ANNEXURE

Climate Change and Environment Action Plan of Pune District

Prepared by:

VASUDHA FOUNDATION
Green ways for a good earth!

Supported by:

SHAKTI
SUSTAINABLE ENERGY FOUNDATION

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Annexure A

Annexure to background

It is crucial to further deepen the process of integrating climate change actions into the developmental planning and programme implementation processes, going beyond the state and directly involving the districts. This is required in order to promote a bottom-up approach in addressing climate change concerns, especially mitigation, into ongoing schemes, policies and programmes at the district level, which is where most of the government's ongoing initiatives and priorities integrate and converge. With SAPCCs being revised, district specific climate action plans will ensure the much-needed directional shift at the district level administration while taking the Nationally Determined Contribution (NDCs) and Sustainable Development Goals (SDGs) forward.

In this context, Vasudha Foundation initiated the project, to develop Climate Change and Environment Action Plan (CCEAP) for multiple districts of India with support from Shakti Sustainable Energy Foundation. The key objectives of the CCEAP are:

- To facilitate a bottom-up approach for climate planning
- Identify local level climate change drivers and sectoral mitigation potential
- Identify & propose recommendations for sectors to enhance climate action as well as for local environmental concerns
- Enhance climate accountability of district level administration

The major components, deliverables, and SDG linkages are summarized in the following table:

<table>
<tr><th>Major Components</th><th>Major Deliverables</th><th>Addressing SDG</th></tr>
<tr><td>District and Climate Profile</td><td>● Information on demography, administration, land-use etc.
● District profile including: power sector, industry, habitat, agriculture and other natural resources, waste etc
● Observed climate variability
● Climate change projections (RCP 4.5 & RCP 8.5: till end of century, in time slices of 2030, 2050, 2070 & 2100)</td><td rowspan="4">The proposed study and action plans directly address at least seven following SDGs at district level:

● SDG 2: Zero Hunger (Target 2.1, 2.3, 2.4)

● SDG 6: Clean Water & Sanitation

● SDG 7: Affordable & Clean Energy

● SDG 8: Decent Work & Economic Growth

● SDG 9: Industry, Innovation & Infrastructure
● SDG 11: Sustainable Cities & Communities</td></tr>
<tr><td>District GHG profile and trend analysis</td><td>● Climate change direct drivers: Source based emission estimations from the sectors of Energy, AFOLU & Waste since 2005 to latest year (using IPCC methodology and as per data availability) and Projections till 2030 – BAU
● Carbon footprint of electricity consumption trends and Projections – BAU</td></tr>
<tr><td>Policy Impact Evaluation</td><td>● Climate (GHG) impact evaluation of sector specific policies/schemes/rules (Energy, AFOLU, Waste, Cross-cutting) on the basis of year-on-year target (indicators) achieved</td></tr>
<tr><td>Budgetary Allocation Analysis</td><td>● Analysis of budget: district budget (where available) & flagship schemes, to identify allocation for climate action (both mitigation & resilience) using CPEIR methodology</td></tr>
</table>

Major Components	Major Deliverables	Addressing SDG
Recommendations	● District specific sectoral recommendations based on the findings of emission profile and situation and policy analysis ● Indicating a timeline (to achieve the recommendations), identifying schemes/ programs and departments/agencies for implementation of proposed measures and linking with SDGs ● Recommendations on district specific concerns, ● Individual climate action and suggesting Behavioural change communication techniques ● Proposed monitoring & evaluation plan and an institutional set-up	● SDG 12: Responsible Consumption & Production ● SDG 13: Climate Action ● SDG 17: Partnerships for the Goals
Impacts of COVID 19	● Changes in electricity and fuel consumption pattern, waste generation & management, migration behaviour, etc. ● Pre and during first lockdown comparative study of air pollution	

Annexure 1

District Profile

1.1. List of existing industrial areas in Pune district

S. No.	Name of industrial area	Land acquired (ha)	Land developed (ha)	Number of plots	Number of allotted plots
1	Pimpri	1,124	1,224	2,570	2,537
2	Chakan	961.98	961.98	185	185
3	Talegaon	557.81	557.81	28	27
4	Ranjangaon	925.00	925.00	470	331
5	Jejuri	144.53	144.53	224	212
6	Baramati	752.48	752.48	1,165	1,131
7	Bhicwan	379.94	379.94	8	8
8	Pandhari	282.29	282.29	55	52
9	Kurkumbh	473.22	472.22	177	172
10	Indapur	406.54	406.54	68	30

Source: (MSME Development Institute, 2016-17)

There are also 6 co-operative industrial areas in the district spread over an area of 154.37 ha with 279 working industries and 3,300 workers.

1.2. Details of MSME units by industry type in Pune district

NIC code	Types of Industries	Number of Units	Investment (Rs lakh)	Employment
20	Agro based (food products)	1,409	19,040	10,866
22	Soda water			
23	Cotton textile	62	1,203	369
24	Woollen, silk & artificial thread-based clothes			
25	Jute & jute based	Nil	Nil	Nil
26	Ready-made garments & embroidery	487	4,958	2,459
27	Wood/wooden based furniture	357	6,242	2,485
28	Paper & paper products	332	7,226	2,596
29	Leather based	454	5,448	2,532
30	Chemical/chemical based	835	11,316	4,401
31	Rubber, plastic & petro based	1,398	21,325	8,272
32	Mineral based	802	17,254	5,684
33	Metal based (steel fabrication)	1,867	35,248	12,477
35	Engineering units	1,320	44,826	12,641
36	Electrical machinery and transport equipment	393	2,976	2,630
97	Repairing & servicing	571	3,697	2,531
01	Others	542	4,266	2,782
	Total	**13,529**	**1,85,025**	**72,725**

1.3. Estimation of emissions from electricity consumption by industry & agriculture sector

	A	B	C	D	E	F
Sector	Electricity Consumption (EC) in 2018 (in Million units)	% Electricity that comes from coal (based on State electricity mix)	EC that can be attributed to coal (in Million units)	Grid Emission Factor (National avg.) in kg of CO_2/kWh	Emissions (Mt of CO_2 e)	Emissions (tonnes of CO_2e)
			C = (A x B) /100		E = (C x D)/10^3	F = E x 10^6
Industry	364.69	79.78	290.95	0.86	0.25	2,50,216.73
Agriculture	651.18		519.51		0.45	4,46,779.81

1.4. Livestock Population by categories of Pune District

Livestock Category	Population (in 2012)
Cattles	7,63,261
Buffaloes	2,94,171
Camels	30
Sheep	3,03,909
Goats	3,94,723
Horses	5,413
Donkeys and Mules	1,754
Dogs	1,00,481
Pigs	9,505
Rabbit	290
Poultry	1,85,57,452

Source: (MoAFW, 2020)

Annexure 2

Climate Profile and Projections

2.1 Background Note

Global warming has significant impacts on the changes in extreme weather and climate events. The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) confirms that the increasing anthropogenic greenhouse gas (GHG) concentrations which are responsible for the unusual warming of the planet in recent decades, cause the frequent high intensity temperature/precipitation extremes with prolonged duration affecting the living and working environments. These changes are reported to have an impact on the social and economic sectors of the society (IPCC 2013). Numerous studies highlighted the increase of temperature and precipitation extremes with high regional variations across the globe. The recent decade has witnessed a high number of extreme precipitation events such as floods/droughts in different parts of the world. Though there is a decrease in annual precipitation, heavy/extreme precipitation events have increased substantially in many regions of the world.

High-resolution modelling or downscaling of general circulation models (GCMs) to higher resolution is essential to obtain the future extremes and their variability under global warming. A key advantage of high-resolution regional climate simulations is their demonstrated capability of showing the mean as well as extreme temperature and precipitation events. In this report, the daily rainfall and minimum and maximum temperature from National Aeronautics and Space Administration (NASA) Earth Exchange Global Daily Downscaled Projections (NEX-GDDP, Thrasher et al. 2012) dataset has been evaluated with India Meteorological Department (IMD) high-resolution daily gridded rainfall data (0.25^{o} x 0.25^{o} , Pai et al. 2015) and daily gridded maximum and minimum temperature data (1^{o} x 1^{o} , Srivastava et al 2014) for the period 1976–2005 and the possible future changes in mean and various indices of extreme temperature and precipitation have been examined under two emission scenarios RCP4.5 and RCP8.5. The analysis is focused on the distribution of temperature and precipitation changes for baseline period and its future scenarios for 2030s (2021-2050), 2050s (2041-2060),2070s (2061-2080) and 2090s (2081-2100). It will help policy makers to quantify the potential impacts of extreme events and enable the formulate appropriate adaptation strategies.

2.2 Data Source and Methodology

The NEX-GDDP datasets (0.25° × 0.25° long/lat) covering the entire globe, bias corrected, high-resolution statistically downscaled product, derived from 20 general circulation models (GCMs), under the coupled model inter-comparison project phase 5 (CMIP5), and across two greenhouse gas emissions scenarios of RCP4.5 and RCP8.5 have been used in this analysis. This dataset is mainly generated by using the bias-correction spatial disaggregation (BCSD) method (Wood et al. 2004; Thrasher et al. 2012). These NEX- GDDP datasets include downscaled projections for precipitation and minimum and maximum surface air temperature for the 20 models (Table 4). The present-day simulations are for the period 1950 to 2005 for each experiment, and future projections from 2006 to 2100 for two scenarios RCP4.5 (mid-range emissions) and RCP8.5 (high-end emissions).[1]

The NEX-GDDP dataset helps to carry out studies on the aspects of climate change and their impacts at local to regional scales. In this present work, we have used the multi-model mean (MMM) approach to investigate the comparison between observational dataset (IMD) and of the NEX-GDDP simulations in the baseline period. The advantage of using the MMM is that it usually outperforms any individual model and averages out internal variability.

The present study investigates the projected changes in mean and extreme temperature and precipitation events over south peninsular India for different time slices with reference to baseline period (1976–2005). The projected changes in precipitation extremes, such as rainy days (a day with precipitation more than 2.5 mm) and the temperature extremes such as warm days (correspond to cases when the maximum temperature exceeds the 90th percentile) and cold days (correspond to cases when the minimum temperature exceeds the 10th percentile) have been analyzed using these high-resolution datasets.

The observed data was analyzed (over the past 68 years) to study current climate variability over six districts. Precipitation, maximum, and minimum temperature data sets are used as the key climate variables in this analysis.

Table 1: GCMs of NEX-GDDP dataset[2]

Modelling Centre (or Group)	**Institute ID**	**Model Name**
Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology (BOM), Australia	CSIRO-BOM	ACCESS1.0
Beijing Climate Center, China Meteorological Administration	BCC	BCC-CSM1.1
Beijing Normal University	BNU	BNU-ESM
Canadian Centre for Climate Modelling and Analysis	CCCMA	CanESM2
National Center for Atmospheric Research	NCAR	CCSM4
National Center for Atmospheric Research	NCAR	CESM1/CAM5

[1] NASA Centre for Climate Simulation: https://www.nccs.nasa.gov/services/climate-data-services

[2] Thrasher et. al. (2012). Hydrol. Earth Syst. Sci. .,https://hess.copernicus.org/articles/16/3309/2012/

Modelling Centre (or Group)	Institute ID	Model Name
Centre National de Recherches Meteorologiques / Centre Europeen de Recherche et Formation Avancees en Calcul Scientifique	CNRM-CERFACS	CNRM-CM5
Commonwealth Scientific and Industrial Research Organization in collaboration with Queensland Climate Change Centre of Excellence	CSIRO-QCCCE	CSIRO-Mk3.6.0
NOAA Geophysical Fluid Dynamics Laboratory	NOAA GFDL	GFDL-ESM2G GFDL-ESM2M
Institute for Numerical Mathematics	INM	INM-CM4
Institut Pierre-Simon Laplace	IPSL	IPSL-CM5A-LR IPSL-CM5A-MR
Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies	MIROC	MIROC-ESM MIROC-ESM-CHEM
Atmosphere and Ocean Research Institute (The University of Tokyo), National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology	MIROC	MIROC5
Max Planck Institute for Meteorology	MPI-M	MPI-ESM-LR MPI-ESM-MR
Meteorological Research Institute	MRI	MRI-CGCM3
Norwegian Climate Centre	NCC	NorESM1-M

Annexure 3

Climate Change Drivers

3.1 About Greenhouse Gas Emissions Inventorization

An emissions inventory that identifies and quantifies a region's primary anthropogenic sources and sinks of greenhouse gases (GHGs) is essential; it is the first step in planning the mitigation and adaptation mechanisms for climate action of that region. In order to present the baseline scenario and trends in emissions of Pune district, an inventory of GHGs covering all the major emission sources and sinks has been prepared. This exercise not only helps to identify the climate change drivers but also the mitigation potential of each sector/category. This comprehensive inventory would be beneficial for the district in the following ways:

- Decision makers will get insights to create strategies and policies for emission reductions and to track the progress of those policies
- Regulatory agencies and corporations can use the inventory to establish compliance records with allowable emission levels
- Research institutes and local universities can develop future projections/emission models using this data set
- Businesses, public and other interest groups/stakeholders can use the inventory to better understand the sources and trends in emissions

This section of the Action Plan estimates GHG emissions for Pune district using the guidelines laid down by the Intergovernmental Panel on Climate Change (IPCC). Estimates have been done for 12 categories covering three major sectors: Energy, Agriculture, Forestry and Other Land Use (AFOLU), and Waste for the years 2005 to 2019[3]. Pune has some large-scale industries that fall under the listed Industrial Processes and Product Use (IPPU) industry categories of the IPCC Guidelines. However, due to lack of data, they have not been included in this report. However, the energy used in industries and the corresponding emissions are reported in the energy sector.

The quality and credibility of GHG inventories rely on the integrity of the methodologies used, the completeness of reporting, and the procedures for compilation of data. As followed at the national level for preparing National Communications (NATCOMs) and Biennial Update Reports (BURs), this project has also adopted the Guidelines for National Greenhouse Gas Inventories laid down by the Intergovernmental Panel on Climate Change (IPCC). Mostly, the 2006 IPCC Guidelines were followed, and for a very few categories the 1996 IPCC guidelines were referred to. Attempts were made to estimate emissions with higher tiers (from the methodological hierarchy given in the three-tier approach of IPCC Guidelines). Furthermore, wherever possible country specific emission factors (from the two NATCOMs, INCCA Report and the two BURs)[4] were used in place of default emission factors. To understand the regional dynamics and to make appropriate methodological assumptions in absence of specific activity data/inputs, sectoral expert inputs as well as the work of Greenhouse Gas Platform India (GHGPI) and its sectoral methodology notes were also referred.

3.2 Sources of Activity Data Used in Pune's GHG Emissions Inventory

The activity data was sourced from government approved data sets for all the sectors. Emission category wise sources of activity data is listed in the following table.

Sector	Category	Source of Activity Data
Energy	Transport	Petroleum Planning & Analysis Cell (PPAC)
	Manufacturing Industries	
	Residential	
	Agriculture	
	Commercial	
Agriculture, Forestry and Other Land Use (AFOLU)	Crop Residue Burning	APY Statistics from Farmers' Welfare and Agricultural Development Department, Government of Maharashtra
	Urea Fertilization	Fertilizer Association of India
	Enteric Fermentation	Livestock Census of India-19th (2012); 18th (2007); and 17th (2003)
	Forest Removals	State of Forest Report-2019; 2017; 2015; 2013; 2011; 2009; 2005; 2003 by Forest Survey of India
Waste	Municipal Solid Waste	Census Data, MPCB Annual Reports, IMC, CPCB
	Domestic Wastewater	
Carbon Footprint of Electricity Consumption	Carbon Footprint of Electricity Consumption	Maharashtra Electricity Regulatory Commission

3 2017, 2018, 2019 emissions are estimated by applying CAGR on the latest possible GHG estimates for each category.

4 India's First National Communication to the UNFCCC, 2004; India's Second National Communication to the UNFCCC, 2012; Indian Network for Climate Change Assessment - INCCA's 2010 Report 'India: Greenhouse Gas Emissions 2007'; India's First Biennial Update Report to the UNFCCC, 2016; and India's Second Biennial Update Report to the UNFCCC, 2018

Annexure 4

Policy Impact Evaluation from a Lens of Climate Change

4.1 Climate Impact Evaluation of Policies/Programmes in Energy Sector

Policy/Scheme	Indicators	Calculation methodology	Emissions avoided/mitigated	Information gaps
State Renewable Energy Policy, 2020 **Policy for Grid-connected Solar projects** **Off-grid Policy, 2020**	**Solar** Power Installed capacity during the policy period.	GHG emissions mitigated between = ∑Installed capacity of solar ground/rooftop in the year of interest x Number of light days[5] x Hours of operation per day[6] x Plant load factor of the solar plant[7] × All India grid emission factor (Net) in the year of interest[8]	**3,44,000 t CO_2** emissions were mitigated between 2017 and 2019.	Electricity generation data from the plants is not available. Emissions have been estimated from the installed capacity.
State Renewable Energy Policy, 2020 **Grid-connected Wind power policy**	**Wind** Power Installed capacity during the policy period	GHG emissions mitigated = Installed capacity of wind ground/rooftop in the year of interest x Number of operational days[9] x Hours of operation per day[10] x Plant Load factor of the solar plant[11] × All India grid emission factor	**4,90,000 tCO_2e** emissions are avoided by wind energy plants	Electricity generation data from the plants is not available. Emissions have been estimated from the installed capacity.

[5] Number of light days considered for Solar energy, per year= 300
[6] Number of hours of operation per day= 24 hours
[7] PLF for Solar =17%
[8] All India Grid Emission factor = 0.86 kg/kWh
[9] Number of operational days considered for Wind energy, per year= 300
[10] Number of hours of operation per day= 24 hours
[11] PLF for Wind Plants =20.88%

Policy/Scheme	Indicators	Calculation methodology	Emissions avoided/mitigated	Information gaps
		(Net) in the year of interest[12]		
State Renewable Energy Policy, 2020 **Policy for Grid-connected Solar projects** **Grid-connected Wind power policy**	Solar + Wind Power Installed capacity during the policy period	GHG emissions mitigated between = ∑ Installed capacity of solar ground/rooftop in the year of interest x Number of light days[13] x Hours of operation per day[14] x Plant Load factor of the solar plant[15] × All India grid emission factor (Net) in the year of interest[16] + Installed capacity of wind ground/rooftop in the year of interest x Number of operational days[17] x Hours of operation per day[18] x Plant Load factor of the solar plant[19] × All India grid emission factor (Net) in the year of interest	**3400 tCO_2e** emissions are avoided by solar and wind hybrid plants	Electricity generation data from the plants is not available. Emissions have been estimated from the installed capacity.

[12] All India Grid Emission factor = 0.86 kg/kWh

[13] Number of light days considered for Solar energy, per year= 300

[14] Number of hours of operation per day= 24 hours

[15] PLF for Solar =17%

[16] All India Grid Emission factor = 0.86 kg/kWh

[17] Number of operational days considered for Wind energy, per year= 300

[18] Number of hours of operation per day= 24 hours

[19] PLF for Wind Plants =20.88%

Policy/Scheme	Indicators	Calculation methodology	Emissions avoided/mitigated	Information gaps
UJALA Scheme, 2015	Number of LED Bulbs, tube-lights and energy efficient fans distributed in the district during the period.	GHG emissions avoided = No. of LED bulbs sold in the year of interest × Difference in Wattage between incandescent and LED bulbs[20] × Annual hours of usage[21] x Net Grid emission factor	Total CO_2 Emissions avoided = **3,35,393 tCO_2e**	Year on Year data since the inception of Scheme
Streetlight National Programme (SLNP)	Number of LED street Bulbs installed in the district during the period.	GHG emissions avoided = No. of LED bulbs installed in the year of interest × Difference in Wattage between sodium vapor and LED bulbs[22]× Annual hours of usage[23] x Net Grid emission factor	Total CO_2 Emissions avoided= **44,631 tCO_2e**	Year on Year data since the inception of Scheme
Integrated Power Development Scheme (IPDS)/Restructured Accelerated Power Development and Reforms Programme (R-APDRP) / UDAY Scheme, 2015	T&D Loss during the policy period.	GHG emissions avoided= $\sum_{2015\text{-}2019}$ Electricity generation avoided with Transmission & Distribution (T & D) loss improvement w.r.t previous year × All India grid emission factor (net) in the year of interest	Total emissions avoided = **37,67,600 tCO_2e**	The DISCOM serves districts other than Pune as well, and the information available is for the overall distribution. Electricity share for Pune is required

[20] Wattage of an incandescent bulb= 60W; Wattage of an LED bulb= 9W

[21] Annual Hours of usage= 10 x 365= 3650 hours

[22] Wattage of a sodium vapor lamp= 150W to 250 W (200 W average is being used); Wattage of an LED street lamp = 70 W

[23] Annual Hours of usage= 12 x 365 = 4380 hours

Policy/Scheme	Indicators	Calculation methodology	Emissions avoided/mitigated	Information gaps
PAT (Perform, Achieve and Trade) Scheme	AT&C Loss reduction during the policy period (for DISCOMS) Reduction in specific energy consumption (for other industries)	(For industries) GHG emissions avoided = (Specific energy consumption (TOE) during the base year of PAT cycle-Specific energy consumption (TOE) during the assessment year of PAT cycle) x (Product output (Tonnes) x Conversion factor[24] (TOE to MtCO2)	Total emissions avoided in the district through PAT Scheme = **18,100 tCO_2e**	The DISCOM serves districts other than Pune as well, and the information available is for the overall distribution. Energy share for Pune is required
BRTS Pune	Number of people shifting from private mode of transport to public transportation service.	GHG Emissions avoided = (Population × Trips × Modal share before implementation of BRTS × $EF^{25}_{i,j}$) - (Population × Trips × Modal share after implementation BRTS × $EF_{i,j}$) **Sample calculation in Annexure*	**4,65,000 tCO_2e** of GHG emissions were avoided between 2013 and 2018.	Annual utilization factor of vehicles is required for the particular region. Latest Modal share of transport is also required.

[24] 1 TOE = 11630 kWh (As per International Energy Agency)

[25] Emission factor $EF_{(I,j)}$, where, i = fuel category and j= vehicle category

4.2 Climate impact analysis of policies/programmes for agriculture, forestry and other land use (AFOLU) sector

Policy Name	Indicators	Calculation Methodology	Emissions Mitigated/ Added	Information gap, if any
Diversion of forests for non-forest purpose under the Forest Conservation Act, 1980	Loss of carbon sink due to reduction in forest area	Loss in carbon sink= Area diverted*carbon stock density*44/12	Total emissions avoided from three forestry policies considered here: **13,72,638 tonnes CO_2e**	Diversion of forests in non-forest purposes (in ha)
Wildlife Protection Act, 1972	Maintenance of CO_2 removals capacity of the terrestrial ecosystem	Add. to C-sink (tCO_2e.) = Area covered *carbon stock density*(-44/12)		None
Maharashtra State Forest Policy	Maintenance/removal of CO_2 sink capacity of the total forest area of the Maharashtra state	Addition/removal to C-sink (tCO_2e.) = Change in forest area *carbon stock density*(-44/12)		None
Social Forestry Scheme	Increase tree cover outside forest area	CO_2e sequestered = area converted*carbon stock density*-44/12	Calculations could not be done due to data gap	None
National Agroforestry Policy, 2014	Expansion of tree plantation in complementarity and in integrated manner with crops. Improved resilient cropping and farming systems to minimise the risk during extreme climatic events.	Increase in tree cover and computation of corresponding CO_2 sequestration	Calculations could not be done due to data gap	Type of species planted or total area covered under plantation

Policy Name	Indicators	Calculation Methodology	Emissions Mitigated/ Added	Information gap, if any
Cattle and Buffalo Development Programme	Improved productivity of cross-bred cattle is likely to reduce or keep the emissions constant Assumption: Total number of indigenous and crossbred cattle have been attributed to this policy from the year 2000	• Enteric fermentation emissions= No. of additional indigenous cattle require to produce total milk from indigenous and crossbreed*EF*21 • Manure management emissions= No. of additional indigenous cattle require to produce total milk from indigenous and crossbreed*EF*31 • Total emissions avoided= Emissions from additional indigenous cattle- Emissions from crossbred cattle	Total emissions avoided **11,819.71 tonnes CO_2e**	None
Feed and Fodder Development Programme	Reduction in CH_4 emission during Enteric Fermentation in Livestock	Tier-III methodology to estimate emissions from enteric fermentation (from IPCC 2006 Guidelines)	Calculations could not be done due to data gap	1. Quantity of feed additives added to the fodder 2. Quantity of Green fodder provided to the animals 3. Details of the target population 4. Improved emission factors due to better feed intake

Policy Name	Indicators	Calculation Methodology	Emissions Mitigated/ Added	Information gap, if any
				In our opinion these gaps in information need to be plugged.
Soil Health Card Scheme	Improve the nutrient proportion of the soil in order to reduce the usage of the fertilizers	Emissions avoided= Reduction in fertilizer use (kg) *emission factor	Calculations could not be done due to data gap	The specific data inputs that are required to make such a judgment include, in our opinion: 1. Actual Area covered under the scheme 2. Actual Reduction in the fertilizer usage due to the scheme
National Food Security Mission	Impact on GHG emissions from the cultivation of food crops 1. Increase in N_2O emissions due to increase in nitrogen fixing (pulses) crop production 2. Change in CO_2 Emissions due to crop residue burning and use of urea.	● Emissions from nitrogen fixing crops ● Crop residue burning emissions ● Emissions from urea used in the fields	Calculations could not be done due to data gap	-Percentage of wheat and pulses production that can be attributed to NFSM. -Amount of urea used in wheat & pulses
Soil and Moisture Conservation	Enhancing the land productivity and increasing the soil	Emissions estimations based on crop yield and reduction of energy for irrigation	Calculations could not be done due to data gap	If any quantifiable results were observed in

Policy Name	Indicators	Calculation Methodology	Emissions Mitigated/ Added	Information gap, if any
	moisture availability for a longer period.			crop yield or enhancement of green spaces.

4.3 Climate impact analysis of policies/programmes for cross-cutting sector: Agriculture and energy

Policy Name	Indicators	Calculation Methodology	Emissions Mitigated/Avoided/Added	Information gap, if any
National Mission on Micro Irrigation	Enhancement of the water use efficiency in a sustainable manner with decline in the use of fertilizers and electricity	Total emissions avoided (tCO_2e) = scenario if micro irrigation (MI) is not in place (total urea consumption in 1 ha of land*area*EF*44/12) - Scenario if MI is in place (28% of urea saved*area*EF*44/12)	**914.45 tonnes CO_2e** avoided (due to decrease in use of fertilizer)	None
Pradhan Mantri Ujjwala Yojana	Reduction in CO_2 removals and improve the health of women and children[26]	Total sequestration (tCO_2e) = {new LPG connections in Pune district (i.e., no. of households) * forest area saved by one household due to reduction in fuel wood consumption*carbon stock density*(-44/12)} – {standard weight of one connection*assuming each connection books 2 LPG cylinders per year *LPG NCV*CO_2 EF}	Total emissions avoided = **12,14,393 tonnes CO_2e**	None

[26] Limitation: We don't know what number of LPG connections actually replaced fuelwood use. Currently it is assumed that 20% of new connections replace fuelwood as the population of rural areas in Pune is 20% of the total population. It has also been assumed that each connection uses two LPG cylinders per year.

4.4 Climate impact analysis of policies/programmes for waste sector

Policy/scheme	Indicators	Emission estimation methodology	Emissions added/avoided/mitigate	Information gaps
Sanitation				
Total Sanitation Campaign (*Completed: 1999-2012)*	Number of household and community/school latrines constructed	F1. Total organic waste (TOW) = (Population*BOD) *0.001*I*365; F2. CH_4= (TOW-S-R) *EF Considering assumptions A1-A5 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of **+30,027 tCO_2e** for 6,18,473 IHHL latrines and **+2,01,865 tCO_2e** for 15,808 community/school latrines between 2006 to 2012. Emission reduction by baseline: IHHL: 43% Community latrines: 8.7%	1. Data not available at public domain from 1999 to 2005 2. District level data not available.
Nirmal Bharat Abhiyan or Clean India Campaign (C*ompleted: 2012-2014)*	Number of households and community/school latrines constructed	F1. Total organic waste (TOW) = (Population*BOD) *0.001*I*365; F2. CH_4= (TOW-S-R) *EF Considering assumptions A2-A6 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of **+1,953 tCO_2e** for 40,219 IHHL latrines and +**7,984 tCO_2e** for 625 community/school latrines between 2012 to 2014. Emission reduction by baseline: IHHL: 43% Community latrines: 8.7%	District-level data not available.
Swachh Bharat Mission Urban *(Ongoing: 2014 - till date)*	Number of households, community and public toilets constructed	F1. Total organic waste (TOW) = (Population*BOD) *0.001*I*365; F2. CH_4= (TOW-S-R) *EF Considering assumptions A2-A5 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of **+2,962 tCO_2e** for 61,002 IHHL latrines and **+1,85,241** tCO_2e for 14,506 community/school latrines between 2014 to 2019/20. Emission reduction by baseline: IHHL: 43% Community latrines: 8.7%	District-level data not available.

Policy/scheme	Indicators	Emission estimation methodology	Emissions added/avoided/mitigate	Information gaps
Integrated Low-Cost Sanitation Scheme (ILCS) ***(Completed: 1960-2014) with revision from 2008)***	Number of household toilets constructed and converted from dry latrines	F1. Total organic waste (TOW) = (Population*BOD) *0.001*I*365; F2. CH_4= (TOW-S-R) *EF Considering assumptions A2-A5 & A7 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of **+238 tCO_2e** for 4,911 IHHL latrines between 2009 to 2014. Emission reduction by baseline: IHHL: 43%	1. Only country level cumulative data available for 1960 to 2008 (28 lakh latrines constructed) 2. District level data not available.
Swachh Bharat Mission Rural ***(Ongoing: 2014 - till date)***	Number of household toilets constructed	F1. Total organic waste (TOW) = (Population*BOD) *0.001*I*365; F2. CH_4= (TOW-S-R) *EF Considering assumptions A2-A4 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of +**30,861 tCO_2e** for 6,35,650 IHHL latrines between 2014-2019/20. Emission reduction by baseline: IHHL: 43%	No data gap
Pradhan Mantri Awas Yojana (*Ongoing: 2014 - till date)*	Number of houses constructed (households essentially include toilet facility)	F1. Total organic waste (TOW) = (Population*BOD) *0.001*I*365; F2. CH_4= (TOW-S-R) *EF Considering assumptions A2-A4 & A8 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of +**17,460 tCO_2e** for 44,644 IHHL latrines between 2014-2019/20. Emission reduction by baseline: IHHL: 8.7%	No data gap

Policy/scheme	Indicators	Emission estimation methodology	Emissions added/avoided/mitigate	Information gaps
		Waste Management		
Solid Waste Management Rules, 2016 and Amendment, 2018 **- Integrated Solid Waste Management Projects (ISWM)** **- Pune Smart and Sustainable City Development Corporation**	• Collection, segregation, storage, transportation, processing and disposal of municipal solid waste (MSW) • Amount of biodegradable waste processed through composting/vermi-composting	F4. CH_4 emissions from biological treatment = $\Sigma_i(M_i \times EF_i) \times 10^{-3} - R$ Considering Assumptions A12-A13 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of **-38,727 tCO_2e** was avoided due to 2,21,409 tonnes of MSW treated biologically through composting.	No scheme-wise data available.
Bio-medical Waste Management Rules, 2016 and Amendment, 2018	Bio-medical waste segregation, storage, collection, transport and disposal Amount of BMW (yellow waste) incinerated (captive treatment & CBWTF)	F5. CO_2 emission for the total amount of waste combusted = $\Sigma_i(SW_i \times dm_i \times CFi \times FCF_i \times OF_i) \times 44/12$ Considering assumption A14 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission of **1,419 tCO_2e** for 2,480 tonnes of BMW treated by incineration	No data gap post 2016
Hazardous & Other Wastes (Management and Transboundary Movement) Rules 2016	Amount of hazardous waste disposed by incineration as part of hazardous waste treatment processes	Formula F5 (where, I = hazardous waste)	Annual average GHG emission of **21,212 tCO_2e** for 25,712 tonnes of hazardous waste incineration at Pune TSDF (Treatment, Storage & Disposal facility)	There is no data available for TSDFs receiving district-wise hazardous waste

Policy/scheme	Indicators	Emission estimation methodology	Emissions added/avoided/mitigate	Information gaps
Wastewater: Domestic and industrial				
National River Conservation Plan	Number of STPs constructed to reduce river pollution load	F3. Total organic waste, TOW (kg of BOD per year) = BOD*0.001*I*365; F2. Annual tCH_4 emissions = (TOW-S-R) *EF, Considering assumptions A9-A11 (See annexure 4.4.1 and 4.4.2)	Annual average GHG emission 2004-2015: **+25,673.62 tCO_2e** for 85 MLD STP capacities 2003-2015: **+51,347 tCO_2e** for 170 MLD STP capacities 2009-2015: **+29,298 tCO_2e** for 97 MLD STP capacities 2012-2015: **+24,465.45 tCO_2e** for 81 MLD STP capacities 1987-2015: **+4,832.68 tCO_2e** for 16 MLD STP capacity 2000-2015: **+13,893.96 tCO_2e** for 46 MLD STP capacity 2008-2015: **+9,061.28 tCO_2e** for 30 MLD STP capacity 1999-2015: **+12,082 tCO_2e** for 40 MLD STP capacity 2010-2015: **+21,143 tCO_2e** for 70 MLD STP capacity 2001-2015: **+4,530.64 tCO_2e** for 15 MLD STP capacity 2007-2015: **+6,041 tCO_2e** for 20 MLD STP capacity 2011-2015: **+9,061 tCO_2e** for 30 MLD STP capacity Emission reduction by baseline: 11.55 percent	Scheme/Policy wise data not available
Jawaharlal Nehru National Urban Renewal Mission on Urban Infrastructure and Governance	No. of STPs created for integrated development of infrastructural services in the cities	F3. Total organic waste, TOW (kg of BOD per year) = BOD*0.001*I*365; F2. Annual tCH_4 emissions = (TOW-S-R) *EF, Considering assumptions A9-A11 (See annexure 4.4.1 and 4.4.2)		

Policy/scheme	Indicators	Emission estimation methodology	Emissions added/avoided/mitigate	Information gaps
Atal Mission for Rejuvenation and Urban Transformation (AMRUT) (*Ongoing: 2015-till date*)	No. of STPs constructed for sewerage and septage management	Formula F3 & F2	No data available	Pune is a mission city but no data available separately for STPs built under this mission
Common Effluent Treatment Plant (CETP) for medium & small-scale industries	Industry category wise wastewater treated in different CETPs	-	No data available	Industry category wise wastewater generation & treatment details not available but have the potential to improve database availability
Online Monitoring of Industrial Emission & Effluent (OCEMS)	Industry category wise wastewater treated		No data available	No data available in the public domain but this system hosted by CPCB has the potential to provide industry category wise wastewater generation, treatment and discharge information

4.4.1. List of assumptions for policy impact evaluation of the waste sector

Assumption No.	Assumptions
A1	Impact estimated for 2006-2012 wherein activity data available
A2	All new IHHLs constructed are operational and in use
A3	IHHL constructed are of two-pit pour flush type and community latrine are of septic tank type.
A4	Baseline: In the absence of IHHLs the wastewater is assumed to be discharged in water bodies (43.3%) and land (56.7%) as sourced for Maharashtra
A5	No. of latrines constructed in the district were determined @ of %household share of districts to that of the state.
A6	Impact estimated for 2012-2014
A7	Impact estimated for 2009-2014
A8	IHHL constructed are of septic tank type
A9	Impact estimated for all STPs constructed and operational between 1959 to 2015 wherein aggregate activity data is available for across schemes as an STP inventory as reported

Assumption No.	Assumptions
A10	Wastewater treated in aerobic system is considered to be 'not well managed/over loaded'
A11	In the absence of STPs installed the untreated wastewater is assumed to be discharged in water bodies (43.3%) and land (56.7%) as applicable for Maharashtra
A12	Impact emission estimated for 2018 wherein the most recent data available for organic waste treatment
A13	Considered as a policy impact of SWM Rules 2016 for activities implemented across schemes/projects
A14	Impact emission estimated for 2017 wherein the most recent data available for hospital waste treatment by incineration
A15	Impact emission estimated for 2018-2019 wherein the most recent data available for hazardous waste incineration

4.4.2. Extension of Formula F1 to F5 in the policy impact evaluation of waste sector

Extension of Formula-F1	*Population is the total number of toilet users per day, BOD per capita per day and I is the correction factor for additional industrial BOD discharged into sewers*
Extension of Formula-F2	*S = Organic component removed as sludge and R = Amount of CH_4 recovered, in the estimation year and EF = Emission Factor*
Extension of Formula-F3	*BOD = Capacity of STP (MLD)*10^6 (conversion to L) *198 mg/L (BOD of domestic waste water) *10^-3 (conversion to g/L), I = Correction factor for additional industrial BOD discharged into sewers*
Extension of Formula-F4	*Mi = mass of organic waste treated by biological treatment type; EFi = Emission factor for treatment I; i = composting or anaerobic digestion; R = total amount of CH_4 recovered in inventory year*
Extension of Formula-F5	*SWi = total amount of solid waste of type i (wet weight) incinerated or open-burned; dmi = dry matter content in the waste (wet weight) incinerated or open-burned; CFi = fraction of carbon in the dry matter (total carbon content); FCFi = fraction of fossil carbon in the total carbon; OFi = oxidation factor; i = type of waste: bio-medical waste*

Annexure 5

Budgetary Analysis to Estimate Expenditure towards Climate Action

5.1. Overview of Budgetary Analysis

5.1.1 Rationale

Countries across the world have realized the need to translate their international commitments to the United Nations Framework Convention on Climate Change (UNFCCC) into national policies and action plans. They are also focussing towards understanding the responsiveness of their policies to climate change as well as their impacts on ground. There is increased public scrutiny and demand for accountability to demonstrate the impacts of budgetary allocations and spending, particularly on poor and vulnerable groups. Thus, it has become extremely important to track and report financial flows that support climate change mitigation and adaptation, to build trust and accountability with regard to climate finance commitments and monitor trends and progress in climate related investment.

Through its ambitious NDC targets and the subsequent policies rolled out to fulfil them, the Government of India has prioritized the financing requirements of climate change interventions. Owing to the federal structure, the onus of climate change efforts in India filters down to state and local governments.

Therefore, an understanding of the financial flows and allocations at state and district levels can enable a better understanding of the extent and impact of climate action on ground. Further, many activities which address climate change (mitigation and resilience) and are aligned with climate SDGs are already included in national and state budgets, but are rarely explicitly referenced or categorized as such. Identification of these actions can further help authorities streamline climate action at local level.

5.1.2 Objectives

The primary objective of this exercise is to examine the budgetary allocations to climate change mitigation and resilience measures at district level.

The exercise will Identify of on-ground climate relevant actions at district level and analyse expenditure on the climate action aimed at mitigation and resilience as well as aligning with climate relevant Sustainable Development Goals (SDGs).

5.1.3 Outcomes

The analysis for budgetary allocations to climate action at the district level will

- Help in the identification of gaps and overlaps in the information available on district level expenditures on schemes and programmes aligned with climate action goals.
- Strengthen climate action at district level by supporting district administration in identifying existing programmes with climate relevant activities.
- Support in the development of relevant recommendations to district authorities to accelerate climate-oriented actions at district level, such as
    - o Integration of district development priorities with climate change mitigation and resilience priorities and streamlining of funds for the same.

Improving coordination between various line departments, state and central ministries to better manage public spending and investments in line with key national and state climate policy intentions.

5.2. Budgetary Analysis Methodology

5.2.1 Methodology

The methodology developed for analysis of district level expenditure is based on the public financial management segment of 'The Climate Public Expenditure and Institutional Review (CPEIR): a methodology to review climate policy, institutions and expenditure'.

The approach, championed by UNDP, builds on the World Bank's Public Expenditure Reviews (PERs) and aims to equip policy-makers with a tool to analyse the allocation of public resources, both domestic and international.

> The CPEIR involves a review and analysis of three main areas with regard to climate change:
>
> - Policy: The scope and comprehensiveness of climate policy at the national and sub-national level, within the sectors and the degree to which the policies are prioritized, costed or sequenced.
> - Institutions: The institutional nexus related to climate policy delivery and the modes of cross government synchronization, accountability and decentralization.
> - Finances: The proportion of public expenditure relevant to the distribution of it across sectors, the national/sub-national split and in some cases, proportion domestically/externally funded.

5.2.2 Assumptions

'Actuals' for any year are considered as actual expenditure on a particular scheme

Two kinds of relevance criteria have been considered

- Relevance of scheme to climate mitigation or resilience based on its ability or future ability to address climate change – by understanding the objectives and activities under each scheme – direct, indirect, marginal and potential

- Relevance of scheme to climate mitigation and/or resilience based on budgetary allocation within the scheme – i.e., how much of the budget under a scheme is allocated to climate relevant activities

The following steps were undertaken for review and analysis of district level expenditures:

1. **Review of available data** – exhaustive literature review was conducted to identify district level information available from state government resources and flagship scheme portals. For missing information, respective departments or district officials were contacted to collect budget details
2. **Sources of funds at district level** – based on literature and inputs from district authorities, the various sources of funds for the identified schemes and programmes were identified. This exercise will help in developing recommendations to improve budgetary allocation to climate action.

Define boundary – For this exercise, due to limitation on data availability and uniformity, certain boundary conditions were applied to have a consistent analysis. The table below lists the sources referred for each state and scheme analysed.

State/Scheme	Source	Assumptions
Maharashtra (Pune, Nagpur)	Planning Department (Annual District Budgets)	'Actuals' in the budget considered actual expenditure for a particular year
Gujarat (Ahmedabad, Rajkot)	**Not available yet District expenditure under schemes from respective websites	'Allocations' in the budget considered actual expenditure for a particular year
Madhya Pradesh (Bhopal, Indore)	**Not available (yet) District expenditure under schemes from respective websites	'Allocations' in the budget considered actual expenditure for a particular year

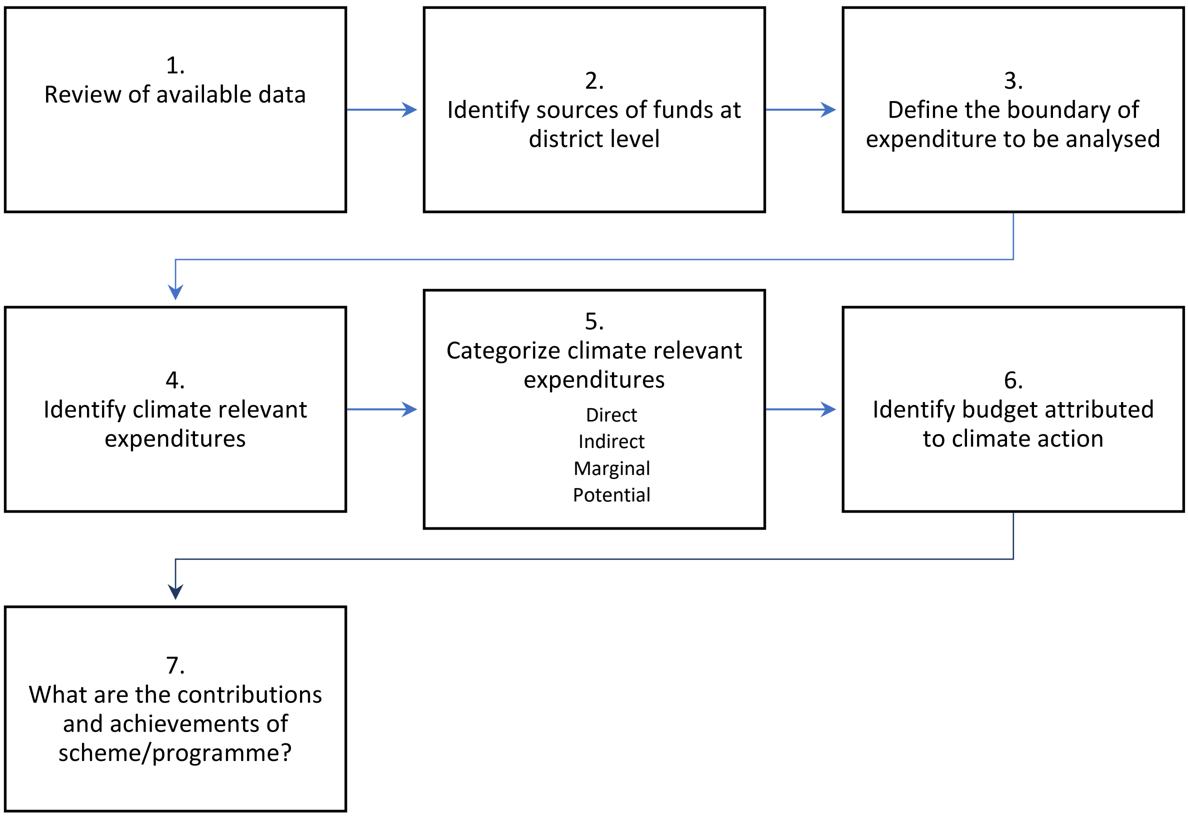

Figure 1: District expenditure review and analysis methodology

3. **Identify climate relevant expenditures** – the subheads were selected on the basis of their relevance to climate action heads corresponding to sectors of water, sanitation, rural and urban development, forestry, energy, and agriculture were selected.
4. **Categorize expenditures** – the objectives and activities undertaken in the shortlisted schemes and programmes were reviewed to understand their outcomes, impacts and potential vis-à-vis climate action. Based on the extent of climate action, the categorization criterion was as shown in Table 5.
5. **Identify budget attributed** – based on the categorization done in the previous step, an internal discussion was undertaken to assign per cent budget attribution to climate action for each scheme. Further analysis was undertaken to understand expenditure trends.
6. **Achievements of the scheme/programme** – Further, based on the impacts, the schemes and programmes were categorized under Mitigation (M), Resilience building (R) or both (M+R).

Table 2: Categorization of climate actions

Category vis-à-vis climate action	Rationale	% budget attributed to climate action
Direct	Scheme and programmes whose principal objectives, activities and outcomes have direct climate resilience and mitigation implications or are aligned with climate SDGs.	70 to 100
Indirect	Schemes and programmes which have significant climate components in terms of activities and outcomes building climate resilience, climate mitigation and/or climate SDG	35 to 69

Category vis-à-vis climate action	Rationale	% budget attributed to climate action
	co-benefits. However, the objectives do not have climate action as a primary objective.	
Marginal	Schemes and Programmes that have some small number of indirect climate mitigation and/or resilience co-benefits and have scope for including more climate-oriented actions	1 to 35
Potential	Schemes and programmes which currently have no climate implication, however, have been identified to have scope for including climate-oriented development activities in the future.	0

5.3. Analysis of schemes at district level

A total of 39 schemes, as listed below, were reviewed to identify those with climate resilience and mitigation relevance. Of these, based on availability of information across districts as well as relevance to climate actions, five schemes were selected for further analysis.

1	**MGNREGS**	21	Pradhan Mantri Ujjwala Yojana
2	Deen Dayal Antyodaya Yojana – NRLM	22	Pradhan Mantri Kaushal Vikas Yojana
3	Deen Dayal Upadhyaya – Grameen Kaushalya Yojana	23	Digital India – Public Internet access programme
4	Pradhan Mantri Gram Sadak Yojana	24	Infrastructure related programmes like telecom, railway, highways, waterways, mines etc
5	National Social assistance Programme	25	Pradhan Mantri Khanij Kshetra Kalyan Yojana
6	Pradhan Mantri Awas Yojana – Urban and Rural	26	Integrated Power Development Scheme
7	SBM – Urban and Rural	27	Non-Lapsable Central Pool of Resources scheme
8	**PMKSY**	28	RKVY
9	Integrated Watershed Management Programme	29	Soil Health Card
10	Digital India Land Records Modernization Programme	30	E-National Agriculture Markets
11	**Deen Dayal Upadhyay Gram Jyoti Yojana**	31	**Green India Mission**
12	Shyama Prasad Mukherji National Rurban Mission	32	Accelerated Irrigation Benefit Programme
13	Heritage City Development and Augmentation Yojana	33	Command Area Development and water Management Programme
14	**AMRUT**	34	Pradhan Mantri Adarsh Gram Yojana
15	Smart Cities Mission	35	Prime Minister's Employment Generation Programme
16	Pradhan Mantri Fasal Bima Yojana	36	Sugamya Bharat Abhiyan
17	National Health Mission	37	Beti Bachao Beti Padhao
18	Sarva Shiksha Abhiyan	38	National Food Security Act

19	Mid-Day Meal Scheme	39	Other Schemes
20	Integrated Child Development Scheme (ICDS)		

MGNREGS

Ministry of Rural Development (MoRD) lists 17 major categories of activities performed under MGNREGS[27]. Out of these, 11 can be attributed to be acting on Climate Change, categorised as mitigation specific, resilience specific or both (See Table 3).

Table 3: Categories of works under MGNREGS

S.No.	**Category of Works**	**Type of climate impact**
1	Anganwadi/Other Rural Infra	Not Relevant
2	Bharat Nirman Rajiv Gandhi Sewa Kendra	Not Relevant
3	Food Grain	Not Relevant
4	Other Works	Not Relevant
5	Play Ground	Not Relevant
6	Works on individual land (Category IV)	Not Relevant
7	Coastal areas	**R**
8	Drought Proofing	**R**
9	Fisheries	**R**
10	Flood control and Protection	**R**
11	Land Development	**R**
12	Micro Irrigation works	**M+R**
13	Renovation of Traditional water bodies	**M+R**
14	Rural Connectivity	**R**
15	Rural Drinking water	**M+R**
16	Rural Sanitation	**R**
17	Water conservation and water harvesting	**M+R**

Only the activities, for which work has been completed or is under progress, have been included in the budgetary apportioning. Since the daily wages are independent of the work being done, we can safely attribute the district budget for the year to each activity, depending on the number of works performed in the year under consideration.

- % Budgetary spending (on a particular activity) = (Expenditure on the particular activity/State MGNREGS budget expenditure) *100
- Expenditure on a particular activity= (Number of works (completed + under progress) under the activity/ Total works done under MGNREGS in the district) *State Budget

PMKSY

PMKSY[28] lists district-wise, number of works done under micro-irrigation, each year. Similarly, PMKSY also lists the number of works done in the whole state in a particular year. This can help us to apportion the percentage of micro-irrigation works performed in a particular district, of the whole state.

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[27] The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) was enacted in 2005 and seeks to improve the rural infrastructure, augment land and water resources, and strengthen the livelihood resource base of the rural poor by providing at least one hundred days of guaranteed wage employment in a financial year to every household whose adult members are willing to do unskilled manual work.

[28] The major objective of PMKSY is to achieve convergence of investments in irrigation at the field level, expand cultivable area under assured irrigation, improve on-farm water use efficiency to reduce wastage of water, enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop), enhance recharge of aquifers and introduce sustainable water conservation practices by exploring the feasibility of reusing treated municipal waste water for peri-urban agriculture and attract greater private investment in precision irrigation system. Programme architecture of PMKSY is to adopt a 'decentralized

Also, since we are provided with the state budget for the micro-irrigation activities performed under PMKSY, we can derive the district budgetary spending by multiplying the state budgetary spending with the percentage calculated above. Further, based on categorization vis-à-vis climate action, the scheme has been identified as an 'Indirect' category scheme, as although its primary objective is not climate resilience yet the activities have many climate co-benefits.

- Budgetary spending on micro-irrigation activities= (Number of works done in a district in a particular year/ Number of works done in the state the same year) * State Budgetary Expenditure for the year.
- Budgetary spending that can be attributed to climate action= (Budgetary spending on micro-irrigation x 0.69)
- *69% is the budget attributed for activities with indirect climate benefits*

Green India Mission (GIM)

Launched in February 2014 by the Ministry of Environment, Forests and Climate Change, Green India Mission aims at increasing the green cover of a State/District under various Sub-missions, as stated below:

1. Enhancing quality of forest cover and improving ecosystem service
2. Ecosystem restoration and increase in forest cover
3. Enhancing tree cover in Urban and Peri-urban areas (including institutional lands)
4. Agro forestry and social forestry (increasing biomass and creating carbon sink)
5. Restoration of wetlands
6. Promoting alternative fuel energy

Since the activities performed under GIM have a direct impact towards mitigating climate change, 100% of budget allocated to the district can be attributed to climate action.
However, an assumption has been made while proportioning the budget to the district. GIM provides budget allocation on the basis of Forest Division/Circle, hence, the district budget has been calculated by apportioning the budget for the Division/Circle on the basis of forest cover in each of the districts falling under that particular Division/Circle.

AMRUT

The AMRUT mission has been identified as a programme that indirectly supports climate action. The activities performed under the mission can be broadly categorized into five sectors:

1. Water supply
2. Sewage and septage management
3. Stormwater drainage
4. Green space development
5. Urban transport

As per the methodology applied in the district budgetary analysis, 50% of the budget approved for water supply could be attributed to climate action. Similarly, the figures stand at 60% and 60% for Sewage & Septage Management and Green Space Development, respectively.

- Budget attributed to climate action= (Approved budget for the particular activity x Physical Progress (%) x Percentage allocation viz-a-viz climate action)

State level planning and projectized execution' structure that will allow States to draw up their own irrigation development plans based on District Irrigation Plan (DIP) and State Irrigation Plan (SIP).

DDUGJY + Saubhagya

11 major activities are carried out under DDUGJY and Saubhagya Yojana, implemented by the Ministry of Power, GOI. These are:

1. Installing New substations
2. Augmentation of existing substations
3. Installing DTRs
4. Laying LT Lines
5. Installing 11KV feeders
6. Installing 33/66 KV feeders
7. Feeder Segregation
8. Works done under Sanad Adarsh Gram Yojana (SAGY)
9. Consumer Metering
10. DTR metering
11. Feeder metering

Out of these activities 6 activities directly support climate action, hence 50% of the budget expended on the scheme in a particular district can be attributed to climate action.