluntary participation is needed for progress in environmental governance.

4.6. Climate Friendly Transportation

Current Scenario

There are already around 10 million vehicles in the State and one million new vehicles get added every year due to which new roads and road-widening is being demanded for traffic.

Recommendations:

Interventions in public transport sector for combating climate change needs to be explored such as running buses on dedicated BRT (Bus Rapid Transit) corridors to increase resource utilization in transport sector. Technology innovations for increasing efficiency and electrification of transport are required. Practices such as car-free zones and policies such as high parking charges, congestion charges etc. should be applied for reducing cars on the roads.

4.7. Climate Friendly Construction

Current Scenario

Red bricks are still widely used and demand for unsustainable products such as APC (Aluminium Polymer Composites) panels is prevalent in current rampant constructions.

Recommendations:

- All building designs should be eco-friendly, or at least, all government buildings should be constructed this way;
- Building code can be modified with guidelines. Examples of Government initiative in this regard are the Kisan Bhavan at Anayara, Thiruvananthapuram, and at Chadayamangalam Soil Research Centre;
- When constructing new buildings, it should be mandatory to utilize a portion of the land for environment protection and even farming. Government should support this with incentives or tax cuts to buildings;
- Environment Impact Assessment must become mandatory for all commercial projects in the State.

5. Conclusion

The current Kerala State Action Plan on Climate Change (SAPCC) can be improved in the areas which have been discussed in the prior sections. Gaps have been identified in Climate Change/DRR Planning and the SAPCC such as:

- ***Knowledge Gap***: lack of up-to-date, localized and reliable data on climate trends and its impacts in most sectors*;*
- ***Governance Gap***: Role of Local Self Governments (LSG) remains understated in strategic climate resilient planning*;*
- ***Financial Gap***: Funding is being inadequately mobilized for climate action projects and instead gets underutilized in low-priority or low-impact areas;
- ***Legal Gap***: Existing laws needs to be revised including updated data to realize the need and urgency for ecological conservation*;*
- ***Policy Gap***: Trivialization of climate mitigation efforts at various levels of government bodies gets reflected in the policy making process.

Actions proposed

- As a response to these gaps, there is a need for more research, awareness, capacity building, and training, where knowledge gathering / knowledge transfer efforts need to be organized and given more importance;
- There is also a need for district, block level and LSG level empowerment, so that implementation can be done locally with increased citizen engagement. Key participants in the making of SAPCC must be the LSGs as they are more aware of the practical issues during implementation on ground;
- 'Glocal' strategies for climate resilience are also required. All future development planning and activities must consider an integrated approach based on the Sustainable Development Goals, Sendai Framework of Disaster Risk Reduction and the principles of United Nations Framework Convention on Climate Change for ensuring a climate resilient Kerala;
- Most importantly, Kerala needs to prioritize intervention areas and action plans in the State's planning based on the above guiding frameworks.

Areas such as disaster risk reduction, climate adaptation funds, LSG, food security, health, solid waste management and resilient agriculture have been presented with different recommendations on how the challenges ahead can be met. The main recommendations set to improve the new Kerala State Action Plan on Climate Change involve a stronger focus on women and children, recommendations on disaster risk reduction and solid waste management. Women and children should have a separate chapter in the SAPCC since they constitute particularly vulnerable groups in the context of climate change and natural disasters. Steps taken to mitigate climate change and to adapt to its impacts should be gender sensitive, child friendly. Such actions should be taken up on priority. The decision making on strategic action plans should include women. Disaster risk reduction should include higher resolution data which needs to be made available for spatial analysis and developing models. The models will be useful in preparing better climate action plans. Mainstreaming of DRR in the state budget is necessary and budgetary support is needed to undertake climate adaptation and DRR initiatives.

Annexure 1

BUILDING A CLIMATE RESILENT KERALA – roundtable 1

Strengthening Kerala's State Action Plan on Climate Change and Disaster Risk Reduction

2-day workshop for policy makers, government officials, civil society organizations, scientists, academicians and media.

26-27 September, 2016
Thiruvananthapuram, Kerala.

CONCEPT NOTE

Climate resilience refers to the capacity of a socio-ecological system to adapt, reorganize, and evolve to be better prepared for future disasters and climate change impacts.

Kerala is home to 3.44% of India's population. Kerala's rate of population growth is India's lowest and as per Census 2001 was 318.41 lakh consisting of 154.69 lakh males and 163.72 lakh females. In Kerala, 74% of the population lives in rural areas. Kerala's human development indices — primary level education, health care and elimination of poverty — are among the best in India. Kerala has one of the highest literacy rates (97.0%) among Indian states and life expectancy (73 years) the highest in India.

Kerala has started witnessing climate change and its impacts on various geographic regions and economic sectors. Rising temperatures, seasonal extremes in rainfall causing floods and water scarcity, accelerated coastal erosion have together led to failure of crops, drop in fisheries catch, increase in diseases and sea level rise threatening the coastal cities.

In order to respond to climate realities of the state, Kerala had prepared a State Action Plan on Climate Change (SAPCC). The SAPCC outlines strategies and provides recommendations to deal with climate impacts. The SAPCC is supported by vulnerability assessment which leads to sector-specific action plans over short, medium and long term for identified institutions.

In its current form the Kerala SAPCC lacks detailed climate vulnerability analyses, state-specific climate research and evidence-building including time series data mechanisms. There is also very little documentation of community voices and their perception of climate change impacts.

In addition, there is a need to identify sources for significant and sustained finance to implement many of the large-scale adaptation measures such as retrofitting core infrastructure assets that are at risk from extreme weather events.

Finally, sector-specific priorities and programmes need re-alignment through adoption of risk-informed planning as well as classification of existing adaptation actions as part of the climate change agenda. The overall purpose is to address economic development and growth in a way to achieve resilience to shocks and stresses.

With the Paris Agreement bringing in new climate regime, there is emphasis on integration of these climate action strategies in existing schemes and policies at sub-national level. The priority for the state has been to build resilient and low-emission society. Though SAPCC is first step towards identifying vulnerability and an adaptation agenda, much more is to be done on implementation of SAPCC. The state needs to prioritise certain cross-sector actions, develop mechanism for monitoring and evaluation of activities as well as devise appropriate institutional mechanisms for implementation. Throughout this process the emphasis also needs to be on enhancing capacity within the concerned departments through skill-building and innovation towards mainstreaming resilience in development planning.

Another global event in 2015 was adoption of Sendai Framework on DRR which identified seven global goals to be achieved by 2030. This is widely deemed to be the guiding framework for DRR preparation and interventions globally until 2030. Thus, the alignment of state and national policies needs to begin in earnest at the earliest.

The Sustainable Development Goals adopted in 2015 with the mission to *leave no one behind* identified addressing climate change as one of the goals besides also identifying other goals for areas such as water and energy access that are key to sustainable development and national government's goal of inclusive growth.

Strategies for poverty eradication (SDG 1), food security (SDG 2), health (SDG 3), water and sanitation (SDG 6) will get affected by changing climatic conditions. The energy source (SDG 7), nature of economic activities (SDG 8), urbanisation (SDG 11) will determine carbon emissions. The SDGs are intertwined with areas involved in climate change and will contribute immensely to the pathways of climate change adaptation and mitigation in the state and country. The SDG agenda 2030 provides an opportunity to direct development in a climate resilient, low carbon, sustainable and inclusive manner. It is therefore pertinent to integrate the Paris Agreement on climate change with action on Post-2015 Sustainable Development Agenda.

Approach to State Consultation

SAPCC is the comprehensive policy framework providing a platform for all departments and planning to find convergence on as climate resilience needs to be integrated across all government actions rather than stand-alone separate policy document with lack of ownership;

All concerned state departments besides Department of Environment and Forestry such as Disaster Management, Energy and Alternative Energy, Agriculture, Irrigation, Housing, Health, Transport, Public Works, Tourism, Women and Child Welfare, Planning and Finance need to be engaged in the deliberations and consultation;

Outcome expected is a draft implementation roadmap to utilize the entry points for mainstreaming DRR and climate change adaptation (CCA) into various policies and plans, addressing all forms of loss and damage, as well as leading Kerala on an inclusive and sustainable development pathway;

Recognize the need for creation of a multi-department work programme as part of the long-term domestic policies and global frameworks implementation and review roadmap to enable contribution from each department along with addressing their capacity-building needs.

Currently, climate resilience efforts encompass social, economic, technological, and political strategies that are being implemented at all scales of society.

From local community action to global treaties, addressing climate resilience is becoming a priority, although it could be argued that a significant amount of the theory has yet to be translated into practice.

Annexure 2

BUILDING A CLIMATE RESILENT KERALA – roundtable 1

Strengthening Kerala State Action Plan on Climate Change and Disaster Risk Reduction

2-day workshop for policy makers, government officials, civil society organizations, scientists, academicians and media.

26-27 September
Thiruvananthapuram, Kerala.

AGENDA

DAY 1

SESSION 1 – INAUGRAL SESSION

MC- (?)
9.30-9.40- Welcome Speech (Mr. Vijayanand Chief Secretary)
9.40-9.50- Objectives of State consultation (Mr. Sanjay Vashisht CANSA)
9.50.10.00- Context of State consultations in India (Mr. Lars Bernd UNICEF)
10.00-10.15- Chief Guest's inaugural address – (Mr. P. Vijayan Chief Minister)
10.15-10.30- Key note address – Finance Minister (Mr. Thomas Issac Finance Minister)
10.30-10.35 - Vote of Thanks & Agenda for 2 days – (Mr. Jayakumar C THANAL)

10.35- 11.00 – TEA BREAK

SESSION 2 – KERALA SAPCC- Climate vulnerability & preparedness

Chairperson-
11.00-11.15- Kerala's SAPCC implementation status and initiatives – (Sanjayan Kumar IFS)
11.15- 11.30 – Kerala's Disaster Risk Reduction programme and initiatives- (SDMA)
11.30-11.45 - Updated climate change impacts and projections for Kerala (Expert with latest study)
11.45-12.00 – Discussion to identify key gaps, areas of priority interventions to integrate climate resilience in Kerala's SAPCC.
12.00-12.15 – Chairperson's conclusion and recommendations.

12.15-13.00 – LUNCH

SESSION 3 –CLIMATE FINANCE - Mainstreaming Climate Policy & Action in State Budgetary Allocations and Central Schemes

Chairperson-
13.00-13.15 - Status of National Adaptation Fund and Green Climate Fund for SAPCC – (CGM, *NABARD)*
13.15-13.30 – International climate finance opportunities (CANSA)
13.30-1345 – Discussion on mainstreaming climate policy & action in State Budgetary Allocations and Central Schemes
13.45-14.00- Chairperson's remarks and recommendations.

SESSION 4 – Developing Women and Children Centric adaptation and DRR planning

Chairperson-
14.00-14.15 – Agenda setting by children (Thanal)
14.15-14.30 - Putting children and women first in climate resilience planning (Sarabjit Singh Sahota UNICEF)
14.30-14.45 - Kerala's women and child friendly initiatives – Shri A. Shahjahan, Secretary Department of Social Justice
14.45-15.00 – Discussion on women and children centric adaptation and DRR approach.
15.00-15.15- Chairperson's remarks and recommendations.

15.15-15.30 – TEA BREAK

SESSION 5- Government Interventions, Private Sector Initiatives & Community Innovation: Successes for Scaling-up and Implementation in Kerala

Chairperson-
15.30-15-45- Carbon Neutral Meenangadi (Thanal)
15.45-16.00- Organic mission of Kerala (Kudumbasree)
16.00-16.15– Waste management initiative
16.15-16.30- Water management initiative
16.30-16.45 – Discussion
16.45-17.00 – Chairperson's remarks and recommendations.

DAY 2

SESSION 6- FOOD SECURITY AND CLIMATE RESILIENT AGRICULTURE

Chairperson-
10.00-10.15- The role of modern agriculture in climate change
10.15-10.30- The role of organic agriculture in mitigating climate change
10.30-10.45- State and CSO initiatives for Climate resilient agriculture
10.45.11.00- Discussion
11.00-11.15- Chairperson's remarks

11.15-11.45 – TEA BREAK

SESSION 7 – FORESTS – WESTERN GHATS – CLIMATE PROTECTION or CLIMATE SINKS

Chairperson
11.45-12.00- Threats and opportunities for forest conservation
12.00-12.15- Role of Western Ghats in building Kerala's climate resilience
12.15-12.30 – Protecting biodiversity from climate change
12.30-12.45- Discussion

12.45-13.00- Chairperson's remarks and recommendations.

13.00-14.00 – LUNCH

SESSION 8 – WASTE MANAGEMENT AND CLIMATE RESILIENCE

Chairperson
14.00-14.15 – How waste contributes to climate change and disasters.
14.15-14.30 – Waste management initiatives in Kerala.
14.30-14.45 – Zero waste society
14.45-15.00 – Discussion
15.00-15.15- Chairperson's remarks and recommendations

SESSION 9 – Recommendations for Kerala's SAPCC and DRR planning

Chairperson
15.15-15.30 – Next steps in SAPCC & DRR planning and implementation (GOVT)
15.30-15.45 – Presentation of collated recommendations from the workshop.
15.45-16.00 – Discussion
16.00-16.15 – Chairperson's remarks and Recommendations.
16.15-16.30 – Closing remarks and Vote of Thanks.

16.30-17.00 – TEA & NETWORKING

Annexure 3

List of Participants – roundtable 1, 26-27 Sep 2016			
Sl No	**Name**	**Designation**	**Department/Organisation**
1	M Sivasankar IAS	Principal Secretary	Chief Minister
2	Lars Bernd	Chief	UNICEF ICO DRR Section
3	Job Zachariah	Chief	UNICEF Kerala and Tamil Nadu
4	Mullakkara Rathnakaran	MLA	Chadayamangalam, Kerala
5	Dr. Ajaykumar Verma	Retired Scientist	
6	Dr. Indiradevi	Agriculture Economist	
7	Vinod Menon	Member	NDMA
8	V R Raveendranath	Chief General Manager	NABARD
9	Beena Vijayan	President	Meenangadi Panchayat
10	Dr. Sekhar Kuriakose	Member	Kerala State Disaster Management Authority
11	Usha Nair	Member	All India Woman's Conference
12	Zeenat Niazi	Director General	Development Alternatives
13	Harjeet Singh	Director	AADRR/ACTION AID
14	Ram Kishan	Director	Christian Aid
15	Sridhar R	Director	Thanal
16	Sanjay Vashisht	Director	CANSA
17	Shailendra Yashwant	Advisor	CANSA
18	Jayakumar C	Founder	Thanal
19	Shibu K Nair	Director	Thanal
20	Aliyamma Vijayan	Co-founder	Sakhi Women's Resource Centre in Thiruvananthapuram.
21	Mr Purushan Eloor	Activist/Research Coordinator	Periyar Malineekarana Virudha Samithi (PMVS)
22	K. Shivakumar		Chintha (KGOA)
23	Sreelatha Suhruth	President	Kerala Government Gazetted Officers Association
24	Usha S	Executive Director	Thanal
25	Santosh Patnaik	Programme Manager	CANSA
26	Rushati Das	Programme assistant	CANSA
27	Usha Nair	Member	AIWC
28	Farhan		
29	Nandakumar	Media	
30	Krishnakumar	Media	
31	Prasad Somarajan		
32	Joe Goerge		Kerala Disaster Management Authority

33	Sasheendra Nath	Freelance Journalist	
34	Agracious		
35	Johnson Roch		P.N. Panicker Foundation
36	Thomas K S	Joint Secretary	Friends of Zoo
37	Akhila	Media	Deccan Chronicle
38	Pratheesh		Institute of Climate Change Studies
39	Sumesh	Media	Deshabhimani
40	Sudhin	Media	Janmabhoomi
41	Ad. A. Jerome		Bar Association
42	Ajith		Haritha Gramam
43	Rajesh T C	Media/PR	
44	Sreejith	Media	Janayugam
45	Dr. Sekhar Kuriakose	Member Secretary	Kerala Disaster Management Authority
46	Peethambaran	Media	Deccan Chronicle
47	Anooja	Media	Madhyamam
48	Krishnapriyan	Media	Malayala Manorama
49	Biaju Kurup		NABARD

Annexure 4
Photo Gallery roundtable 1

Annexure 5

CLIMATE RESILIENT KERALA – Roundtable 2

Integrating climate action and disaster risk reduction in the State's flagship missions: concerns and challenges

12 JANUARY 2017

Thiruvananthapuram, Kerala

CONCEPT NOTE

Background:

In September 2016, Thanal, UNICEF and Climate Action Network South Asia, hosted 'Climate Resilient Kerala', a two-day workshop in Thiruvananthapuram for policy makers, government officials, civil society organizations, scientists, academicians and media, with the objective of strengthening Kerala's State Action Plan on Climate Change (SAPCC) and Disaster Risk Reduction and Management Plans. The three main recommendations of the workshop were: a: total revision of the SAPCC with a more participatory planning process, b: integration climate action and disaster risk reduction plans across all the developmental missions of the state government and c: to prioritize the needs of women, children and the most vulnerable peoples in planning and implementation of all programmes.

Last month, the Department of Environment and Climate Change (DoECC) announced that the Kerala SAPCC is open for revision and has invited inputs from the citizens of the state. Thanal has submitted the outputs and key recommendations from the Climate Resilient Kerala workshop on behalf of the participating experts to the DoECC.

This second consultation in the Climate Resilient Kerala initiative will once again bring together experts, policymakers and governmental representatives to assess options and opportunities to integrate climate action and disaster risk reduction, particularly from the perspective of women and children in the Kerala Government's Nava Keralam Mission launched in November 2016. The initiative seeks to address problems faced in four key social sectors, namely, health, education, housing with focus on energy and water, with the help and involvement of local self-governments. Proposed date: January 12 2017, Thiruvananthapuram.

Organizers:
Thanal, Thiruvananthapuram, Kerala
UNICEF South Region, Tamil Nadu
Climate Action Network South Asia, New Delhi
PHIA Foundation, New Delhi
Partners:
Haritha Keralam Mission, Kerala
Suchitwa Mission, Kerala
Agency for Non-Conventional Energy and Rural Technology, Kerala

Annexure 6

Climate Resilient Kerala – roundtable 2

Integrating climate action and disaster risk reduction in Kerala's flagship missions

12 JANUARY 2017

Thiruvananthapuram, Kerala

AGENDA

Objectives:

1. Explore recommendations on integrating climate action and disaster risk reduction in the Nava Keralam mission of Kerala government.

2. Facilitate opportunities for inclusion of gender and child-centred approaches in Climate Resilient Kerala.

9.30 – 10.00 am	Registration
10.00 – 10.30 am	Opening remarks: Nava Keralam Mission – Vision and Status; Concerns and Challenges; Setting agenda for the workshop – CM/CS/HOM
10.30 – 10.45 am	Climate Resilient Kerala – Vision and Status; Results of the 1st CRK consultation; Setting agenda for the workshop – Thanal
10.45 – 11.00 am	Building capacity of four state governments and CSOs to make children and women-centred climate resilience policies and practices – CANSA
11.00 - 11.15 am	TEA BREAK
11.15 – 11.30 am	**Haritha Keralam** - Introduction and Status – Govt.
11. 30 – 12.00 pm	Expert discussion – Shaping State Missions and policies as action plans for climate resilient Kerala
12.00 - 12.15 pm	**Aardram** – Introduction and status – Govt.
12.15 – 1.00 pm	Expert discussion - Preparing Kerala's public health system to cope with rise in diseases caused by extreme weather events and for emergencies including floods, droughts, tsunamis, heat-waves and others.
1.00 PM – 2.00 PM	LUNCH
2.00 PM- 2.15 PM	**CERP**(Comprehensive Educational Rejuvenation Program)- Introduction and Status – Govt.
2.15 – 3.00 pm	Expert discussion
3.00 – 3.15 pm	**LIFE** – Introduction and Status
3.15 – 3.45 pm	Expert discussion
3. 45 – 4.00 pm	TEA BREAK
4.00 – 4.15 pm	Integrating women-child centric perspectives in State missions (UNICEF)
4.15 – 4.30 PM	Understanding the mitigation and adaptation potential of Mission projects to prepare proposals for National Adaptation Funds and/or GCF funding. Integrating adaptation response in State Missions (CANSA)
4.30 – 5.00 pm	Response: Chief Secretary's response to planning State Mission with a climate resilience perspective and the way forward
5.00- 5.15 pm	Concluding remarks and next steps. (THANAL)

Annexure 7

List of Participants – roundtable 2, 12 Jan 2017			
#	**Name**	**Organization**	**Phone**
1	Rejitha G	Sakhi, Thiruvananthapuram	9446274988
2	Renjith CS	Development Advisor to CM	9447038248
3	Sekhar Kuriakose	Member Secretary, SDMA	9446579222
4	Dr. Sreekala P.S.	Director, Kerala State Literacy Mission Authority	9497689809
5	Sreelatha	Addl. Director, Medical and Hospital Administration	
6	Dr. Thomas Isaac	Minister for Finance	
7	Usha Nair	Member AIWC	9968284746
8	Mr. V.S. Senthil IAS	Addl. Chief Secretary, Planning and Economic Affairs, Secretary Environment, Member secretary Planning Board	
9	Dr. V. Venu	Principal Secretary, Tourism, Tribal Development	
10	Dr. Vasuki IAS	Executive Director, Suchitwa Mission	
11	Mr. Vijayanand S.M.	Chief Secretary	
12	Dr. Anish T.S	Dept of Community Medicine, Medical College, Trivandrum	9946039211
13	Bindu Mohan	Dy. Director, Medical and Hospital Administration	9447343238
14	George Chackacherry	Director ICCS	9446404780
15	Jagadeesh	Dy. Director Planning, Health Services	9447124413
16	Mridul Eapen	Member, Stat Planning Board	9846009557
17	Babu Arun	A&C Consultant, UNICEF	9446316690
18	Abhijit Asokan	PG Student, Kerala Agricultural University	8943465717
19	Sahana Sridhar Hegde	Teaching Assistant ACCER, Kerala Agricultural University	9482015011
20	Abdul Niyas P.A.	Teaching Assistant ACCER, Kerala Agricultural University	9995821421
21	Dr. Sunil K Mukundan	Asst Professor, Kerala Agricultural University	9744213336
22	Dr. Preetha N	Kerala Biodiversity Board	9746819305
23	P. Michael Vetha Siromany	MD. Marketfed	9496116111
24	N. Vinod Chandra Menon	CANSA	9810111328
25	Joe George	State Project Officer, GOI UNDP	9947756700
26	P. Valsaraj	Director Technical	9447275863
27	Pradeep P.	Sr. Supt. Social Justice Dept	9495627069
28	Sundarie	Asst. Director, Social Justice Dept	9447533690
29	Ajith Kumar R.	Activist	9447103667
30	Team Thanal		
31	Team CANSA		

Annexure 8
Photo Gallery – Roundtable 2

6. Acknowledgements

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Special thanks to:

1. Haritha Kerala Mission
2. Kerala Suchitwa Mission
3. UNICEF India
4. CANSA
5. PHIA
6. Development Alternatives
7. PAN-India