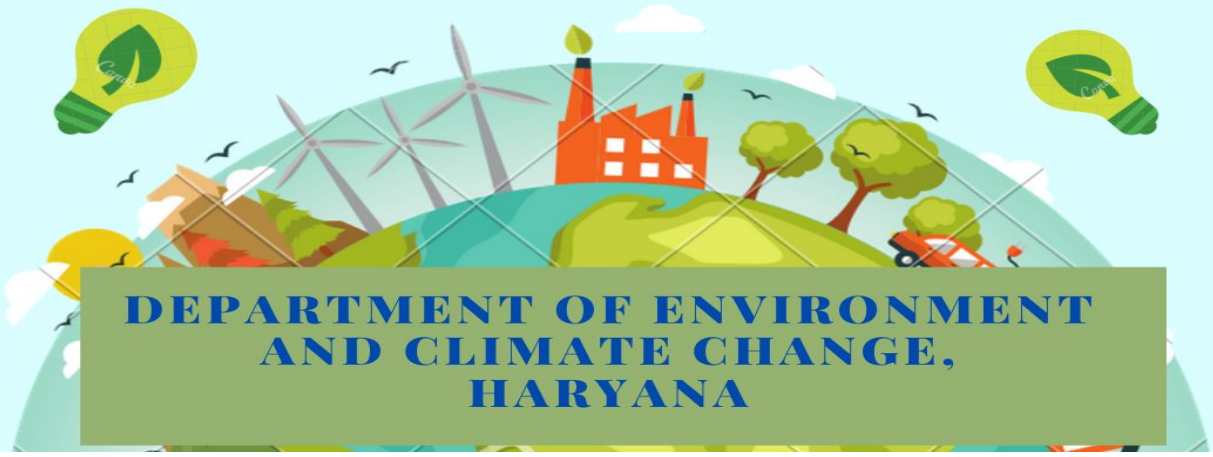
REVISED STATE ACTION PLAN ON CLIMATE CHANGE, HARYANA



DEPARTMENT OF ENVIRONMENT AND CLIMATE CHANGE, HARYANA

Abbreviations

IPCC	Intergovernmental Panel on Climate Change
ADB	Asian Development Bank
AR	Assessment Report
ASHA	Accredited Social Health Activists
ATMA	Agricultural Technology Management Agency
BAU	Business-as-Usual Scenario
BCM	Billion Cubic Meter
CAGR	Compound Annual Growth Rate
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CH4	Methane
CHCs	Community Health Centre
CO2	Carbon dioxide
CSR	Corporate Social Responsibility
CSS	Centrally Sponsored Scheme
DFID	Department for International Development
DST	Department of Science and Technology
ETP	Effluent Treatment Plant
FMD	Foot and Mouth Disease
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse Gases
GIM	Green India Mission
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GRIHA	Green Rating for Integrated Habitat Assessment
GSDP	Gross State Domestic Product
ICDS	Integrated Child Development Services
IHHL	Individual Household Latrine
IMD	India Meteorological Department
IMR	Infant Mortality Rate
INDC	Intended Nationally Determined Contribution
INM	National Horticulture Mission
IPM	Integrated Pest Management
ISFR	India State of Forest Report
JJM	Jal Jeevan Mission
JNNSM	Jawaharlal Nehru National Solar Mission
JSY	Janani SurakshaYojana
M&E	Monitoring and Evaluation
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoEF&CC	Ministry of Environment Forest and Climate Change
MSW	Municipal Solid Waste
MW	Mega Watt
N2O	Nitrous Oxide
NAPCC	National Action Plan on Climate Change
NFSM	National Food Security Mission
NHM	National Horticulture Mission
NHM	National Health Mission
NIE	National Institute of Engineering
NMSA	National Mission for Sustainable Agriculture
NRHM	National Rural Health Mission
NRM	Natural Resource Management
NTFP	Non-Timber Forest Produce
NUHM	National Urban Health Mission
PHCs	Public Health Centre
PHE	Public Health Engineering
PMAY	Pradhan Mantri Awas Yojana

PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
PM-KUSUM	Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Yojana
R&D	Research and Development
RAS	Recirculating Aquaculture System
RCC	Reinforced Cement Concrete
RCM	Regional Climate Model
RCP	Representative Concentration Pathway
RKVY	Rashtriya Krishi Vikas Yojana
SAPCC	State Action Plan on Climate Change
SBM	Swachh Bharat Mission
SC	Scheduled Caste
SDC	Swiss Development Corporation
SDGs	Sustainable Development Goals
SMAF	Sub- Mission of Agroforestry
SMAM	Sub-Mission of Agricultural Mechanization
SOC	Soil Organic Carbon
SPV	Solar Photovoltaic
ST	Scheduled Tribe
T&D	Transmission and Distribution
TB	Tuberculosis
UNDP	United Nation Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
WDC	Watershed Development Component
WG	Working Group

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EXECUTIVE SUMMARY

Haryana is a landlocked state that lies at the Northern region surrounded by Himachal Pradesh to the north, Uttarakhand to the northeast, Rajasthan to the south and southwest, Uttar Pradesh and Delhi to the east and Punjab to the northwest. The State is predominantly an agrarian economy.

Ministry of Environment, Forest and Climate Change (MoEF&CC) has planned to mainstream the National Action Plan on Climate Change. GiZ has been supporting the State of Haryana in this process and CTRAN Consulting has been engaged as technical support organisation.

Increasing trends observed for both maximum and minimum temperatures (high confidence) (for the entire region it is 0.1 degree C - 0.2 degree C per year). Maximum temperature rise (0.4-0.8 degree C/year) and minimum temperature rise 0.1 to 0.05 degree C/year. In terms of annual rainfall three districts viz. Ambala, Panchkula and Panipat show significant decreasing trend, rest of the districts show decreasing trend (low confidence).

The Vulnerability Assessment indicates that Mewat (Nuh) is the most vulnerable district and Gurugram is least vulnerable. 10 districts (45%) have low vulnerability; Similarly, 45% of the districts have medium vulnerability. 2 districts have high vulnerability. Sirsa has the highest risk score, and Panchkula has the least score. Little less than one third (32%) district have high climate risk and 14 districts (63%) have moderate climate risk.

The Mitigation focused sectors include Energy efficiency & Solar Mission and Sustainable Habitat. These sectors have larger contribution to climate change and thus the State have proposed long term goals to combat climate change in the State of Haryana.

The Adaptation focused sectors include Sustainable Agriculture Mission, Forest and Biodiversity, water mission, health mission and strategic knowledge mission. The chapters focus on the departmental roles in combating climate change in Haryana.

There are 73 actions proposed in the SAPCC V2 (2021-30), out of which 37 are strongly linked to adaptation, 28 linked to mitigation and 8 strategies have linkages to both adaptation and mitigation. The total proposed budget for these activities in 10 years (2021-30) amounts to Rs 39,371.80 crore.

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Climate change is one of the most serious global threats to mankind in the modern times. It has far-reaching implications for environment, agriculture, water availability, natural resources, ecosystem, biodiversity, economy, and social well-being. Owing to India's federal structure, and introduction of India's National Action Plan on Climate Change (NAPCC) in 2008, State Governments were also encouraged to prepare their own State Action Plan on Climate Change (SAPCC) consistent with the strategies in the NAPCC. States/UTs were encouraged to integrate state-level variations in ecosystems, geographic conditions, socio-economic scenario, and other factors, while converging with the existing policies and ongoing programmes and schemes being implemented. Dedicated climate change institutions/cells have been established in most of the States/UTs to coordinate activities related to climate change. States/UTs have initiated capacity building actions and demonstration projects to implement SAPCCs since the formulation of SAPCCs. Haryana had formulated the Haryana State Action Plan on Climate Change in the year 2011 with accordance to the National Missions in the NAPCC of 2008.

Since the formulation of SAPCCs, the National and International Climate Action and Policy Landscape have evolved. In the year 2015, the. Paris Agreement has been agreed upon to limit global mean temperature within 2 degree and working towards to limit 1.5 degree Centigrade.Nationally Determined Contributions (NDC) goals has been submitted by India for post-2020 focusing eight different goals including three major quantifiable goals related to emission reduction, renewable energy and forestry. Over the years, India has pursued major domestic policies and schemes in areas of climate change mitigation and adaptation actions, particularly in the fields of clean and renewable energy, enhancing energy efficiency, development of less carbon-intensive and resilient urban development, promotion of waste to wealth, electric vehicles, etc.

Over the past few years, the scientific and socio-economic understanding and knowledge on climate change have also advanced. State's dedicated climate change institutions/cells, with the active support of scientific, academic and research institutions, carried out several regional and sectoral vulnerability studies highlighting the impacts of climate change. The enhanced capacities and improved understanding of sectoral and regional climate variabilities and projections, Green House Gas Emissions (GHG), long-term vulnerabilities, mapping vulnerable regions/ social groups/sectors, etc. will help in the identification and prioritization of mitigation/ adaptation strategies and refining regional specific action plans and strategies.

In this context, SAPCCs need to be revised and strengthened further considering the evolving context of climate science, policy, and actions. Ministry of Environment Forests & Climate Change, Government of India requested States to initiate the process of revision of the SAPCCs in January 2018 considering the principles enlisted in Section 1.1.2

1.1.1 National and State-level Climate Policy and Planning

The revision of SAPCC revision is thus intended to:

1. Better align National and sub-National adaptation and mitigation planning and
2. Enhance the evidence-based character and effectiveness of climate policy and planning by integrating recent advancements in knowledge and understanding.

1.1.2 National-level Climate Policy and Planning Frameworks

The broad guidelines for the revision of SAPPCs as enlisted by Ministry of Environment Forests & Climate Change, Government of India are:

Principle 1

- SAPCCs should b e a policy document of the States/UTs outlining the major initiatives and strategies reflecting the commitments and proposed actions in the state to tackle the vulnerabilities and impacts of climate change across the socio-economic sectors.

Principle 2

- SAPCCs should envisage an inclusive, sustainable and climate resilient low carbon development pathways with a focus on climate change adaptation and mitigation within the key sectors in the States/UTs and should protect the poor and vulnerable sections of society from adverse effects of climate change.

Principle 3

- SAPCCs should take into account recent scientific assessments and projections on global warming; vulnerability; and impacts.

Principle 4

- SAPCCs should synergise with the goals of NDCs under the Paris Agreement, though the targets under NDCs are national targets. It should also contribute towards achieving other development goals including Sustainable Development Goals (SDGs).

Principle 5

- SAPCC should highlight the links with national missions related to climate change.

Principle 6

- SAPCC should also be built on the evolving socio-economic development context and priorities of the state.

Principle 7

- States/UTs can strengthen existing climate action measures as well as launch new initiatives in their priority sectors. Some of the initiatives can be introduced in the areas of efficient and cleaner technologies, promoting renewable energy generation, reducing emissions from transport sector, afforestation and greening activities and standardizing knowledge management system for adaptation and mitigation.

Principle 8

- Time period of the implementation of SAPCCs should be clearly brought out starting with the implementation cycle of NDCs i.e. 2021-2030 and beyond.

Principle 9

- Financial resources required for the implementation of the action plan should primarily be leveraged from the existing budget of the State Governments and convergence with the relevant schemes and programs.

Principle 10

- SAPCCs should set out the institutional mechanism for implementation including stakeholder engagement ensuring inclusiveness along with the mechanism for capacity building and monitoring and evaluation with clea rindicators for reporting.

Figure 1: Guiding Principles, from Ministry of Environment, Forest and Climate Change, "A Common Framework for revision of State Action Plan on Climate Change", 2018

The NAPCC established 8 National missions "representing multipronged, long term and integrated strategies for achieving key goals in the context of climate change" as listed:

Table 1: Eight Missions of the National Action Plan on Climate Change (NAPCC)

Mission Name	Goals
National Solar Mission	Increase the share of solar energy in the total energy mix
National Mission for Enhanced Energy Efficiency	Enhance energy efficiency through market-based certification mechanisms, cost reductions through R&D, demand-side financing mechanisms, and fiscal instruments
National Mission on Sustainable Habitat	Improvements in energy efficiency in buildings, solid waste management and modal shift to public transport
National Water Mission	Ensure integrated water resources management helping to conserve water, minimize wastage and ensure more equitable distribution both across and within States
National Mission for Sustaining the Himalayan Ecosystem	Evolve management measures for sustaining and safeguarding the Himalayan glacier and mountain ecosystem
National Mission for a Green India	Enhance ecosystem services including carbon sinks
National Mission for Sustainable Agriculture	Devise strategies to make Indian agriculture more resilient to climate change
National Mission on Strategic Knowledge for Climate Change	Enhance the understanding of challenges of and response to climate change

A refinement of India's National mitigation and adaptation goals is provided by the mentioned Nationally Determined Contribution submitted to the UNFCCC. The NDC, initially formulated as the "Intended Nationally Determined Contribution" (INDC) in 2015, sets out eight different goals for the post-2020 period, out of which three are quantitative. These goals are listed in table below:

Table 2: India's NDC Goals

NDC Goals	Qualitative/Quantitative
To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.	Qualitative
To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development.	Qualitative
To reduce the emissions intensity of its Gross Domestic Product by 33 to 35 percent by 2030 from 2005 level.	Quantitative
To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 with the help of transfer of technology and low-cost international finance including from Green Climate Fund (GCF).	Quantitative
To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.	Quantitative
To better adapt to climate change by enhancing investments in development	Qualitative

programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.	
To mobilize domestic & new and additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.	Qualitative

Moreover, the NDC goals are strongly linked to the Sustainable Development Goals (SDGs) which is illustrated in figure below that shows the number of actions of relevance to a particular SDG in the Indian NDC.

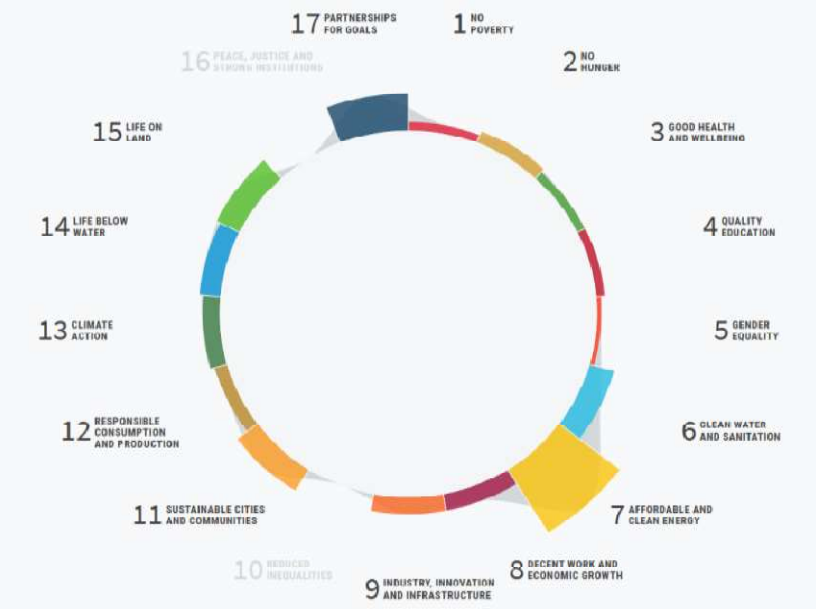


Figure 2: SDG- NDC Linkages for India's First NDC

Note: The size of the coloured bar indicators the number of actions of relevance to a particular SDG that are Mentioned in India's NDC, with bigger bars meaning more mentions.[1]

1.1.3 Updated Nationally Determined Contributions (NDCs)

The update to India's existing NDC translates the 'Panchamrit' announced at COP 26 into enhanced climate targets. The update is also a step towards achieving India's long term goal of reaching net-zero by 2070.As per the updated NDC, India now stands committed to reduce Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level and achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030.

Mission LiFE (Lifestyle for Environment) is an initiative launched by the Hon'ble Prime Minister of India Shri Narendra Modi at the 2021 UN Climate Change Conference (UNFCCC COP26), to bring individual behaviors at the forefront of the global climate action narrative and with the aim of promoting sustainable living and protecting the environment. The mission focuses on various aspects of sustainable living, including conservation of water resources, reduction of plastic waste, promotion of clean energy, and protection of biodiversity.

The updated NDC reads "To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation, including through a mass movement for

[1] https://klimalog.die-gdi.de/ndc-sdg/country/IND

‘LIFE’– ‘Lifestyle for Environment’ as a key to combating climate change". The vision of LIFE is to live a lifestyle that is in tune with our planet and does not harm it. India’s updated NDC also captures this citizen centric approach to combat climate change.India’s updated NDC also reaffirms our commitment to work towards a low carbon emission pathway, while simultaneously endeavoring to achieve sustainable development goals.

1.1.4 National-level Climate Policy and Planning Frameworks in Haryana

In accordance with the mandate for the SAPCCs, Haryana formulated seven vulnerable Sectors that has grouped the proposed actions and strategies into clusters and thus extended the eight National missions. The Sectors in Haryana SAPCC that are aligned with Government of India Missions are as follows:

1. Forest (Greening India Mission)
2. Agriculture (Sustainable Agriculture Mission)
3. Energy (Enhanced Energy Efficiency Mission, Jawaharlal Nehru National Solar Mission)
4. Water (National Water Mission)
5. Rural Development
6. Health Sector
7. Strategic Knowledge

The sectors identified in the Haryana SAPCC Phase-1 forms the basis for the refined strategy packages of the Revised Climate Change Action Plan. In the Revised Haryana SAPCC Phase-2 the following sectors are combined into different Working Groups under both adaptation and Mitigation category. Working Groups under Adaptation Category are:

1. Working Group 1: Sustainable Agriculture
2. Working Group 2: Water Resources
3. Working Group 3: Forest and Environment including Biodiversity
4. Working Group 6: Strategic Knowledge and Skill Development
5. Working Group 8: Mountain Ecology

Working Groups for Mitigation Category are:

1. Working Group 4: Enhanced Energy Efficiency and Solar Mission
2. Working Group 5: Sustainable Habitat
3. Working Group 7: Industry

1.1.5 Integration with the District Environmental Plans (DEPs) of Haryana State

District Environment Plan is operated by a District Committee (as a part of District Planning Committee under Article 243 ZD) with representatives from Panchayats, Local Bodies, Regional Officers, State PCB, and a suitable officer representing the administration, which in turn is chaired and monitored by the District Magistrate. Such District Environment Plans and Constitution of District Committee is placed on the websiteof Districts concerned and kept on such websites for a period of one year.

District Environment Plan is prepared according to the Model/Format suggested by CPCB published on its website. Suitable changes have been incorporated as per local requirements for all Districts and reported to concern Chief Secretaries to the Tribunal in O.A No. 606/2018.

The DEPs of encompasses on environmental issues covering cities, towns and villages of the State. As mandated, data on waste management, sewage treatment and utilisation, water quality, industries pollution control including industrial clusters, air quality management, Regulating mining/ sand mining, noise pollution, wetland management, significant issues in the area, timeline for implementation of the interventions/ tasks with a budgetary plan is proposed under the DEPs. The reports will be accommodated into a State Environmental Plan, followed by contribution to National Environmental Plan.

1.2 Objectives

The State Action Plan on Climate Change needs to be revised and strengthened considering the evolving context of climate science, policy and actions. Therefore, the objective of this document is to identify and prioritise mitigation and adaptation strategies in the light of such developments, and to refine the regionally specific action plan and strategies. More specifically, the Revised Haryana SAPCC aims to increase the level of ambition, accurateness, specificity and practicality of the mitigation and adaptation actions contained and facilitate progress from planning to action. In order to do this, this document:

- Assess the achievements made under proposed actions in previous SAPCC and aligns & redefines the goals & targets considering the NDCs (Nationally Determined Contributions) & SDGs (Sustainable Development Goals).
- Updates forward-looking plans, strategies and actions for ambitious, workable mitigation and adaptation actions and strategies for 2021-30

1.3 Approach and Methodology

The Haryana SAPCC Phase-2 builds on the developments at the national level, various policies and programmes and the national and international commitments by India on the issues of climate change adaptation and mitigation. The steps taken for the revision of SAPCC are depicted below in the Figure 1. Vulnerability Assessment is done that provides current and future projections. Key priorities have been outlined both in adaptation and mitigation segments. Synergy has been established with the International climate goals like NDCs and SDGs. National policies and programmes for each sector have been in line with the State adaptation and mitigation strategies. Capacity needs in the form of multi stakeholder consultations have been achieved for proper implementation. Institutional arrangement has been set up so that the responsibility for various missions will rest under individual departments, which shall strive to attain all listed objectives within stipulated time frames and ensure their vertical integration with the National Missions and objectives of the NAPCC. Chapter on Monitoring and evaluation will help to monitor the progress of the State in coping with climate change.

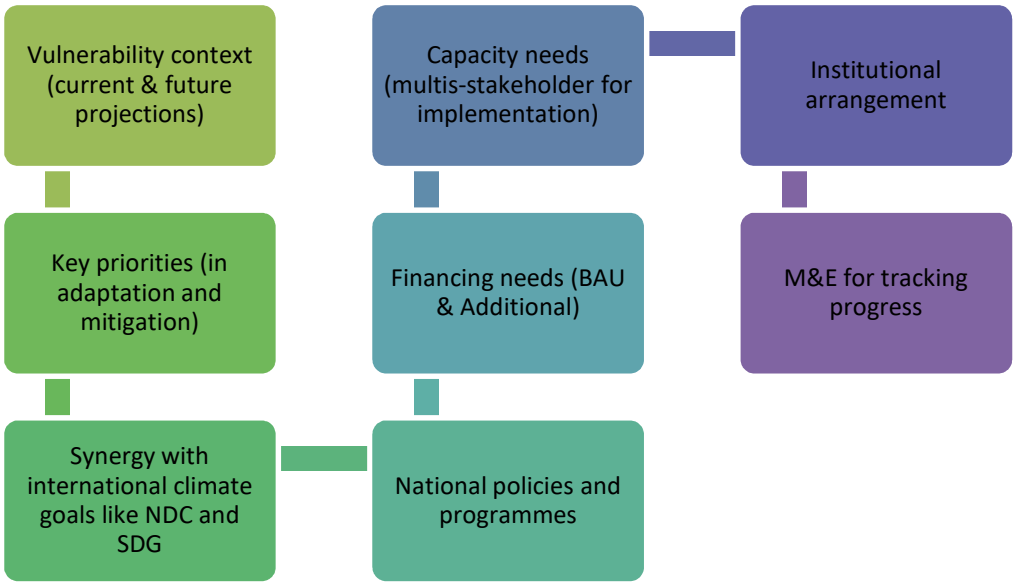


Figure 3: Approach and Methodology

Using the approach and referring to the climate policy context introduced in this chapter, this document aims to achieve its two-fold purpose by proceeding in the following structure. **Chapter 2** introduces the State profile, circumstances, resource endowments, economic and societal sectors, using the latest scientific assessment, **Chapter 3** then presents Haryana's Climate profile including historical conditions and observed trends and projected climatic changes. **Chapter 4** deals with the vulnerability assessment of the State and presents key observed projected sectoral impacts. **Chapter 5** includes both (a) stocktaking and b) adaptation planning by- (i) comprehensively assessing progress towards State targets set out in the Haryana SAPCC Phase-1 and barriers related to their achievement and (ii) identifying forward- looking adaptation strategies for the identified key sectors and areas (Agriculture, Water Resources, Forestry & Environment, Strategic Knowledge & Skill Development and Mountain Ecology). **Chapter 6** focuses the steps for key mitigation areas, Energy (Enhanced Energy Efficiency, Solar Mission & Non-Conventional Energy) and Sustainable Habitat. Out of the identified adaptation and mitigation strategies, **Chapter 7** highlights the financial mechanism on how the strategies and activities prioritized will be funded. **Chapter 8** details the institutional mechanisms involved in the implementation of the SAPCC Phase-2 and **Chapter 9** concludes by identifying the monitoring and evaluation framework to be followed for monitoring and evaluating the implementation of the plan.

CHAPTER 2: STATE PROFILE

2.1 LOCATION, DEMOGRAPHY, ECONOMY

2.1.1 Location, Geography and Size

Haryana extends from 27°39' to 30°35' N latitude and between 74°28' and 77°36' E longitude with a total area of 44,212.00 sq km. It accounts for about 1.4 percent of the total area of the country. Haryana is a landlocked state that lies at the Northern region surrounded by Himachal Pradesh to the north, Uttarakhand to the northeast, Rajasthan to the south and southwest, Uttar Pradesh and Delhi to the east and Punjab to the northwest. The state is located at an altitude of 200 meters to 1200 meters over the sea surface.

2.1.2 Demographic Profile

As per the Census of India 2011, the State has a population of 253.51 lakh, an increase from 211.44 lakh in 2001 Census. The State accounts for 2.1 percent of India's population. The share of urban population in the State is 34.88 percent whereas the share of rural population is 65.12 percent. The decadal population growth rate of Haryana is estimated at 19.90 percent whereas the national rate of growth during the last ten years was 17.6 percent. The State has a population density of 573 persons per sq. km. as per the Census 2011, whereas India has only 382 persons per sq. km. In 2011, out of the 253.51 lakh population, the Scheduled Caste population constituted 20.17. The effective literacy rate of Haryana as per Census 2011 is 75.6 percent (Rural- 71.4 percent, Urban- 83.1 percent) while in 2001, literacy rate of the State was 67.9 percent. As per Census 2011, the sex ratio of the State of Haryana is 879 F/1000M. When compared to 2001 Census, sex ratio has increased by 18 points. The demographic profile of the State is outlined in below table.

Table 3: Demographic Profile of Haryana

Particulars	Haryana		India	
	2001	**2011**	**2001**	**2011**
Population (in Crore)	2.11	2.54	10,2.87	12,1.02
Urban Population (%)	28.92	34.88	27.82	31.14
Rural Population (%)	71.08	65.12	72.18	68.86
Population Decadal Growth Rate (%)	28.06	19.90	17.60	21.50
Population Density (person per sq. km)	478	573	324	382
Sex Ratio (Per 1000 Males)	861	879	933	943
Literacy Rate (%)	67.91	75.55	64.83	74.04
Male Literacy Rate (%)	78.49	84.06	75.26	82.14
Female Literacy Rate (%)	55.73	65.94	53.67	65.46

There are few important indicators that must be analyzed for gender integration into Natural Resources Management and Climate change. Some of them have been highlighted in the section below.

Sex Ratio

The overall Sex Ratio in the State is 879 females per 1000 males which is lower than that of India (943 females per 1000 males). The urban sex ratio is 873 females per 1000 males whereas rural is 882 females per 1000 males.

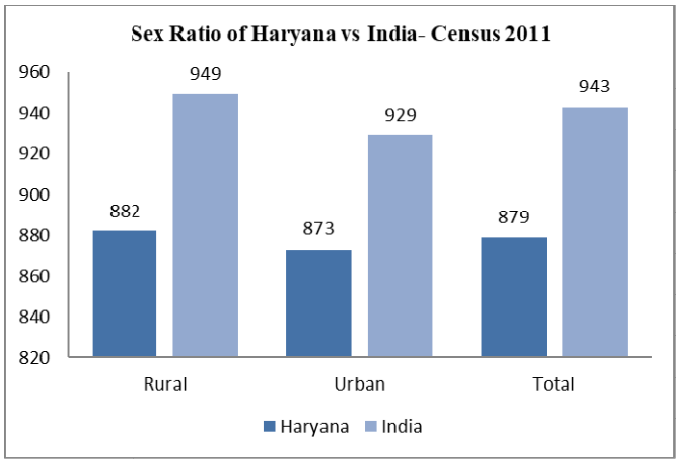


Figure 4: Comparison of Sex Ratio of Haryana and India

(Source: Census 2011)

Female Literacy Rate

Female literacy is an integral part of Human Development that supports the fulfillment of Sustainable Development Goals and several National strategies. Improvement in the overall education level has a positive response in terms of decreased maternal mortality, better health and education and reduction in poverty and hunger on a regular basis. Providing better and enhanced educational support to females will in turn contribute towards reduced child mortality, improved child nutrition and health and the overall development. This may also increase productivity, skills, and innovation, which directly affects economic growth.

The female literacy rate has increased from 55.73 to 65.94 percent in Haryana when compared to all India levels which saw a rise from 53.7 to 64.6 according to the census 2001 and 2011, respectively. The overall female literacy rate of Haryana is lower than that of the average of all over India.

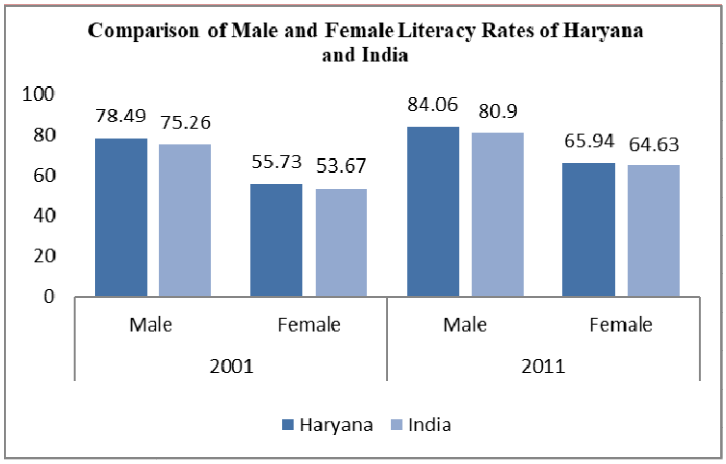


Figure 5: Comparison of Male and Female Literacy Rates of Haryana and India

(Source: Census 2011)

Employment Status

There are some important indicators which help to study the employment status, they are- Average wage earning, Labor force participation and Proportion of unemployment. Works are classified as Works other than Public Works, Public Works other than MGNREGA and MGNREGA Public. The average wage earning (in Rs.) received per day by Casual laborers of Age 15-59 years in specified works (2011-12) is shown in the below table. From the table, it can be observed that only in Public Works other than MNREGA Public Works under Rural employment, the wages earned by females in the state is higher than that of males.

Table 4: Average Wage Earning of Males and Females in Specified Works (2011-12)

	Rural						Urban	
	Works other than Public Works		Public Works other than MNREGA Public Works		MNREGA Public Works		Works other than Public Works	
	Female	Male	Female	Male	Female	Male	Female	Male
Haryana	152	202	180	127	-	-	207	166
India	103.28	149.32	110.62	127.39	112.46	101.97	182.04	110.62

Source: Participation in Economy, Ministry of Statistics 2017

For an inclusive and sustainable development, women's labor force participation and access to decent work is an important element. In Haryana, the proportion of women involved in contributing to economy through their labor activities in rural areas and urban areas are 13.7 percent and 18.5 percent respectively. This proportion is less than the overall average of India, which is 26.4 percent in rural areas and 20.4 percent in urban areas.

Table 5: Labor Force Participation Rate for persons aged 15 years and above (2018-19)

	Rural			Urban			Total		
	Female	Male	Person	Female	Male	Person	Female	Male	Person
Haryana	13.7	74.7	45.3	18.5	73.9	48.0	15.3	74.4	46.2
India	26.4	76.4	51.5	20.4	73.7	47.5	24.5	75.5	50.2

Source: Participation in Economy, Ministry of Statistics 2019

In terms of unemployment, 6.7 percent women are unemployed in rural areas compared to 8.9 percent in urban areas. Haryana's rural unemployed proportion is less than the overall average of India, which is 3.5 percent.

Table 6: Proportion Unemployed for persons aged 15 years and above (2018-19)

	Rural			Urban			Total		
	Female	Male	Person	Female	Male	Person	Female	Male	Person
Haryana	6.7	10.0	9.6	8.9	8.7	8.7	7.6	9.6	9.3
India	3.5	5.5	5.0	9.8	7.0	7.6	5.1	6.0	5.8

Source: Participation in Economy, Ministry of Statistics 2019

2.1.3 Economic Profile

The Gross State Domestic Product (GSDP) of the State at current price increased from Rs 297538.52 crore in 2011-12 to Rs 831610.21 crore in 2019-20 registering an increase of 179.5 percent. The average annual growth rate during the period 2012-13 to 2019-20 has been estimated at 13.7 percent. During this period, the annual growth rate varied from the minimum of 9.5 percent in 2014-15 to the maximum of 16.6 percent in 2012-13. The GSDP of the State at constant (2011-12) prices increased from Rs 297538.52 crore in 2011-12 to Rs 572239.70 crore in 2019-20 registering a growth of 92.3 percent. The average annual growth rate at constant (2011-12) prices during 2012-13 to 2019-20 has been estimated at 8.5 percent. The GSDP growth at constant (2011-12) prices became slow in 2018-19 and 2019-20 with the growth of 7.5 percent and 7.7 percent respectively. The low growth recorded in 2018-19 and 2019-20 may be attributed because of low growth registered in primary, secondary and tertiary sectors. The per capita income at current prices increased from Rs 106085 in 2011-12 to Rs 264207 in 2019-20 showing an increase of 149.1 percent whereas the per capita income at constant prices increased from Rs 106085 in 2011-12 to Rs 180026 in 2019-20 with the increase of 69.7 percent only.

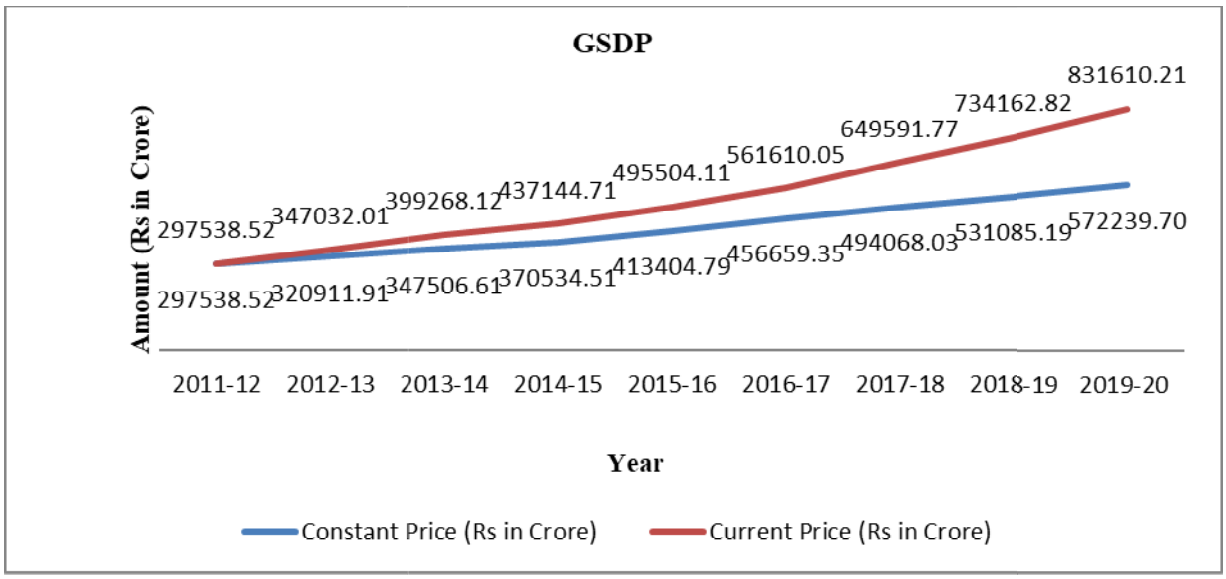


Figure 6: GSDP of Haryana (Constant Price and Current Price)
Source: GSDP/NSDP/Per Capita Income of Haryana 2019-20

2.2 Natural Resources: Availability Of Land, Water, Energy, Forestry And Biodiversity Resources

Haryana has total geographical area of 4421000 Ha and the land use pattern for the State is given below:

Table 7: Land Use Pattern of Haryana

Details	Area (in 000 Ha)	% with reference to geographical area
Forest Area	35	59.99
Land not available for agriculture use	445	14.10
Land under Misc. tree Crops, groves not including in net area sown	21	0.99
Permanent pasture & other grazing land	74	0.09
Culturable Waste land	54	0.27

Current fallow	105	0.08
Fallow land other than current fallow	36	0.15
Net Area Sown	3601	24.31
Reporting area for land utilization	4371	100.00
Total Geographical Area	**4421**	

Physio-graphically, the State is divided into five natural topographic divisions- The Bagar and the undulating sandy plains-the sand dunes and the tals (230-350 meters); The Alluvial Plain or the Ghaggar-Yamuna Plain comprising Bangar, Khadar, Naili and Bet (below 300 meters); The Aravali outliers (300-600 meters); The Shivalik-The hills (over 400 meters); and The Foot Hill Zone-The piedmont plain (300-400 meters). River like Yamuna and tributary of Ganges flows along the state's eastern boundary. The Northern part of the State has several north-east to west flowing rivers that originates from the Shivalik Hills of Himalayas whereas the Southern part of the State has many south-west to east flowing seasonal rivulets that originates from the Aravalli Range in and around the hills in Mewat region.

As per the Forest Survey of India Report 2019, the forest cover in Haryana is 1602.44 sq km of which 28.00 sq. km is very dense forest, 450.90 sq. km is moderately dense forest whereas 1123.54 sq. km is open forest. The forest cover in the State constitutes 3.62% of the State's geographical area. The total Carbon stock of forest in the State is 10.47 million tonnes (38.39 million tonnes of CO_2 equivalent) which is 0.15% of total forest carbon of the country.

2.3 Agriculture And Livestock

Haryana has an agrarian economy and majority of the State's population depends on agriculture & allied activities. Rice, wheat, rapeseed & mustard, bajra, cotton and sugarcane are the major crops grown in the State. There are two agro climatic zones in the state- the north western part is suitable for Rice, Wheat, Vegetable, and temperate fruits whereas the south western part is suitable for high quality agricultural produce, tropical fruits, exotic vegetables and herbal and medicinal plants. For 2019-20, the contribution of agriculture and allied sector in state's GSVA at current price stood at Rs 69, 657.09 crore whereas at constant price stood at Rs 43429.95 crore. Total cropped area of Haryana during 2018-19 is 6605 thousand hectares. The Cropping Intensity of the State is 182.8 percent. As per Agriculture Census 2015-16, the number of operational land holders in Haryana is 16.28 lakh which is 1.11 percent of the country. Haryana has an average size of holding of 2.22 hectare which is higher than the average size of land holding of the country which is 1.08 hectare.[2] The net irrigated area during 2018-19 is 3282 thousand hectares. The total food grain production in the State is 17863.5 thousand Tonnes in 2019-20.[3]
State's total livestock and total poultry population as per 2019 Livestock Census are 71.12 lakh numbers and 457.45 lakh numbers respectively and as per 2012 census are 88.2 lakh numbers and 428.21 lakh numbers, respectively.

Table 8: Statistics of Animal Husbandry

Parameters	Unit	2019-20
Meat Production	Lacs Kgs	553.87
Milk Production	Lacs MT	117.34
Egg Production	Lacs	66153

[2] State Statistical Abstract 2019-20
[3] State Statistical Abstract 2019-20

Per capita availability of milk per day	gm/day	1142

Source: Animal Husbandry Statistics, Pasudhan Haryana

2.4 Energy Profile Including Primary Energy Supply, Energy Demand And Electricity Installed Capacity

In Haryana, power is distributed by two state-owned power utilities - Uttar Haryana Bijli Vitran Nigam (UHBVN) and Dakshin Haryana Bijli Vitran Nigam (DHBVN). The total installed capacity of the State during 2018-19 was 11268 MW. Per capita availability of power in 2018-19 was 2116.7 kWh. During 2018-19, power requirement in the State was 5367 Net Crore Units whereas power availability was 5367 Net Crore Units.

Table 9: Energy Statistics of Haryana

State	Installed Capacity of Power (MW)	Per Capita Availability of Power in KWh (2018-19)	Power Requirements in Net Crore Units (2018-19)	Availability of Power in Net Crore Units (2018-19)
Haryana	11268	2116.7	5367	5367

Source: RBI Handbook of Statistics on Indian States

2.5 State Development Issues And Priorities

State's development has been studied with the help of some key policies which are in place and the performance of the State against the same. Highlights of the State performance against the key policy elements are depicted in below table:

Key Policy Elements	State Performance
National Action Plan on Climate Change	The State has all the eight missions aligned to NAPCC
State Action Plan on Climate Change	The State has prepared SAPCC and duly endorsed by the State and submitted to MOEFCC in 2014
Agriculture	National Mission for Sustainable Agriculture National Food Security Mission National Horticulture Mission Rashtriya Krishi Vikas Yojana (RKVY) Pradhan Mantri Fasal Bima Yojana Paramparagat Krishi Vikas Yojana Management of Soil Health (Soil Health Card Scheme) Kisan Credit Card National Mission for Oilseed and Oil Palm National Mission on Agriculture Extension and Technology Sub-Mission of Agricultural Mechanization National Agricultural Insurance Scheme (NAIS) Scheme for promotion of Sustainable Agriculture – Strategic Initiatives Scheme for promotion of Crop Diversification Scheme for strengthening of Agricultural Extension Infrastructure Scheme for Quality Control on Agricultural Inputs Scheme for providing Soil and Water Testing Services to the Farmers Scheme for Technology Mission on Sugarcane Scheme for National Project on Management of Soil Health and Fertility

	Scheme for providing implements/ machinery on subsidy Integrated Watershed Development and Management Mukhyamantri Bagwani Bima Yojana Mission for Integrated Development of Horticulture National Livestock Mission Pradhan Mantri Matsya Sampada Yojana (PMMSY)
Water	Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) Jal Jeevan Mission Integrated Watershed Management Programme National Rural Drinking Water Programme Accelerated Irrigation Benefit Program (AIBP) Rainwater Harvesting Programme Accelerated Rural Water Supply Programme Desert Development Programme Indira Gandhi Drinking Water Supply Scheme Mera Pani-Meri Virasat Scheme
Forest	Forest (Conservation) Act, 1980 Green India Mission National Forest Policy 2017 National Environment Policy 2016 National Afforestation Programme CAMPA (Compensatory Afforestation Fund Management and Planning Authority) Rehabilitation of degraded forests Green Belt in Urban Areas Development of Agro Forestry in Community/ Farm Lands Rehabilitation of Aravalli Hills Forest Buildings Herbal Nature Park Intensification of Forest Management Scheme Integrated Development of Wildlife Habitats (IDWH) Forest Fire Prevention and Management Extension of Zoos and Deer Parks Protection of Wildlife in multiple use areas
Solar Mission & Non-Conventional Energy and Energy Efficiency	Mhara Gaon Jag Mag Gaon scheme Feeder Sanitization scheme Ujjawal Discom Assurance Yojana Deen Dayal Upadhyaya Gram Jyoti Yojana Integrated Power Development Scheme Haryana Solar Policy 2016 LED based SPV Street Lighting Programme LED based Solar Home Lighting System (MANOHAR JYOTI) New National Biogas & Organic Manure Programme (NNBOMP) National Biogas & Manure Management Programme (NBMMP) Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUSM) Haryana Rooftop Solar Plant Subsidy Scheme Remote Village Electrification Programme

	Integrated Power Development Scheme (IPDS) Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) Rajiv Gandhi Grameen Vidyutikaran Yojana SAUBHAGYA Scheme
Sustainable Habitat (Urban)	Jawaharlal Nehru National Urban Renewal Mission (JNNURM) Integrated Housing and Slum Development Programme Smart City Mission Atal Mission for Rejuvenation and Urban Transformation (AMRUT) Swachh Bharat Mission (Urban) Deendayal Antyodaya Yojana-National Urban Livelihoods Mission (DAY-NULM) Housing For All Mission/ Pradhan Mantri Awas Yojana (PMAY) Affordable Housing- Rajiv Awas Yojana (RAY) Mahatma Gandhi Gramin Basti Yojana Integrated Solid Waste Management Solid Waste Management Rules 2016

2.6 SECTORAL HIGHLIGHTS

2.6.1 Agriculture and Allied

Agriculture plays an important role in economy because it provides livelihood, reduces poverty, and ensures food security. Being an agrarian state, Haryana is one of the leading contributors to the country's production of food grains and a large portion of the population is dependent on agriculture. The agriculture sector of Haryana broadly comprises of agriculture, horticulture, animal husbandry and fishery. Agriculture sector is highly vulnerable to climate change. Increasing agricultural production and productivity is necessary for ensuring food security, livelihood security, and nutritional security. Fishery and animal resources are fully integrated into the agriculture system of the country. Animal husbandry acts as an integral component of diversified agriculture system because it is a source of employment and livelihood for rural population. During 2019-20, the contribution of agriculture and allied sector in state's GSVA at current price stood at Rs 69657.09 crore whereas at constant price stood at Rs 43429.95 crore.

Table 10: Agriculture Profile of Haryana

Particulars	Details
Total Cropped Area in '000 Ha (2018-19)	6605
Net Sown Area in '000 Ha (2018-19)	3613
Gross Irrigated Area in '000 Ha (2018-19)	6024
Cropping Intensity	182.8%
Total food-grain production as on 2019-20 (in 000 Tonnes)	17863.50
Operational Land Holders (in 000) (Agriculture Census 2015-2016)	1628
Average size of Holdings in Ha (Agriculture Census 2015-2016)	2.22
Total Livestock (in Lakh numbers)	71.12
Total Poultry (in Lakh numbers)	457.45
Total Milk Production in Lakhs MT	117.34

Source: Statistical Abstract of Haryana 2019-20

2.6.2 Forest

Climate Change has adverse effect on forest health and productivity. Deforestation and forest degradation significantly contribute to greenhouse gas (GHG) emissions. This makes the sector key for both climate change mitigation and adaptation. Forest in Haryana is classified into three Forest Type Groups i.e.,

Tropical Dry Deciduous Forest, Tropical Thorn Forest and Subtropical Pine Forests which are divided into 10 Forest Types. The State has shown progressive result in the field of agroforestry that made the forest deficient State to support many wood-based industries based on farm-grown timber. Major agroforestry species include Poplar and Eucalyptus trees. There are two National Parks, eight Wildlife Sanctuaries and two Conservation Reserves which constitute the State's Protected Area network covering 0.75% of its geographical area. The State has over 500 bird species. Recorded Forest Area (RFA) in the State is 1,559 sq km which is 3.53% of its geographical area. Out of this RFA, 249 sq km is Reserved Forests, 1,158 sq km is Protected Forests and 152 sq km is Unclassed Forests. The reserved, protected, and unclassed forests are 15.97%, 74.28% and 9.75% of the recorded forest area in the State respectively.

Table 11: Forest Profile of Haryana

Particulars	Details
Total Forest Cover (sq. km)	1602.44
Percentage of State area under forest	3.62
Area under VDF (Very Dense Forest) in sq. km	28.00
Area under MDF (Moderately Dense Forest) in sq. km	450.90
Area under OF (Open Forest) in sq. km	1123.54
Tree cover in sq. km	1565
Recorded Forest Area (sq. km)	1599
Bamboo bearing area within forest area of state (sq. km)	72
Total carbon stock of forest (million tonnes)	10.47
Growing Stock in Recorded Forest Area (in m cum)	4.22
Growing Stock in Recorded TOF (in m cum)	17.56

Source: ISFR Report 2019

2.6.3 Water

Climate change is also critically threatening the water sector, primarily manifesting itself through changes in the hydrological cycle. Adaptation to climate change is a critical need for the water sector. Adaptation measures should build on existing water resource management practices that have the potential to create climate resilience, as well as enhance water availability and distribution. The major source of water in the State is Ground Water. Ground water resources is contributed by monsoon and non-monsoon rainfall, irrigation return flow, recharge from canals, lakes, ponds, and flood. As compared to 2017 assessment, the Total Annual Ground Water Recharge have decreased from 10.15 to 9.53 BCM in 2020, Annual Extractable Resources have decreased from 9.13 to 8.63 BCM and the Annual Ground Water Extraction from 12.5 to 11.61 BCM. The Stage of Ground Water Extraction has decreased from 137 % to 135 %. The reduction in draft is due to reduction in yield of wells. Out of total 141 assessment units (blocks), 85 units (60.28 %) have been categorized as 'Over-exploited', 12 units (8.51 %) as 'Critical', 14 units (9.93 %) as 'Semi Critical' and 30 units (21.28 %) as 'Safe' categories of assessment units.[4]

Table 12: Water Profile of Haryana

Particulars	Details
Annual Precipitation per year (in mm)	536.5
Total Annual Ground Water Recharge (in BCM)	9.53
Annual Extractable Ground Water Resource (in BCM)	8.63

[4] Dynamic Ground Water Resources Assessment of India - 2020

Current Annual Ground Water Extraction (in BCM)	11.61
Net Ground Water Availability for future use (in BCM)	0.97
Stage of Ground Water Extraction (in %)	134.56

Source: Dynamic Ground Water Resources Assessment of India - 2020

2.6.5 Solar Mission & Non-Conventional Energy and Energy Efficiency

Access to reliable, equitable, clean, and affordable energy services are fundamental to drive economic well-being, alleviate poverty, reduce human drudgery and sustain environmentally sound socio-economic development. Haryana Government has taken steps to increase the provision of clean energy within state through a number of key programmes and policies, such as the Haryana Solar Policy 2016. The Haryana Solar Policy 2016 has committed state solar plants to produce an additional 4,030 MW by 2022. Regulations enforcing the net metering of rooftop solar photovoltaic systems have already been notified by the Haryana Electricity Regulatory Commission building towards producing an additional 1,600 MW by 2022[5]. Improving the energy efficiency meets the dual objectives of promoting sustainable development and of making the economy competitive. The State achieved 100% electrification and all the rural households in Haryana have been saturated i.e.,100 percent villages have been electrified.

Table 13: Energy Profile (Solar & Non-Conventional and Energy Efficiency) of Haryana

Particulars	Details
Estimated Potential of solar energy (GWp)	4.56
Installed Capacity of Grid Connected Solar Projects till 31-12-2020 (MW)	262.42
Number of Solar Home Light installed till 31-12-2020	56727
Number of Solar Lamp installed till 31-12-2020	93853
Number of Solar Street Light Installed till 31-12-2020	34625
Number of Solar Pump installed till 31-12-2020	5014
Capacity of Solar Power Plant installed till 31-12-2020 (kW)	2321.25
Estimated Potential of small hydro power (MW)	107.4
Installed Capacity of small hydro power (MW)	73.50
Estimated Potential of biomass power (MW)	1333
Installed Capacity of biomass power (MW)	212
Estimated Potential of numbers of Biogas Plant units	300000
Cumulative achievement up to 31-03-2020, Numbers of Biogas Plant units	63221
Total Installed capacity in MW (2018-19)	11268
Per Capita Availability of Power in KWh (2018-19)	2116.7
Per Capita Energy Consumption in KWh (2018-19)	2082
Percentage of Village electrified from all sources	100%

Source: MNRE Annual Report 2020-21 and CEA statistics

2.6.7 Sustainable Habitat

Rising issues like food insecurity, inequitable water distribution, improper sewerage, more accumulation of solid wastes, health issues, vehicular growth, pollution, etc. make urban regions more vulnerable to climate change. Migration of people from rural to urban areas is the most important factor of urbanisation. Rapid urbanization with higher population growth creates pressure not only on the access but also on the quality of basic amenities. Such expeditious urbanization means that the Government must constantly analyse and upgrade policies and regulations for urban areas to allow them to grow as feasible and vibrant growth regions, while continuing to be livable and inclusive. About 34.88% of Haryana's population

[5] Haryana Vision 2030

resides in urban areas as per 2011 Census which was higher than that of all India's urban population 31.2%. The state has registered remarkable urban growth of about 44.59 percent during 2001–11, and the urban population has grown from 61.15 lakh to 88.42 lakh during this period.

Table 14: Urban Profile of Haryana

Particulars	Details		
Total Population	25,351,462		
Urban Population	8,842,103		
Urban Male Population	4,720,728		
Urban Female Population	4,121,375		
Urban Pop Growth Rate	44.59 %		
Urban Sex Ratio	873		
Urban Literacy Population	6,440,546		
Urban Literacy Rate	83.14 %		
Male Literacy Rate	88.63 %		
Female Literacy Rate	65.98 %		
Urban Local Bodies	Municipal Corporations-10	Municipal Council-19	Municipal Committees-58

Source: Census 2011 and Statistical Abstract of Haryana 2019-20

2.7 Contribution To NDC In Terms Of Key Indicators

GSDP and emissions of the State has a strong correlation. Tracking of indicators like GSDP growth is an important NDC requirement in terms of moderation of emission intensity by switching to alternative sources of energy. State's per capita energy consumption and forest carbon sink has been compared with national value in the table below to analyze where the State stands in terms of fulfilling its NDC targets.

Table 15: Key Indicators with respect to NDC

Indicators	Unit	2019-20	2030	Remark
GSDP at current prices	In Rs Lakh	8,31,61,021		
Population (Census 2011)	In lakh	253.51		
Urban population (Census 2011)	In lakh	88.42		
Per capita GSDP	In Rs	3,28,038.43		
Electricity Consumption	In GWh	41,017		NITI Aayog (2019)
The status of energy consumption and carbon sink as of 2019				
		Haryana	**All India**	
Per capita energy Consumption	In kWh	2229	1208	CEA
Forest carbon sink	In million tonnes	10.47 million tonnes (38.39 million tonnes of CO2 equivalent)	7124.68 26076.33 CO_2 equiv	

2.8 Performance Of The State Under SDGs

The Sustainable Development Goals (SDGs) are set of 17 global goals that are set by the United Nations General Assembly in 2015 for the year 2030. After coming into force as Global Goals in 2016, many countries have taken proactive measures to achieve the targets on time. India's commitment to achieve SDGs interprets into transforming this country by improving its social, economic, and environmental indicators.

According to SDG India Index Baseline Report 2020-21 of National Institution for Transforming India (NITI) Aayog, the performance of Haryana towards the SDG goals is shown in table below. With a composite score of 67, Haryana is above India's average composite score of 66.

Table 16: Performance of Haryana under SDG Goals

	SDG Goal	Score	Performance Category	Rank among States
Goal 1	No Poverty	69	Front Runner	12
Goal 2	Zero Hunger	58	Performer	11
Goal 3	Good Health & Well Being	72	Front Runner	13
Goal 4	Quality Education	64	Performer	6
Goal 5	Gender Equality	43	Aspirant	21
Goal 6	Clean Water & Sanitation	80	Front Runner	23
Goal 7	Affordable & Clean Energy	100	Achiever	3
Goal 8	Decent Work & Economic Growth	59	Performer	15
Goal 9	Industry Innovation & Infrastructure	66	Front Runner	5
Goal 10	Reduced Inequalities	68	Front Runner	14
Goal 11	Sustainable Cities & Communities	81	Front Runner	6
Goal 12	Sustainable Consumption and Production	77	Front Runner	14
Goal 13	Climate Action	51	Performer	17
Goal 15	Life on Land	48	Aspirant	25
Goal 16	Peace, Justice & Strong Institution	71	Front Runner	18
	Composite Score	67	Front Runner	14

The relative performance of Haryana with respect to other states in the listed sectors in table below has been analyzed for the base year and recent year to understand the progress achieved in the indicators over the period. The percentage change over the time-period has also been calculated.

Table 17: Sectors and SDGs

Sectors included in revised SAPCC	**Sustainable Development Goals being supported**
Agriculture	
Forest	
Water	
Health	

Solar Mission & Non-Conventional Clean Energy	
Energy Efficiency	
Sustainable Habitat	
Himalayan Ecosystem	
Gender	

Table 18: State wise ranking according to performance

Sector		Unit	Year	Haryana	India	Rank	Year	Haryana	India	Rank
Energy										
	Capacity addition[6]	Mega Watt	2012-13	8114	223344	10	2018-19	11268	356100	12
	Electrification (village electrification)[7]	Percentage	2011-12	100.00	3	28	2018-19	100	99.67	-
Forest										
	Enhancement of Forest Cover[8]	Area in sq. km.	2017	1588	708273	28	2019	1602	712249	28
Urban										
	Slum population accommodation (year-wise house completed under PMAY-Gramin)[9]	Numbers	Till 2015-16	5462	871676	14	Till 2019	17795	9099808	17
Health										
	Reduction in vector borne diseases (No. of Malaria cases)[10]	Numbers	2012	26819	1067824	11	2017	6887	842095	12
	Reduction in IMR [11]	Rate	2012	42	42	19	2018	30	32	17
Water										
	Area irrigated/cultivable area (Net Irrigated Area)[12]	000 hectare	2011-12	3073	65707	10	2015-16	2956	67300	10
Agriculture										
	Food grain production[13]	000 Tonnes	2012-13	16226.4	257124.7	6	2018-19	18145.0	285209.4	6
	Horticulture production[14]	000 MT	2012-13	5676.08	268847.57	14	2018-19	8650.88	310738.2	13
	Livestock[15]	Numbers	2012	51640866	1241266621	8	2019	53341056	1385178527	11

[6] NITI Aayog State Statistics, Installed Capacity
[7] NITI Aayog State Statistics, Village Electrification
[8] ISFR Report
[9] PMAY-Gramin Website
[10] NHM Statistics
[11] RBI, Handbook of Statistics on Indian States
[12] RBI, Handbook of Statistics on Indian States
[13] RBI, Handbook of Statistics on Indian States
[14] http://agricoop.nic.in/statistics/horticulture
[15] Livestock Census

2.9 SECTORAL SCHEMES AND THEIR SDGS AND NDCS LINKAGES

Sector	Schemes	Linkage to SDG Goals	Linkage to NDC
Sustainable Agriculture	National Mission for Sustainable Agriculture	2, 13, 15	• To better adapt to climate change by enhancing investments in development programs in sectors vulnerable to climate change, particularly agriculture.
	National Food Security Mission	1, 2	
	National Horticulture Mission	2, 13	
	Rashtriya Krishi Vikas Yojana (RKVY)	1, 2	
	Pradhan Mantri Fasal Bima Yojana	1, 2	
	Paramparagat Krishi Vikas Yojana	1, 2	
	National Mission on Agriculture Extension and Technology	2	
	Management of Soil Health (Soil Health Card Scheme)	1, 2, 15	
	Mission for Integrated Development of Horticulture	2	
	National Mission for Oilseed and Oil Palm	2	
	Sub-Mission of Agricultural Mechanization	2	
	National Livestock Mission	1, 2	
	Pradhan Mantri Matsya Sampada Yojana (PMMSY)	1, 2	
Solar Mission & Non-Conventional Clean Energy	Haryana Solar Policy 2016	7	• Reduction of Emission intensity by 33-35% by 2030 from 2005 level National target of achieving 40% cumulative electric power installed capacity from non-fossil-based energy resources by 2030
	Jawaharlal Nehru National Solar Mission (JNNSM)	7, 11	
	National Biogas & Manure Management Programme (NBMMP)	7	
	LED based Solar Home Lighting System (MANOHAR JYOTI)	7, 11	
	Haryana Rooftop Solar Plant Subsidy Scheme	7, 11	
	SAUBHAGYA Scheme	7	
	LED based SPV Street Lighting Programme	7, 11	
	Remote Village Electrification Programme	7	
	Haryana Rooftop Solar Plant Subsidy Scheme	7, 11	
Energy Efficiency	Mhara Gaon Jag Mag Gaon scheme	7, 11	• o better adapt to climate change by enhancing investments in development programs in sectors vulnerable to climate change, particularly agriculture and allied
	Feeder Sanitization scheme	7, 11, 12	
	Deen Dayal Upadhyaya Gram Jyoti Yojana	7, 11	
	Ujjwal DISCOM Assurance Yojana	7, 11	
	Integrated Power Development Scheme (IPDS)	7, 11, 12	

Forest	National Afforestation Programme	13, 15	• To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030 • To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change
	CAMPA (Compensatory Afforestation Fund Management and Planning Authority)	13, 15	
	Rehabilitation of degraded forests	13, 15	
	Green Belt in Urban Areas	13, 15	
	Development of Agro Forestry in Community/ Farm Lands	13, 15	
	Rehabilitation of Aravali Hills	13, 15	
	Forest Fire Prevention and Management	13, 15	
	Integrated Development of Wildlife Habitats (IDWH)	15	
Industries	The Saur Urja Nivesh (SUN) Solar Park	7, 9	• To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation
	Green technology and innovation: promoting entrepreneurship, redefining the role of IT	9	
Sustainable Habitat	Jawaharlal Nehru National Urban Renewal Mission (JNNURM)	11	• To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation • To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development
	Pradhan Mantri Awas Yojana (PMAY)	11	
	Deen Dayal Jan Awas Yojana 2016	11	
	Smart City Mission	11	
	Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	6, 11	
	Deendayal Antyodaya Yojana-National Urban Livelihoods Mission (DAY-NULM)	11	
	Indira Awas Yojana (IAY)	11	
	Rajiv Awas Yojana (RAY)	11	
	Swachh Bharat Mission (SBM)	3, 6, 11	
	Integrated Solid Waste Management	3, 6, 11	
Water	Jal Jeevan Mission	3, 6, 12, 13	• o better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management (better water use efficiency)
	Indira Gandhi Drinking Water Supply Scheme	3, 6, 13	
	Mera Pani-Meri Virasat Scheme	3, 6, 13	
	Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)	2, 6, 13	
	Integrated Watershed Management Programme	3, 6, 12, 13, 14	
	National Rural Drinking Water Programme	3, 6, 13	
	Accelerated Irrigation Benefit Program (AIBP)	2, 13	
	Desert Development Programme	2, 13	
	Rainwater Harvesting Programme	2, 13	

2.10 Performance of the State under Key NDC Areas: Adaptation Strategy

There are some important NDC areas which need to be focused and prioritized for attaining the targets. Some of them have been detailed in this section and State's performance has been noted in each area.

2.10.1 Poverty and Food Security

To determine the incidence of poverty, availability, and access to food stand as a major factor. Poverty refers to a state when a person is not able to take part in economic activities, to earn sufficient income or unable to sustain the cost of a healthy living. In such a situation, a person is not only deprived of a healthy living but is also not able to make use of opportunity because of lack of adequate resources. The poverty ratio in the State has been declining over the last few years because of centrally sponsored poverty alleviation programmes.

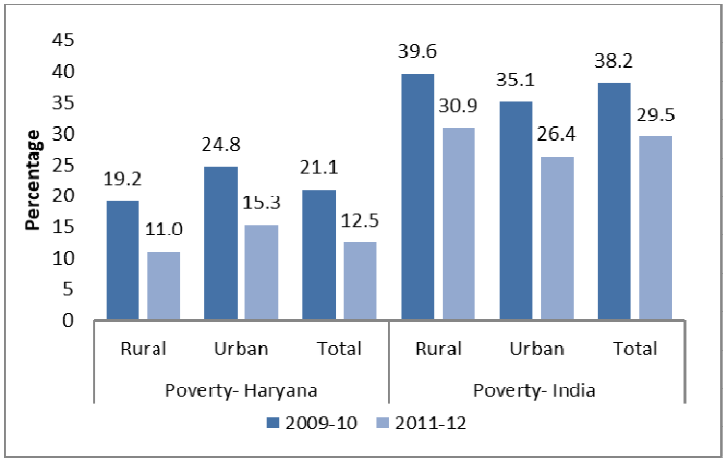


Figure 7: Percentage of people below poverty line

(Source: Report of the expert group to review the methodology for measurement of poverty, Government of India Planning Commission June 2014)

The trend in the poverty level across rural and urban regions of Haryana is shown the figure above. An encouraging trend from the past few years in the State shows that rural poverty decreased much faster than urban poverty. In rural areas, the percentage share of population below poverty line increased from 19.2 to 11.0 whereas in urban regions, the percentage share of population below poverty line had declined from 24.8 to 15.3. The population below the poverty line in rural Haryana has significantly declined from 21.1 per cent in 2009-10 to 12.5 per cent in 2011-12 as against all-India's average figure of 29.05 per cent.

National Food Security Mission (NFSM) is an important investment with an objective for improving the adaptive capacity in the vulnerable areas and is being implemented in the State with an objective of improving the production by expanding area, productivity enhancement, restoring soil fertility and creation of employment opportunities.

Figure below shows the allocations, release, and expenditure under National Food Security Mission (NFSM) for Haryana and India, respectively.

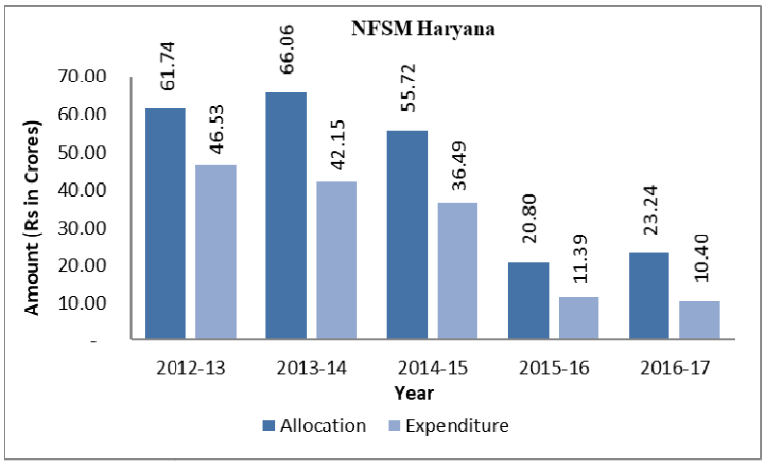


Figure 8: Allocations, Release and Expenditure under National Food Security Mission, Haryana
(Source: Allocation and Release under NFSM)

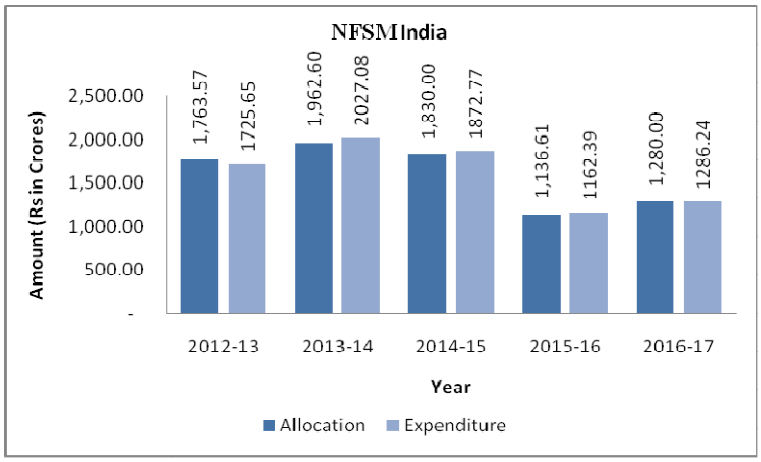


Figure 9: Allocations, Release and Expenditure under National Food Security Mission, India
(Source: Allocation and Release under NFSM)

2.10.2 Sustainable Agriculture (NMSA)

Haryana is known as the "Bread Basket of India" and has been in the forefront in terms of adoption of latest technologies in agriculture. The State is counted as one of the leading states for Agriculture production in the country. Haryana is self-sufficient in food production and the second largest contributor to India's central pool of food grains. The food grain production in the State during 2017-18 was 16191.80 thousand Tonnes, 2018-19 was 18145.00 thousand Tonnes, and during 2019-20 was 17863.50 thousand Tonnes.

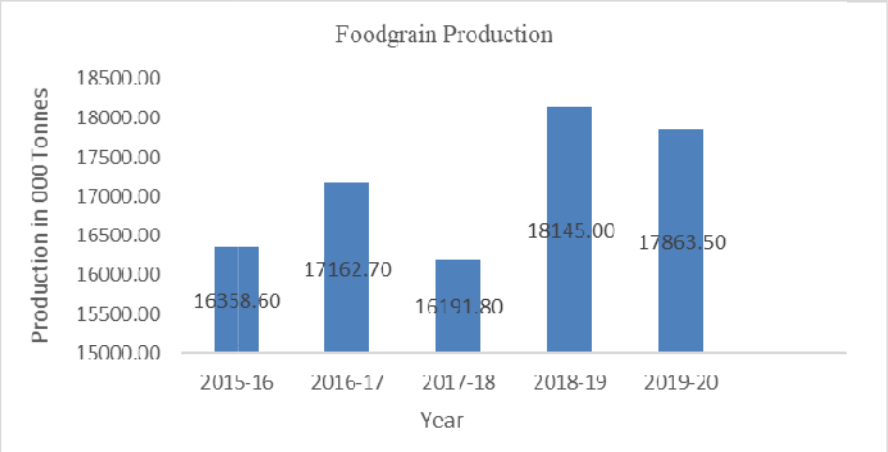


Figure 10: Food Grain Production in Haryana
(Source: Statistical Abstract of Haryana)

National Mission for Sustainable Agriculture (NMSA) is introduced with an objective to increase agricultural productivity and make agriculture more sustainable by focusing on soil health management, farmland management and indigenous farming techniques for resource conservation, water use efficiency and making agriculture more sustainable. NMSA component has a strong adaptation linkage to NDC because NDC clearly defines the appropriate climate resilient farming systems and allied activities for income generation and value addition. Rainfed Area Development and Sub-Mission on Argo-Forestry are the components implemented under this scheme.

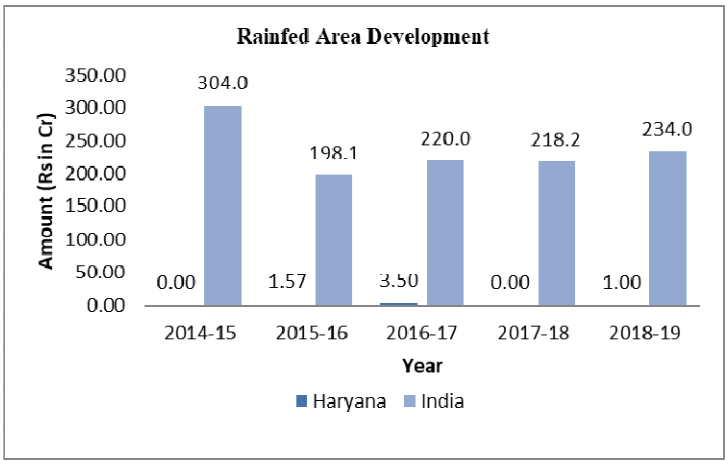


Figure 11: Allocations under National Mission on Sustainable Agriculture, Rainfed Area Development
(Source: National Mission on Sustainable Agriculture Website)

The chart above represents the allocation under Rainfed Area Development in the State. Rainfed Area Development Programme (RADP) aims to promote Integrated Farming System (IFS) with importance on multi-cropping, rotational cropping, inter-cropping, mixed-cropping practices with allied activities like horticulture, livestock, fishery, agro-forestry, apiculture, conservation/promotion of NTFPs etc. so as to enable farmers not only in increasing the farm returns for sustaining livelihood, but also to mitigate the impacts of drought, flood or other extreme weather events.[16]

[16]National Mission for Sustainable Agriculture (NMSA), Operational Guidelines

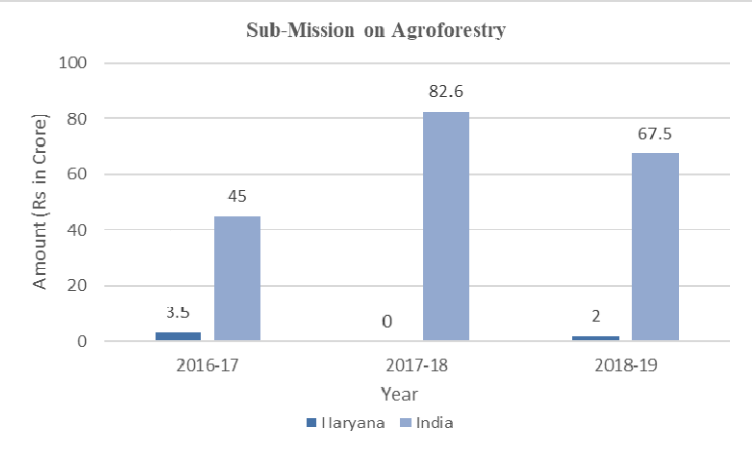


Figure 12: Allocation under Sub-Mission on Agro Forestry
(Source: National Mission on Sustainable Agriculture Website)

The chart above shows the allocation under Sub-Mission on Agro Forestry in the State. Sub-Mission on Agro forestry aims at increasing the tree coverage in farm areas complementary with agricultural crops. The State had fund allocation under sub-Mission on agro forestry of Rs 3.5 crore during 2016-17 and Rs 2 crore during 2018-19.

Rashtriya Krishi Vikas Yojana (RKVY) is an important contributor to poverty reduction and food security. Its objective is to assist the States in preparing agriculture development plans and achieve sustainable growth in agriculture sector by ensuring a holistic development of agriculture and allied sectors.

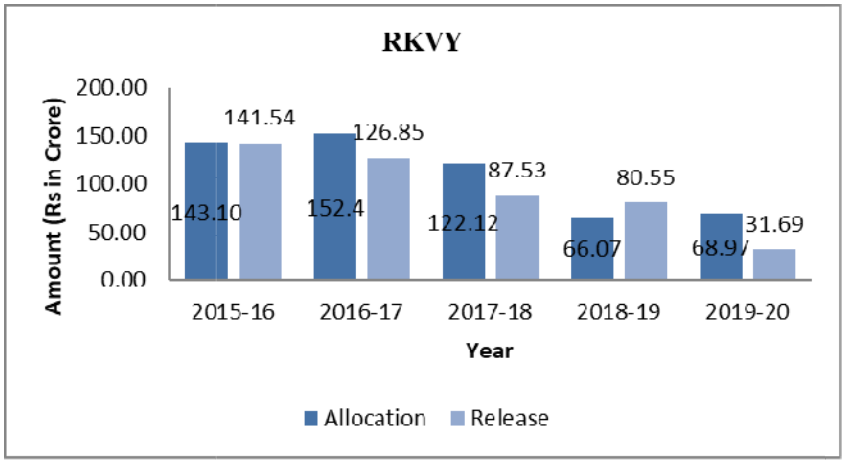


Figure 13: Allocation and Release under Rashtriya Krishi Vikas Yojana, Haryana
(Source: Statement Showing allocation release and expenditure year wise)

The chart above shows the allocation and release of the State under RKVY for different years. The activities of RKVY are associated with agriculture, horticulture and allied sectors that have strong linkage to livelihood and employment generation.

Soil Health

Soil testing plays a major role in climate resilient agriculture by examining nutrient status of the soils and by giving suggestions on judicious use of fertilizers. Declining soil health in terms of soil erosion, pollution, losses of organic matter can impact livelihoods in future. Soil Health Management aims to promote location as well as crop-specific sustainable soil health management. Soil Health becomes an important component for sustainable profitability of the farmers.

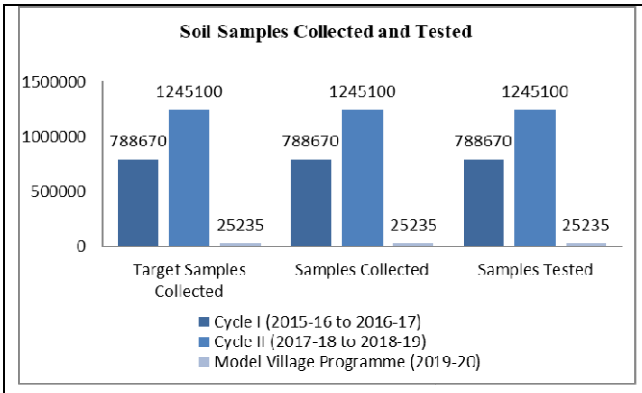


Figure 14: Soil Samples Collected and Tested

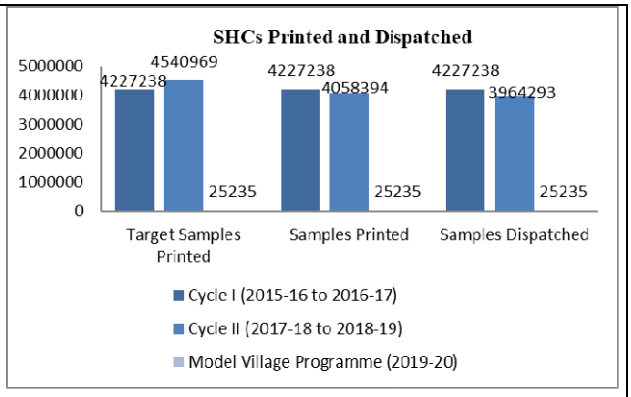


Figure 15: Soil Health Cards Printed and Dispatched

(Source: Soil Health Card Website, Scheme Progress)

In the first cycle, 100% of the target soil samples was collected and tested whereas in the second cycle, 100% of the target soil samples were collected and tested. In Model Village Programme (2019-20), 100% of the target soil samples were collected and were tested. In the first cycle, 100% of the SHCs were printed and dispatched whereas in the second cycle, only 89.37% of the SHCs were printed and only 87.30% of the SHCs were dispatched. In Model Village Programme (2019-20), 100% of the SHCs were printed and dispatched.

2.10.3 Enhancement of Carbon Sink and Green India Mission

Green India Mission aims to protect, restore, and enhance forest cover. The mission also involves adoption of adaptation and mitigation measures to respond to climate change by focusing on goals like increase in forest and tree cover to extent of 5 Mha, increase the quality of existing forest and tree cover, development of eco system services like carbon sequestration and storage, biodiversity, hydrological services and provision of fuel, fodder, and Non-Timber Forest Products (NTFPs); and to increase forest-based income.

Compensatory Afforestation Management and Planning Authority (CAMPA) have been formed to monitor the effective implementation of the compensatory afforestation efforts in the country. The main objective for allocation of funds under CAMPA was to reduce the impact of diversion of forest land for non-forest purpose. Figure below shows the allocation of funds to the State under CAMPA scheme.

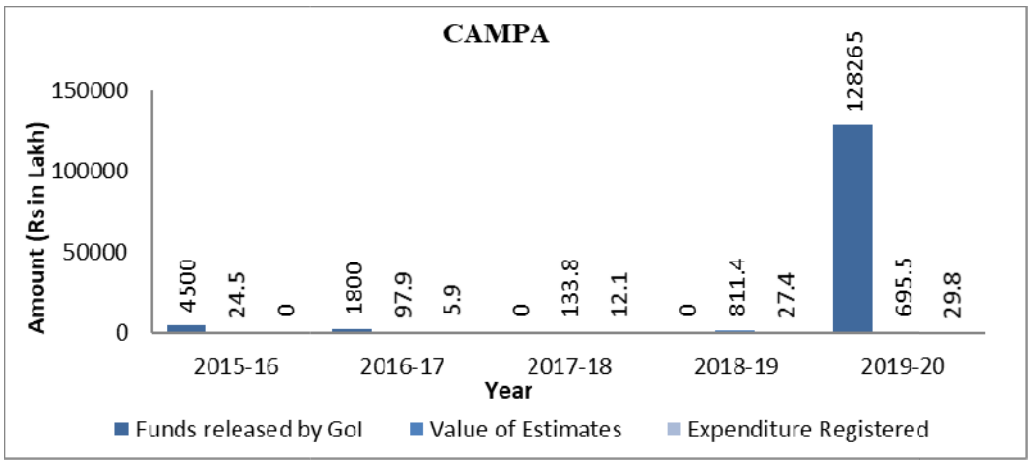


Figure 16: Allocations under Compensatory Afforestation Management and Planning Authority (CAMPA)
(Source: egreenwatch.nic.in, Year-Wise State-Wise Expenditure Summary of Campa Fund)

As per the ISFR 2019 by FSI, the forest cover in the State is 1,602.44 sq km, out of which 28.00 sq km is Very Dense Forest (VDF), 450.90 sq km is Moderately Dense Forest (MDF) and 1,123.54 sq km is Open Forest (OF). Forest Cover is 3.62 percent of the State's geographical area. State's forest Cover has decreased by 14.44 sq km when compared to the ISFR 2017 assessment report. The total carbon stock in the forest of Haryana is 10.47 million tonnes (38.39 million tonnes of CO_2 equivalent) which is 0.15 percent of the total forest carbon stock of the country.

2.10.4 Water Resources and Water Use Efficiency

National Water Mission was introduced with an objective of conserving water, minimizing its wastage, and ensuring its equitable distribution. The Mission also focuses on improving water use efficiency by 20 percent. To achieve the goal, several schemes like more crop per drop (micro-irrigation), Har khet ko Pani, watershed activities, plantation, and farm ponds, etc. were implemented.

Table 19: Total Cropped Area, Gross Irrigated and Un-Irrigated Area in Haryana

Year	Total Cropped Area	Net Irrigated Area	Gross Irrigated Area	Percentage of Gross Irrigated Area to Total Cropped Area
2014-15	6536	2974	5824	89.11
2015-16	6578	3014	5948	90.42
2016-17	6452	3177	5737	88.92
2017-18	6549	3261	5993	91.51
2018-19	6605	3282	6024	91.20
2014-15	6536	2974	5824	89.11

Source: State Statistical Abstract of Haryana

The percentage of gross irrigated area to gross cropped area in the State ranges between 88-92 percent as shown in the table above.

Table 20: State-wise ground water resources availability

(In BCM)

State	Annual Replenishable Ground Water Resource				Total Annual Ground Water Recharge	Natural Discharge during non-monsoon season	Annual Extraction Ground Water Resource
	Monsoon Season		Non-monsoon				
	Recharge from rainfall	Recharge from other source	Recharge from rainfall	Recharge from other source			
Haryana	3.24	2.81	0.58	2.90	9.53	0.90	8.63

(Source: Dynamic Ground Water Resources Assessment of India - 2020)

Table 21: State-wise ground water resources utilization and stage of development

(In BCM)

State	Annual Ground Water Draft			Annual GW Allocation for Domestic use as of 2025	Net Ground Water Availability for future use	Stage of Ground Water Development (%)
	Irrigation	Domestic and industrial uses	Total			
Haryana	10.47	1.12	11.61	0.57	0.97	134.56

(Source: Dynamic Ground Water Resources Assessment of India - 2020)

Total Annual Ground Water Recharge of the State has been assessed as 9.53 BCM and Annual Extractable Ground Water Resource is 8.63 BCM. The Total Current Annual Ground Water extraction is 11.61 BCM and Stage of Ground Water extraction is 134.56 %.

Integrated Watershed Management Programme

The main objectives of the Integrated Watershed Management Programme are to put back the ecological balance by harnessing, conserving, and developing degraded natural resources such as soil, vegetative cover and water. The results are soil erosion prevention, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area. The watershed structures include farm ponds, nala bund, percolation tanks and water recharge structures.

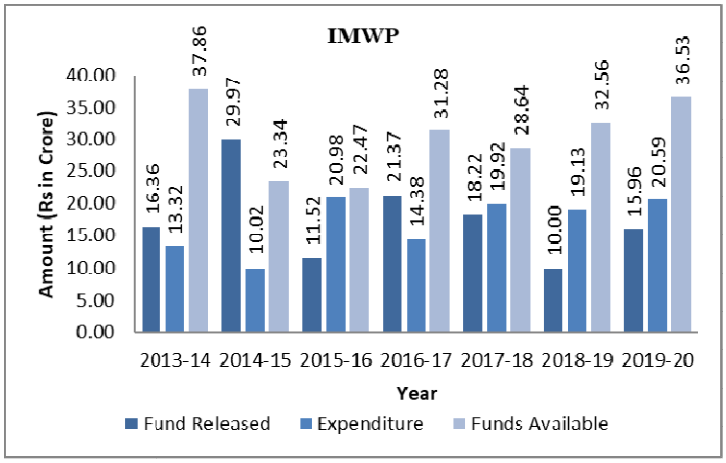


Figure 17: Financial Allocations under Integrated Watershed Management Programme

(Source: IWMP MIS Dashboard)

2.10.5 Drinking Water and Sanitation

Special efforts are given by the National government to revamp the conditions of water and sanitation in India. Swachh Bharat Mission is introduced as a transformational step in this pathway which aims to make the villages open defecation free. The Mission has numerous social benefits like reduction in emission and disease burden, and livelihood improvement. Total household toilet constructed in the State as per Swachh Bharat Gramin is 6, 34, 476[17] (till 2019-20).

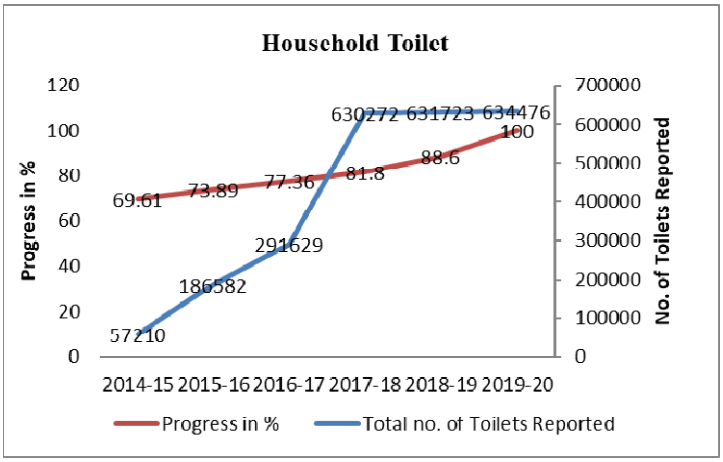


Figure 18: Trend of Household Toilet Coverage in Haryana
(Source: Swachh Bharat Mission Gramin MIS)

As per Swachh Bharat Gramin, total number of villages declared ODF in Haryana is 6908[18]. The progress in ODF across the State is given below:

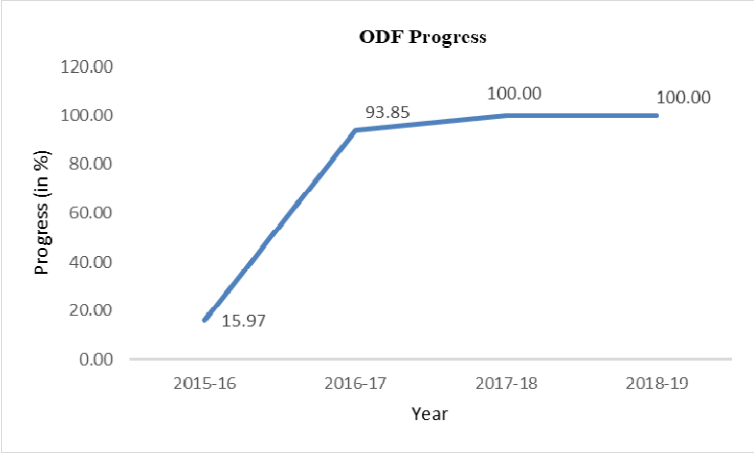


Figure 19: Trend of ODF in Haryana
(Source: Swachh Bharat Mission Gramin Dashboard ODF)

Central Government of India started helping the States for rural water supply since 1972 with the launch of Accelerated Rural Water Supply Programme. In 2009, this was renamed as National Rural Drinking

[17] Swachh Bharat Mission Gramin MIS
[18] Swachh Bharat Mission Gramin Dashboard

Water Programme (NRDWP), a centrally sponsored scheme, with fund sharing between the Centre and the States.

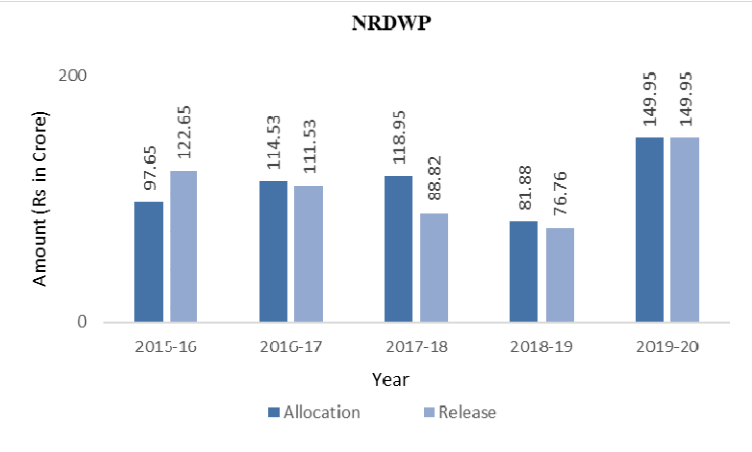


Figure 20: Performance of drinking water supply
(Source: Ministry of Drinking water and Sanitation, NRDWP)

The chart above shows year-wise allocation and release in National Rural Drinking Water Programme. NRDWP aims to enable all households to have access to and use safe and adequate drinking water within premises. The goal was proposed to achieve by 2030 following UN's Sustainable Development Goals but now through Jal Jeevan Mission (JJM) the goal is proposed to achieve by 2024.

Jal Jeevan Mission has been designed with an integrated approach with end-to-end measures; that is from source to supply to reuse and recharge. The 'Har Ghar Jal' programme has been proposed as a 'Jan Aandolan' - people's movement. The objective of Jal Jeevan Mission is to enable every rural home in the villages to have Functional Household Tap Connections (FHTC) by 2024. [19] Haryana has achieved 100% Households with tap water connections, that is total 30,96,792 households are provided under FHTC.

2.10.6 MGNREGA and Climate Benefits

The key activities of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the climate benefits helping in adaptation and reduction of vulnerability in the State is:

Table 22: MGNREGA and Climate Benefits

Key activities Key benefits helping in adaptation and vulnerability reduction	Key activities Key benefits helping in adaptation and vulnerability reduction
Livelihood	Wage employment and social protection for the poor
Water Resources	MGNREGS works like water conservation and harvesting works, drought proofing, irrigation provisioning and improvement works, and renovation of traditional water bodies have contributed to improved ground water levels
Land Resources	MGNREGS works related to land development such as land levelling, conservation bench terracing, contour and graded bunding, field bunding, pasture development, silt application and drought proofing have contributed to improved soil organic carbon (SOC) content, reduced surface runoff and reduction in soil

[19] Jal Jeevan Samvad November 2020

	erosion
Carbon Sequestration	MGNREGS works related to increase in soil organic carbon, and increasing tree plantations and fruit orchards leading to carbon sequestration in biomass and soil, potentially contribute to mitigation of climate change
Plantations	MGNREGS works related to drought proofing such as afforestation and reforestation, Soil quality improvement with increase in soil organic carbon, carbon sequestration, soil moisture retention, reduction in diurnal variability in temperature, biodiversity (reduced risk), biomass production (fuel wood)
Overall	MGNREGS works related to water and land development have contributed to generation of environmental benefits such as ground water recharge, increased water availability for irrigation, increased soil fertility, reduction in soil erosion, and improved tree cover. These environmental benefits derived from MGNREGS works have contributed to reducing the agricultural and livelihood vulnerability in the post-MGNREGS implementation period, compared to the pre-MGNREGS period and further have the potential to not only build resilience to cope with current climate risks but also build long-term resilience to projected climate change.

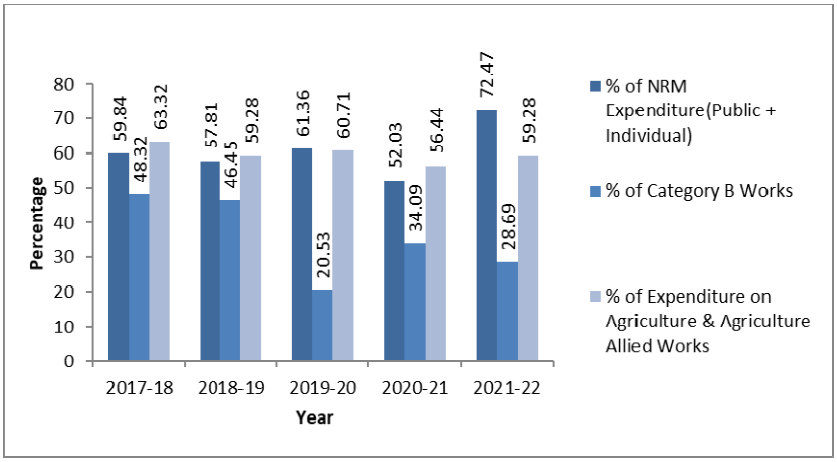


Figure 21: Expenditure of Major Works taken up under MGNREGA
(Source: MNREGA Official Website)

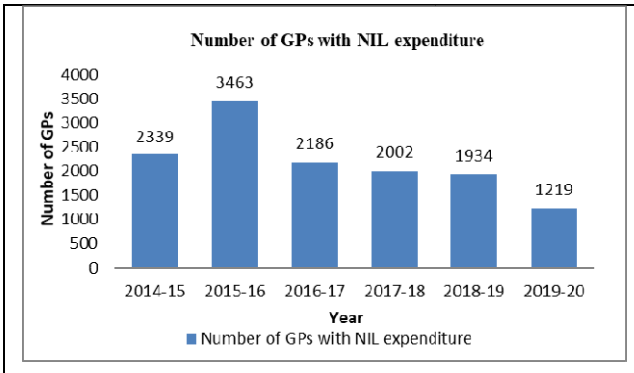


Figure 22: Number of GPs with Nil Expenditure

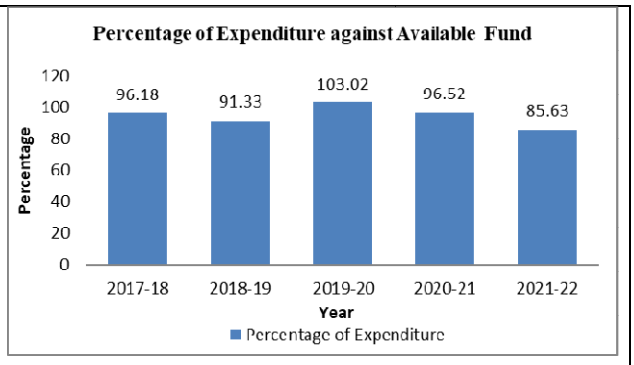


Figure 23: Percentage of Expenditure against Available Fund

(Source: MGNREGA Official Website)

The State has 140 blocks and 6184 Gram Panchayats. Under MGNREGA, total job cards issued in Haryana till September 2021 were 11.91 lakh which covered 20.86 lakh workers. Of the total job cards issued, total active job cards were 5.85 lakh.

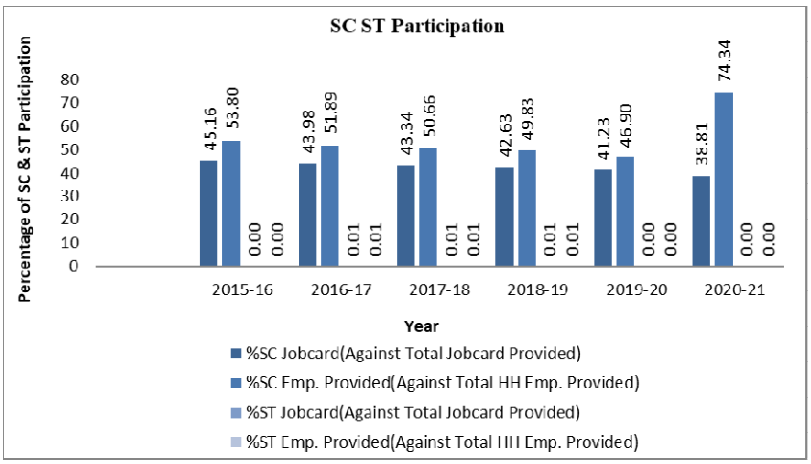


Figure 24: SC& ST Participation in MGNREGA in Haryana
(Source: MGNREGA Official Website)

The chart above shows the participation of SC and ST workers in MGNREGA in the State. The total number of active workers in the State is 8.64 lakh, out of which the percentage of SC workers against active worker is 45.27 percentage.

2.10.7 Health Outcomes

Climate Change affects the basic requirements for maintaining health, clean air and water, sufficient food, adequate shelter and causes new challenges in controlling infectious diseases. During 2019-20, the medical infrastructure available in the state include 68 Hospitals, 133 CHCs, 536 PHCs and 2655 Sub-Centers[20]. In case of Infant Mortality Rate (IMR), the State has achieved 30 per 1,000 live births as per Sample Registration System (SRS) 2018.

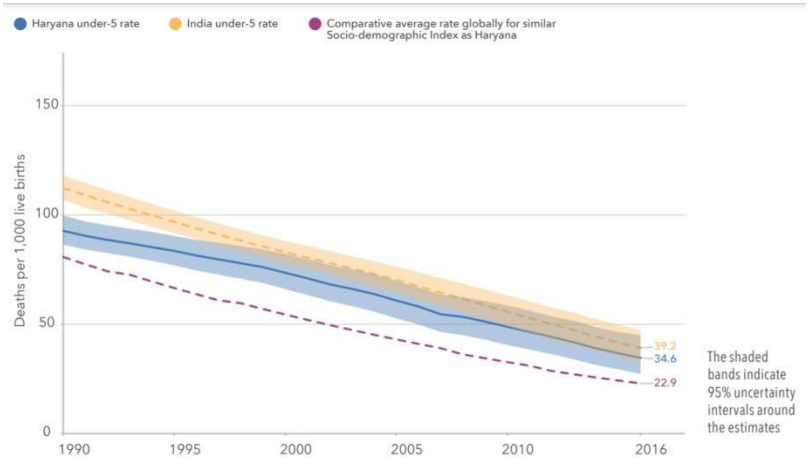


Figure 25: Under five mortality rates from 1990-2016 for Haryana and all-India
(Source: Haryana Disease Burden Profile)

[20] State Statistical Abstract Haryana 2019-20

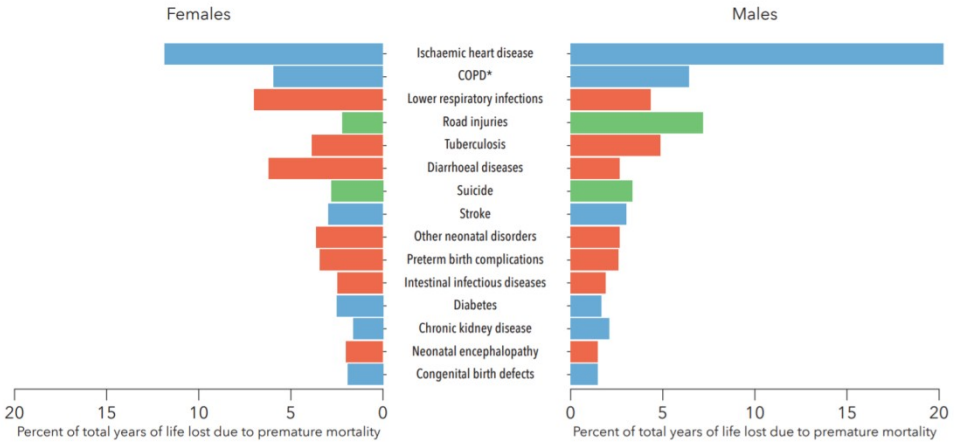


Figure 26: Pattern of disease burden in Haryana
(Source: Haryana Disease Burden Profile)

Diseases contributing to loss in maximum years due to premature mortality in 2016 are Heart diseases, Pulmonary diseases, Respiratory diseases and diarrhoeal diseases. Some major risk factors are high blood pressure, dietary risk, air pollution and malnutrition. Most of the risk factors have strong association to climate and other environmental changes. Reasons for water borne diseases can be because of non-availability of safe drinking water and increase in water pollution.

National Health Mission aims to reduce health related vulnerability. Major objectives of NHM are as follows:

- To provide accessible, affordable, accountable effective and reliable primary health care facilities, especially to the poor and vulnerable sections of the population
- To bridge the gap in Rural Health Care services through creation of a cadre of Accredited Social Health Activists (ASHA) in certain pockets like the tribal areas and improved hospital care, decentralization of programme to district level to improve intra and inter-sectoral convergence and utilisation of resources
- To provide overarching umbrella to the existing programmes of health and family welfare including Malaria, blindness, iodine deficiency, filaria, kalaazar, TB, leprosy and rural disease surveillance

Financial allocation, release and expenditure of the State under National Rural Health Mission (NRHM) and National Urban Health Mission from 2014 to 2018 is given in figure below:

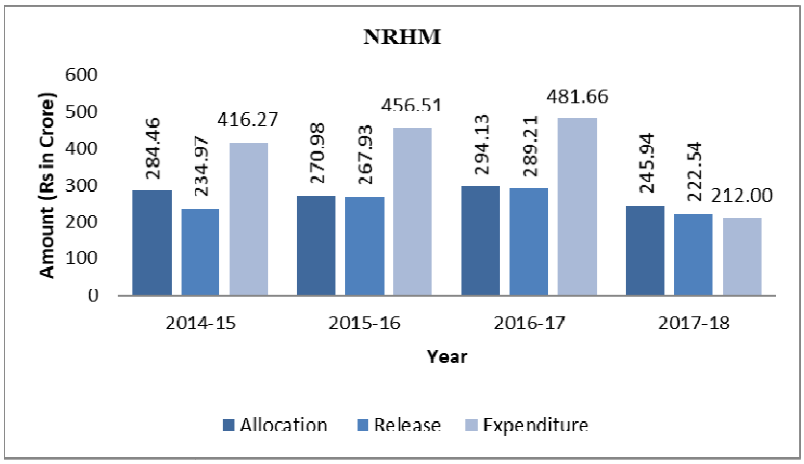


Figure 27: Financial allocation, release, and expenditure of the State under NRHM
(Source: Achievements under NRHM and NUHM, Published- 06-February-2018)

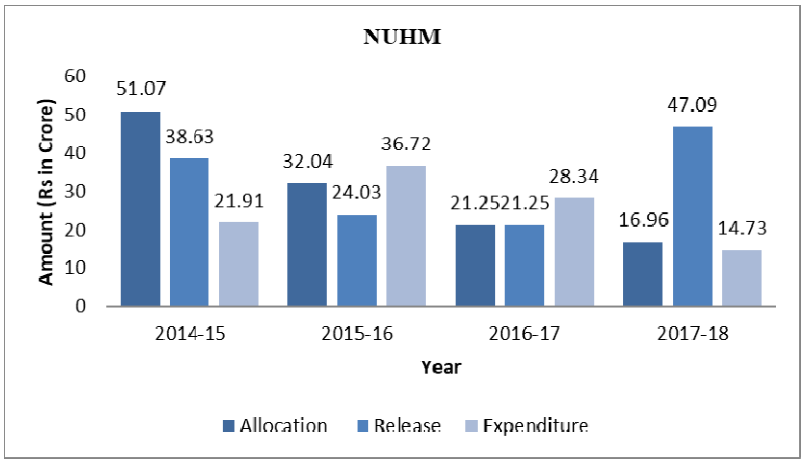


Figure 28: Financial allocation, release and expenditure of the State under NUHM
(Source: Achievements under NRHM and NUHM, Published- 06-February-2018)

2.10.8 Strategic Knowledge for Climate Change

Strategic Knowledge for Climate Change focuses on formulating a dynamic knowledge system that would help in achieving the objective of ecologically sustainable development and in creating a better understanding by reducing knowledge gaps and upgrading the information available related to climate science and its impacts. Strategic Knowledge for Climate Change addresses several issues by identifying different climate sensitive actions and educating on activities with the objective of development, adaptation and mitigation.

In order to achieve an overall sustainable development, it is important to keep the climate change concerns in the State view. Haryana Mission on Strategic Knowledge has proposed the Climate Change Cell focuses to create a better understanding of climate change, its effects on different sectors and also vulnerabilities of the sectors so as to to enable sustainable adaptation to climate change and mitigation of drivers of climate change. Haryana has an agrarian economy and agriculture is highly sensitive to climate effect. State faces a huge challenge in providing water for irrigation (to assist agriculture sector that forms the backbone of the state's economy) and drinking water, so focus will be on water sector also.

The Climate Change Cell proposed under Haryana Mission on Strategic Knowledge also focuses on strenthening the technical capacity of the concerned departments to cope up with the issues rising due to climate change, adaptation capability, monitoring, awareness creation and financial management. It also aims at sharing and exchange of data of relevance to climate change, responses and mainstreaming climate change in development programmes of the state.

2.11 Performance of the State under Key NDC Areas: Mitigation Strategy

2.11.1 Sustainable Habitat

National Mission for Sustainable Habitat predominantly focuses on how urban regions can cope with the new challenges arising due to climate change. Its main objective is to make sure that cities are resilient to face the after effects of climate change. Central Government of India has launched two important Missions, Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart City that focuses on urban habitations, waste management and emission reduction in the cities. Besides this, the State has also Deendayal Antyodaya Yojana-National Urban Livelihoods Mission (DAY-NULM). In Haryana, Karnal and Faridabad has been selected under the Smart City Mission. Atal Mission for Rejuvenation and Urban Transformation (AMRUT) aims to provide basic services (that include water supply, sewerage facilities, storm water drainage; non-motorized transport and upgrade green spaces).

Table 23: Sector Wise Proposed Total Project Fund and Sharing Pattern for the year 2015-20 in AMRUT

								(Amount in Crore) Year 2017-20
Sl. No	**Sector**	**No of Project**	**GoI**	**State**	**ULB**	**Convergence**	**Others**	**Total**
1	Water Supply	81	703.57	682.57	0.00	0.00	21.00	1407.13
2	Sewerage & Septage Management	73	698.38	698.38	0.00	0.00	0.00	1396.75
3	Drainage	41	350.26	350.26	0.00	0.00	0.00	700.51
4	Urban Transport	68	306.42	306.42	0.00	0.00	0.00	612.84
5	Green Spaces & Parks	119	89.33	89.33	0.00	0.00	9.00	196.66
6	Reforms	0.00	0.00	0.00	0.00	0.00	0.00	70.00
	Grand Total	**382**	**2226.95**	**2126.95**	**0.00**	**0.00**	**30.00**	**4383.89**

For 2015-20, allocation of funds for AMRUT under Central Share is Rs 2226.95 Crore and allocation of funds under State is Rs 2126.95 Crore. The total sector wise proposed fund under AMRUT fund during 2015-20 is Rs 4383.89 Crore.

2.11.2 Energy Efficiency and Solar Mission

As per latest data given by Union Minister for Power and New and Renewable Energy, JUL 2021 Government of India had set a target of 175 GW installed capacity from renewable sources by the year 2022 which includes 10 GW from Solar, 60 GW from Wind, 10 GW from Biomass and 5 GW from Small Hydro. Government of India has revised the target again to install 480 GW RE power with 280 MW of solar power by 2030. As on 30.06.2021, the total capacity of Renewable Energy installed: under installation and under tied was 96.95 GW. This does not include large Hydro, which is also renewable. As on 30.06.2021, the total power generation capacity installed from non-fossil fuel sources was 150.06 GW; which is 39% of the total installed capacity[21].

[21] Information by HAREDA

Haryana's power generation mix is comprised of 75% thermal, 15.9% hydro, 6.1% gas, 1.28 % non-solar renewable, 0.9% nuclear and 0.49% solar energy. The total installed capacity of power in Haryana State is 12,305 MW (including share in Central and joint projects (Source CEA). The share of power from Renewable Energy Sources in the State is 670.3 MW as on date, which is 5.4% of the installed capacity.

Table 24: Renewable energy potential and Achievement

Source	Approx. Potential	Achievement
Solar MW Scale	**4030 MW**	88.90 MW
Solar Rooftop		183.22 MW
Small Hydro	**100 MW**	73.50 MW
Solar Water Pumping System	**-**	30.26 MW
Solar Water Heating system	**-**	75.00 MW
Other Solar Projects	**-**	21.1 MW
Biomass Power Projects	**1000 MW**	27.40 MW
Biomass Gasifiers		4.07 MW
Biomass Cogeneration		59.51 MW
Bagasse cogeneration	**100-150 MW**	102.00 MW
Biogas Based Power (Cattle Dung and Poultry)	**11.52 Lakh CuM (96 MW)**	5.34 MW
Total		670.3 MW

Source: HAREDA

The Haryana Solar Policy 2016 has committed state solar plants to producing an additional 4,030 MW by 2022. The major objectives of this policy are to promote generation of green and clean power in the State using solar energy, productive use of wastelands / non – agricultural lands thereby leading to socio-economic transformation and a reduction in regional disparities in development, employment generation and skill up gradation of the youth. The Policy also aims at decentralization and diversification of the energy portfolio and to increase the share of renewable solar power. To promote the renewable energy sources, the following steps have been taken:

- Waiver of inter-State transmission charges on transmission of the electricity generated from the solar and wind sources, for projects to be commissioned up to 30th June 2025.
- Green energy corridors have been developed to evacuate power from the Renewable Energy Sources.
- Renewable Purchase Obligation Trajectory has been notified with the objective of creating renewable power capacity of 175 GW by year 2022.

The State would implement 24x7 ‘Power for All’ (PFA) programme to bridge current gaps in providing reliable power supply. Government has taken efforts towards energy conservation that has been enforced through the Energy Conservation Building Code and waste-to-energy projects. Programmes like these have contributed to the overall strengthening of Haryana's energy infrastructure, both in terms of capacity and efficiency.

CHAPTER 3: CLIMATE PROFILE

3.1 INDIAN SCENARIO

As per IPCC, Climate Change is generally defined as "a change in the state of the climate that can be identified (e.g., using statistical analysis) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer" (IPCC 2014). The climate change can be as per the various bio-physical properties ofthe earth as well as anthropogenic causes. Anthropogenic climate change is defined as a change in climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere (e.g., increase in greenhouse gases due to fossil fuel emissions) or surface characteristics e.g., deforestation) and which is in addition to natural climate variability observed over comparable time periods. It is reported that, in India, the mean annual temperature is increased by 0.6 degree Centigrade over the last century; the monsoon rainfall is declined over the last three decades of the 20th century in many parts of the country, while some parts have showed an increasing trend in the observed frequency of heavy precipitation events.[22] Recently launched IPCC AR6 report findings state that a decrease in mean rainfall over most parts of the eastern and central north regions of India is seen. It also states that frequency of moderate and heavy precipitation events has been on the rise since 1950. Key driver of monsoon anomaly (largely the deficit aspects) in India is due to anthropogenic aerosol forcing. The report predicts longer heat wave duration and rise in frequency and intensity of extreme events. However, there might be slight increase in the precipitation in India in the long term[23]. (IPCC 2021).

3.2 CLIMATE PROFILE OF HARYANA: PAST AND ONGOING CLIMATE TREND

Haryana lies between Haryana lies in the area bounded by 27°39', 31°N latitudes and 74°30'E longitudes. The state has sub-tropical, semi-arid to sub-humid climate. The districts Karnal, Ambala and a portion of Kurukshetra district lying between Karnal and Ambala and Chandigarh fall under the climatic type of Sub-tropical monsoon, Mild winter, dry winter, hot summer. Only Sirsa district has got climatic type: tropical desert, Arid, hot and Hisar district has a climatic type varying between (Tropical Steppe, Semi-arid). Hottest months are May and June, and coldest months are December and January. 82% of the rainfall in the state occur during monsoon season (JJAS). state gets highest rainfall (33%) of southwest monsoon rainfall in August month while the July month get 32% of the southwest monsoon rainfall. June and September receive 14% and 21% of southwest monsoon rainfall. Shivalik region is the wettest and Aravalli region is driest. Winter month temperature range is 3-9°C and summer month temperature range 35-48°C. Region wise mean annual temperature and precipitation has been given in the table below.

Bio-physical region	Mean annual temperature (°C)	Annual Average Precipitation (mm)
Hot Arid Region	27	300-500
Hot Semi-Arid Region	26	500-750
Hot Sub-humid region	24	750-1050

3.2.1 Rainfall Trend

Analysis of rainfall data from 1989-2018 (IMD 2020)[24] shows that variability of monsoon rainfall and annual rainfall are 31% and 27.2% respectively. In terms of annual rainfall three districts viz. Ambala, Panchkula and Panipat show significant decreasing trend, rest of the districts show decreasing trend too,

[22] IPCC (2014). 'Summary for Policymakers', in Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Farahani, E., Kadner, S., Seyboth, K., Adler, A., Baum, I., Brunner, S., Eickemeier, P.,Kriemann, B., Savolainen, J., Schlömer, S., von Stechow, C., Zwickel, T. and Minx, J.C.(Eds.): Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, NY, USA

[23] Zhongming, Z., Linong, L., Wangqiang, Z., & Wei, L. (2021). AR6 Climate Change 2021: The Physical Science Basis.

[24] IMD (2020) Met Monograph No.: ESSO/IMD/HS/Rainfall Variability/09(2020)/33

but these are not significant. If the entire southwest monsoon period is considered six districts viz. Panchkula, Ambala, Kaithal, Panipat, Bhiwani, Charkhi Dadri has shown significant decreasing trend and rest of state has non-significantly decreasing trend.

Annual Rainy days which have implications on crop husbandry and logistics show the following trends:

District Clusters	No of rainy days in a year
North- eastern	38-43
North- western	20-24
Rest of the districts	24-38

Heavy rainfall days show the following trends:

District Clusters	Heavy rainfall days in a year
North- eastern	3-4
North- western	0.6-1
Rest of the districts	1-2

3.2.2 Temperature Trend

As per the IMD data, both minimum and maximum temperature is showing an increased trend in the state. In pre monsoon season (March-May) both maximum and minimum temperatures show significant increasing trends in the state with max temperatures in the range (+0.04 to 0.08°c/ year) and minimum temperatures in the range (+0.1 to 0.05° c/year). Significant trends have been observed in Hisar (+0.02°C/year), Ambala (+0.01°c/year) respectively[25].

3.3 Climate Change scenarios Representative Concentration Pathways (RCPs)

The IPCC scenarios provide a mechanism to assess the potential impacts on climate change. Global emission scenarios were first developed by the IPCC in 1992 and were used in global general circulation models (GCMs) to provide estimates for the full suite of greenhouse gases and their potential impacts on climate change. Since then, there has been greater understanding of possible future greenhouse gas emissions and climate change as well as considerable improvements in the general circulation models. The IPCC, therefore, developed a new set of emissions scenarios. The process by which these new scenarios are being produced differs from earlier scenario development.

The new process aims to both shorten the time required to develop and apply new scenarios, and to ensure better integration between Socio-Economic driving forces, changes in the climate system, and the vulnerability of natural and human systems. Rather than starting with Socio-Economic scenarios that give rise to alternative greenhouse gas emissions, the new scenarios take alternative futures in global greenhouse gas and aerosol concentrations as their starting point. These are called Representative Concentration Pathways (RCPs). The Representative Concentration Pathways (RCP) are based on selected scenarios from four modelling teams/models working on integrated assessment modelling, climate modelling, and analysis of impacts.

[25] Paul, S., & Singh, O. P. (2014). A study on trends in meteorological parameters over Punjab and Haryana. *MAUSAM*, *65*(4), 603-608.

RCPs are four greenhouse gas trajectories adopted by the IPCC for its Fifth Assessment Report (AR5). The four RCPs; RCP2.6, RCP4.5, RCP6, and RCP8.5, are named after a possible range of radioactive forcing values in the year 2100.

Table 25: Overview of Representative Concentration Pathways (RCPs) adopted by IPCC AR5

RCP	Description	IA Model
RCP 8.5	Rising radioactive forcing pathway leading to 8.5 W/m2 in 2100.	MESSAGE
RCP 6	Stabilization without overshoot pathway to 6 W/m2 at stabilization after 2100	AIM
RCP 4.5	Stabilization without overshoot pathway to 4.5 W/m2 at stabilization after 2100	GCAM (MiniCAM)
RCP 2.6	Peak in radiative forcing at ~ 3 W/m2 before 2100 and decline	IMAGE

Resolution of the projected climate data is at a grid-spacing of 0.5°x0.5° for IPCC AR5 scenarios, namely, RCP8.5 (a scenario of comparatively high greenhouse gas emissions and does not include climate policy interventions) and RCP4.5 (moderate emission scenario and assumes climate policy intervention to transform associated reference scenarios). Ensembles mean of 3 regional climate models (RCM), namely, REMO (from MPI), RCA4 (from SMHI) and CCAM (from CSIRO) has been used for the analysis. Ensemble mean is chosen to reduce model related uncertainties and ensemble mean climate is closer to observed climate than any individual model.

3.4 Climate Projections & Analysis

For Haryana State and districts, IPCC AR5 RCP4.5 and RCP8.5 scenarios has been analyzed for the annual maximum and minimum temperature and precipitation.

Table 26: Summary of Climate Analysis

Observed Climate Data[26] (1951-2018): IMD Gridded Data		
Temperature	**Precipitation**	**Climate Extremes**
Increasing trends observed for both maximum and minimum temperatures (high confidence) (for the entire region it is 0.1°C - 0.2°C per year). Maximum temperature rise (0.4-0.8 deg C/year) and minimum temperature rise 0.1 to 0.05 dec C/year.	In terms of annual rainfall three districts viz. Ambala, Panchkula and Panipat show significant decreasing trend, rest of the districts show decreasing trend (low confidence)	Extremely wet days are increasing in all districts except Palwal, Sirsa, Faridabad, Gurgaon in high emission baseline scenario.
Projected Climate Data[27] (2021-50): RCP 4.5 and RCP 8.5		
Projected change in Temperature Under RCP 4.5 **T_{max}: 1.3°C** **T_{min}: 1.4°C**	Projected annual precipitation changes **Under RCP 4.5** Decrease by 0.9%	Projected extreme events: Very heavy precipitation events may increase by 2.5% by mid-century under RCP 8.5. However, warm spells are likely to increase by 10-fold and flooding events are likely to be more frequent in future and will become increasingly challenging for

[26] Based on IMD Gridded data for 63 years

[27] Based on 29 GCM CMIP simulated for Mid Century Scenario (near term to our NDC 2030) under RCP 4.5 and RCP 8.5 scenarios

Under RCP 8.5 **T_{max}: 1.6 ^{o}C** **T_{min}: 1.8 ^{o}C**	**Under RCP 8.5** Increase by 2.1%	disaster management authorities.

3.4.1 Temperature

The following comparative trends are available:

The analysis[28] of the projected daily temperature under climate change scenario shows that:

- Mean annual maximum temperature for RCP 4.5 scenario is projected to increase by about 1.3 degree Celsius by mid-century. For RCP 8.5 scenario it is projected to increase by about 1.6 degree Celsius by mid-century for the state of Haryana.
- Mean annual minimum temperature for RCP 4.5 scenario is projected to increase by about 1.4 degree Celsius by mid-century. For RCP 8.5 scenario it is projected to increase by about 1.8 degree Celsius by mid-century.

3.4.2 Rainfall

The analysis of annual rainfall reveals a negative trend indicating that, the total amount of rainfall received has been decreasing for some parts of the state. However, mean annual rainfall for RCP 4.5 mid-century scenario is projected to decrease by about 1 % from baseline. For RCP 8.5 scenario rainfall is projected to increase by about 2.1 % towards mid-centuries.

OVERALL IMPLICATION FOR THE STATE

General implications of temperature increase may include heat stress related health impacts, increase in energy demand for cooling, additional evaporation and evapotranspiration losses resulting in increase in water required for irrigation of crops. Considering increase in intensity of rainfall events may lead to floods, urban flooding, enhanced prevalence of vector borne diseases, loss of work, transport disruption, additional cost for flood proofing factories and warehouses which are quite a few in the state. However, it is likely that one day maximum precipitation event may decrease towards mid-century under RCP 4.5 and RCP 8.5 marginally (<1%). The cold spell events may decrease significantly as much as 96% by mid-century in a low emission scenario where as it may decrease further in high emission scenario reporting no cold spell events in any of the districts barring a few.

[28] Analysis from IMD gridded data and climate projection data source INRM

CHAPTER 4: CLIMATE CHANGE RISK AND VULNERABILITY ASSESSMENT

4.1 VULNERABILITY

The process of recognizing, measuring, and prioritizing the vulnerabilities in a system is termed as Vulnerability Assessment. Climate change, including climate variability and extreme events can directly and indirectly impact several sectors such as water resources, agriculture and food security, human health, and biodiversity, even physical environments in urban setting. Vulnerability in AR5 includes the concepts of sensitivity (susceptibility to harm) and adaptive capacity.

Vulnerability assessment helps in:

- Understanding present vulnerability
- Recognizing the factors that make some areas more vulnerable than others
- Inform and encourage the decision-making process
- Selection of adaptation strategies and practices

IPCC AR5 further introduces the concept of risk which is a function of hazard, exposure, and vulnerability.

Risk = f (h, e, v)

Risk is defined as the potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events (likelihood) multiplied by the impacts (or consequences) if these events occur. Risk results from the interaction of vulnerability, exposure, and hazard (IPCC, 2014)

4.2 METHODOLOGY

Vulnerability and Risk Analysis (VRA) is a baseline for climate impacts study which helps to prioritize climate actions as well as its integration in development planning. The VRA provides a top-down evidence base for climate-resilient planning, which is to be tightly aligned with a bottom-up community-level vulnerability to draw linkages between the impacts of climate change and current policies for ease of an inclusive policymaking.

The vulnerability literature of Haryana includes the study by DST which was conducted at the national level (which also has a state specific vulnerability). Considering of the nature of the sectors using the framework given by DST a district level vulnerability and risk analysis has been attempted. Since the indicators and methods of computation varies, findings of both the studies have been presented. The present study used indicator-based approach to access the vulnerability. Following steps were followed:

1. Scoping and objectives for Vulnerability and Risk Assessment in the context of Haryana
2. Selection of type of Vulnerability and Risk Assessment- Integrated vulnerability assessment using top-down approach largely based on secondary data
3. In total 35 indicators have been considered for analysis. Sensitivity to hazard (13) capacity (9) have been used for computation of vulnerability
4. Both historical hazard and future hazard using the downscaled cordex data for the state have been used to compute the hazard score. Total 7 variables have been used for this. The projections have been for mid-century considering high emission scenario.
5. Key Exposure variables (6) include % rural area, forest area, population density, livestock, SC-ST population, and net sown area

6. Identification, definition, and selection of indicators for vulnerability assessment- While choosing the indicators, several things are considered, that is type of indicator (i.e., whether it captures 'sensitivity' or 'adaptive capacity'), nature of indicator ('biophysical' or 'Socio-Economic,' etc.) based on the sectors of interest in the state.
7. Normalization of Indicators- To make the indicators unit-free, normalization of each indicator is done
8. Assigning weights to the indicators- Weights are assigned to each indicator according to their importance in determining vulnerability of a system based on PCA method which is bias free. Assignment of weight also takes care of underlying hidden correlation and factors explaining maximum variance are extracted
9. Aggregation of Indicators and development of Vulnerability Index- The weights are multiplied with the normalized indicator values and aggregated. Normalized and weight values of indicators were aggregated to obtain the overall vulnerability index value for each district in the state
10. Vulnerability Ranking and Representation of Vulnerability in spatial maps
11. For risk computation equal weight has been given to hazard, exposure and vulnerability components

4.3 VULNERABILITY AS PER THE LATEST DST REPORT

A district-level vulnerability assessment has been carried out which followed an indicator-based approach and used secondary sources of information to quantify the indicators selected[29]. Selection of indicators and their functional relationship is given the table below:

Table 27: List of indicators for vulnerability assessment, rationale for selection and weights assigned

Indicators	Adaptive Capacity / Sensitivity	Functional relationship with Vulnerability
Women's participation in the workforce	Adaptive Capacity	Negative
Percentage of households with electricity	Adaptive Capacity	Negative
Insant Mortality Rate (IMR)	Sensitivity	Positive
Marginal and small farmers (land < 5 acre)	Sensitivity	Positive
Yield Variability of food grain	Sensitivity	Positive
Average days of employment provided per household under MGNREGA	Adaptive Capacity	Negative
Proportion of rainfed agriculture	Sensitivity	Positive
Forest area (in ha)/1000 rural population	Adaptive Capacity	Negative
Per capita income	Adaptive Capacity	Negative
Livestock to human ratio	Adaptive Capacity	Negative
Number of functional health centers per 1000 population	Adaptive Capacity	Negative
Percentage of villages connected with paved roads	Adaptive Capacity	Negative
Road density	Adaptive Capacity	Negative
Proportion of area under crop insurance	Adaptive Capacity	Negative
Total groundwater extraction per 1000 ha	Sensitivity	Positive

[29] Climate Vulnerability Assessment for Adaptation Planning in India Using a Common Framework.

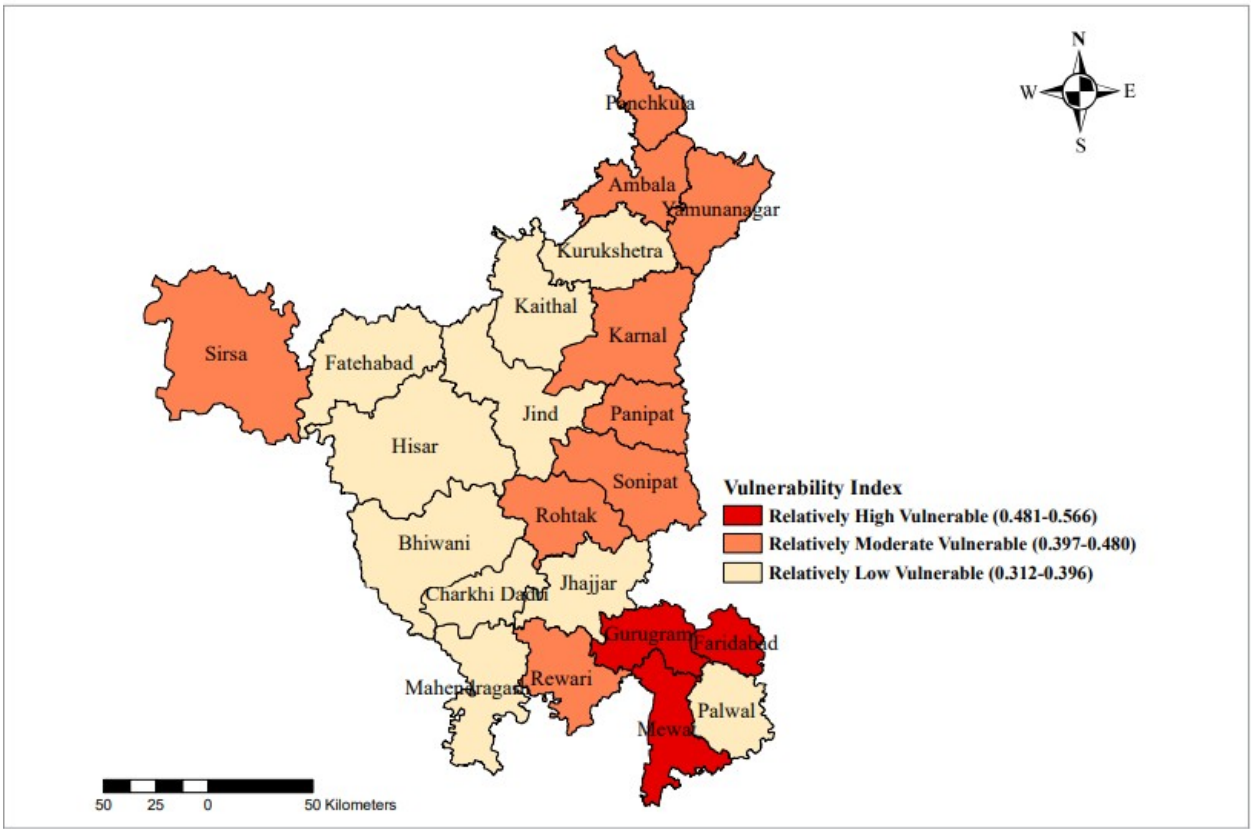


Figure 29: Vulnerability Profile of Haryana as computed in the DST study using 15 indicators

As per this study, Mewat to be highly vulnerable with a VI value of 0.57, followed by Gurugram (0.51) and Faridabad (0.49). Fatehabad District is the least vulnerable (0.31), followed by Hisar (0.35) and Kaithal (0.36).

4.4 Integrated Risk and Vulnerability assessment

In this study as stated earlier 35 indicators have been considered for analysis. Sensitivity to hazard (13) capacity (9) have been considered for V&A. Additionally seven indicators for past and future hazards have been used and 6 exposure indicators have been used for risk computation.

The indicators and their functional relationships have been presented in the table below:

Indicators	Component	Functional Relationship
Projected increase in maximum temp by mid-century in high emission scenario (deg C)	Hazard	+Ve
Projected increase in minimum temp by mid-century in high emission scenario (deg C)	Hazard	+Ve
Projected Precipitation Change by mid-century in High emission scenario (in Mm)	Hazard	-Ve
Change in Consecutive Dry days by Mid-century under High emission scenario	Hazard	+Ve
Change in Consecutive Wet days by Mid-century under High emission scenario	Hazard	-Ve
Drought Proneness	Hazard	+Ve
Flood prone area % in the district	Hazard	+Ve
% Of rural area out of total geographical area of the district	Exposure	+Ve
% Of area under forest cover	Exposure	-Ve

Indicators	Component	Functional Relationship
Density of Population	Exposure	+Ve
% Of SC/ST Population out of the total population of the district	Exposure	+Ve
Net sown area (000 Ha)	Exposure	+Ve
Livestock population	Exposure	-Ve
Rainfed Area %	Sensitivity	+Ve
Annual Rainfall variability	Sensitivity	+Ve
BPL Percentage	Sensitivity	+Ve
Divyang percentage	Sensitivity	+Ve
Household earning less than Rs 5000 percentage	Sensitivity	+Ve
Small marginal-sharecropper percentage	Sensitivity	+Ve
Share of agriculture labour to total population	Sensitivity	+Ve
Cropping Intensity	Sensitivity	-Ve
Net irrigated area	Sensitivity	-Ve
Stages of Ground water extraction percentage	Sensitivity	+Ve
Variability in food grain production	Sensitivity	+Ve
Fertilizer application in kg per ha	Sensitivity	-Ve
Area under fruit crops as a % pf total cropped area	Sensitivity	-Ve
Female literacy rate	Capacity	-Ve
Overall Literacy rate	Capacity	-Ve
Livestock population per Household	Capacity	-Ve
Women participation % in workforce	Capacity	-Ve
Average MGNREGA person days per Household	Capacity	-Ve
Health Infrastructure (beds per thousand population	Capacity	-Ve
Percent of HH having access to mobile phone landline	Capacity	-Ve
Road Density	Capacity	-Ve
Percent of area insured under PMFBY	Capacity	-Ve

The district wise climate vulnerability map of Haryana has been given below:

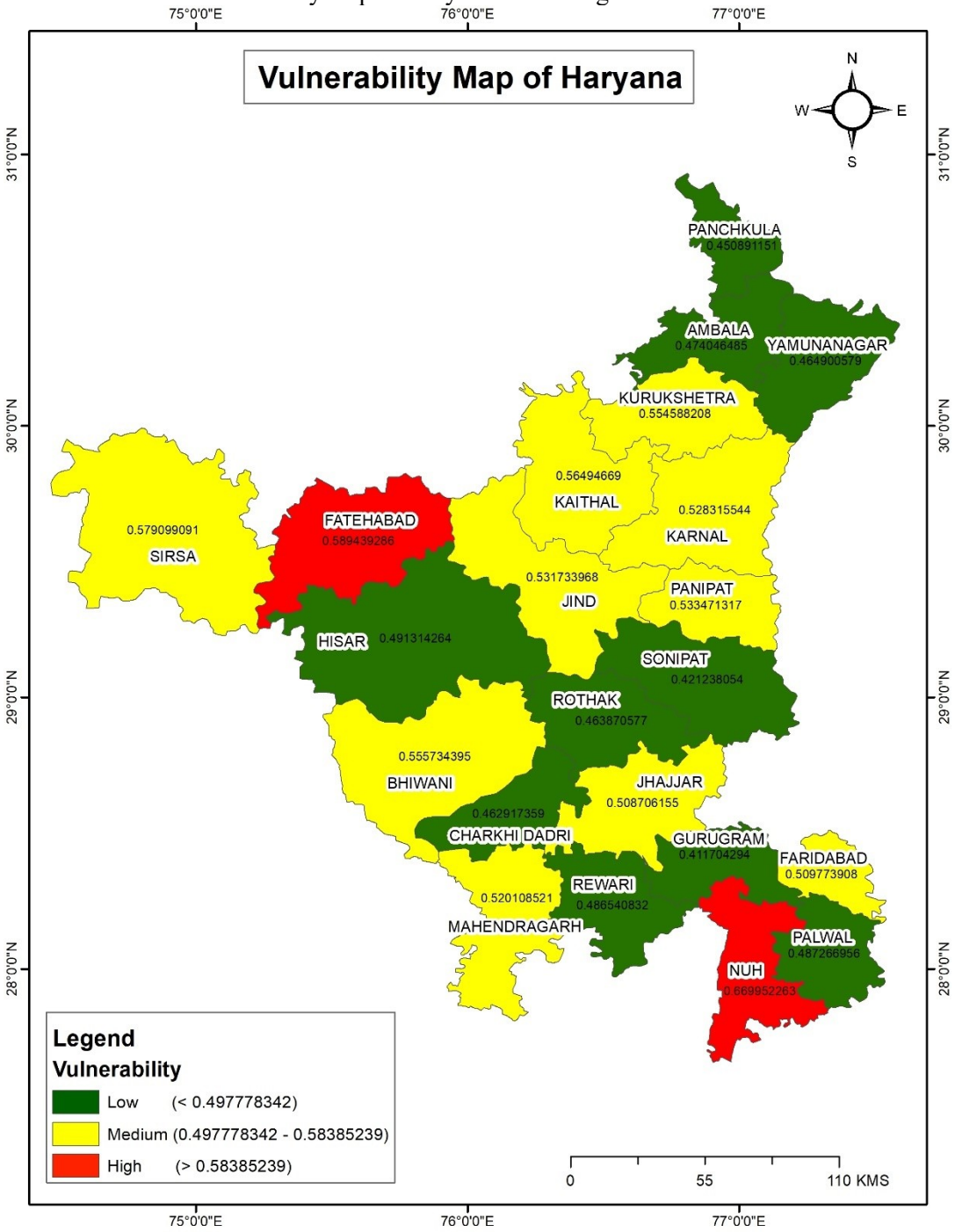


Figure 30: Climate Vulnerability Map of Haryana

In terms of this analysis Mewat (Nuh) is the most vulnerable district and Gurugram is least vulnerable. 10 districts (45%) have low vulnerability; Similarly, 45% of the districts have medium vulnerability. 2 districts have high vulnerability.

In terms of risk profile, the following spatial distribution has been obtained:

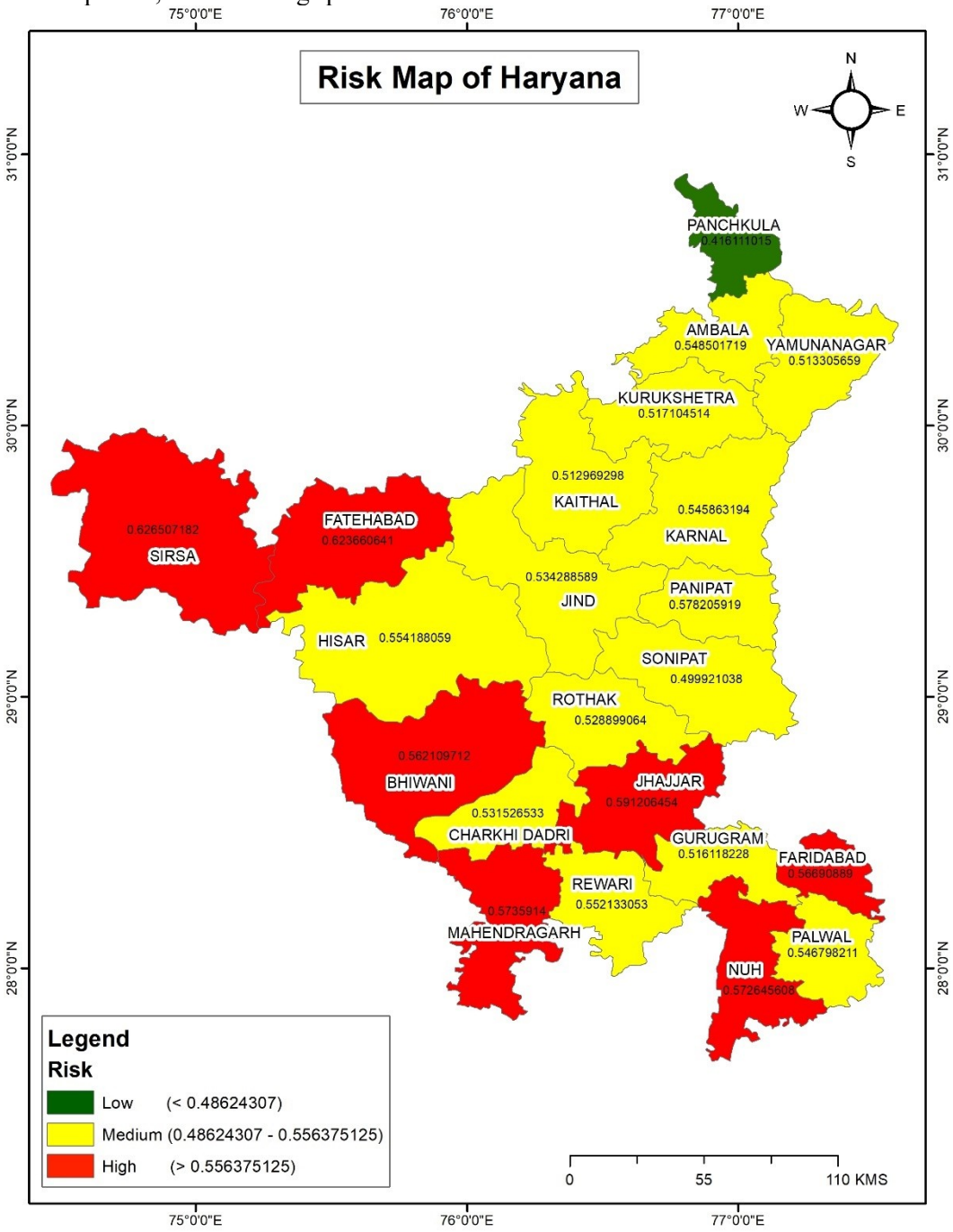


Figure 31: Risk Profile of Haryana

Sirsa has the highest risk score, and Panchkula has the least score. Little less than one third (32%) district have high climate risk and 14 districts (63%) have moderate climate risk.

Key **drivers of vulnerability** differ from district to district. However, these are the most common drivers of vulnerability for most of the districts in Haryana.

- Poverty and low income
- High share of small and marginal farmers and agricultural labourers in the working population
- Net irrigated area and ground water extraction
- Fertiliser use
- Areas under fruit crops (lesser areas contribute to higher vulnerability)
- Low per capita livestock
- Health infrastructure
- Agriculture insurance coverage

4.5 Sectoral Vulnerability and Impacts

Generic impact

Sectors	Vulnerability	Impacts
Agriculture and Food Security	• Erratic Rainfall • Shift in temperature pattern • Flood or Drought Conditions • Overutilisation of Ground water • Invasive alien species	• Crop productivity and crop water demand is likely to be affected • Soil nutrient loss, soil erosion, top / fertile soil loss • Decline in availability of food and increased incidence of malnutrition
Forest and Biodiversity	• Decline in open and moderately dense forest • Habitat degradation and loss • Invasive of species • Effect on regeneration	• Impact on ecosystems services • Impact on livelihood of people dependent on forest resources • Extinction of species • Change in vegetation composition
Health	• High temperature and high humidity • Vector borne diseases • Water logging and occurrence of water borne diseases • Availability of fresh water • Food and nutrition • Sanitation facilities	• Increased rate of mortality • Decline in ambient air and water quality leading to health hazards • Increased demand of health care infrastructures • Decline in ambient air and water quality leading to health hazards
Water Resources	• Reduced quality of available water resources • Decrease in groundwater recharge • Reduction in wetlands • Flooding conditions • Erratic rainfall and uneven stream flow	• Decrease in water table • Groundwater dependence and overexploitation • Increased demand of water • Uneven distribution of water • Reduced availability of water for industrial purposes

Specific Impact

<table>
<tr><th>Sector</th><th>Impact</th></tr>
<tr><td>Water</td><td>Due to rise in temperature, the drawl of ground water is likely to exceed replenishment enhancing soil salinity, this will affect portability of water as well yield of major crops.

In Kurukshetra, Karnal, Kaithal, Fatehabad, Panipat and Sirsa district water table declined sharply due to sowing of paddy, while in Gurgaon and Faridabad districts water table declined sharply due to urbanization. In districts Bhiwani, Rewari and Mahendragarh, there is depletion of ground water due to availability of ground water in fractured zones of hard formation. This is likely to get worse in mid-century where there is rise in temperature and decline in rainfall.</td></tr>
<tr><td>Agriculture</td><td>Deficient soil moisture during crop growth can result in decrease in yield by 30-40%

Irrigated Rice and Wheat- 15-17% yield loss by mid century[30]
<table>
<tr><th>Rise in Temp</th><th>Wheat Yield reduction</th><th>Rice Yield reduction</th></tr>
<tr><td>1 deg c</td><td>8%</td><td>11%</td></tr>
<tr><td>2 deg c</td><td>22%</td><td>23%</td></tr>
<tr><td>3 deg c</td><td>38%</td><td>30%</td></tr>
<tr><td>5 deg c</td><td>57%</td><td>34%</td></tr>
</table>
Potato- 3.5-7.1% yield increase in potation by 2030

Tomato- There may be sudden decrease in fruit set and due to that crop growth will increase and expected yield may likely to reduce by 50 per cent in tomato[31]

Onion and garlic- Unfavorable weather conditions/sudden temperature rise may reduce the yield up to 25 per cent[32]</td></tr>
<tr><td>Livestock</td><td>Thermal heat index (an indicator of heat stress) lowers the livestock productivity and reduced availability of water in dead storage and their quality induces water borne diseases. As outlined in the earlier state action plan, annual loss in milk yield is about 2% due to heat stress</td></tr>
<tr><td>Forest</td><td>28.6% of the total forest grids in the state will be impacted adversely due to climate change[33] by 2030 and beyond.</td></tr>
</table>

[30] Climate Change and Indian Agriculture: Impact, Adaptation and Vulnerability – Salient Achievements from ICAR Network Project, 2012, Eds. S. Naresh Kumar, Anil Kumar Singh, P.K. Aggarwal, V.U.M. Rao and B. Venkateswarlu. IARI Publication p. 32

[31] Hundal, S. S. and Kaur, P, 1996. Climate change and its impact on crop productivity in the Punjab, India', In: Climate Variability and Agriculture [Abrol, Y. P., Gadgil, G and Pant, G B (eds.)], New Delhi, India, pp. 41

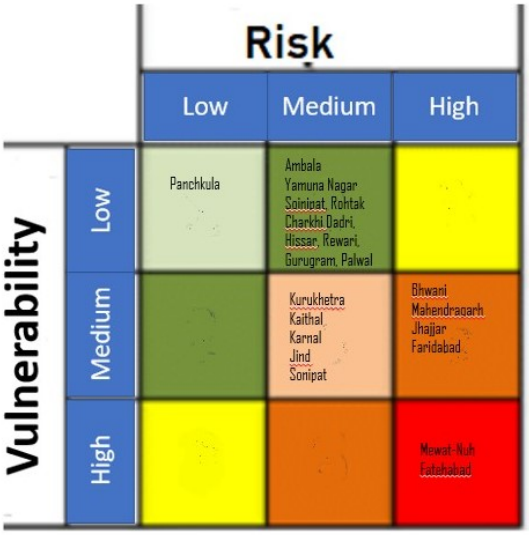
[32] Singh, D., Singh, S., Shekhar, C., Singh, R., & Rao, V. U. M. (2010). *Agroclimatic Features of Hisar Region*. AICRP on Agrometeorology, Department of Agril Meteorology, College of Agriculture, CCS Haryana Agricultural University.

[33] Chaturvedi R., Gopalakrishnan R., Sukumar, R., Ravindranath N.H. (2010) Carbon management in Indian forests: a policy analysis to assess mitigation potential, Carbon Management (2010) 1(1), 109–117

4.6 Focus Areas as per the Impact

The following matrix gives the focus areas to reduce climate impact in short and medium term.

- Mewat (Nuh) and Fatehabad are hotspots and need immediate attention
- Panchkula is the comfort zone for the state and need to be protected
- With climate proofing investments in the medium to long term, the districts of Ambala, Yamunanagar, Sonipat, Rohtak, Charkhi Dadri, Hisar, Rewari, Gurugram and Palwal can be climate smart or can fall back on neglect
- Kurukshetra, Kaithal, Karnal, Jind, Sonipat need medium term investment on climate proofing reduce climate risk and vulnerability



4.7 Disaster Risk, Loss and Damage in Haryana

The geomorphological setup of Haryana makes the State prone to several natural hazards, mainly floods, earthquakes, cyclones, landslides, and drought along with issues of water logging, salinity, and soil erosion. The natural hazards are naturally heightened in the districts of Gurgaon and Faridabad. All the districts fall in High Damage risk Zone IV and Shaking Intensity VIII (MSK VIII) with regards to earthquake, Very High Damage Risk Zone B (V_b = 50 m/s) regarding wind and cyclone hazard and highly liable to floods.

The major tectonic feature affecting the region and mainly Gurgaon are the Sohna Fault, junction of Aravalli and Alluvia near Delhi, Moradabad Fault, Delhi Moradabad Fault and Delhi Haridwar Fault. Most earthquakes in this region are shallow, though a few earthquakes of intermediate depth have been recorded in Haryana. The Mahendragarh-Dehradun Fault line passes through Jhajjar and Rohtak districts.

Table 28: Year-wise Earthquake incidences Haryana

Year	Location	Intensity
August 1960	Gurgaon- Faridabad	Earthquake of 6 intensity
June 1966	Delhi Gurgaon Border	Mb 4.7
July 1980	Western Nepal	Mw 6.8
Oct 1991	Near Pilang (Uttarkashi), Uttaranchal	Mw 6.8
Nov 1996	Near Kurukshetra (Haryana-U.P. bdr. region)	Mb 4.5
May 1997	Rothak-Sonipat Districts (Haryana)	ML 4.1
Mar 1998	Mahendragarh-Bhiwani Districts (Haryana-Rajasthan Border)	Mb 5.0
Mar 1999	North of New Delhi, (Haryana-Uttar Pradesh Border region)	Mb 4.1
Mar 1999	Near Gopeshwar (Chamoli), Uttaranchal	Mw 6.5
Apr 2001	Sonipat-Delhi region	Mb 4.3
Dec 2003	Jind region, Haryana	ML 3.5
Nov 2004	Chandigarh-north Haryana region	ML 3.9
Oct 2005	Kashmir-Kohistan, Pakistan-India border	Mw 7.6
Nov 2007	Delhi metropolitan area	Mb 4.6

Source: NDMA & RDMD, Haryana

In the sub-region of Haryana, the proneness of flooding is more as hazard rather than disaster, as the areas under low-lying contour zone (heterogeneous topography) and along the river of Yamuna are subject to flood hazard. The cause of flood is attributed to peculiarities of the rainfall in the state. The floods occur mainly due to heavy runoff in the mountainous terrain and over flow in river Yamuna in the plains during monsoon season. The active and old flood plain areas in Sub-Region are in parts of Panipat, Sonipat and Faridabad. Flooding in several districts is mostly attributed primarily to heavy rain in monsoon and discharge in Yamuna.

The districts Rohtak, Panipat, Palwal, Gurgaon, Sonipat and Faridabad mainly experiences flooding during heavy rainfall. Sonipat & Faridabad due to its proximity to river Yamuna, over flowing of local streams and rainfall in its catchment, Rohtak, Mewat & Gurgaon are primarily flooded due to heterogenous topography while flooding is Rohtak, Jhajjar and Rewari is due to poor surface drainage.

Table 29: Year-wise Flood Incidences in Haryana

Year	Location	Primary Cause
1978	Sonipat, Faridabad and adjoining areas of Delhi	Heavy rainfall and discharge in Yamuna
1983	Rohtak, Sonipat, Gurgaon, Faridabad	Intensive rainfall
Sept 1988	Faridabad, Sonipat	Heavy rainfall and discharge in Yamuna
Sept 1995	Haryana	Heavy rainfall and discharge in Yamuna
June 1996	Gurgaon, Mewat, Rewari, Faridabad	Intensive Rainfall
Oct 1998	Sonipat, Rohtak, Jhajjar	Intensive Rainfall
Aug 2008	Rohtak, Jhajjar, Sonipat	Intensive Rainfall

Source: Irrigation Department, Haryana

Drought is a perpetual attribute in some parts of sub-region. district of Rewari in the Sub-Region and Mahendragarh, Bhiwani and Hisar surrounding the Sub-Region are affected by sand spread, causing acute moisture stress on agricultural lands producing drought like situation, once in 3 years. Areas frequently affected by drought in the Sub-Region are Gurgaon and Rohtak.

CHAPTER 5: MITIGATION FOCUSSED SECTORS

The Mitigation Strategies have been covered in the respective major chapters:

1. **Energy Efficiency and Solar Mission**
2. **Sustainable Habitat**

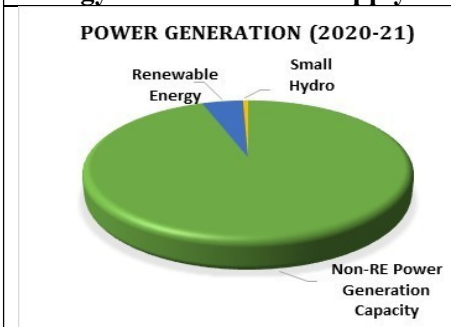
ENERGY EFFICIENCY AND SOLAR MISSION

SECTORAL OVERVIEW

State's Energy Security Scenario:

The role of energy is well recognized in development of economy through revenue and employment generation and as well as in enhancing quality of life. Therefore, affordable, reliable and modern energy supply is crucial for development of the state. The state is highly dependent on non-renewable sources. Only 6.75% of solar power potential is tapped in the state due to limitation in land area availability. The state is mainly depended on central sector power allocation and Independent Power Producers (IPPs). Only 29% of power generation capacity is from state owned and jointly owned power stations. Out of total installed capacity of 12,241 MW[34]as of 2020-21 in the state, 531.30 MW is from renewable energy sources.

Energy Generation and Supply



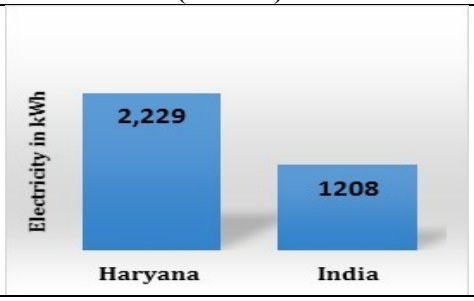
Year	Power Demand (MU)	Power Supplied (MU)	Unmet Demand (%)
2017-18	50,775	50,775	0%
2018-19	53,665	53,665	0%
2019-20	54,505	54,492	0.024%
Year	**Peak Demand (MW)**	**Peak Met (MW)**	**Unmet Peak Demand (MW)**
2017-18	9671	9539	1.365%
2018-19	10270	10270	0%
2019-20	11001	11001	0%

AT&C Loss: The state has reduced its AT&C loss from 29.58% in 2014-15 to 17.17% in 2019-20 which is lower than the national average of 22.57%

Source- CEA (2021-21)[35]

The state observes high growth in electricity consumption from 2014-15 to 2019-20 with over 39% increase. Domestic and agriculture sectors are second and third highest power consumer after industrial sector. Power consumption in domestic sector has increased from 6,659.45 MU in 2014-15 to 11077.81 MU in 2019-20 which seems result of the schemes such as Power for All, Rural electrification, etc.

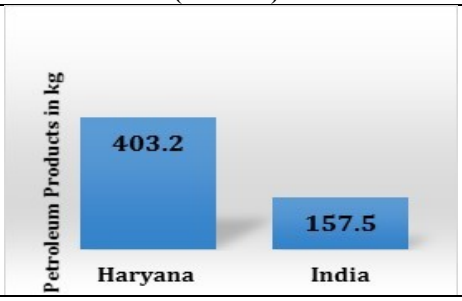
Per Capita Electricity Consumption (2019-20)



Summary

Per capita electricity consumption is approximately 85% higher than national average.

Per Capita Petroleum Products Consumption (2019-20)



Summary

Per capita petroleum product consumption of Haryana is 1.56 times the national average.

[34]Statistical Abstract of Haryana 2020-21

[35]https://cea.nic.in/wp-content/uploads/l_g_b_r_reports/2019/lgbr-2020.pdf

Though all villages and households of the state are electrified; but rural households still have access to power for only 13 hours/day whereas in urban households it is for 23 hours/ day. Power consumption by urban household in the state is almost 3 times higher than rural household (2.24 kWh/ household/ day). The power availability for agriculture sector is only 10 hours/day.
On the other hand, cooking services observe gradual phase-out of traditional biomass and penetration of LPG in the state has reached 127.30% whereas the national average has achieved 99.80%.

Energy intensity (2018-19) of the state at constant price is 0.1184 MJ/ Rs. which is almost half of the national energy intensity (0.2331 MJ/Rs.).

Energy Efficiency Index
The alliance for an Energy Efficient Economy (AEEE), under the leadership of BEE and in collaboration with SDAs has developed State Energy Efficiency Index to help drive of Energy Efficiency (EE) policies and program implementation. The State Energy Efficiency Index categorizes states based on their efforts and achievements towards energy efficiency implementation.

With a score of 22 against a possible sector total of 30, performance of Haryana has been appreciated in the prestigious annual report of the Bureau of Energy Efficiency, Ministry of Power, Govt. of India. Other good performers include Karnataka, Punjab, Maharashtra, Andhra Pradesh, and Rajasthan, Additional Chief Secretary (Power & NRE).

Indicator	Policy & Regulation	Financing Mechanisms	Institutional Capacity	Adoption of EE Measures	Energy Savings
Group	**1 (**comprising of Karnataka, Rajasthan, **Haryana**, Maharashtra, Tamil Nadu, Uttar Pradesh, Gujarat, Madhya Pradesh, Odisha and West Bengal**)**				
Overall	**59.5 (**No progress in total score since 2019**)**				
Group Ranking	**3rd**				
Buildings (Max. Points**)**	**30**				
Points Scored	**22**				
Rationale	**Group Ranking – 1st** **Driving Force**: Haryana government offers financial assistance to all private, semi-government, industrial, institutional, and commercial buildings, subject to a ceiling of Indian Rupee (INR) 50,000 which released in two parts. The first instalment of 50% is released after acceptance of an energy audit report by the approved committee and the remaining 50% is released after 50% implementation of the energy audit recommendations suggested by the energy auditor. Energy audits are conducted free of cost by the Department of New & Renewable Energy, Government of Haryana for government buildings with a connected load above 100 kW and which commit to implement at least 50% of the energy audit report recommendations. Haryana has state financing for Energy Conservation Building Code (ECBC) compliant and green buildings. Haryana has specific fund allocation in the annual budget of Haryana Renewable Energy Development Agency (HAREDA) to support EE building programmes.				
Industry (Max. Points**)**	**25**				
Points Scored	**9 (Highest score -18.5)**				
Rationale	**Group Ranking – 4th** **Driving Force**: Haryana has reported offering financial incentives for EE implementation in industries including incentives for conducting energy audits and implementing energy audit recommendations, low-interest loans and subsidies for the adoption of energy-saving equipment and facilities.				

Municipalities (Max. Points**)**	**10**
Points Scored	**6.5 (Highest score -8.5)**
Rationale	**Group Ranking – 3rd** **Driving Force**: Haryana has signed up with EESL to implement programmes on municipal water pumping and sewage treatment. Haryana has also deployed EE technologies such as Centralized Control and Monitoring Systems (CCMS), sensors and Light Emitting Diode (LED)s for street lighting in ULBs.
Transport (Max. Points**)**	**15**
Points Scored	**6.5 (Highest score -13.5)**
Rationale	**Group Ranking – 7th** **Driving Force**: Haryana has issued draft Electric Vehicle (EV) policies. Although Haryana's EV policy is in the draft stage, the state has a separate government gazette notification for offering tax rebates on the registration of battery-operated vehicles.
Agriculture and Discoms (Max. Points**)**	**15**
Points Scored	**12**
Rationale	**Group Ranking – 1st** **Driving Force**: Haryana has notified Demand Side Management (DSM) regulation (Haryana has notified guidelines on the framework for evaluating, measuring, and verifying DSM programmes by the DISCOMs). Haryana has also set targets for energy savings from the agricultural DSM programmes. Non-agricultural DSM programmes have been implemented by the state.

National Energy Conservation Awards- The New and Renewable Energy Department, Haryana received Second Prize in the 30th National Energy Conservation Awards 2020 under Best Performing State Designated Agency category from the Ministry of Power, Government of India.

The awards were bestowed by Shri. R K Singh, Hon'ble Minister of State (I/C) for Power and New & Renewable Energy and Minister of State in Ministry of Skill Development & Entrepreneurship during the virtual National Energy Conservation Award (NECA) function organized by Ministry of Power, GoI on 11.01.2021 and streamed from Vigyan Bhawan, New Delhi.

NECA 2020 witnessed participation of 409 units and based on their performance assessment, 57 units have been selected for Awards in different categories. There are 36 State Designated Agencies in the State among which the New and Renewable Energy, Haryana, which is acting as State Designated Agency for Haryana got the second award.

Scheme, Policy and Regulatory Landscape: Energy Sector

Ujwal DISCOM Assurance Yojana (UDAY)

A substantial turn-around of the operational performance of DISCOM and enhanced consumer satisfaction has been attained with the implementation of UDAY scheme launched by Ministry of Power, GoI on 5th November 2015. Key achievement through UDAY includes -

Particulars	UHBVNL	DHBVNL
ACS-ARR Gap	Rs. 0.17/unit	Rs. 0.03 /unit
Feeder Metering	100%	100%
DT metering (Urban)	58%	75%
DT metering (Rural)	0%	30%
Smart Metering above 200 and up to 500 kWh	1%	0%
Distribution of LEDs Under UJALA	80.74 Lakhs	76.20 Lakhs

Pradhan Mantri Sahaj Bijli Har Ghar Yojana – "Saubhagya"

State has achieved 100% household electrification on date including electrification of 54,681 numbers of households under "Saubhagya".

Street Light National Programme (SLNP)

On date 84,693 numbers of Street Light[36] have been replaced under SLNP resulting in approximate reduction of 28.17 MU annually.

Unnat Jyoti by Affordable LEDs for All (UJALA)

As on date[37]

1) 156.08 Lakhs of LED bulbs have been disseminated resulting in energy saving in tune of 20.27 Lakh MWh per year and GHG abatement of 16, 41,853 tCO_2 per year.
2) In addition, 60,709 numbers of energy efficient fan resulting in annual energy savings of 5,645.94 MWh and GHG avoidance of 4,630 tCO_2 per year.
3) 2.13 Lakhs of LED tube light resulting in annual energy savings of 9,342.63 kWh and GHG avoidance of 7,660 tCO_2 per year has been undertaken.

Haryana Renewable Energy Policy 2005

The Govt. of Haryana had notified "Renewable policy on Generation of Electricity" vide Gazette Notification No. 22/69 /2005-5P dated 23rd November, 2005. The objective of the policy is to create conducive environment for the involvement of private sector and ensure public - private participation towards promotion of renewable energy sources-based power projects in the state.

Haryana Solar Policy 2016

To promote the generation of electricity from Renewable Energy Sources, the govt. of Haryana had notified Solar Power Policy 2016 vide Notification No. 19/14/2015-16-5 on 14.03.2016. The policy aims to create conducive atmosphere for promotion of solar energy-based power generation project in the state. The policy also aims at productive use of wastelands /non–agricultural lands thereby leading to socio-economic transformation and a reduction in regional disparities in development, employment generation and skill up gradation of the youth. The policy also aims at decentralization and diversification of the energy portfolio and to increase the share of solar power.

Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) Scheme

The scheme is aimed at provisioning of reliable source of irrigation by mainstreaming solar water pump and de-dieselize the farm sector.

Haryana Bio-Energy Policy 2018

With growing environmental concerns and thrust on finding scientific and pollution free disposal techniques for biomass, the Govt. of Haryana had notified Haryana Bio-Energy Policy 2018 vide Notification No. 19/06/2018-5P dated 09.03.2018. The policy aims to promote use of biomass for production of energy including cogeneration, bio-CNG, biochar and bio-fuels/bio-ethanol.

Mandatory Energy Audit for Govt. And Other Sectors: The Govt. of Haryana had issued notification (no. 19/21/2016-5P dated 09.11.2016) to mandate Energy Audit for govt./other sector buildings having connected load above 100 kW and for all consumers having connected load above 1 MW.

[36] Last assessed on 23/01/2022 (https://slnp.eeslindia.org/)

[37] http://ujala.gov.in/state-dashboard/haryana (23/01/2022)

Mandatory Use of LED Lights in Govt. And Other Sectors

The Govt. of Haryana had issued notification (no. 22/52/2005-5P dated 29.06.2016) to restrict use of conventional bulb and purchase of new sodium vapor lamp in govt. sector buildings. The use of LED lights is made mandatory for govt. sector buildings and industries/ commercial /instructional sectors having connected load above 30 kW.

Mandatory Implementation of ECBC for Buildings having Connected Load of 100 kW and above

The Govt. of Haryana had issued notification (no19/6/2016-5P dated 31.03.2016) by virtue of which the provision of ECBC has been made mandatory for various categories of buildings having connected load of 100 kW and above or contract demand of 120 kVA and above.

Mandatory Installation of Solar Rooftop Power Plants

The Govt. of Haryana had issued notification (no. 22/52/2005-5 Power dated 21.03.2016) by virtue of which the installation of Solar Photovoltaic Power Plant has been made mandatory for various categories of buildings.

Mandatory Purchase of Star Rated Products by Govt. Departments/ Boards.

The Govt. of Haryana had issued notification (no. DRE/2007/47204919 dated 13.11.2007) that mandates purchase of minimum BEE four star rated appliances along with compliance of instruction of the state govt. be ensured while carrying out the purchase of appliances by Head of the Departments, MDs/CEOs of Boards/Corporations/ Government Undertakings.

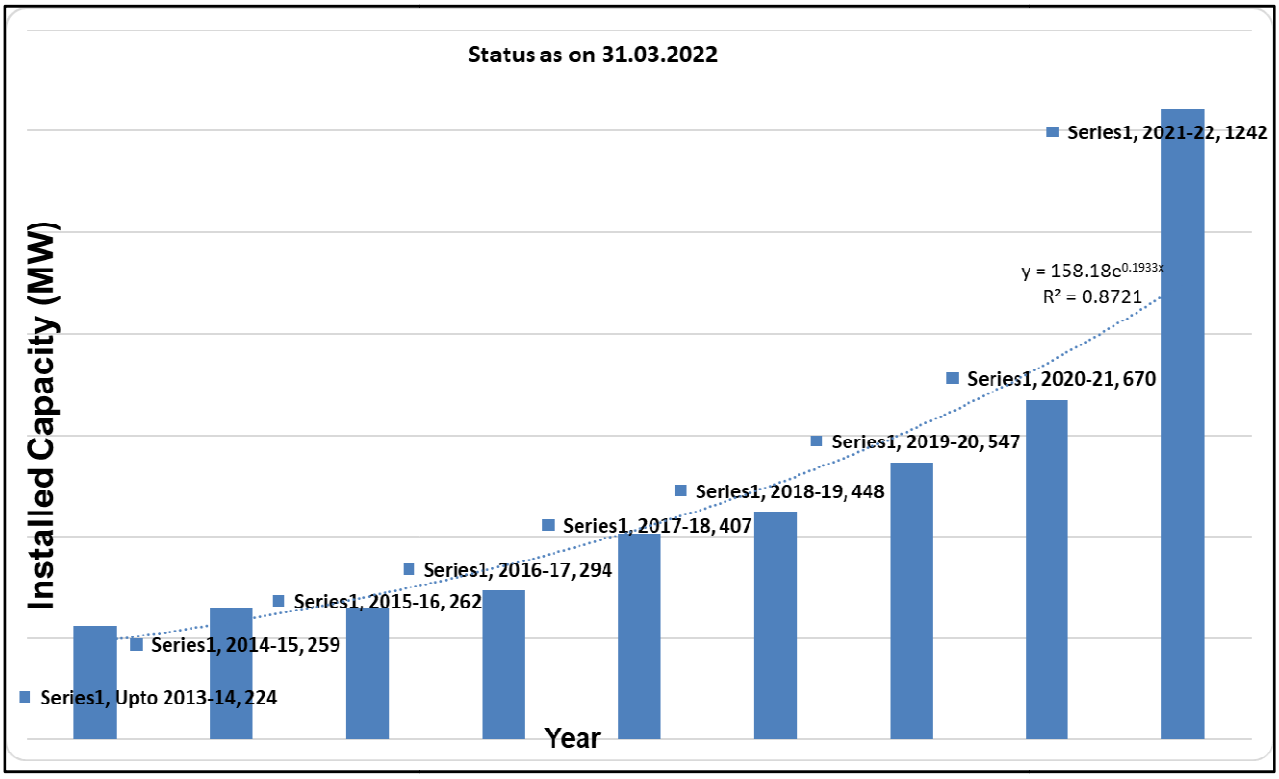


Figure 32: Cumulative Growth of RE in Haryana

Source- MNRE[38]

[38] https://mnre.gov.in/the-ministry/physical-progress

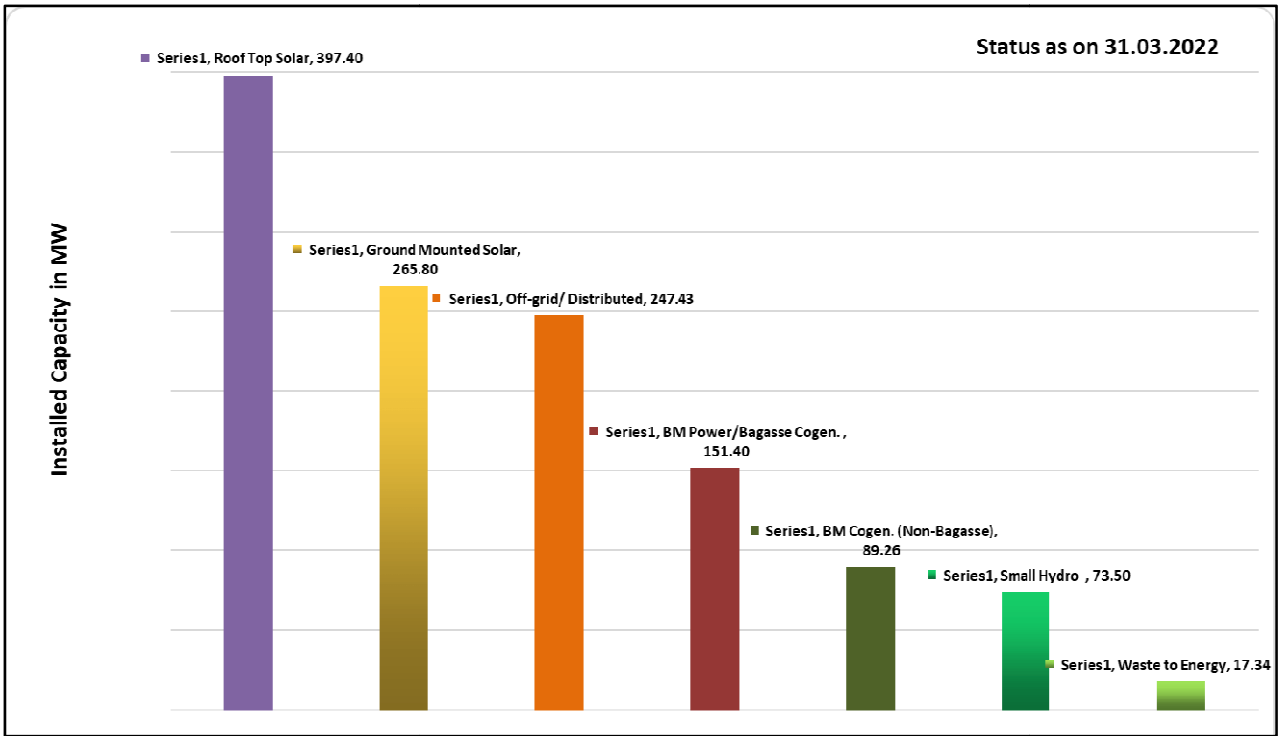


Figure 33: Installed capacity of Renewable Power in Haryana

Source- HAREDA

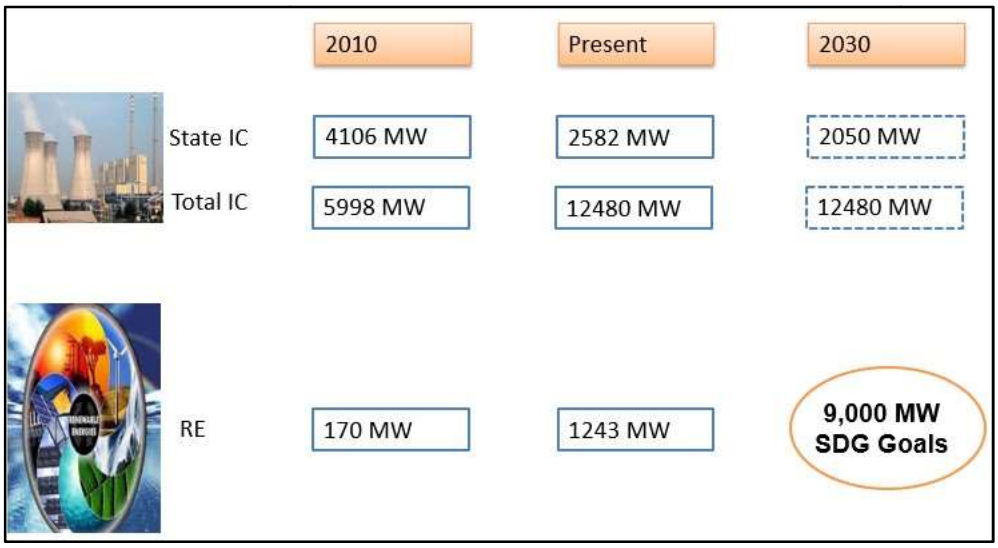


Figure 34: Installed Power Generation capacity outlook

Source- HAREDA

Awareness Creation Activities by HAREDA-HAREDA / DNRE is already conducting such activities on regular intervals with / without support of GoI and various other Stakeholder Agencies. Awareness programmes for targeted stakeholders like MSME, School Students, Farmers, Discoms and Govt. Officers are being organized. The Department has carried out school competitions, Workshops, advertisements, Energy users (Report on Status of energy consumption under Energy Consumption Act 2001), Energy Information Centre and Urja Mantra Programme. Under the Special Area Demonstration Programme, Energy parks and

solar shops are being set up to demonstrate the applications and after sale service of various renewable energy devices by HAREDA.

IMPACT OF CLIMATE CHANGE IN THE SECTOR

Energy production and use accounts for substantial portions of the total GHG emissions and is regarded as the major driver behind the human induced climate change. Unlike the impact of climate change in undermining prosperity and hampering sectoral growth, the energy sector is equally impacted by climate change. The impact of and from the sector to climate change cause and effect is outlined in the section below:

Climate Parameters	AR5 RCP4.5 scenario	AR5 RCP8.5	Projected Impact
Average annual maximum temperature	Projected to increase by about 1.5°C towards mid-century (MC) and by 2.5°C towards end-century (EC).	Projected to increase by about 1.8°C towards MC and 5.0°C towards EC	1. With substantial dependency of the state on thermal power generation unit; projected increase in temperature coupled with the likelihood of water scarcity might impact the power generation of the units. Such event can also increase dependency on unscheduled power procurement leading to financial bleeding of DISCOM. 2. Higher temperatures tend to reduce the efficiency of thermal power stations as heat engine performance is fundamentally driven by the temperatures of the hot source and the cold sink to which heat is rejected. The rising temperature will decrease the electricity production efficiency of the fossil fuel-based power plants (power output decrease by about 0.45% and the thermal efficiency by approximately 0.12% for 1°C increase in cooling water extracted from environment (Held, 2012)). 3. Increase in temperature has a dichotomous relation with increase in energy demand to meet up the cooling load. Increase in summer temperatures will most likely increase the summer peak electricity demand. 4. Projected increase in temperature coupled with variation in radiation are likely to influence/reduce the performance of solar PV power plants.
Precipitation	Decrease marginally by about 0.8% towards MC and increase by about 7.1% towards EC.	Increase by about 3.6% towards MC and 5.4% towards EC	1. Impact on hydrological cycle and water discharge impacting hydro power generation.

KEY ISSUES AND CHALLENGES

Table 30: Key Issues and Challenges of the Energy Sector

Area	Issues/Challenges
Technical/ Infrastructural	• Substantial disparity in urban and rural energy consumption (Rural power consumption within Haryana is 2.24 kWh/ household/ day while urban consumption is 6.14 kWh/ household/ day)[39]. • Despite improvements over the last few years, the state DISCOMs face significant challenges towards its operational and financial performance. Paucity of funds with state utility restricts power sector infrastructure improvement, IT enablement and improving of billing and revenue recovery efficiency as indicated from the high level of Aggregate Technical and Commercial (AT&C) losses. • Rural domestic households in the state have power supply for approximately 13 hours per day, while the agricultural sector has it for approximately 10 hours per day in contrast, industrial and urban areas are enjoying power supply for approximately 23 hours per day. • The present level of energy efficient lighting use is approximated at 10% and energy efficient equipment use is less than 5%. • Higher dependence to meet domestic demand and lower penetration of renewable energy-based power generation. Implementation of renewable energy technology (with specific to solar energy technology) in the state is heavily dependent on grants/aids like Central Finance Assistance (CFA) and state funding assistance without proper development of market-based mechanism and therefore the likely reduction/obsoletion of subsidy/grant might impact the market. • Significant AT&C losses, especially in the rural feeder.
Policy & Regulatory	• Lower share of renewable energy. Of total share of 12,828.52 MW of generation capacity (including state, central and private sector) the share of renewable energy is 3,405.40 MW (including share of hydro)[40]. • There is widespread use of substandard, unrated and inefficient electrical appliances and lighting equipment in spite of regulatory norms.
Institutional	• Lack of co-ordinated actions amongst the departments and agencies in institutionalizing different energy efficient and renewable energy project in the state. • Poor integration of the concepts of energy conservation and renewable energy in departmental planning and budgeting. • Poor access to finance is the major challenge in implementing of the energy conservation/ RET measures.
Socio economic/ Cultural	• Residents of rural areas particularly which suffer from markedly limited access to clean energy options continue to use high carbon intensive fuels such as wood, coal, or kerosene for household purpose.
Financial	• Reluctance amongst financial institutions to finance private sector small ticket investment in renewable energy and energy efficient technology options due to perceived risk about the technology performance and investors credit worthiness.

[39] State Vision Document

[40] Generation capacity as per CEA-Installed capacity report as on December 2021 (https://cea.nic.in/installed-capacity-report/?lang=en)

PROGRESS MAPPING (IN LAST 5 YEARS)

Physical Progress

The achievements under the strategies of the Energy sector are highlighted below for Haryana State Action Plan on Climate Change (HSAPCC) 2014.

Table 31: Physical Stocktaking of the Energy Sector

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure[41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
On-grid Renewable Energy Application						
EN/1 Generation of power from solar energy	Yes	Grid Connected Rooftop Solar Power Plant Programme - C	C, S and Private funding	**Grid connected Ground-mounted Solar Power Project** a) In FY 2015-16, four Power Purchase Agreements has been signed with 23 MW of solar power projects. In addition, allotment being made to sign PPA with IPPs for 165 MW of solar power projects (13 numbers). b) During 2016-17, ground mounted solar power plant of 12 MW capacity has been installed in Panipat Thermal Power Plant. c) During 2017-18, 2 numbers of ground mounted solar power plant of 21 MW capacity has been installed in the state. d) During 2018-19, target being set to install grid connected solar power plants of 24 MW. Out of this 24 MW, MNRE, GoI will provide subsidy for 20 MW and the State govt. shall provide subsidy for 4 MW capacity. **By end of 2019 (December 2019), the cumulative installation of Ground mounted Solar Power Project has reached 249.27 MW (0.74% of cumulative national installation). Around 200 MW of the said installation is during the plan period.** **In addition, 6 nos. of private solar parks with total capacity of 310 MW are also sanctioned**. **Rooftop Solar (RTS) Power Project – Central and State govt. programme** a) In 2015-16, 16 MW of solar rooftop projects have been installed with 30% CFA. In addition, about 4 MW of solar rooftops have also been installed by various category of user covered under mandatory policy/order. b) In 2016-17, 7 MW of rooftop solar power plant have been taken up for installation by various categories of user covered under mandatory policy/order.	170,000	

[41] The figures are ttentative investment allocation/ mobilisation

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
				c) During 2017-18, grid connected rooftop solar power projects of 23 MW capacity were installed in the state. The cumulative capacity of RTS project installed till 2017-18 was around 88 MW. d) By end of 2019 cumulative rooftop solar power project of about 118 MW have been commissioned in the state of which 57.76 MW is under subsidised mode. **In 2019, Grid connected rooftop solar power plant of 113.60 MW has been planned.**		
EN/2 Promotion of biomass-based cogeneration and biomass power project	Yes		C, S and Private funding	a) Around 17.5 MW biomass power project commissioned during 2014 and 2015. b) Around 25 MW bagasse cogeneration unit commissioned during 2017-18. c) Around 26.5 MW biomass-based co-gen power project commissioned during the plan period. d) Around 1.5 MW biomass-gasifier project commissioned during the plan period. e) 50 MW capacity of biomass power project were proposed to be set up in six districts of the state namely Karnal, Kurukshetra, Fatehabad, Jind, Kaithal, Ambala to combat the issue of stubble burning. **Haryana has achieved a cumulative capacity of around 121.40 MW grid interactive Biomass Power/Bagasse Cogen and 84.26 MW of non-bagasse Biomass Cogen power project.**	66,000	
Introduction of Enabling Policy ✓ In order to harness the enormous solar power potential of the state, the state govt. has notified the Haryana Solar Power Policy in 2016. ✓ The govt. of Haryana has also formulated Haryana Bio-energy Policy, 2018 to promote generation of energy from the surplus biomass in the state. ✓ Mandatory installation of Solar Rooftop Power Plants in Haryana vide notification 22/52/2005-5 dated 21.03.2016. The installation of Solar Photovoltaic Power Plant has been made mandatory for various categories of buildings. **Key Programmes** ✓ Grid Connected Rooftop Solar Power Plants in Govt. Buildings under capex mode. ✓ Promotion of Solar Park (Government agency may set up the solar park by forming a Special Purpose Vehicle (SPV), while a private solar park may be set up by any Solar Power Park Developer). ✓ Grid Connected Rooftop Solar Power project under RESCO Power Plant mode. ✓ Solar City Programme (Haryana has selected Panchkula City for development as Solar City). ✓ Grid connected Solar Power Plants in Gaushalas (Grid Connected/ Hybrid Solar Power Plant on Gaushalas with 80% or 85% State Financial Assistance with an objective to make them self-reliant in energy. Balance cost of the system is borne by the Haryana Gau Sewa Aayog.						
EN/4 Off grid Renewable Energy Applications						

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
Solar Home Lighting Systems (SHLS)	No	Manohar Jyoti -S	S and Private (beneficiary) contribution	a) To fulfil the energy requirements i.e. lighting and air cooling of the un-electrified households of the state, particularly the families living in un-electrified dhanis, SC families, BPL families, beneficiaries of PMAY (Gramin) and households without electric connection, HAREDA is implementing "Manohar Jyoti" scheme. Under the scheme, households were provided with 150 W Solar PV system with battery, LED luminaries, LED tube light, DC ceiling fan and 1 USB mobile charging points. 4,043 households, 457 SC households and 5,024 Anganwadis have been provided with the SHLS. In addition, 22,760 HHs were provided with Solar Inverter Charger to charge the battery bank of existing inverter from solar power. Solar Inverter Charger consist solar panels and interface charge controller.	23,250	
SPV Street Lighting Systems (SSLS)	No	LED Based SPV Street Lighting scheme - C	S and Private (beneficiary) contribution	a) HAREDA has been implementing LED Based SPV Street Lighting scheme with the objective to reduce the dependence on conventional power for street lighting in the state. These lights are being operated with lithium batteries fitted on the upper side of the pole for safety of the batteries. More than 12,500 SSLS have been implemented in the state during the plan period (State has more than 34,600 solar streetlight installed). In addition, 1,260 nos. of LED based SSLS with 180 kW solar power plants is installed in the 25 SC dominated villages in 12 districts namely Ambala, Fatehabad, Bhiwani, Hisar, Jhajjar, Kaithal, Kurukshetra, Palwal, Panipat, Rohtak, Sonipat & Yamuna Nagar districts of Haryana.  SPV module of 75 Wp, 12.8 volt 30 Ah Lithium Ferro Phosphate battery, 12 Watt white LED Luminaire and Pole of 5 Meter above ground level with dusk to dawn operation {first 4 hours full light (min. 24 lux), rest of the time at lower light (50% Min. 12 lux) level} & 3 days or minimum 36 operating hours autonomy.	2,300	
Off-grid SPV Power Plant	No		S and Private	a) During 2016-17, total 6 plants have been installed with cumulative capacity of 52.50 kW. Total 35 power plants were installed till March 2017 with	2,000	

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
			(beneficiary) contribution	cumulative capacity of 235 kW. b) Cumulative installed capacity of off-grid solar power plant till 2019-2020 was 2,321.25 kW.		
Solar Water Pumps (SWP)	Yes	PM-KUSUM -C Swarna Jayanti -S	C, S and Private (beneficiary) contribution	Prior to launch of PM-KUSUM scheme, HAREDA has been promoting SWPs to support agricultural activity in fur-flung off grid area to aid agricultural activity. a) During 2015-16, 500 nos. of SWPs were provisioned to be installed by providing State & Central subsidy @ 30% each. b) During 2016-17, Swarna Jayanti scheme has been launched to provide farmers with 2 HP and 5 HP SWP systems with 90% financial assistance. • 750 numbers of SWPs were installed with 90% subsidy from the state govt. (out of 750 numbers 300 were of 2 HP capacity and remaining were of 5 HP capacity). **PM-KUSUM scheme has three components -** • Component-A: Setting up of 10,000 MW of Decentralized Ground/ Stilt Mounted Grid Connected Solar or other Renewable Energy based Power Plants; • Component-B: Installation of 17.50 Lakh Stand-alone Solar Agriculture Pumps; and • Component-C: Solarisation of 10 Lakh Grid Connected Agriculture Pumps. The component-B is implemented by HAREDA, and Component-A and Component-C are being implemented by the DISCOMs in their respective jurisdiction.	5,300[42]	
EN/5 Other Programmes						
Solar Water Heating (SWH) Projects	No		C, S and Private (beneficiary) contribution	The state government has been in the forefront of promoting SWH through introduction of enabling policy environment and market eco-system. During the plan period, around 23,000 LPD has been promoted in social sector and 80,300 LPD in domestic sector. Usage of SWH in general saves around 70-80% of electricity or fuel bills. Specific incentives provided by the State/Central govt. towards promotion of SWH during plan period: **State Govt.:**	200	

[42] excluding 2018-19 proposal

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
				1. Rebate in electricity bills for domestic users – Rs.1,200/year for 100 LPD system, Rs.2,400/year for 200 LPD system & Rs.3,600/year for 300 LPD system or more for three years. 2. Capital subsidy on domestic SWHs @ Rs.4,000/- for 100 LPD & Rs.8,000/- for 200 LPD & above in case of Flat Plate Collector (FPC) based systems & @Rs.1,500/- for 100 LPD & Rs.3,000/- for 200 LPD & above in case of Evacuated Tube Collector (ETC) based systems for all Haryana residents and Haryana govt. employees living in Chandigarh. To ensure hassle free implementation of the scheme and hassle free disbursement of subsidy, the user has freedom to install SWH system from a supplier of his own choice provided it is BIS approved/MNRE empanelled. 3. 70% financial assistance provided on installation of SWH systems in social sector charitable institutions like Working Women Hostel, Destitute Children Home, Deaf & Dumb Rehabilitation Centres, Sports Hostels, Hostel for the SC students etc. **Central Govt.:** 1. Capital Subsidy @Rs.3,300/ sq. m. for FPC based systems and @Rs.3,000/ sq.m. in case of ETC based systems from all categories. 2. Soft Loan @5% per annum from Indian Renewable Energy Development Agency (IREDA), New Delhi and Nationalized Banks under interest subsidy scheme of the MNRE/GOI.		
Energy Efficiency Mission	Yes	SECF [43], ECBC, Standard & Labelling -C	C and S	a) The govt. of Haryana has mandated energy audit and its implementation for various categories of electricity consumers under Energy Conservation Act 2001 vide Haryana Govt. Notification Ref. No. 19/2/2012605P dated 9th November 2016. This includes Designated Consumers (DC) with connected load of over 1 MW and for commercial building with connected load of 100 kW or 120 kVA. 1. For Govt. / Semi Govt. buildings who undertakes to implement at least 50% of the recommendations of the energy audit reports. The energy audit will be conducted free of cost by the department. 2. For other categories of Buildings: Financial assistance @ 50% of the Energy Audit cost with the maximum limit of Rs. 50,000/- shall be provided. b) The govt. of Haryana vide notification Ref No. 22/52/2005-5P dated 26th June	2,907	

[43] State Energy Conservation Fund

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
				2016 has mandated use of LED lamps/tube light and EE lighting and banned use of incandescent lamp and purchase of sodium vapor lamps for govt. sector and various categories of private sector. c) ECBC cell were set up in HAREDA to provide technical assistance for construction of ECBC compliant building. d) The provision of ECBC has been made mandatory vide notification no19/6/2016-5P dated 31.03.2016 for various categories of buildings having connected load of 100 kW and above or contract demand of 120 kVA and above. e) Mandatory purchase of Star rated products by Govt. Departments/ Boards vide notification no. DRE/2007/47204919 dated 13.11.2007. Purchase of minimum BEE four star rated appliances has been made mandatory and compliance of instruction of the state govt. be ensured while carrying out the purchase of appliances by Head of the Departments/ MDs/ CEOs of Boards/Corporations/ Government Undertakings. f) Publicity was carried out for promotion of energy efficiency measures across different category of consumers. g) HAREDA has undertaken capacity building programmes on energy conservation followed by launch of state level energy conservation award and state level quiz competition. For promotion of energy efficiency, activities will be organized as per budget availability, from the projected allocation of budget (i.e. Rs 29 Cr). BEE, GoI is preparing State Energy Efficiency Action Plan (SEEAP) to be implemented by the Haryana till 2030 through its empanelled Agency and State Specific targets will be fixed after consultation with Centre Govt. To avoid duplication, SEEAP finalized by GoI/ MoP may be incorporated in the revised SAPCC for the State of Haryana.		
EN/7 Demand Side Management Applications						
Reducing AT&C losses	Yes	UDAY -C	C	a) As against the target of 15% AT&C losses by 2018-19, a detailed Loss Reduction Plan (LRP) has been prepared and implemented resulting in reduction of AT&C losses to 17.17% in 2019-20.		
EN/9 Designing Power Utilities for 'Zero effluent discharge' and Implementing Energy Efficiency Measures in Thermal Power plant						
Designing power utilities for 'Zero	No	SPEED [44], SECF -C	C & S	a) Clarifier installed at the ash handling system of unit-7 & 8 (PTPS, Panipat (HPGCL)) has been revived which was out of service since the commissioning	6,788.62	

[44] State Partnership for Energy Efficiency Demonstration

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
effluent discharge' and Implementing Energy Efficiency Measures in Thermal Power plant				of the unit. Discharge from various effluents of boiler and turbine area of Unit-7 & 8 is being discharged into the clarifier of the ash handling system to attain zero discharge of Unit-7&8. Clarified water is being utilized into ash handling system of Unit-7&8 due to which water consumption of the ash handling has reduced a lot. b) Zero Discharge System has been provided at RGTPP (2*600 MW RGTPP, Khedar, Hisar) during April 2016 to utilize the water from various effluents of Boiler, Turbine & CHP Area. c) 2.170 million Units per annum in both Unit-7&8 of PTPS, Panipat (HPGCL) by reducing differential pressure between the BFP discharge pressure and boiler drum pressure is reduced to minimum from conventional value of 12.5 kg/cm^2. Refurbishment of Cooling Towers in the said power plant units including replacement of PVC fills. d) Reducing net heat rate of PTPS, Panipat (HPGCL) by 125.51 kcal/kWh. e) Energy saving measures at 2*600 MW RGTPP, Khedar, Hisar (HPGCL) includes: 1. Energy savings in ID Fans through avoiding air ingress - Unit-1 2. Energy savings in PA Fans through avoiding air ingress - Unit-1 3. Boiler efficiency improvement of Unit-1 4. Energy Efficient LED lights for total plant 5. VFD for FO oil pumps - Unit-2 6. Pump Coating for CW Pumps 7. Improving insulation for steam lines 8. FD-PA flow optimization 9. Revamping of Cooling Tower of Unit-1 and Unit-2. 10. Provisioning of Variable Frequency Drive (VFD). f) Energy saving of 19.76 lakh kWh at 2*300 MW DCRTPP, Yamuna Nagar (HPGCL) power plant achieved through adoption of energy conservation measures. g) Key energy saving measures at DCR-TPP are - 1. 100 Nos. of 16 W LED tube light installed in place of 28 W FTL. 2. 20 Nos. of 120 W LED flood lights installed in place of 250 W HPSV lights. 3. Replacement of 48 Nos. of 400 W HPSV lamp with 150 W LED lights. 4. Replacement of 4 Nos. of 150 W HPSV lamp with 60 W LED lights. 5. Replacement of 5 Nos. of 70 W HPSV lamp with 40 W LED lights.		

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
				6. Replacement of 40 Nos. of 72 W CFL Tube light with 36 Nos. of 36 W LED lights. 7. 15 Nos. of Timers have been installed on all the lighting panels for auto switching off lights in daytime. 8. Replacement of 11,300 Nos. of existing nozzles with high efficient modified nozzles. 9. Replacement of 4 No. of Roof extractor (Hybrid) in TG Hall area. 10. Installation of VFDs on 2 No. of CEP in both units. 11. VFD on 2 Nos. seal air fan of Unit 1 & 2 12. VFD on DM makeup pump of Unit 1 & 2 13. VFD on LP pump in Ash handling unit 14. VFD on economizer pump in Ash handling unit 15. Modification for covering the peripheral gaps in cooling tower. 16. Replacement of 23 Nos. of 70 W HPSV Lamp with WELL Glass 35 W LED. 17. Replacement of 128 Nos. of 150 W HPSV Lamp with 70 W industrial LED High Bay Light. 18. Replacement of 34 Nos. of 250 W HPSV Lamp with 140 W Industrial LED High Bay Light. 19. Replacement of 23 Nos. of 400 W HPSV Lamp with 190 W Industrial LED High Bay Light. 20. Replacement of 188 Nos. of 36 W T5 Tube rod with 18 W LED Tube rod. 21. 1 No. LT VFD on Seal Air Fan Motor. 22. 1 No. VFD for 160 kW Fire Hydrant Pump Motor. 23. Replacement of 4 Nos. Metallic expansion below at economizer 2 Nos. and APH (2 Nos.) of Boiler of Unit 1 24. W.O. for replacement and repair of extended seal plate of Boiler Unit-1, DCR TPP, Yamuna Nagar. 25. Repairing & replacement of damaged duct, support pipes and providing protection angle on the support pipe of furnace to APH. 26. Installation of guide vanes in flue gas duct at Economizer Outlet. 27. 211 Nos. of 36 W LED Tube light of fitting 2" * 2" installed in place of 72 W FTL fittings of size 2" * 2". 28. 1 Nos. LT VFDs on seal air fan motor. 29. 2 Nos. DM cycle make pump motors. 30. 50 Nos. of 16 W LED tube light installed in place of 36 W CFL tube light (12 hours running).		

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
				31. 51 Nos. of 16 W LED tube light installed in place of 70 W HPSV lamp (24 hours running). 32. 630 nos. of 16 W LED tube light (4 feet) installed in place of 28 W (4 feet) FTL. 33. 10 nos. of 36 W LED light fixtures installed in place of 2 x 36 W FTL (24 hours running). 34. 6 nos. of 36 W LED light fixtures installed in place of 2 x 36 W FTL (12 hours running) 35. Replacement of 44 nos. of 36 W tube lights with energy efficient 18 W LED tube lights (12 hours running). 36. 1 No. of VFD for 160 kW Fire Hydrant Pump Motor. 37. Replacement of 550 nos. of 70 W HPSV lamp with WELL GLASS 40 W LED. 38. Replacement of 230 nos. of 150 W HPSV lamp with 80 W industrial LED High Bay Light. 39. Replacement of 50 Nos. of 400 W HPSV lamp with 250 W industrial LED High Bay Light. 40. 2 Nos. LT VFDs on seal air fan motor. 41. 2 Nos. DM cycle make pump motors. 42. 2 Nos. VFD installed on 630 kW CEP Motor.		
Energy conservation across agriculture sector		Ag-DSM - C	C and S	a) Capacity building of youths /farmers /Self-help groups (self-help groups formulated by other Departments of Govt. of Haryana like Women & Child Development, Rural Development Department etc.) were carried out in the area of water conservation and energy conservation in association with Mewat Engineering College, Nuh under BEE Agriculture Demand Side Management Programme.		
EN/11 ISO Certification for HPGCL Power Plants	Yes	-	S	Regular activity of the Department		
EN/12 Energy Efficient Buildings	Yes	ECBC - C	S and Private (beneficiary) contribution	a) Construction of five star rated GRIHA compliant building by HAREDA towards demonstrating energy efficient building construction design features. b) Energy conservation handbook for Buildings & Homes have been prepared & distributed. c) Conventional lights were partially replaced with energy efficient LED lights in (PTPS, Panipat (HPGCL)). d) Conventional lights were partially replaced with energy efficient LED lights in	347	

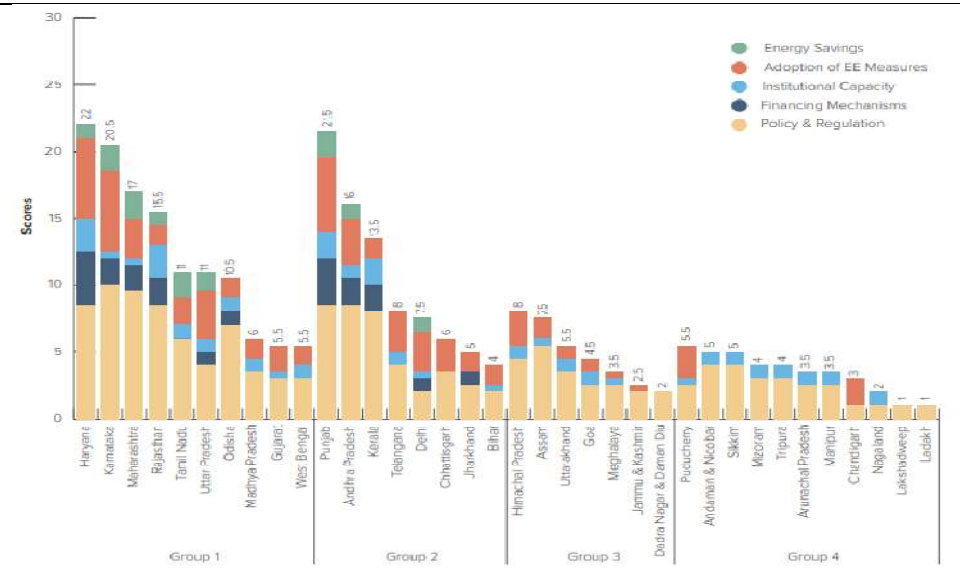
Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
				various buildings of RGTPP (2 * 600 MW RGTPP, Khedar, Hisar) premises and colony premises. e) Implementation of energy conservation measures at school building. Under this project, following appliances are being provided at free of cost to Govt. schools (100% financial assistance from BEE funds), as replacement of conventional appliances. So far, energy saving measures has been implemented in approx. 470 nos. of schools and activity is under process in 150 nos. schools. f) HAREDA has constructed its own office building "Akshay Urja Bhawan, Panchkula" which is 5 Star Green Rating for Integrated Habitat Assessment (GRIHA) rated building to demonstrate the concept g) Installation of LED in Govt, building		

Haryana Declared as Top Performing Energy Efficient State in the Building Sector

Haryana has emerged as the top state in energy efficiency in the building sector in India as per the State Energy Efficiency Index (SEEI), 2020, released by the BEE, Ministry of Power.

The scoring is carried out against 16 indicators pertaining to Energy Conservation Building Code (ECBC 2017), mandatory energy audits of buildings, financial incentives for energy audits, construction/ retrofits, adoption of certified green buildings, institutional capacity to support ECBC 2017 implementation and EE in buildings.

The SEEI assesses the states in four categories of Aspirant with a score below 30 points, Contenders with a score between 30-50, Achievers with a score of 50-60 and the Front runners with above 60 points score. SEEI 2020 has assessed the performance of 36 states and Union territories in energy efficiency (EE) using 68 qualitative, quantitative, and outcome-based indicators aggregating to a maximum score of 100 across six sectors.



EN/13 Energy Savings by Reducing Consumption	Yes	State Fund	S	Distribution of LED bulbs by HAREDA	140	

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Name of the Scheme for the Strategy/ Action (Central/ State)	Source (indicate if central C, if state S, if external aid E)	Physical Progress (2014-2019)	Expenditure [41] (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
EN/14 Energy Audit Tests	Yes	State Fund	S	Regular activity of the Department		
EN/ 17 Technical Modifications for energy efficient and cleaner technologies	yes	MuDSM	S	Replacement of existing fixtures with LED Fixtures under MuDSM Project	112	
EN/18 Enhancing Renewable power capacity and Generation	Yes	HPGCL	S	HPGCL has installed 10 MW grid connected Solar Power Plant at PTPS Panipat during 2016	9921.7	
EN/22 Energy Conservation Campaign	Yes	HAREDA	S	Publicity and IEC activities	298.09	

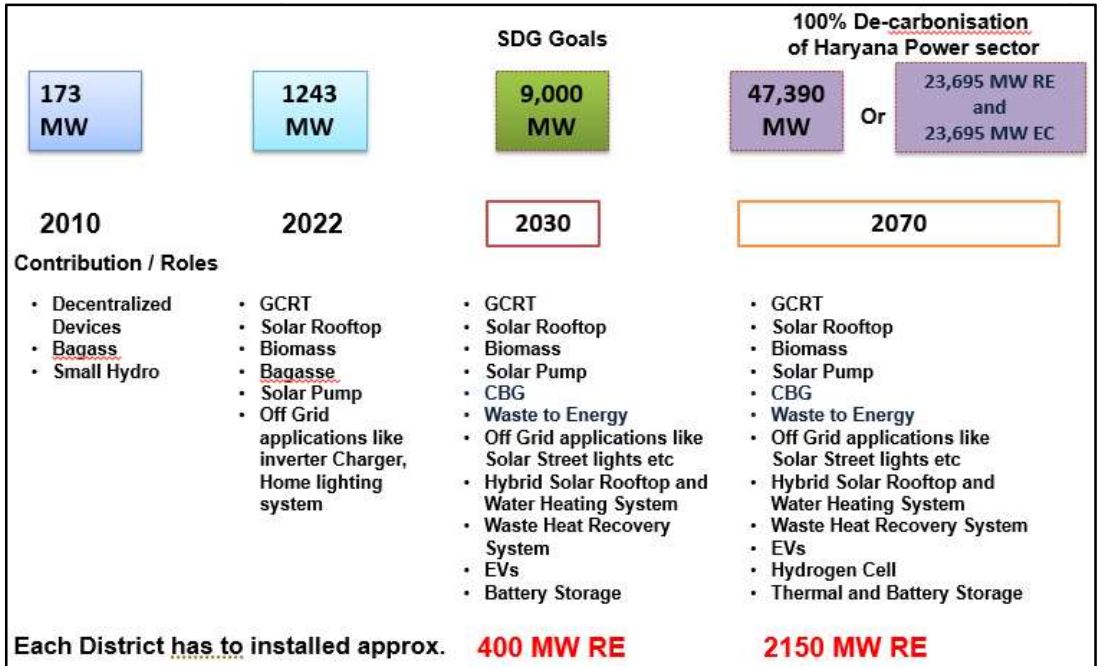


Figure 35: Way Forward for the State of Haryana in Renewable Energy sector

GAP/BARRIER ANALYSIS

Table 32: Gap/Barrier Analysis of the Energy Sector

Type	Gaps

Technical/ Infrastructural	• Ground-mounted Solar Power Project
	  ○ Lack of availability of land has hindered the state's ability to develop low-cost solar and renewable energy projects.
	  ○ Erratic and infirm power generation from solar generators leads to grid instability.
	  ○ Unavailability of accurate forecasting facilities is a challenge for scheduling of power for DISCOM, SLDC and TRANSCO.
	• Rooftop Solar Power Projects
	  ○ Constrained space and quality of roof in case of residential societies and apartments, SMEs and 25-years roof lock in period.
	  ○ Challenge with net metering.
	  ○ For developers/ RESCO, the fragmented and disaggregated demand contributes to higher CAPEX coupled with high transaction cost involved in collection of payment.
	  ○ Limited business planning horizon of SMEs makes them apprehensive to commit for installing a rooftop solar system which in general for 25 years horizon.
	  ○ Financial Institutions are constrained with the credit-worthiness of developers /consumers coupled with higher transaction cost for small ticket loan for rooftop solar leading to absence of customised financing options.
	  ○ Higher variability at Distribution Transformer (DT) level, lack of awareness at operational level of DISCOM staff, unscheduled and variable load pattern, lack of incentives for DISCOM to promote RTS.
	  ○ Inadequate DT capacity.
	• Sudden loss of demand for thermal power plant towards accommodating renewable results in reduction of PLF and impacts the operational efficiency of the power plant.
	• Concern stem from technical issue pertaining to the integration of renewable power into the grid in terms of grid balancing.
	• Limited potential of hydro power in the state.
	• Insufficient wind velocity to develop wind power projects.
	• Poor supply chain impacts adoption of Energy Efficiency measures across industries with specific to MSME sector.
	• Poor power quality in the agricultural feeder often led to motor burn-outs. In addition, inconvenient pumping hours, erratic power supply, flat tariff and poor supply chain of efficient pumps led farmers in adoption of inefficient and oversized pumps leading to enhanced energy consumption in agriculture sector. Such events also lead to increasing DT damage.

Policy & Regulatory	• Enforcement of regulations are uneven, not followed strictly including non-implementation of policies. • No incentives/schemes for replacement of existing inefficient equipment across agriculture and industrial sector with star rated equipment.
Institutional	• Lack of inter-departmental convergence. • Lack of awareness amongst consumer groups (SME, commercial and

	residential) on the benefit and cost economic of Rooftop Solar and energy efficient devices. • There was lack of interest from ESCOs (mainly private) due to poor financial conditions of ULBs etc. for implementation of MuDSM measures. • Ag-DSM initiatives including directions for use of star rated pumps is only applicable for new connections leaving out existing inefficient pumps. • Lack of ESCO based business model coupled with poor Financial Institution interest in funding standalone EE measures across industrial sector. • Lack of sector specific assessment and action plan for scaling up energy efficient efforts. • Lack of enforcement for the utilities and public institutions to invest in energy efficiency. • Poor M&E framework in assessing impact and benefits of intervened measures.
Socio economic/Cultural	• Continuation and adoption of inefficient technology and process.
Financial	• Rupee declination and volatility has been a challenge: Weakening rupee will impact investor returns in auctioned solar projects, especially when there is a significant exchange rate variation between the time of bidding and finalisation of module supply agreement. • Unorganised markets result in fluctuating price in addition to the challenges with biomass collection, transportation, processing and storage.

SECTOR PLANNING

National/ State-Level Targets and Linkages

The growth of electricity demand has been projected for the state till 2036 by CEA under different scenario. In line with the target set under NDC and in line with the commitment made under COP26 (Glasgow) and state's commitment, the section intends to assess compliance gap.

Forecasted Electrical Energy Requirement	Electricity Demand (in MU)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2034**	**2037**
PAM Baseline Scenario [45]	73,760	78,425	83,308	88,385	93,688	99,230	105,020	**111,061**	138,055	162,221
PAM Optimistic Scenario	74,108	78,799	83,785	89,084	94,715	100,695	107,045	**113,785**	145,145	174077
PAM Pessimistic Scenario	71,452	75,198	79,138	83,281	87,638	92,215	97,024	**102,074**	124,938	145268
NDC Commitment – Fulfill 50% of the energy requirement through Renewable energy by 2030										

SITUATIONAL ANALYSIS- NDC PERSPECTIVE

NDC embodies national efforts to reduce emission and adapt to the impact of climate change. Since NDC commitment (including additional commitment under COP 26) is yet to be downscaled at the state level; therefore, the state level target under NDC is conceived in line with the national commitment. In similar

[45] Partial Adjustment Model

line, SDG specific to the energy sector outlines actions aimed at ensuring affordable, reliable, sustainable, and modern energy for all. With strong possibilities of integration of NDC and SDG agendas, the action planning exercise intends to cross fertilize the NDC and SDG commitment and synergize it under the proposed climate change action plan. The key commitment under NDC and SDG pertaining to energy sector are outlined in the table below.

Key NDC Commitments	Key State level Initiatives to comply with NDC Targets
NDC 4- Achieve about 40% of cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 (Cumulative target enhanced to 500 GW by 2030).	• Enhance renewable energy capacity to 9,000 MW by 2030.
NDC 3- Reduce the emission intensity of its GDP by 33 to 35% by 2030 from 2005 level (Target enhanced to 45%).	• Reduce AT&C losses to 10% by 2030. • Achieve 100% adoption of Energy efficiency in domestic and street lighting. • Achieve 75% penetration of energy efficient equipment.
Key Commitments under COP-26	
Fulfill 50% of the energy requirement using Renewable energy sources by 2030.	• Enhance renewable energy installed capacity to 9,000 MW by 2030.

SPECIFIC TARGETS UNDER SDG FOR THE SECTOR

SDG Goals	Key State level Initiative to comply with SDG Goals	
SDG 7- By 2030, ensure universal access to affordable, reliable, and modern energy services (7.1)	100% achievement in 24x7 power for all.	**Initiatives** Certain programme like (a) Power for all (b) SAUBHAGYA are under execution with objective of enabling access. Programmes like Integrated Power Development Scheme (IPDS), Restructured Accelerated Power Development and Reform Programme (R-APDRP) and Ujwal DISCOM Assurance Yojana (UDAY) have been institutionalized through DISCOM towards improving the operation and functional efficiency of DISCOM.
By 2030, double the global rate of improvement in energy efficiency (7.3)	• Reduction of AT&C losses. • Adoption of Energy efficient domestic and street lighting. • Adoption of energy efficient equipment.	
By 2030, increase substantially the share of renewable energy in the global energy mix.	• Enhance renewable energy installed capacity to 9,000 MW by 2030.	

Description of Strategies/Activities

EN/1– Promote Grid Interactive Solar Energy Technology (Ground-mounted and Rooftop technology)

Description-The action includes establishing of an enabling policy environment and market ecosystem that could foster deployment of 4,030 MW of solar power project by 2022 and 9,000 MW by 2030.

1. **<u>Strengthening of Policy Environment</u>**
   i. Constitute an inter-departmental committee to address cross-cutting issues of land availability, provision for adequate infrastructure like development of roads, water arrangements and necessary clearance expeditiously. This will include -
      a. Revise Panchayati land lease policy, demarcate (identification of suitable project sites based on renewable resources) and facilitate availability of land for large scale ground mounted project.
      b. Establish transmission infrastructure and facilitate infrastructural access.

c. Establish time bound framework in provisioning of approval and clearance.

ii. Easing out policy bottlenecks towards ensuring establishment of additional 1600 MW of Roof Top Solar (RTS) project by 2022, including but not limited to
   a. Easing out net metering.
   b. Enhancing capacity limit of individual RTS capacity.
   c. Allowance for contract demand reduction/cut for RTS consumer resulting in reduction of fixed charge cost of Commercial & Industrial (C&I) sector consumer.
   d. Ensure favourable tariff structure for gross metering and lucrative adjustment rate for annualised surplus energy for net metering.
   e. Mainstream of virtual and group net metering support under the ambit of existing policy framework.
   f. Institutionalisation of DISCOM led business model.
   g. **Promotion of Utility led community solar model** based on virtual net metering principle where common areas within a society premises or off-site locations could be used for RTS installation.
   h. On bill financing model based on net metering principle
   i. DISCOM entering into PPA with Developers for aggregated residential demand selected on reverse auction model, whereby the consumer will avail solar power at annual subscription fees based on virtual net metering principle.

2. <u>Infrastructural strengthening</u>

i. Augmenting of inter and intra state transmission network along with promotion of Green Corridor Scheme, setting up of Renewable Energy Management Centres (REMCs) equipped with advanced forecasting tools and authorise to conduct real-time monitoring of RE generation for better forecasting and dispatch of RE generation.
ii. Augmenting grid infrastructure for accommodating variable energy generation unit -
   a. Deployment of sensors for generating real-time and location wise high-resolution data on grid conditions coupled with centralized RE generation forecasting facilities, data analytics and control system to enable system operators to respond faster to changed grid condition.
   b. Up gradation of grid operation protocols to enable lower time scheduling and dispatch of all resources connected to the grid through automated incorporation of RE forecasts.
   c. Expand balancing areas.
   d. Promote flexible demand and access to supply resources to ensure continued stability of the grid at each moment.
iii. Focusing on land neutral technologies like canal top and floating solar system.
iv. Improve power quality, grid availability, reduce SAIFI and SAIDI.

3. <u>Market enablement</u>

i. Develop strong institutional framework towards attracting private sector investment.
ii. Enhance sensitization of financial institution towards enabling easy access to affordable finance (loans from public and private sector bank under priority sector lending).
iii. Capacity building of stakeholders (utilities, suppliers, financial institutions) and strengthening of the supply chain (manufacturers, distributors and O&M vendors).

Direct & Co-Benefits

- Establishment of 9,000 MW of solar capacity will help in feeding of 15,768 million unit of clean energy to the grid per annum and emission reduction in tune of 15 million tCO_2e per annum.
- Lower the dependency on central sector generating unit.
- Short term employment for business development, design, pre-construction and construction to commissioning and long-term employment for operation and maintenance of power project.

EN/2– Increase share of Biomass-based Power generation unit including cogeneration unit

Description- The state has cumulative potential of 1,707 MW of biomass-based power generation (*including 1,333 MW of biomass-based power generation potential, 350 MW of co-generation-based power generation potential and 24 MW from waste to energy*)[46]. However, a considerable portion of the estimated potential is yet to be tapped. Endeavor is to be made to maximize biomass-based power generation capacity in the state. Key initiatives proposed towards promoting biomass-based power generation includes -

1. Publication of biomass assessment report for attracting potential investor/IPPs and institutionalise norms for fixation of rates for biomass waste.
2. Dedicated biomass based RPO under Non-Solar RPO component.

HPGCL shall endeavour to use biomass pellets for co-firing with coal in its thermal plants.

Direct & Co-Benefits-

- Establishment of biomass power project will result in effective utilisation of biomass and avoid associated GHG emission.
- Lower the dependency on central sector generating unit.
- Short term employment for business development, design, pre-construction and construction to commissioning and long-term employment for operation and maintenance of power project.

EN/3 – Deployment of Solar powered irrigation pump

Description- Promotion of solar water pump is intended to enhance the irrigation outreach, de-dieselize irrigation sector and at the same time sensitize farmers on the cost reduction in agriculture water pumping. The dissemination of solar pump is planned to be carried out as part of PM-KUSUM scheme. The activity is planned to be executed through the following steps -

1. Sensitisation of the farmers on the PM-KUSUM scheme.
2. Support farmer in availing the solar pump, facilitate connection of the pump with grid for effective utilisation of solar power during non-operational period of solar pump.
3. Support farmers in post commissioning operation and maintenance.

Direct & Co-Benefits-

- Extended assured irrigation outreach and reducing farmers risk against climate variability.
- Assured irrigation will not only enhance agricultural productivity but will also address the concern over crop failure.
- Reduce GHG emission from combustion of diesel/use of electricity.

EN/4 – Promote end use energy efficiency

Description- Adoption of energy conservation and demand side management measures is identified as a key de-carbonization strategy and most economical way of managing the peak and total energy demand without bleeding the budget starved state power department. The sector wise energy saving target in Mtoe by 2031 for the state in line with the NDC target is outlined in the table below:

Domestic	Commercial	Industrial	Municipal	Transport	Agriculture	Total
State energy saving target in Mtoe under moderate savings scenario						
0.422	0.208	1.710	0.026	0.571	0.309	3.247
State electricity-saving target (in TWh) by 2031 under moderate savings scenario						
4.47	2.42	3.20	0.32	-	-	10.42

1. Improved Energy Efficiency in Building Sector

With energy conservation potential in range of 30-40% across commercial building segment[47], adoption of energy conservation measures in existing building and integrating the concept of energy efficient design could result in substantial energy savings. Key activities include:

[46] MNRE annual report 2016-17

[47] Ref: BEE

i. Mandatory energy audit of commercial buildings including govt offices.
ii. Promotion of market-based mechanism/ESCO in the state for implementation of energy efficiency measures across commercial building segment.
iii. Develop enabling mechanism and process of mainstreaming ECBC, under state general development control rule/ULB's building Bye-law, revision of Schedule of Rate (SoR).
iv. Enhance capacities and expertise of the implementing agencies like Urban Local Bodies (ULBs), builders, architects/planners and building material suppliers.
v. Sensitisation of commercial building sector stakeholders for adoption of energy conservation measures including promotion of super-efficient appliances.

2. **Mainstreaming of Ujala scheme and Super-Efficient Equipment Programme (SEEP)** by extending its outreach and strengthening its supply chain coupled with consumer's awareness/sensitisation.
3. **Creating a Market Demand for Adoption of Star Labelled Products** through sensitization and awareness.
4. **Complete Replacement of Existing Street Lights to LED Street Lights under UJALA** scheme.
5. **Mandatory Investment Grade Energy Audit of Street Lighting unit and Water Pumps under Public Water Works.**
6. *Training and Capacity Building of the ULBs and PHED* on the aspect of energy conservation.
7. Training programme to target professionals in the energy conservation cell by the Energy Auditors may be routinely conducted.
8. **Supporting clean energy transition in MSME sector** including adoption of energy efficiency, technology up gradation measures and renewable energy technology measures.
    i. Cluster/Sector wise energy conservation potential mapping.
    ii. Sensitization of MSME unit's owners through awareness workshop.
    iii. Facilitate walk thorough/detailed energy audit at the unit through utilisation of SECF or converging of fund with MSME department for undertaking energy audit.
    iv. Facilitate access to concessional finance for implementation of energy conservation or technology up gradation measures.
    v. Implementation of model demonstrable unit in each sector for motivating other units in the sector for adoption of EC measures.
    vi. Establish and strengthen supply chain base (local service provider and technology suppliers) in the cluster for provisioning and maintenance of the energy efficient appliances.
    vii. Undertake training need analysis and training of industrial worker in association with ITI and MSME tool room on the energy efficient appliances.
9. **Replacement of old and inefficient agricultural pumps with energy efficient pumps**under AgDSM, and replacement of inefficient municipal water and sewage pumps with energy efficient pumps under MuDSM.
10. **Ensure 75% penetration of energy efficient equipment by 2030.**

Direct & Co-Benefits-

- Development of market for energy efficient building materials and create engagement opportunities of experts.
- Reduce energy demand and associated GHG emission to generate the power.
- Enhance sustainability of MSME industries and thereby ensuring local employment generation and improve of state economy.

EN/5 – Reduce AT&C losses to 10% by 2030

Description- AT&C loss is a critical determinant of the performance and financial health of power distribution utility. Reduction of AT&C losses will not only help in reduction of financial loss but will reduce the demand supply gap and utility level demand. As a signatory to UDAY, the state DISCOMs has already taken up initiatives like feeder metering, DT metering, feeder level audit, feeder improvement programme, feeder separation initiatives, implementation of ERP etc. under UDAY, IPDS to reduce its AT&C losses.
Recommendations for attainment of AT&C Loss Reduction Target are -

1. Adoption of infrastructural modification measures like installation/ periodic replacement of capacitor bank based on its function-ability at 11/33 kV sub-station, incorporation of LT Aerial Bunch Cable (LT ABC) and laying of LT ABC in theft prone areas.
2. IT enablement and performance monitoring of the transformer and other utility system.
3. Compulsory implementation of 100% DT metering, feeder level metering, and consumer level metering and facilitate feeder segregation.
4. Strengthening and implementation of metering system including but not limited to introduction of smart meters and Automated Meter Reading (AMR) based billing for high value consumers, replacement of mechanical meters with electronic meters, ensure 100% metering and periodic meter reading including Android based billing and spot billing system, provisioning of prepaid meters for new temporary LT connections, advertisements /hoardings and for Government connections up to 25 kW and installation of double metering in selected 11 kV & 33 kV consumers.
5. Introduction of High Value Consumer Management System (HVCMS) for DISCOMs.
6. Facilitate implementation of R-APDRP Part A & Part B and IPDS scheme.

Direct & Co-Benefits-

- Reduce financial loss of DISCOM.
- Reduce electricity demand-supply gap.
- Reduce energy generation and thereby GHG emission..

EN/N/1 – Mainstreaming Energy Storage infrastructure

Description- Strategy is suggested towards development and deployment of enabling policy measures aimed at mainstreaming adoption of energy storage infrastructure with focus on battery-based storage. The key policy initiatives recommended are -

1. Integrate battery energy storage into overall energy plans at the federal level.
2. Support in a targeted manner, demonstration projects and first movers with loan guarantees, low interest loans, grants, and others for adoption of Variable Renewable Energy (VRE) -based energy storage in commercial/industrial applications.
3. Develop industrial cluster to promote localised manufacture/assembly of battery-based energy storage unit.
4. Promote provision for energy storage facilities to be connected to renewable energy-based power generation facilities both at Medium Voltage (MV) and Low Voltage (LV) level.
5. Mandating energy storage facilities for Electric Vehicle (EV) charging, telecom towers and data centres.
6. Promote energy storage as replacement of diesel generator for industry and hospitality sector through enforcement of stricter emission norms for operational generator and incentivisation for adoption of energy storage facilities.

Direct & Co-Benefits-

- Reduce fluctuating generation challenge of renewable energy systems and promote higher integration of RE based generation in the grid mix.
- Sustain the market growth of electric vehicles.
- Minimise use of diesel generator and associated ambient air pollution.

EN/N/2 – Promotion of Electric Mobility

Description- Activity will include adoption of e-mobility through adoption of multi-pronged transition strategy.

1. Sensitize consumer on social benefits of electric vehicles, operating cost economics.
2. Development of policy aimed at encouraging EV adoption, supporting development of manufacturing base, promote and attract investment for EV or its component manufacturing in the state.
3. Provide fiscal concessions, in the early stages, to allow electric vehicle technology to compete with the more established conventional technology.
4. Mandating sub-national agencies to procure and use EVs.

5. Create the necessary infrastructure for re-energising batteries by setting up charging stations and offering facilities for swapping stations to be set up.
6. Procure electric buses for the use of state-owned transport companies to create a base for mandating all buses to be electric.
7. Support workforce skill development towards supporting e-mobility supply chain.

Direct & Co-Benefits- .

- Reduce use of diesel /petrol like highly polluted fuels for transportation.
- Reduce associated ambient air pollution.
- Ensure local employment generation and improve of state economy for automobile manufacturing.
- Short term employment for business development, design, marketing and sales of vehicles and long-term employment for operation and maintenance of EVs.

KEY PRIORITIES SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Table 33: Synopsis of Planned Activities for Energy Sector

Code	Activities/Interventions	Scheme	Source	Duration (in years)	Proposed budget during (2021-30) in INR Lakh	Amount likely from existing Central scheme (in INR Lakh)	Amount likely from State Budget (in INR Lakh)	Amount likely from External Aid (Amount in INR Lakh)	Implementing Dept.
Continuation of activities from SAPCC-1									
EN/1	Promote Grid Interactive Solar Energy Technology (Ground-mounted and Rooftop technology)	Grid connected rooftop and Small solar power plant programme, Development of Solar Parks and Ultra Mega Solar Power Projects, RPO and Open Access	C, private sector	8	50,000.00		50,000.00		HAREDA
	Installation of 181 MW grid mounted Solar Power Plant on its land under Bundling of Thermal Power of HPGCL with RE power	HPGCL	S	1	72,400.00		72,400.00		HPGCL
EN/2	Increase share of Biomass-based Power generation unit including cogeneration unit	Promotion of Biomass based Cogeneration in Sugar mills and other industries in the country, NNBOMP [48], BPGTP[49]	C	8	203280.00	203280.00			HPGCL
EN/3	Deployment of Solar powered irrigation pump	PM-Kusum/MNRE solar pump subsidy scheme	C, S	8	240000.00	240000.00			HAREDA, Agri Dept.

[48] New National Biogas and Organic Manure Programme

[49] Biogas Power Generation (Off grid) and Thermal energy application Programme

EN/4	Promote end use energy efficiency	ECBC, SEEP, UJALA, Ag-DSM, MuDSM	C	8	2900.00		2900.00		HAREDA
Proposal of New activities to be added in SAPCC-2									
EN/N/1	Mainstreaming Energy Storage infrastructure	Solar Inverter Charger Programme	C	8	17000.00		17000.00		HAREDA
EN/N/2	Promotion of Electric Mobility	FAME	C	8	5000.00		5000.00		HAREDA
				Total	**590580.00**	**448280.00**	**142300.00**		

SUSTAINABLE HABITAT

SECTORAL OVERVIEW

Haryana State represents about 34.9% urban population to total population as per the 2011 Census (which is above the national average of 31.16%. The urban population of the State continues to grow due to better living facilities along with the continuous migration of rural population to urban areas. Sound agricultural and industrial base has also given rise to the rapid growth urbanization in Haryana, with rapid developments in the agricultural sector during the green revolution period the establishment and growth of the Mandi Towns has taken place in various parts. The highest proportion of urban population are found in the districts of Faridabad, Gurgaon, Panchkula, and Ambala whereas low levels of urbanization are found in Mewat, Rewari, Fatehabad and Bhiwani districts. Highest urban population is concentrated in the northern parts of the State as well as 2 southern districts, Gurgaon, and Faridabad, due to its proximity and impacts of NCR region. The districts Panipat and Yamunanagar have high concentration of urban population because they have high level of industrial development. The average urban literacy rate for the State is 83.1% (2011 Census). In terms of relationship with level of urbanization, the districts Fatehabad, Bhiwani, Mahendragarh and Mewat have low proportion of urban population have also low value of urban workers. The districts adjoining boundary with Punjab and Himachal Pradesh have high and moderate per cent of urban workers except districts Fatehabad and Jind.

Study shows maximum urbanization in Faridabad, with 70% of the population concentrated in urban areas. Faridabad is followed by Gurgaon and Panchkula with around 60% of urban population[50]. The high level of urbanization is attributed to the high level of industrial development, strategic location along the highway and proximity to the NCR region of Delhi and Panchkula to the capital city Chandigarh. Low level of urbanization is due to low level of industrial development, remote location, harsh climatic conditions and poor connectivity to NCR or Chandigarh.

There were over eight million registered vehicles across the Indian state of Haryana at the end of fiscal year 2019. The south Asian country's transport sector accounted for a 4.85 percent share of the GVA with road transport accounting for over three percent of it. There are currently 87 municipalities under the department, including 10 municipal corporations, 19 municipal councils and 58 municipal committees in the state.

Haryana provides scope for industrialization and areas are continuously being developed and allotted for potential outcomes. Haryana State Industrial and Infrastructural Development Cooperation (HSIIDC) is responsible for development of industrial model township/ Industrial Estates in the State. The facilities provided involve roads, water supply, drainage, sewerage, electrification, CETP, WTP, re-circulation networks and related works in the Industrial estates providing an ideal environment with necessary infrastructure. IMT Manesar, IMT Bawal, IMT Rohtak, IMT Faridabad, Udyog Vihar, Gurugram are few industrial areas of HSIIDC.

IMPACTS OF CLIMATE CHANGE IN THE SECTOR

Studies links the changes in land use/land cover (LULC) with the changing geomorphology of the study area using satellite remote sensing and GIS. The results showed that in Panchkula between 1980 and 2020, agricultural (+73.71%), built-up (+84.66%), and forest (+4.07%) classes of land increased in contrast to that of the fallow land (-76.80%) and riverbed (-50.86%) classes that have decreased in spatial extents.[51] Heat pollution average night-time temperature has increased tremendously in Panchkula due to tremendous increase in pollution loads because of urbanization. Agrarian livelihoods such as cropping choices, irrigation cycles, sharecropping arrangements, declining common property resources and land use changes to non-agricultural uses are influenced by (peri-) urbanization processes, where climate variability plays out at a larger scale than

[50] https://www.worldwidejournals.com/global-journal-for-research-analysis-GJRA/recent_issues_pdf/2013/December/urban-population-distribution-and-its-socio-economic-attributes-in-haryana-2011_December_2013_1599027270_25.pdf

[51] Kanga, S.; Singh, S.K.; Meraj, G.; Kumar, A.; Parveen, R.;Kranjˇci´c, N.; Đurin, B. Assessment of the Impact of Urbanization on Geoenvironmental Settings Using Geospatial Techniques: A Study of Panchkula District, Haryana. Geographies 2022, 2, 1–10. https://doi.org/10.3390/geographies2010001

the urbanization processes[52]. With rapid urbanization, there is an increase in public and private encroachment of common pool resources (CPRs) such as rainwater harvesting structures and cumulative variability in rainfall and temperature is reducing the dependency of communities on CPRs[53]. In peri-urban setup, decreasing rainfall is the cause of reduced dependence on traditional rainwater harvesting structures in peri-urban Gurgaon[54].

KEY ISSUES AND CHALLENGES

Table 34: Key Issues and Challenges of Sustainable Habitat Sector

Area	Issues/Challenges
Technical/ Infrastructural	• Sharp increase in the built-up area from 38.93 sq km to 71.89 sq km between 1980 and 2020 in Panchkula district • significant proportion of its area with national capital region (NCR) • huge number of vehicles in cities is causing more traffic cognation • lack of infrastructure and poor maintenance of existing public transport infrastructure and less penetration of public transport • poor sanitation condition in urban areas and particularly in slums and unauthorized colonies of urban areas such as Faridabad, Gurugram, Ambala, Sonipat, Panipat, Hisar and Rohtak • Heterogeneous, non-linear and patchy development as compared to public sector development in some districts[55]
Policy & Regulatory	• unremitting augment in the proportion of urban population as a result of more liberal industrial policies
Institutional	• subsistence nature of agricultural economy associated with low level of urbanisation
Socio economic/ Cultural	• Mewat, Sirsa and Fatehabad have very high value of sex ratio, but these districts have low level of urbanization except Sirsa urban sex ratio is quite low (873) to total sex ratio • significant variation in level of urbanization • urbanization is unplanned due to uncontrolled migration • Private Urban Development (PUD) Projects have significant impact on the socio-economic characteristics of the affected villagers
Environmental	• Harsh climatic condition attributing to low level of urban development in district of Mewat, Mahendragarh, Bhiwani and Fatehabad • Urban areas are becoming heat islands[56] • Persistent water crisis. Ground water is not being recharged • uncontrolled conversion of farmland into urban development project • sharp decrease in riverbed area (drainage) from 55.76 sq km in 1980 to 27.40 sq km in 2020 has been observed, indicating an intensification of urbanization and industrialization in Panchkula

[52] Mishra P., Vij S. (2022) Changing Agriculture and Climate Variability in Peri-Urban Gurugram, India. In: Narain V., Roth D. (eds) Water Security, Conflict and Cooperation in Peri-Urban South Asia. Springer, Cham. https://doi.org/10.1007/978-3-030-79035-6_6

[53] Vij, S., & Narain, V. (2016). Land, water and power: The demise of common property resources in periurban Gurgaon, India. Land Use Policy, 50, 59–66

[54] Ranjan, P., & Narain, V. (2012). Urbanization, climate change and water security: A study of vulnerability and adaptation in Sultanpur and Jhanjhrola Khera in peri-urban Gurgaon, India (Peri-urban water security discussion paper series, paper no. 3). SaciWATERs, India

[55] https://www.researchtrend.net/ijet/pdf/46-%20120_.pdf

[56] https://www.ijcrt.org/papers/IJCRT1802209.pdf

PROGRESS MAPPING (IN LAST 5 YEARS)

Physical Progress

The achievements under the strategies of the Sustainable Habitat sector are highlighted below for Haryana State Action Plan on Climate Change (HSAPCC) 2014

Table 35: Physical Stocktaking of Sustainable Habitat Sector

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Scheme	Source	Physical Progress (2014-2019)	Expenditure (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
SH/1. Urban Planning						
1.4 Improving urban infrastructure through rainwater harvesting and reuse of wastewater	Yes	AMRUT 2	S	• Improving urban infrastructure through rainwater harvesting and reuse of wastewater by the ULB department, Haryana	190353.00	0
1.6 Improve drainage, sewerage and sewage treatment in all ULBs	Yes	Mukhya Mantri Samagra Shahri Vikas Yojna	S	• Maintenance of urban water and sanitation and sewerage under the Urban water supply programme • Operation & Maintenance of urban storm water drainage works		
SH/2. Urban Transport						
2.1 Promote and plan Public Transport System and parking infrastructure in large ULBs	Yes	AMRUT 2	S	• installing more than 25 mechanical sweeping machines in the state for 587 km of main roads	0	0
SH/3. Waste Management						
3.1 Capacity Building for Waste (Municipal solid waste, domestic sewage, wastewater) to Energy. Also, waste to compost to be used as fertilizer	Yes	NULM	CSS	• Urban Solid Waste Management by Urban Local Bodies (ULB) • Training of women councillors by Department of ULB • 4257 self-help groups of 10 to 20 urban poor women have been formed in 80 cities	0	0

Key initiatives of HSIIDC to mitigate Environmental Pollution are:

- Establishment of Common Effluent Treatment Plans (CETPs) in their industrial areas with tertiary treatment facilities to diminish ground water pollution
- Treatment of wastewater is re-circulated for use in horticulture, cooling towers, washing, flashing to reduce freshwater load
- Green area development, green buffer zone development and plantation along roads to diminish air pollution
- Provision of separate storm water drainage pipe networks in order to avoid mixing of sewerage and maximum discharge collection and disposal in natural bodies/ drainage to have maximum filtration in groundwater
- Provision of Rainwater harvesting pits to improve groundwater
- Encouraging green industries in the area

GAP/BARRIER ANALYSIS

Table 36: Gap/Barrier Analysis of Sustainable Habitat Sector

Type	Gaps
Technical/Infrastructural	• EV infrastructure • Shortage of technical staff for climate change relevant actions
Institutional	• Lack of inter- departmental coordination
Planning	• Planning of long-term activities for climate relevant actions is meagre • BRTS is not planned for all the cities

SECTOR PLANNING

National/State-Level Targets and Linkages

SITUATIONAL ANALYSIS- NDC PERSPECTIVE

NDC Commitments	Key State level Initiatives to comply with NDC Targets
NDC 1: To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation	• MukhyaMantri Samagra Shahri Vikas Yojna • AMRUT 2 • Pradhan Mantri Awas Yojana PMAY (U) and PMAY (G)
NDC 2: To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development	• MGNREGA • NRLM • Deen Dayal Upadhyay Grameen Kaushalya Yojna

SPECIFIC TARGETS UNDER SDG FOR THE SECTOR

SDG Goals	Key State level Initiative to comply with SDG Goals
SDG 1: End poverty in all its form everywhere	• National Urban Livelihood Mission (NULM) • Deen Dayal Upadhyaya Sewa Basti Utthaan • Mukhyamantri Awas Yojna
SDG 6: Ensure the availability and sustainable management of water and sanitation for all	• Swachh Bharat Mission Urban
SDG 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all	• Rajiv Gandhi Shahri Bhagidari Yojna
SDG 9: Build resilient infrastructure,	• Shyama Prasad Mukherjee Rurban Mission (SPMRM)

promote inclusive and sustainable industrialization and foster innovation	
SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable	• Mukhyamantri Samagra Shahri Vikas Yojna • Jagmag Shahar • Mera Shahar Sarvottam Shahar • Pradhan Mantri Awas Yojana -Urban (PMAY-U) • SMART City Mission • New Urban Renewal Mission (AMRUT)

Description of Strategies/Activities

The description of activities below is based of mitigation and adaptation options. The activities that are named "**SH**/N" are transformative activities and other set of activities are named as "**SH**", which are incremental activities. Incremental activities are those which are old activities proposed under earlier SAPCC (2014-17) and will be continued for upcoming years as per agreement of the nodal departments and transformative activities are those which are newly proposed by the nodal departments for the upcoming years under **Sustainable Habitat** sector.

SH/1- Integrated Solid Waste Management in ULBs and sewage treatment plants

Description- Integrated Solid Waste Management (ISWM) includes a comprehensive waste prevention, recycling, composting, and disposal. Sewage treatment plants aim to remove contaminants from sewage to produce an effluent that is suitable for discharge to the surrounding environment or an intended reuse application, thereby preventing water pollution from raw sewage discharges. There are several STPs proposed under AMRUT. In Karnal 4 STPs with a total capacity of 86 MLD, in Hisar, 1 STP with a capacity of 8 MLD, in Panchkula 8 STPs with a total capacity of 6.5 MLD, in Gurugram 6 STPs with a total capacity of 7 MLD, in Ambala 4 STPs with a total capacity of 44 MLD, in Palwal 3 STPs with a total capacity of 27.5 MLD, in Rohtak 4 STPs with a capacity of 57 MLD and lastly in Panipat 2 STPs with a capacity of 40 MLD has been planned and under progress of construction.

Direct & Co-Benefits-

- Provides clean, safe water processed, minimises waste and is overall beneficial to the environment
- STP meet the standards for emission of pollutants set by the Government & avoid heavy penalty
- Installation of sewage treatment plant reduces risk to public health and the environment
- Sewage treatment plant preserve natural environment against pollution
- Low operation and maintenance of plant reduces the cost as well

SH/2- Bioremediation of Legacy Waste

Description- Bioremediation is a method for separating soil and recyclables from legacy waste, and is both environmentally friendly and effective. To change the environmental conditions at legacy waste dumpsites, the procedure entails promoting the development of microorganisms and decomposing the target pollutants without the use of any hazardous chemicals.

Direct & Co-Benefits

- Land reclamation
- Green House Gas Emissions reduction,
- soil pollution and groundwater contamination reduction
- Low-cost solution to capping of solid waste management and disposal

SH/N/1- Integrated Solid Waste Management

Description- An ISWM system evaluates how to avoid, recycle, and manage solid waste in ways that preserve human health and the environment as effectively as possible. The major ISWM activities are waste prevention, recycling and composting, and combustion and disposal in properly designed, constructed, and managed landfills. Each of these activities requires careful planning, financing, collection, and transport.

Direct & Co-Benefits-

- Recovers nutrients, materials and energy from the waste stream
- Reduces landfill disposal and promotes organic and recyclable waste
- Reduces GHG emissions very significantly compared to conventional landfill disposal

SH/N/2- Re-use of treated waste water

Description- Wastewater reuse is a solution for the future to combat water scarcity. After treatment, wastewater can be used for a variety of applications including watering green spaces and golf courses, crop irrigation, firefighting and street-cleaning, or it can be used to recharge aquifers. The detailed action plan for the reuse of Treated Waste Water of both STPs was proposed in the previous project of Sewerage system in Sonepat Town under AMRUT scheme. There is a proposal for the reuse of Treated waste water was withdrawn for the 25 MLD STP Kakroi Road Sonepat.

Direct & Co-Benefits-

- Reduce environmental impact and promotes sustainability
- Reduce demand and stress on freshwater supply
- Re-using treated water saves energy

KEY PRIORITIES SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Table 37: Synopsis of Planned Activities for Sustainable Sector

Code	Activities/Interventions	Scheme	Source	Duration (in years)	Proposed budget during (2021-30) in INR Lakh	Amount likely from existing Central scheme (Amount in INR Lakh)	Amount likely from State Budget (Amount in INR Lakh)	Amount likely from External Aid (Amount in INR Lakh)	Implementing Dept.
Continuation of activities from SAPCC-1									
SH/1	Integrated Solid Waste Management in ULBs and sewage treatment plants	SWM, AMRUT	CSS	22	80479.00	7494.00	28985.00	0	ULBs
SH/3	Bioremediation of Legacy Waste	SWM	S	1	26200.00	0	26200.00	0	ULBs
Proposal of New activities to be added in SAPCC-2									
SH/N/1	Integrated Solid Waste Management for new sites	SWM	S	22	127900.00	0	127900.00	0	ULBs
SH/N/2	Re-use of treated wastewater	SWM	S	1	0	0	0	0	ULBs
				Total	**234579.00**	**7494.00**	**83965.00**	**0**	

CHAPTER 6: ADAPTATION FOCUSSED SECTORS

The Adaptation Strategies have been covered in the respective major chapters:

3. **Sustainable Agriculture Mission**
4. **Forest and Biodiversity**
5. **Water Mission**
6. **Health Mission**
7. **Strategic Knowledge Mission**

SUSTAINABLE AGRICULTURE MISSION

SECTORAL OVERVIEW

Haryana is a leading state in national agricultural production and contributes to 14.1% in the nation's agricultural GDP. The agriculture and allied sectors play important role in the state, crop husbandry and dairy farming are major components which contribute 95% to the state's agriculture sector. The state is divided into three agro-climatic zones namely arid, semi-arid and dry sub-humid.

The sector engages around 45% of the state's population. Of total 16.2 lakh operational holdings in Haryana, majority i.e., 67% are small and marginal in nature and only 3% are large land holders. The GSDP at constant prices (2011-12) is Rs. 5,28,069.75 crores for the year 2020-21 (Advanced estimates) with a negative growth of 5.7% in the year 2020-21 as compared to the growth of 8.2% recorded in 2019-20. The status of Gross State Value Added (GSVA) of the state at constant prices (2011-12) was recorded as 8.0% in 2019-20. A negative growth of 5.2% in GSVA is estimated for the year 2020-21.

Agriculture Status in the State

Haryana is rich in culture and agricultural prosperity with nearly 80% of the state's total geographical area under cultivation. The state is predominantly an agrarian economy, where a major population is engaged in agriculture and allied sectors for their livelihood. The 71.72% of the cropped area is under food grains and remaining 28.3% is under non-food grains. Major crops grown in Haryana are Wheat and Rice. It is self-sufficient in food production and second largest contributor to the nation's food grains pool. The major food grains grown in state are rice, wheat, sugarcane, cotton, oilseeds, pearl millet, gram, and barley. The state has assured irrigation with 84% of the cultivated area, most suited for rice-wheat production system. The irrigation of the cultivable land is facilitated through tube wells and an extensive system of canals. The gross area sown in the state during 2018-19 is approximately 64.90 lakh hectare. The contribution of area under wheat and paddy crops to the total gross area sown in the state was 61.63% during this period. The area under commercial crops i.e., sugarcane, cotton and oilseeds has shown fluctuating trend.

Diversification to Cotton in the State of Haryana- During Kharif 2020, Govt. of Haryana had launched a unique initiative "Mera Pani Meri Virasat" to diversify the Paddy Crop (water guzzling crop) into alternative less water consuming crops like Maize, Cotton, Bajra, Pulses, Vegetables and Fruits. Under the "MPMV", assistance @7000/acre is being provided to the farmers who have replaced their paddy crop with alternate crops. The Scheme was further strengthened in Kharif 2021 with additional alternate crops like Kharif Oilseeds (Til, Castor, Groundnut), Kharif Onion, Kharif Pulses (Moth, Urd, Guar, Soyabean), fodder crops. In Kharif 2021 another initiative was inclusion of fallow land in this scheme. Farmers who kept their land fallow in place of paddy for improvement of soil health were also allowed for incentive in Kharif 2021(Khet Khali Phir Bhi Khushhali). During Kharif, 2021 Bajra crop was dropped from the ambit of alternate crops. Due to concerted efforts of the State Government, an approximate 25,600 ha. and 20,752 ha. area was diversified from paddy to other alternate crops and the State Government has provided incentives of Rs. 45 crores and Rs. 31 crores during 2020 & 2021, respectively. The Scheme was further strengthened in Kharif 2022 by inclusion of Agro-Forestry (Poplar and Eucalyptus) in the ambit of alternate crops. During Kharif, 2022 an area of 37956 ha has been registered against the targets of 40000 ha and an area of 23554 ha has been verified.

Horticulture Status in the State

The development of the rural economy of the state depends on the horticulture sector. Haryana is focusing on increasing the horticultural production in the state. The agro-climatic condition of the state supports the growth and cultivation of many varieties of fruits, vegetables, plantation crops, spices, flowers, medicinal and aromatic plants. The major fruits grown in the state are guava, kinnow, mango, peach, pear, plum, strawberry, chickoo, citrus fruits like oranges, amla and ber. Among fruits, ber is gaining special attention of the state horticulture department. The people of Haryana generally opt for vegetarian cuisines, thus, increasing the demand for horticultural crops.

Livestock Status in the State

There livestock sector of Haryana plays an important role nationally in the rural economy despite the small size of 1.3% of total geographical area of the state. The animal husbandry activities in the sector are helping in income generation and diversification, employment generation, socio-economic development for a large part of population and additionally they are helping in providing better nutrition through production of livestock products like milk, eggs, and meat, etc. The state has variety of livestock including cattle, buffaloes, sheep, goats, horses, donkeys, pigs, and poultry. Cattle rearing of all these varieties forms the backbone of economy of this state. Haryana is known for 'Murrah' breed of buffaloes and 'Hariana' breed of cows. Thousands of Murrah buffaloes are exported by the state to many metropolitan cities of the nation, as they are amongst the most efficient milk and butter-fat producers of India. The importance of this sector is ever increasing, as the holdings are small and fragmented and the collective and co-operative farming is practically non-existent.

Fisheries Status in the State

The state has ample water resources in form of rivers, canals, drains, reservoirs, watershed, and village ponds to enable fisheries development. However, there is limited fisherman population and high vegetarian population in the state which makes it difficult to keep the growth in sector continuous. In the period of over five decades the area under fish culture has increased from 58 ha. to 18207.06 ha. area under fish culture. Under the current area, there is stocking of 2925.31 Lakh fish seed raising 203160.11 MT of fish during the year 2020-21. The state has achieved self-sufficiency in seed production of Indian Major Carp and Common Carp. The fish farmers have learnt new techniques on marketing and received assistance from department to depend on the sector for their livelihoods.

IMPACTS OF CLIMATE CHANGE IN THE SECTOR

Vulnerability assessment studies on Haryana have shown possibility of water shortage due to changing rainfall patterns in several districts of Haryana. The historical data has shown a temperature range from 31.4°C To 17.4°C. There is no significant trend in the mean maximum temperature. The minimum temperature shows an increase of about 1.0°C To 1.2°C in 37 years. The Districts of Fatehabad, Jhajjar and Karnal shows higher increase in the minimum temperature (1.1°C to 1.3°C). There has been maximum variation in average annual temperature in the past decade (2005-2015) with an increase from 43°C to 47°C[57].

- Impact on Crop productivity- The wheat production in the state has shown an increasing and decreasing trend during this period which signifies the impact of heat stress on crop yield.
- Shift in temperature patterns- Alterations in temperature and rainfall, resulted in abnormalities in weather like excess and untimely rains, heat waves, cold waves, high and hot winds during summer, dust storms, fog, frost, and hails.
- Overutilization of Groundwater- The Districts Rohtak, Jhajjar, Jind, Sonipat, Bhiwani, Hisar, Charkhi Dadri, Fatehabad, Sirsa, Palwal and Nuh shows water level is above 3-meter depth. As per data available with department around 70000 ha. is in critical range and crop production is affected adversely.
- Erratic rainfall- Impact on crop water demand. Deficient soil moisture during crop growth can result in decrease in yield by 30-40%.
- Impact on Horticulture- Sudden decrease in fruit set and due to that crop growth will increase expected yield may likely to reduce by 50 per cent in tomato.
- Heat stress- livestock production, reproductive and health performances of dairy animals are reported in the state. High temperature and humidity have considerably negative impacts on reproduction on cattle and their milk production. These impacts are assessed by formulating THI (temperature Humidity index) values, the increase of these values above a threshold will impact the milk production and health of cattle.

[57] Impacts of climate change on agriculture productivity: A case study of Haryana, Surendra Kumar, Priyanka,International Journal of Academic Research and Development ISSN: 2455-4197, Volume 2; Issue 5; September 2017; Page No. 252-257

KEY ISSUES AND CHALLENGES

Table 38: Key Issues and Challenges of Agriculture & Allied Sector

Area	Issues/Challenges
Technical/Infrastructural	• Shrinking of land holding • The role of crop varieties/hybrids in enhancing crop productivity has been tremendous. However, yields of many crops are plateauing. • Issues in weed and pest management. • Farmers lack the knowledge on advanced agricultural technologies • The ground water quality in 45% of the area of state is not good for irrigation due to salinity. • Increased ground water salinity in 5% of the districts and blocks in the state • Availability of open drains because the reclamation process cannot be possible without proper open drains • The drain in State is a major concern that needs proper leveling and cleaning to drain out the saline water from the treated area • Lack of new machineries to execute work of reclamation of saline waterlogged lands
Policy & Regulatory	• The prices of the crop produce are determined by people other than producers. • There is need of incentivize the shift from water demanding crops like paddy to other alternative crops.
Institutional	• The reclamation of saline waterlogged lands due to shortage in manpower • lack in farmer participation in projects and absence of sociologists in field, • Facing issue of maximum utilization of agricultural machinery especially under schemes like Sub Mission on Agriculture Mechanization. • Problems in implementing insurance schemes like lack of infrastructure at field level and unawareness among farmers • Inadequate infrastructure for post-harvest management and handling especially for perishable horticulture produce.
Socio economic/Cultural	• Excessive use of chemical fertilizers and pesticides thus resulting in more stress for crops and increased chance of pest resistance • The per unit productivity of most horticulture crops in Haryana is low compared to the best obtained in other States. • Diversion of agricultural land for non-agricultural use is an emerging big problem. • Over exploitation of groundwater in 78 blocks of the state. • There continuous increasing needs of population resulting from urbanization, change in food habits and growing emphasis on nutritional security needs to look upon. • Small and marginal farmers more prone to poverty due to decrease in crop productivity.
Environmental	• Erratic change in climate is resulting in more stress for crops and livestock. • Decrease in farm productivity • Declining water table in most of the districts of the state, the state average decline in water table from 1995-2020 is 9.47 m. • The problems of soil degradation (soil compaction, soil salinity, water logging, and pesticide residue), multiple nutrient deficiency, low organic carbon content and decline in the total factor productivity have been observed under different production systems in the State.

PROGRESS MAPPING (IN LAST 5 YEARS)

Physical Progress

The achievements under the strategies of the Agriculture sector are highlighted below for Haryana State Action Plan on Climate Change (HSAPCC) 2014

Table 39: Physical Stocktaking of Agriculture & Allied Sector

Strategies/Actions(SAPCC-1)	Continuationof Activity(Yes/No)	Scheme	Source	PhysicalProgress(2014-2019)	Information /Data prepared by Environment Department		Information /Data prepared to be updated	
					Expenditure(2014-19) asper SAPCC-1(inINRLakhs)	Financial Allocation(2014-19) asperSAPCC-1 (in INRLakhs)	Expenditure(2014-19) asper SAPCC-1(inINRLakhs)	FinancialAllocation(2014-19) asperSAPCC-1 (in INRLakhs)
1. Agriculture								
AG/1 Creation of assuredirrigationinsettledcultivationareas	Yes	RKVY	S	• On-FarmWatermanagementunderRKVY, ADA (SWM) during 2015-16,2016-17,2017-18,2018-19	9619.01	4800	13253.31	18439.24
				• Collective approach is taken up forreclamationofsalinewater-loggedlandsintheStatebyHOPPunder AgricultureDepartment			889.595	1639.74
				• SurfaceDrainage,BioDrainage,verticaldrainage,andSubSurfaceDrainageareimplementedinthe State			916.5	1861.79
		RKVY-RAFTAAR	C andS	• ConstructionoffarmpondsunderRKVYRAFTAAR during2018-19			00	1000.00
		RKVY	C andS	• Reclamationandsustainablemanagementofalkalisoilsandadoption of rainwater recharging inNilokheriblockofKarnalduring 2018-19 to2020-21			500.00	800.00
		RKVY-RAFTAAR	C andS	• Executionofsoilandwaterconservationactivitiesunderscheduledcastesubplancomponent oftheschemeduring2018-			1000.00	1000.00

				19byAgricultureDepartment				
		RKVY-RAFTAAR	C andS	• Landdevelopmentprogrammethrough vertical drainage in villagesChinderandBadopaldistrict, Fatehabadundertheschemeduring2018-19			203.77	282.00
		RKVY	C andS	• Phytoremediation potentialofselectedHalophytesforsaltaffectedlandsofHaryanabyCSSRIin2017-18			157.20	157.20
				Total of AG-1			**16920.375**	**35179.97**
AG/2 Promotion of scientific planning and cropping pattern to improve the yield per hectare	Yes	Technology Mission onSugarcane(TMS) and	S andC	• Area under Sugarcane has increased from 0.96 lakh ha. in 2019-20 to 1.60 lakh ha. in 2021-21, with productivity remaining approximately 802 Qtls./ha and productivity of 948.4 lakh Qtls. in 2019-20 and 850 lakh Qtls in 2020-21 under TMS and NFSM (commercial crop) • Increased income of cane growers, develop linkages with Sugar mills, research centers for collaborative exchange of information and material, promotion of new methods ofsugarcane plantation,mechanization of sugarcane cultivation, varietal balance maintenance of sugarcane varieties • Tissue culture seedlings (60810 nos.)providedtofarmersatsubsidizedrates • Promotion of wide row spacing withintercroppingin 1055 acre • Single bud plantation method in 316acre • AssistanceinpromotionofTrashmulchingin 296acre • Adoptionofringpitmethodplantationin 9 acre • OrganisationofKisanMela,training		10835.5	10527.67	14635.00
		NationalFoodsecurityMission(NFSM)	C andS				339.72	601.55

				tofarmers,farmer-scientistinteractions,Subsidytosugarmills formaking caneprice payment				
		RKVY-ATMA	C and S	• Healthy seed production and mechanization of sugarcane agriculture- a farmer's participatory initiative by ICAR- Sugarcane Breeding Institute, Karnal in 2019-20			87.32	313.50
				• Promotion of sugarcane cultivation in Haryana by Department of Agriculture in 2015-16, 2017-18			2200.29	2740.65
				• Developing sustainable seed production model in sugarcane for the farmers of Haryana State in 2019-20 by AFW Department			000.00	527.50
				• Centre of Excellence for Sugarcane by Department of Agriculture in 2019-20			000.00	2245.00
				• Healthy seed production and quality jaggary production towards increasing sugarcane farmers income- An institute, industry, and farmers participatory initiative by ICAR- Sugarcane Breeding Institute, Karnal in 2018-19			75.00	175.50
				• EstablishmentofmodernjaggeryTechnologyUnitatregionalResearchStationCCSHAU,Karnal in 2019-20			000.00	200.00
				Total of AG-2			**13230**	**21438.7**
AG/3 Integrated efforts for enhanced productivity	Yes	NationalFoodsecurityMission(NFSM)	C andS	• Increaseproductionofwheatandpulsesthroughareaexpansionandproductivityenhancementinasustainable manner in the identifieddistrictsofthe state. • In2014-15fiveDistrictsJhajjar,Hissar, Bhiwani, Mahendragarh andRewari were covered under NFSM-CoarseCerealsandCommercial Crops, sugarcane and Cotton were also introduced in sugarcane and Cotton growing districts.	7021.58	5426.98	9574.04	18354.87

				• From2015-16onwardstheschemeisimplementedin60:40,Centerand State basis				
		RKVY	C andS	• EstablishmentofTechnologyResourcecentreatBlockLevelin2018-19,2019-20			2500.00	5559.94
				• PromotionofResourceConservingTechnologiesbyDepartmentofAgriculturein2015-16, 2016-17and2016-17			2113.97	5388.56
				• SettingupofAdvancedCenterforPromotingMicro-Irrigation(ACPMI)inHaryanaunderRKVY for2019-20byAFWDept.			000.00	1125.00
				Total AG-3			**14188.01**	**30428.37**
AG/4 Integrated crop management	Yes	Promotionof AgricultureMechanization on for In-SituManagementt of CropResidueofin the Stateof Punjab,Haryana,UttarPradesh andNCTofDelhi(CRM)	C	• For management of crop residue inthe State of Haryana a total of 1194CHCwith7078machineswereestablishedand3549individualmachineswereprovidedduringtheyear2018-19	10537.00	13784.00	23435.00	32990.00
				• 1685 CHC with 8850 machines wereestablishedand5528individualmachinesin 2019-20	12912.00	22467.00		
				• 1345 CHC with 5308 machinery andindividual23712machineswereprovided in theyear2020-21	20575.91	26555.00		
				• 53725CRMMachinesprovided,under(21236 machinery under 4224Agriculture machinery custom hiringCentrewereformed+32489Individual)from2018-2021. • Increasingthereachoffarmmechanization to small and marginalfarmersandtotheregionswhereavailabilityoffarmpowerislow • Promoting‘CustomHiringCenters’ tooffsettheadverseeconomiesof scalearisingduetosmalllandholdingandhighcostofindividualownership • Creationofhubsforhi-tech&high valuefarmequipment’s	47271.91	62806.00		
				• 35governmentstaticsoiltestinglaborat				

				orieswithmicronutrientstesting facilities established. 17 newwillbe operationalby 2021 • 59Mini-soiltestinglaboratoriesestablished at block level are underprocess • 34VLSTPswereestablishedindifferentdistricts asentrepreneur • SettingupofAdvancecenterforpromotingefficientuseofAgricultureMachineryinHaryanaunder RKVYforthe year 2019-20by AFWDept.				
		RKVY	C andS	• UpgradationandStrengtheningofPesticide Quality Control LaboratoryKarnal[ADA(Extn.)]in2018-19underRKVY-General			17.68	42.80
				• UpgradationandstrengtheningofPesticide Quality Control Laboratory,SirsabyAFWDept.under RKVY-RAFTAARin2019-20			000.00	104.00
				• Development and implementation ofE-pestsurveillancesysteminHaryanafor rice-wheatbyICAR-IndianInstituteofWheatandBarley Research,Karnalin 2019-20			17.00	61.00
		RKVY	C andS	• Developmentandpopularizationofeco-friendlytechnologiesforpaddystrawmanagementduringCCSHAU,Hisarin2017-18			410.00	610.00
				• EstablishmentofCentreofExcellenceforModelingofDifferent CropResidueforBio-Methanationandorganicmanurebyccshau,Hisarin 2019-20			258.05	285.00
				Total of AG-4			**24137.00**	**34092.8**
AG/5 Continuation of the traditional organic farming to meet market demands for organic	Yes	RKVY MobileFertilizersMonitoringSystem(m	C andS	• EstablishmentofSoiltestingLaboratoriesin Mandis • Regulationsimposedforexcessiveuseoffertilizersby GoIandStateGovernm	1220.99	700	500.00	500.00

products		FMS)		ent • WeightofUREAbagreducedto5kg • Regular training sessions to educatethefarmerstoadhereonthereco mmendations ofSHC • Educationtofarmersregardingbalance duse offertilizers • Creationofplatformtomonitorsupplya ndavailabilityoffertilizers CCSHAU,Hisarpracticestherecomm ended dose of fertilizers forKharifandRabicrops in theState				
		RKVY	C andS	• Bio-fertilizerandBioPesticideproductionu nittosupportinnovationsinestablishm entofGreen Economy village movement inHaryana in 2018-19 and 2019-20 byHABITATGenomeImprovementP rimaryProducerCompany,Ramayan, Hisar			24.90	625.05
				• Setting up of bio pesticide laboratoryforresearchandtestingfacili tybyCCSHAUin2019-20			00	110.00
				• EstablishmentofCertificationLaborat oryfororganicmanures&Bio-fertilizers by CCS HAU in 2019-20			131.72	160.64
				• Scalingupofliquidbiopesticidesprodu ctionfacilityforpromotionof organicfarmingCCSHAUin2019-20			00	225.30
				Total AG-5			**656.62**	**1620.99**
AG/6 Efforts for improving the rice production rate	Yes	RKVY-RAFTAAR (Remunerative Approachfor Agriculturea nd AlliedSector Rejuvenation	C	• Distributionof298900certifiedseeds of 2500 Qtl. Paddy, 200 Qtl.Bajra, 294200 Qtl. Wheat and 2000Qtl. Barley at a subsidized rate to thefarmersinallthedistrictsof Haryana • Subsidyisadmissibleonhybrids/variet ies not older than 10 years asper GoI notification (Wheat at 1000Rs/Qtl.,Barleyat1500Rs/Qtl.,Pa	7485.86	0	2679.14	3056.00

		)(60:40)		ddy at 1000 Rs/ Qtl. And Bajra at1500Rs/Qtl.)byAgricultureDepartmentduring 2020				
				• DistributionofCertifiedseedsofpaddy, Bajra, Wheat and Barley byDepartment of Agriculture in 2017-18 • Through sale outlets of Government/Institutionalagencieslike HSDC,HLRDC,HAIC,HAFED,HAU,NSC, HARCO Bank, IFFCO/IFFDC,KRIBHCO andNFL • Increase in food productivity per unitareathroughSSDtechnologyby HOPP			11033.8	11773.75
		RKVY	C andS	• Direct Seeded Rice (DSR) byDepartmentofAgricultureduring 2015-16and 2017-18			1369.93	3567
		RKVY-RAFTAAR	C andS	• EstablishmentofModernseedmultiplicationfacilitiesforHighValueCropsbyCCSHAUin2019-20			00	300.00
				Total AG-6			**15082.87**	**18696.75**
AG/7 Ecologicallysustainableand Economically viablediversification of agriculture	Yes	RashtriyaKrishiVikasYojana(RKVY), Promotion of Cottoncultivationscheme inHaryana	C andS	• Increasedarea,production,andproductivity of Cotton in Districts oftheStatenamelySirsa,Hisar,Fatehabad,Jind,Bhiwani,Rohtak, Jhajjar, Rewari, Mahendragarh, Sonipat,PalwalandKaithalunderRKVY during 2018 to 20 • Front Line Demonstration (FLD) OnProduction Technologies(DemonstrationonSeed RateandDeepPloughing),PromotionofMicronutrients and INM, IntegratedPestManagementDemonstration(IPM), Farmer Trainings, Farm FieldSchool (Six Sessions), Scout Farmer,KisanMela,KapasDivas,WaterTankwithDripIrrigationSystem/Sprinklerset,SupplyofPowerOperatedSprayPumps(BatteryOperatedandEngin	250	0	980.04	1365.41

				eOperated),SupplyofCottonSeedDrill,ThreeweekTrainingofExtensionWorkers(TOEW)Refresher Course, Exposure Visit ofFarmers/Extension Officers Workers,ContingencyforPrintMedia, Documentary, Workshop, AwarenessCampaign,POLand Salary&OE • Improvementofsocio-economicconditionoffarmersthrough landreclamationprogrammeandSSD technology				
				Total of AG-7			**980.04**	**1365.41**
AG/8 Major emphasis on growing off season vegetables and fruits	Yes	CropDiversificationProgram(CDP)PMKSY	S	• PromotionofalternatecroplikeMaize, CottontoreduceWheat-PaddyCrop rotation • During Kharif 2020 State Govt. hadlaunched a new scheme "Mera PaniMeri Virasat" (MPMV) to diversifythe Paddy Crop into alternative cropslike Maize / Cotton / Bajra / Pulses /Vegetablesand Fruitsin theState • Underthe"MPMV"anassistance@ Rs7000/acreprovidetothefarmers replacingtheirpaddycropbyalternatecrops			3957.25	4470.00
				• 2000haofDrip,20,000portablesprinkler and 10,000 mini sprinklersunder per drop more crop in 2018-19underPMKSY-AAPforboth AgricultureandHorticulture			1330.83	1330.83
		RKVY(CDP)	C andS	• CropDiversificationProgrammeinthe State of Haryana during 2015-16,2016-17and 2017-18 • PromotionofcastorforCropDiversificationandHigherSystemproductivityin South-WestHaryana byCSSHAU,Hisar			15507.36	28986.93
				Total AG-8			**20795.44**	**34787.76**

AG/11 To improving abiotic (drought and salinity) stress tolerance in Indian mustard	Yes	LandReclamation (HOPP Unde A&FW Dept.)	S	• Biofortificationandmultiplicationofseedofvariousseasonalcrops(RabiCrops-wheatandmustard)(2018-19) • 957 numbers of roof-top rain waterharvestingstructuresforground water recharge have been constructedtill2019-20in Govt.buildings • Landreclamationof11240ha.Waterloggedandsalinelands through Subsurface Drainage (SSD)technologybenefiting8051farmers			903.55	1726.5
AG/13 Soil health: Action Plans	Yes	PradhanMantri SoilHealth CardScheme	C	• 13,42,393numberofsoilsampleswere collectedandtestedduringCycle-I(2015-16&2016-17).Against these samples 45,21,588 SoilHealth Cards (SHCs) were issued tothefarmers • During Cycle 2 (2017-18 & 2018-19)13,44,025numberofsoilsampleswerecollected&testedandbasedon • testresults,41,30,356numberofSHCsweredistributed tofarmersCycle3(PilotProject)onvillagebasiswasintroducedbytheGoIduringthe year2019-20 to addressthedeficiencyofnutrientsinsoil,under which one villagefromeachblock was selected for collection ofsoil samples on land holding basis.From122blocks,25,605soilsampleswerecollectedandSHCswereissued to25,605farmers • The state has organized 653 farmerstrainingand2,720fielddemonstrations • Trainingto26,487farmerswasimparted regardingimportanceand useofSHCrecommendations	1168.30	00	2806.75	3751.52
		RKVY-RAFTAAR	C andS	• Establishment of Soil Dynamics Laboratory for			00	135.00

				research andapplication purposes by CCS HAU in 2019-20				
		RKVY-RAFTAAR	C andS	• Development of digital methodologyfor low-cost real-time assessment ofsalt affected soils in Haryana usingHyper-spectral Remote Sensing databyCSSRI, Karnalduring2019-20			90.00	187.80
				• Developmentofmodulesfortreatment ofhighRSCandsalinewaters for their safe irrigation use byCSSRIKarnalin 2019-20			28.42	102.00
				• Reclamationandsustainablemanagement of alkali soils in mostaffectedblockofRohtakdistrictduring2019-20byHaryanaLand Reclamation&developmentCorp.(HLRDC)in2019-20			650.00	1000.00
				Total AG-13			**3575.17**	**5176.32**
Horticulture								
AG/14 Extension works and advisory for fruits and vegetables	Yes	Plan Scheme for Integrated Horticulture Development	S	• Establishment of new gardens/ orchards, 8116.88ha. area has been covered under crops like strawberry, banana, guava, citrus & ber • Mushroom Cultivation- establishment of total 161 mushroom production unit, spawn making unit and compost making unit • Flower cultivation- 9442.15 ha area has been covered under loose flowers, bulb flowers & cut flowers (small, marginal & other farmers) • Protected Cultivation- NVPH/ INH/ WIT in 1703.97 acre • Creation of water resources- 990 no of water harvesting system for individuals & community for storage of water • Organic Farming- 153 no. of vermi compost units			43882.9	40481.5

		Integrated Horticulture Development (IHD)	C	• Promotion of Horticulture in Shivalik Area (Panchkula, Ambala and Yamunanagar): 76.14 acre area has been covered under bamboo stacking in vegetables, 12000 sqm of Family Drip Irrigation System, 83 no. of Rainwater Harvesting tanks, 248 ginger powder making machine, 24749 no. of mushroom trays and 326 tool kits • Promotion of Sericulture. 94 acre of Mulberry plantation development, maintenance of 33 acre of mulberry plantation, construction of 11 rearing houses for 50 dfls and 10 rearing appliances • Providing assistance to FPOs for Clusters based technologies like hybrid vegetables, plastic mulching, bamboo staking in vegetable crops, plastic tunnel, promotion of IPM and Promotion of INM. 2780 ha area has been covered under above mentioned component. • Promotion of onion in the State, 5361.85 In all over the State				
		PMKSY (PDMC)	C	• Micro Irrigation Programme under Per Drop More Crop component of PMKSY in all the districts of Haryana, 4131 no. of beneficiaries covering 6524.50 Ha. area under drip and 6706 no. of beneficiaries covering 7925.29 Ha. area under Mini Sprinklers				
		RKVY	C and S	• Technology demonstration cum training Centre at Centre of Excellence for Fruits, Indo-Israel, Mangiana (Sirsa) by Horticulture Dept. • Quality Seed Potato Production using Aeroponics and Select and Supply short duration potato				

				varieties at Potato Technology Center (PTC) Shamgarh (Karnal) by Horticulture Department • Promotion of Protected cultivation technologies in Haryana under RKVY during 2017-18 • Formation of 15 Farmers Producers Organizations (FPOs)/ Farmers Producer Company (FPC) Management of hand holding of FPOs in Haryana • Formation of 15 Farmers Producers Organizations (FPOs)/ Farmers Producer Company (FPC) Management of hand holding of FPOs in Haryana under MIDH				
AG/15 Pest and disease Management	Yes	Mission for Integrated Development of Horticulture and Integrated Horticulture Development (IHD)	C and S	• Integrated Post Harvest Management including 587 pack house/ on farm collection,6 Integrated Pack House with facilities for conveyer belt, sorting, grading, washing, drying & weighing unit, 9 cold room, 43 cold store and 16 low-cost onion storage in Haryana			5444.92	8904.54
		RKVY	C and S	• Integrated Post Harvest Management Unit of Fruits at Guava Demonstration Centre (GDC) Bhuna,Fatehabad by Horticulture Department in 2018-19				
AG/16 Weed Management	No	Mission for Integrated Development of Horticulture and Plan Scheme for Integrated Horticulture Development	C and S	• 228.63Ha area has been covered under plastic mulching in the Haryana State from 2014 to 2019			35.54	0

Livestock								
AG/17 Capacity building of farmers for effective adaptation to climate change.	Yes	MMBBPUY	S	• A total of 75 Sheep and 125 Goat units would be established during the year 2019-20 which will boost milk, meat, and wool production in the State in 2019-20 • 25 Sheep units and 75 Goat units are targeted under the SCSP of the scheme in 2019-20 • Self-employment opportunities to 200 beneficiaries in the animal husbandry sector in 2019-20			1710.07	60
		Scheme for establishment of Hi-Tech & Mini Dairy Units	S	• Establish 1000 dairy units of 3, 5 & 10 milch animal indigenous cattle of Hariana, Sahiwal and Belahi and 25 Hi-tech dairy units of 50 milch animals during 2017-18 • Technological interventions for value addition of milk at grassroot level in Haryana • Self-employment will be provided to 1025 beneficiaries during the year				
AG/18 Dairy development	Yes	RKVY	C and S	• Establishment of Milk testing laboratory during 2018-19 by LUVAS Hisar • Establishment of Embryo Transfer in-vitro fertilization (IVF) laboratory and production of high genetic IVF Embryos from indigenous cattle breeds of Haryana in 2018-19 by LUVAS Hisar • Strengthening of milk processing infrastructure in cooperative sector in the State by Haryana Dairy Development Coop. Fed. Ltd. during 2015-16, 2016-17, 2018-19 and 2019-20 • Strengthening of marketing infrastructure in cooperative sector in the State by Haryana Dairy Development Coop. Fed. Ltd in 2018-19 and 2019-20			2038.62	4102.5

				• Providing of mobile lab facility for milk chilling Centres/ milk processing unit under RKVY for the year 2018-19 under the Haryana Dairy Development Cooperation Fed. Ltd. • Conservation and Genetic Improvement of Indigenous Breed – Hariana by LUVAS Hisar in 2015-16 • Green Fodder Development Programme by Dept. of Agriculture Hisar in 2015-16 and 2018-19 • Sustainable rice straw management through improving its Feed value for ruminants by LUVAS in 2019-20 • Vaccine Production unit- production of Hemorrhagic Septicemia Vaccine by Animal Husbandry and Dairying Dept during 2018-19				
AG/19 Feed and Fodder Development	Yes			• Establishment of Indo Israeli Centre of Excellence at Hisar by Animal Husbandry and Dairying Dept during 2018-19 and 2019-20			680.92	1000
AG/20 Preventive health measures	Yes	RKVY	C and S	• "Establishment of Immuno-histo-chemical laboratory and strengthening of Immuno-technology laboratory for diagnosis of diseases of animals and poultry in 2018-19 by LUVAS Hisar • Strengthening and upgradation of facilities and services for diagnostic imaging in different diseases of animals by LUVAS Hisar in 2019-20			1164.47	650
		RKVY-RAFTAAR	C and S	• National control programme on brucellosis (Bang's Disease) by AHDD during 2019-20				
AG/21 Strengthen disease investigation system	Yes	RKVY-RAFTAAR	C and S	• National control programme on brucellosis (Bang's Disease) by AHDD during 2019-20			399.65	125.5

AG/22 Risk Management	No	PMMSY	C and S	• Utilization of Inland underground Saline water for culture of white shrimp Letopeneus vannamei • Establishment of Hi-tech and Ultra-Modern Ornamental Fish Hatchery in Jhajjar • Subsidy (60%) for the establishment of small scale and medium scale backyard ornamental fish hatchery • Fish feed Mills (Mini, Medium and Large, Plants with production capacity of 100 ton/Day)			1203.82	0
Fisheries								
AG/23 Better feeds, selective breeding, and genetic improvement	Yes	PMMSY	C	• Department has enhanced the subsidy from 20% to 60% under Central Sector Scheme on Blue Revolution for Excavation, renovation and inputs of ponds, development of waterlogged and saline affected areas • Construction of New ponds for Saline /Alkaline areas, with Rs 8 Lakh/ ha. • Inputs for Saline /Alkaline Water Aquaculture, with Rs 6 Lakh/ ha.			4729.9	998
		RKVY	C	• Promotion of Prawn culture in Saline Affected Areas under the RKVY to provide financial assistance to SC families for fish culture and marketing sector • Department provide subsidy on inputs @ 60% to the fish farmer on inputs (Pelleted feed) with ceiling up to 2 hectare • Inputs for freshwater Aquaculture including Composite fish culture, Scampi, Pangasius, Tilapia etc. with project cost Rs 4 Lakh/ ha. • Promotion of Recreational Fisheries with project cost of Rs 50 Lakh/Ha.				
AG/24 Improve	Yes	PMMSY	S	• 64 RAS Units under PMMSY			532.43	0

efficacy of water usage				• 118 units of Biofloc under PMMSY			373.65	0
AG/25 Encourage non-consumptive water use in aquaculture, e.g. culture based fisheries	Yes	PMMSY	C	• Haryana State has been declared as disease free State in Fish Culture by Indian Council of Agricultural Research (ICAR) • Development of Inland fisheries and Aquaculture in the State • Establishment of New Freshwater Finfish Hatcheries with project cost of Rs. 25 Lakh per Ha. • Establishment of New Freshwater Scampi Hatcheries with project cost of Rs 50 Lakh per ha. • Construction of New Rearing ponds (nursery/seed rearing ponds) with project cost of Rs. 7 Lakh per Ha. • Construction of New Grow out Ponds with project cost of Rs. 7 Lakh per Ha. • Installation of Cages in Reservoirs with project cost of Rs. 3 Lakh per Ha.				
AG/26 Encourage uptake of individual/cluster insurance	Yes	RKVY	C	• 400 Hectare saline affected waste land under white shrimp culture during the year 2017-18 • Under SLSC, the project was approved and provision of 50% subsidy to shrimp farmers				
AG/27 Improve siting and design to minimize damage, loss, and mass escapes	Yes	Intensive Fisheries Development Programme	S	• Fish Seed Production in Govt. Sector was 958.71 Lakh and Private Sector was 6506 Lakh in 2021 • The State has covered 18207.06 ha. area under fish culture by stocking 2925.31 Lakh fish seed, raising 203160.11 MT of fish during the year 2020-21 • Fish farming in 21000 ha ponds in overall Haryana under Fisheries Development • Establishment of 15 no. of Govt. Fish Seed Farms				

				• Establishment of 1 Research & Training Institute and 1 Training Sub-centres, Jyotisar • Subsidy on installation of aerator, shallow tube well, Deep Tube well				
AG/28 Encourage use of indigenous species to minimize impacts on biodiversity use non-reproducing stock in farming systems	Yes	PMMSY	C	• Construction of Cold Storage/ Ice Plants • Plant/storage of minimum 10-ton capacity with project cost of Rs. 40 Lakh per Ha. • Plant/storage of minimum 20-ton capacity with project cost of Rs. 80 Lakh per Ha. • Plant/storage of minimum 30-ton capacity with project cost of Rs. 120 Lakh per Ha. • Plant/storage of minimum 50-ton capacity with project cost of Rs. 150 Lakh per Ha. • Refrigerated vehicles with project cost of Rs. 25 Lakh per Ha. • Insulated vehicles with project cost of Rs. 20 Lakh per Ha. • Motorcycle with Ice box with project cost of Rs. 0.75 Lakh per Ha. • Markets and Marketing Infrastructure (fish retail markets with project cost of Rs. 100 Lakh per Ha. and fish kiosk with project cost of Rs. 10 Lakh per Ha.)			5110.00	
AG/29 Improving fisheries management	Yes	PMMSY	C	• Use of pelleted feed, installation of aerator and feed mill			200	0
AG/30 Reducing Post harvest losses	Yes	PMMSY	C	• Cycle with ice box			1.35	
				• Motorcycle with ice box			10.02	
				• Three Wheeler with Ice-Box			52.14	
AG/31 Increasing waste recycling	Yes	Intensive Fisheries Development Programme	C	• Excavation of ponds			590.83	

GAP/BARRIER ANALYSIS

Table 40: Gap/Barrier Analysis of Agriculture & Allied Sector

Type	Gaps
Technical/Infrastructural	• Technological gap for enhancement of productivity and profitability on sustainable basis • Infrastructural and technological gaps to widely implement organic farming • Development of better agro-processing units • Qualitative improvement and excellence in agricultural research and education to build capacities in agriculture space is crucial • Availability of SSD material through DGS&D rate contract
Financial	• No allocation of funds to improve the water efficiency in crops like rice and efficient irrigation systems • Timely sanction and availability of funds
Policy & Regulatory	• There is need to shift the focus from crop/commodity to multi enterprise-based farming system's approach to increase employment, income, and livelihood security of small holder farmers • Need to develop new implements as per local farmer's needs • Need of provision for private markets for farmers
Institutional	• Better implementation of soil testing and health card schemes • Needs more provision by Insurance companies to provide crop insurance for all famers • Acute shortage of skilled manpower in technical projects • Inter Departmental issues.
Socio-Economic/Cultural	• Farmers lack knowledge on efficient irrigation, green house technology and structural design • Price of Nitrogenous fertilizer is lower than the Phosphatic and Potassic fertilizers. Therefore, farmers are using in higher quantity
Planning	• No existing market forecasting to plan production and sale by farmers • Lacks planning to promote climate resilient agriculture in the state

SECTOR PLANNING

National/State-Level Targets and Linkages

SITUATIONAL ANALYSIS- NDC PERSPECTIVE

NDC Commitments	Key State level Initiatives to comply with NDC Targets
NDC 6: To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health, and disaster management	• National Mission on Sustainable Agriculture • PMKSY • Mission for Integrated Development of Horticulture (MIDH) • RKVY • National Livestock Mission • Blue Revolution • Pradhan Mantri Matsya Sampada Yojana • Haryana State Preservation of Sub Soil Water Act, 2009

SPECIFIC TARGETS UNDER SDG FOR THE SECTOR

SDG Goals	Key State level Initiative to comply with SDG Goals
SDG 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	• Accelerated Recharge of Ground Water • Mission for Integrated Development of Horticulture (MIDH) • Integrated Horticulture Development (protected Cultivation)

	• Micro Irrigation programme under Per Drop More Crop (PMKSY) • RKVY- RAFTAAR • National Beekeeping and Honey Mission (NBHM) • Scheme for creation of Integrated Supply chain for fruits and vegetables in major cities • Scheme for Integrated Horticulture Development Plan Scheme for Scheduled Caste Families • National AYUSH Mission • National Mission on Oilseeds and Oil Palm (NMOOP) • Scheme for Conservation and Development of Indigenous cattle and Murrah Development • Scheme for the establishment of Backyard poultry units • Mukhya Mantri Bhed Bakri Palak Yojna
SDG 12: Ensure sustainable consumption and production patterns	• Soil Health Card Scheme • Haryana Polyhouse Policy 2015-16 • Scheme for On – Farm and Marketing Support to Horticulture Farmers • Scheme for Good Agriculture Practices and effect of Pesticide Residue on Fruit and Vegetable (GAP)
SDG 13: Take urgent action to combat climate change and its impacts	• State Action Plan on Climate Change • National Mission for Sustainable Agriculture • Mera Pani Meri Virasat
SDG 17: Strengthen the means of implementation and revitalize the global partnership for Sustainable Development	• Scheme for promotion of Advanced National and International Technologies in Horticulture Sector • Scheme for Establishment of Hi-Tech and Mini Dairy Unit

Description of Strategies/Activities

The description of activities below is based of mitigation and adaptation options. The activities that are named "AG/N" are transformative activities and other set of activities are named as "AG", which are incremental activities. Incremental activities are those which are old activities proposed under earlier SAPCC (2014-19) and will be continued for upcoming years as per agreement of the nodal departments and transformative activities are those which are newly proposed by the nodal departments for the upcoming years under "**Sustainable Agriculture Mission**" sector.

AG/2- Organisation of Kisan Mela

Description- The Department of Agriculture & Farmer Welfare plans to organise 2 Kisan Mela under the Technology Mission on Sugarcane (TMS) and NFSM (Commercial Crop) scheme for the year 2019-20. The Kisan Mela will be organised to promote different methods of plantation in sugar cultivation, promotion of trash mulching, interaction with farmer scientists will be covered under the strategy.

AG/2- Promotion of Farm Mechanisation in Sugarcane

Description- The strategy for promotion of farm mechanisation in sugarcane in the State is planned under the Technology Mission on Sugarcane (TMS) and NFSM (Commercial Crop) scheme for the year 2019-20. Under the strategy 3 number of sugarcane harvester to be provided to sugar mill for demonstration at 100 lakh per unit as well as 10 number of sugarcane harvester to farmers/ societies/ FPOs at subsidized rate at 50 lakh per unit.

AG/2- Strengthening of Tissue culture lab in Karnal

Description- Technology Mission on Sugarcane (TMS) andNFSM (Commercial Crop) are being implemented in the State to encourage sugarcane cultivation. The strategy for strengthening of tissue culture lab in Karnal is envisaged to achieve the desired growth in area, productivity, production and recovery of sugarcane, enhance the sustainability of sugarcane, and to disseminate information/ technology to the cane growers.

AG/3- Promotion of cotton cultivation scheme in Haryana State

Description- Promotion of cotton is being implemented in cotton growing districts of the State namely, Sirsa, Hisar, Fatehabad, Jind, Bhiwani, Rohtak, Jhajjar, Rewari, Mahendragarh, Sonipat, Palwal and Kaithal. The main objectives of the scheme are to increase area, production and productivity of Cotton. The main activities under the scheme are Front Line Demonstration (FLD) On Production Technologies (Demonstration on Seed Rate and Deep Ploughing), Promotion of Micronutrients and INM, Integrated Pest Management Demonstration (IPM), Farmer Trainings, Farm Field School and related activities. The scheme is planned to be implemented for the year 2020-21 with an outlay of Rs. 500 lakh.

AG/4- In-situ Management of Crop residue

Description- The strategy is planned under the new Central Sector Scheme by GoI "Promotion of Agricultural Mechanisation for In-Situ Management of Crop Residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi". For management of crop residue in the State, 1345 CHC with 5308 machinery and individual 23712 machines were planned to be provided during the year 2020-21. An annual Action Plan amounting to Rs. 501.72 Cr. has been submitted to Ministry of Agriculture, GoI for release of funds during the next financial year 2021-22.

AG/6- Increase production of wheat and pulses

Description- The strategy is planned under the nationally sponsored National Food Security Mission (NFSM) in Haryana. Objective of the Mission is to increase production of wheat and pulses through area expansion and productivity enhancement in a sustainable manner in NFSM- Wheat and NFSM- Pulses districts of the State. In year 2014-15 five Districts namely Jhajjar, Hissar Bhiwani, Mahendragarh and Rewari were covered under NFSM- Coarse Cereals .and Commercial Crops, sugarcane and Cotton were also introduced in sugarcane and Cotton growing districts. From the year 2015-16 onwards the scheme is implemented in 60:40 Center and State basis. An amount of Rs. 2926.98 Lakh was received from GoI under General Category and Rs. 1101.11 Lakh for SC Category out of which an amount of Rs 868.19 Lakh was utilized for General Category farmers and Rs. 36.13 Lakh for SC Category respectively for the year 2019- 20. Now, an amount of Rs. 1628.33 Lakh for General Category and Rs. 756.58 Lakh for SC Category received for the year 2020-21, in which an amount or Rs. 948.43 Lakh for utilized under General Category and Rs. 32.55 Lakh for SC Category farmers.

AG/6- Distribution of certified seeds of Paddy, Bajra, Wheat and Barley

Description- The strategy is proposed to spread the use of certified seed of wheat, paddy, Barley and Bajra for which the farmers are aided with the purchase of certified seeds. Subsidy is provided only on the certified seed sold to the farmers through sale outlets of Government/ Institutional agencies like HSDC, HLRDC, HAIC, HAFED, HAU, NSC, HARCO Bank, IFFCO/IFFDC, KRIBHCO and NFL. During 2020-21, an amount of 5.86 Crore was allotted and out of which an amount of Rs. 1,99,42,000/- was utilized.

AG/8- Promotion of Crop Diversification Programme (CDP) in Haryana

Description- Crop Diversification has been implemented in the State through CDP (RKVY) and CDP (State Plan) to promote the use of alternate crops like Maize, Cotton etc. in order to reduce Wheat- Paddy Crop rotation. During Kharif 2020 State Govt. had launched a new scheme "Mera Pani Meri Virasat" (MPMV) to diversify the Paddy Crop into alternative crops like Maize / Cotton / Bajra / Pulses / Vegetables and Fruits in the State. Under the "MPMV" an assistance @ Rs 7000/acre provide to the farmers who have replaced their paddy crop by alternate crop such as Maize / Cotton / Bajra / Pulses / Vegetables and Fruits.

In the budget estimate for the year 2021-22, an amount of Rs. 4484.50 lakh has been sanctioned as per budget estimate by the finance department under "scheme of Promotion of Crop Diversification in Haryana" during the year 2021-22 to meet out expenses incurred under various interventions under this scheme.
For Crop diversification, Fisheries Department will lay emphasis to introduce new cat fish species like Pangasius, Pabda, Tilapia, Desi Magur etc. in addition to traditional carp culture. To utilise the unproductive saline water the Department will promote the white shrimp culture in a long way.

AG/11- Development of waterlogged areas in Jhajjar and Charkhi Dadri
Description- Department proposes to develop about 16000 Acre waterlogged areas in the District Jhajjar and Charkhi Dadri for Fish Culture. This will be a source of income for the farmers whose land was destroyed and turned into water logging area due to lift Irrigation.

AG/14- Extension works and advisory for fruits and vegetables
Description- Vertical farming is a highly beneficial technique, adopting which the farmers can increase their income by producing vine vegetables like gourd, zucchini, bitter gourd, cucumber, melon, watermelon, and tomato. The farmers can opt for vertical farming during the upcoming Kharif season, instead of paddy and contribute towards water conservation. provision has been made to provide grants under a special scheme by the government to the farmers adopting this method. Rs.1.42 lakh per acre is spent on adopting this method, for which the Horticulture Department provides a grant of Rs. 70, 500 per acre to the farmers. In Rohtak, the technique has become popular, and the farmers are producing vine vegetables in an area of about 250 ha. The scheme includes horticulture diversification and construction of water harvesting system.

AG/14- Quality seed potato production
Description- A new strategy for production of quality seed potato using aeroponics technology and selection and supply of short duration potato varieties at Potato Technology Center (PTC) Shamgarh (Karnal) under the scheme RKVY- RAFTAAR (Infrastructure/Assets) by the Horticulture Department. The project aims to increase farmers' access to early-yielding, heat- and virus-resistant varieties of potato, to promote sustainable intensification of production and boost nutrition, incomes and food security throughout Haryana. The new short-duration climate-proof varieties will allow farmers to plant at suitable times to complement conventional rice and wheat growing seasons, generating high yields relatively quickly. The new varieties will be selected for high dry matter and low sugar content, making them more suitable for processing and other value-addition purposes.
The strategy targets 10% increase in potato productivity, 10% increase in farmer incomes and 600 farmers producing quality seed of new varieties. The budget for 2018-2021 is USD 900,000.

AG/14- Promotion of FPOs in Haryana
Description- FPO promotion is planned in the State for the period of 2021-30 under the new FPO scheme, which aims at increasing incomes of small and marginal farmers through aggregation and development of agri-business. Agriculture as well as horticulture (beekeeping/ Honey FPO) FPOs can be formed and promoted under NAFED and SFAC.

AG/15- Integrated Post Harvest Management Unit of Fruits
Description- Strategy for Integrated Post Harvest Management Unit of Fruits at Guava Demonstration Centre (GDC) Bhuna, Fatehabad under the Central scheme RKVY- RAFTAAR in the State.

AG/23- Production of Fish fingerling
Description- It is proposed to stock 4400 lakh Fish Fingerling to produce 220000.00 MT fish during the year 2021-22 by covering 22000.00 ha. water area. It is envisaged to provide technical and financial assistance to 2500-3000 families in fisheries sector during the year 2021-22.

AG/23- Enhanced Fish Production
Description- Enhanced fish production is a strategy planned under the Scheme for National Fish Seed Programme. The State of Haryana has planned 72 number of fish seed production unit/ rearing unit

&hatcheries (both new and old) covering all the States along with a target of 10164 Lakh fish fry for the year 2021-22.

AG/23- Enhancement of Fish Production and productivity

Description- Enhancement of fish production and productivity are planned for 2021-22 in the State under the flagship Centrally Sponsored Scheme of Pradhan Mantri Matsya Sampada Yojana (PMMSY). The programme has different planned components and subsequent sub-components. Component 1 is Development of Inland Fisheries and Aquaculture, which will involve establishment of 2 new freshwater fin fish hatchery, construction of new rearing ponds in 112 ha., construction of new grow-out ponds in 440 ha., inputs for freshwater aquaculture in 552 ha., including Composite Fish culture, Scampi, Pangasius, Tilapia and others. Component 2 is Development of Ornamental and recreational fisheries which will include Development of 5 Medium Scale Ornamental Fish Rearing Unit (Marine and Freshwater Fish). Component 3 involves Technology Infusion and Adaptation. The Sub-components are establishment of 15 large Recirculatory Aquaculture System (with 8 tanks of minimum 90m3/tank capacity 40 ton/crop), Establishment of 10 Backyard Mini Recirculatory Aquaculture System Units, 10 Biofloc (50 tanks of 4m dia and 1.5 high) culture system, 15 Biofloc culture system (25 tanks of 4m dia and 1.5 high), Establishment of 20 small RAS (with 1 tank of 100m3 capacity) and 20 Biofloc (7 tanks of 4m dia and 1.5 high) culture system. Component 4 aims at Infrastructure and Post-Harvest Management. Subcomponents include construction of cold storages/ ice plants, large fish feed plants, fish feed mills (Mini and Medium), refrigerated vehicle,22 number of 3-wheeler with Ice box, 22 number of motorcycle with ice box, 66 number of cycles with ice box, establishment of 2 Brood bank at Government fish seed farm in Sampla (Rohtak) and construction of State of Art Wholesale fish market. Component 5 aims at Market and marketing infrastructure with a plan of construction of 22 Kiosks of aquarium/ ornamental fish. Component 6 is development of saline/ alkaline area, with construction of new ponds for saline/ alkaline area in 500 ha. and inputs for the saline/ alkaline water aquaculture in 500 ha.

AG/23- Hi-tech and Ultra-Modern Ornamental Fish Hatchery

Description- Establishment of Hi-tech and Ultra-modern Ornamental fish hatchery is planned for the year 2021-22 under the Scheme PMMSY. The strategy will also involve 1137 number of training and awareness camps and 2 number of angling competition covering all the districts of Haryana.

AG/23- Establishment of Ornamental Backyard RAS Unit

Description- The strategy is planned under the PMMSY scheme and scheme for Welfare of Scheduled Caste Families under fisheries sector for the year 2021-22. 6 no. of Ornamental Backyard RAS Unit are planned to be established under the scheme. The plan aims at 4324 number of trainings to fishermen/ fish farmers in the State along with support for purchase of nets, subsidy on inputs, subsidy on rent of fish shops as well as notification of water units.

AG/26- Training of fish farmers

Description- The Strategy is planned for 2021-22 under the Scheme for Agricultural Human Resources Development covering all the districts of the State. The programme aims at imparting training and enhance capacities of the fish farmers of the State. 1000 no. of demonstration, 500 no. of lectures, 209 no. of film shows, 2360 no. of soil samples collected, 394 no. samples for diagnosing fish disease, 5000 no. of training to fish farmers, 150 no. of in-service training to officers/ para fisheries staff as well as refresher courses to fish farmers, Govt. Fishermen and Private Fishermen.

AG/29- Integrated Fish Management

Description- The strategy of Integrated Fisheries Management under the Scheme for Intensive Fisheries Development programme for the year 2021-22 is inclusive of various components. The strategy covers all the districts of Haryana. It aims at 22,000 ha. of water area coverage, 4400 lakh of Stocking of fish fingerling, 220000 MT of Fish production, 10450 No. of Water/ soil analysis of ponds, subsidy on shallow tube well, deep tube well, Aerator, subsidy on notified water and excavation of 200 ha. of ponds.

KEY PRIORITIES SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Table 41: Synopsis of Planned Activities for Agriculture & Allied Sector

Code	Activities/Interventions	Scheme	Source	Duration (in years)	Proposed budget during (2021-30) in INR Lakh	Amount from existing Central scheme (Amount in INR Lakh)	Amount from State Scheme (Amount in INR Lakh)	Amount from External Aid (Amount in INR Lakh)	Implementing Dept.	Remarks (if any)
Continuation of activities from SAPCC-1										
AG/2	Organisation of Kisan Mela	TMS	State	1	6.00	0	6.00	0	A&FW	
AG/2	Promotion of Farm Mechanisation in Sugarcane	TMS	State	1	800.00	0	800.00	0	A&FW	
AG/2	Strengthening of Tissue culture lab in Karnal	TMS	State	1	100.00	0	100.00	0	A&FW	
AG/3	Promotion of cotton cultivation scheme in Haryana State		State	1	500.00	0	500.00	0	A&FW	
AG/4	In-situ Management of Crop residue (2020-21)	CRM	Central	2	20000.00	20000.00	0	0	A&FW	Submitted to GoI for fund release
AG/6	Increase production of wheat and pulses	NFSM	Central + State	1	2384.91	1430.946	953.964	0	A&FW	
AG/6	Distribution of certified seeds of Paddy, Bajra, Wheat and Barley	RKVY-RAFTAAR	Central	1	3000.00	3000.00	0	0	A&FW	
AG/8	Promotion of Crop Diversification in Haryana	CDP	State	1	4484.5	4484.5	0	0	A&FW	
AG/9	Promotion of Vertical farming cultivation technologies in Haryana	MIDH, Plan Scheme for IDH	C + S	10	216813.00	38112.00	178701.00		Horticulture Dept., State Horticulture Development Agency	

AG/14	Extension works and advisory for fruits and vegetables	MIDH, Plan Scheme for IDH	C + S	10	105246.80	45565.00	59681.80	0	Horticulture Dept., State Horticulture Development Agency	
AG/14	Quality seed potato production using Aeroponics	RKVY-RAFTAAR	Central	1	17.50	17.50	0	0	A&FW	
AG/14	Promotion of FPOs in Haryana	RKVY-RAFTAAR	Central	1	528.00	528.00	0	0	A&FW	
AG/15	Pest and Disease Management	MIDH, Plan Scheme for IDH	C + S	10	26530.00	15589.00	10941.00	0	Horticulture Dept., State Horticulture Development Agency	
AG/16	Weed Management	MIDH, Plan Scheme for IDH	C + S	10	1134.00	19.20	1114.80	0	Horticulture Dept., State Horticulture Development Agency	
				Total	**381544.71**	**128746.15**	**252798.56**			

FOREST AND BIODIVERSITY

SECTORAL OVERVIEW

Haryana is a predominantly agricultural state, with 80 percent of the area under cultivation.Forest Cover in the State is 1,602.44 sq km, or 3.62 percent of the State's geographical area, according to IRS Resourcesat-2 LISS III satellite data from October to December 2017. The state has 28.00 sq km of Very Dense Forest (VDF), 450.90 sq km of Moderately Dense Forest (MDF), and 1,123.54 sq km of Open Forest canopy density classifications (OF). In comparison to the last assessment recorded in ISFR 2017, the State's forest cover has improved by 14.44 square kilometers. According to the ISFR 2019 report, the State has an increase of forest cover of about 14.4% as compared to the ISFR 2017 report. Main reasons for the increase in forest cover in the State are plantation and conservation activities. According to the FSI Report 2019, the State's forest cover was 1,602.44 km^2, or 3.62 % of the total geographical area. The State has recorded 0.1% increase in total forest cover in recent ISFR- FSI 2021 assessment accounting 3.63% of the total geographical area of the State. As per FSI 2021 assessment, the State has 28.00 km²of Very Dense Forest (VDF), 445 km²of Moderately Dense Forest (MDF), and 1,130 km²of Open Forest canopy density classes (OF).As per FSI 2019 assessment, the State had 28.00 km² of Very Dense Forest (VDF), 450.90 km² of Moderately Dense Forest (MDF), and 1,123.54 km²of Open Forest canopy density classes (OF). Therefore, in comparison to the previous assessment recorded by ISFR in 2019, the change in VDF, MDF and OF categories has been recorded as no change, -6 km^2 and 7 km^2 respectively.

Forest Cover of Haryana (in km^2)

Class	2019 Assessment (Area)	2021 Assessment (Area)	Change	% of Geographical Area(2021)
VDF	28.00	28.00	0	0.06
MDF	451	445	-6	1.0
OF	1,123.54	1,130	7	2.55
Total	1,602.44	1,603	1	3.63
Scrub	154.29	159	4.71	0.36

Source: ISFR 2019 & 2021

The Reserve Forest, Protected Forest, Unclassified Forest, and areas enclosed under the Indian Forest Act of 1927, and in sections 4 and 5 of the Punjab Land Preservation Act (PLPA) include in the forest area. Even though agricultural fields cover most of the land, the state has developed a unique position in the field of agroforestry, allowing the forest-deficient state to maintain a significant number of wood-based companies based on farm-grown timber.*The State has two National Parks, eight Wildlife Sanctuaries, two Conservation Reserves, five Community Reserves, one Deer Park, three Zoos, and five Conservation and Breeding Centers.*

The overall carbon stock of the state's forests, including TOF patches larger than 1 ha, is 10.47 million tonnes (38.39 million tonnes of CO equivalent), which is 0.15 percent of the country's total forest carbon.

Wetlands of Haryana- *A total of 11,970 natural and man-made wetlands, covering a geographical extent of 42478 ha (0.86%), have been mapped in the State of Haryana by the Space Application Centre (SAC), Indian Space Research Organization (ISRO), Ahmedabad and Remote Sensing Applications Centre (RSAC), Uttar Pradesh, as part of the National Wetland Atlas 2011*[58]. The Sultanpur National Park and Bhindawas Wildlife Sanctuary of Haryana have been declared as wetlands of international importance under the Ramsar Convention.

[58]*National Wetland Atlas 2020*

Haryana State Biodiversity Board (HSBB) is an Autonomous Statutory body constituted under the provisions of Biological Diversity Act, 2002 to protect and preserve the biodiversity in the State. Further, the Board's mission is to ensure effective implementation of Biological Diversity Act, 2002 and Biological Diversity Rules, 2004 for conservation of biodiversity in the State of Haryana and its sustainable use, fair and equitable sharing of the benefits arising out of the utilization of bioresources.

The Haryana State Biodiversity Board is conducting capacity building and awareness program towards biodiversity conservation and preparation of Peoples Biodiversity Registers (PBRs) across the State. The HSBB is the State level Institution on Biodiversity Conservation and maintenance of records/ data on flora and fauna.Haryana State Biodiversity Boardhas 6,435 Biodiversity Management Committees for preparation and maintaining the People's Biodiversity Registers (PBRs).

Table 42: Status of faunal diversity of Haryana

Groups in Animal Kingdom	**Species in the world**	**Number of Species in India**				**Number of Species in Haryana**	
		Species in India	**% Species of the World**	**Endemic Species**	**Threatened Species**	**Species in Haryana**	**% Species inHaryana w.r.t. India**
Protozoans (free living + parasites)	36400	3545	9.74	640	NA	43	1.21
Invertebrates	3902087	242100	6.20	NA	NA	1755	0.72
Vertebrates							
Fishes	34362	3472	10.10	481	228	74	2.13
Amphibians	7667	433	5.65	287	75	14	3.23
Reptilians	10450	670	6.41	220	54	38	5.67
Birds	10357	1345	12.99	81	89	530	39.40
Mammals	5853	430	7.35	45	94	57	13.26
Total Vertebrates	68689	6350	9.24	1115	540	713	11.23
Total Animalia (Vertebrates + Invertebrates)	1528247	99173	6.49	NA	NA	2468	2.49
Grand Total (Protista + Animalia)	1564647	102718	6.56	NA	NA	2511	2.44

Source- ZSI State Faunal Series 2020, Haryana

Table 43: Status of floral diversity of Haryana

Sr. No.	**Category**	**Species**	**Reference**
Pteridophytes of Haryana			
1.	Kalesar National Park	6 species	Shukla, AN, Verma, Durgesh and Srivastava, SK (2021). Enumeration of Vascular plants of Kalesar National Park, Yamuna Nagar, Haryana. Nelumbo Vol. 63(1): 130-157pp.
Gymnosperms of Haryana			
2.	Sonipat District	6 species	Devi, Seema, Malhotra, Chanchal and Savina (2021). Floristic Diversity as Trees, Shrubs and Herbs of District Sonipat, Haryana, India. Nat. Volatiles & Essent. Oils, 2021; 8(4): 16152-16165pp.
Angiosperms of Haryana			
3.	Ambala District	414 species	Kaur, Mandeep, Singh, Nidan and Vashishtha, BD, (2017). Floristic diversity of Ambala District, Haryana, India. Plant Archives Vol. 17 No. 2, 993-1003 pp.
8.	Aravalli Haryana	92 species	Gaury, Pawan Kumar and Devi, Rani (2017). Plant species composition and diversity at the Aravalli

			Mountain Range in Haryana, India. J Biodiversity, 8(1): 34-43pp.
4.	Hisar District	79 species	Rani, Ritu, Sidhu, Harvinder Kaur and Kumar, Pawan (2020). An ethnobotanical study of flora on Hisar district of Haryana, India. Bull. Env. Pharmacol. Life Sci., Vol 9[11]: 99-103pp.
5.	Karnal District	345 species	Kaur, Ravinder, Singh, Nidan and Vashishtha, BD (2016). Flowering plant diversity of District Karnal, Haryana, India Int. J. of Life Sciences, Vol. 4 (3): 361-371pp.
6.	Rohtak District	210 species	Lath, Amit, Gulia, Surender Singh and Kumar, Manoj (2018). Flosristic inventory of District Rohtak (Haryana) India. Plant Archives Vol. 18, Special Issue (ICAAAS-2018), 219-226pp.
7.	Southern Haryana	181 species	Gulia, Surender Singh, Ganie, S.A., Bhandoria, M.S. and Yadav, S.S. (2017). Floristic Inventory of village ponds of Southern Haryana, India. Plant Archives Vol. 17 No. 1, 681-690pp.
Medicinal plants of Haryana			
10.	Aravalli Haryana	53 species	Kumar, Narender and Khurana. S.M. Paul (2020). Medicinal Plant s Wealth of Aravalli Hills, Gurgaon District, Haryana, India. Research Journal of Medicinal Plants, 14: 96-103pp.
9.	Morni Hills	323 species	Balkrishna, Acharya & Srivastava, Anupam & Shukla, Bishnu Kant & Mishra, Rajesh & Joshi, Bhasker (2019). Medicinal plants of Morni Hills, Shivalik Range, Panchkula, Haryana. Journal of Non Timber Forest Products. 25.10.54207/bsmps2000-2018-IR3J0N.

Source- Haryana State Biodiversity Board

A total of 1,062 wild plant species of Haryana have been enlisted by S. Kumar, 2001 in his publication entitled 'Flora of Haryana'

IMPACTS OF CLIMATE CHANGE IN THE SECTOR

- Reduced survival of plantation and change in vegetation type and alteration in native species of the area
- Reduction in biomass due to climatic variation
- Change in species and growth of trees due to increased mean annual temperature & lower and irregular rainfall
- Reduction of ground water table due to untimely and scanty rains
- The extreme winter frost takes heavy toll of the frost sensitive species and large-scale casualty occurs and the survival of young saplings drops considerably
- Conversion of village forest land into agricultural land due to reduced productivity of crops
- Delay in plantation drive due to long dry spell which results in reduction of the growing period

KEY ISSUES AND CHALLENGES

Table 44: Key Issues and Challenges of Forest & Biodiversity Sector

Area	Issues/Challenges
Technical/Infrastructural	• Very slow increase in forest cover in the state • Huge demand gap in provisioning ecosystem services such as timber, fodder, and fuelwood

Policy & Regulatory	• Haryana's Forest Policy 2006 was aimed to achieve 20% forest and tree cover in the State, however as per State reports, it has achieved only 10% increase • Absence of Re-notification of large areas under Punjab Land Preservation Act (PLPA), leaving eco sensitive areas open from the protective layer
Institutional	• Lack of public and media participation in proactive environmental matters • Lack of coordination among different government bodies for facilitating climate adaptation measures • Construction and mining operations have made both hill ranges susceptible
Socio economic/Cultural	• Open forest in Rohtak, Bhiwani, Sirsa, and Rewari has been overgrazed and is being chopped for fuel • Without re-notification of areas under PLPA, the forest area will be vulnerable to real estate and private builders
Environmental	• Increasing forest fire cases • Depleting Air quality • Degradation in forest quality in Aravalli • Increasing fragmentation in forest cover • Loss of wildlife habitats and wildlife corridors • numerous migrating birds have returned to Sultanpur bird sanctuary near Gurgaon due to rising temperatures and pollution

PROGRESS MAPPING (IN LAST 5 YEARS)

Physical Progress

The achievements under the strategies of the Forest and Biodiversity sector are highlighted below for Haryana State Action Plan on Climate Change (HSAPCC) 2014

Table 45: Physical Stocktaking of Forest & Biodiversity Sector

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Scheme	Source	Physical Progress (2014-2019)	Expenditure (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
FB/1. Enhancing quality of forest cover and improving ecosystem services						
1.1 Control degradation of dense forest cover	Yes	Desert Control/ Rehabilitation of Degraded Forests	S	• Control of advancement of deserts through afforestation by creation of wind breaks, shelter belts along rail, road, canal and bunds • 86 ha. of area covered under plantation and maintenance of the forest area • Plantation of *Azadirachta indica, Acacia nilotica, Pongamia pinnata, Zizyphus* and *Dalbergia* species • Area covered under the scheme are Bhiwani, Rewari and Mahendragarh • The State Government has taken major initiatives in increasing the green cover of the state. During 2014-19, 4412 ha of degraded open forests has been restored • Protection of forests from forest fires under Intensification of Forest Management Scheme • Protection of forests against illegal encroschment	413.60	0
1.2 Eco- restoration of degraded open forests (in Ha.)	Yes	Rehabilitation of Degraded	S	• 4412 ha. of degraded open forest has been undertaken for eco-restoration • 726 RKM of plantation	5856.62	5859

		Forests				
FB/2. Enhancing tree cover in Urban and Peri-urban areas						
2.1 Avenue, city forests, municipal parks, gardens, households/ plantation in Urban and Peri-Urban areas on waste land, parks, industrial areas and urban housing colonies for enhancing the tree cover	Yes	Green belt in Urban Areas	S	• 2749 RKM of tree cover in urban and peri-urban areas • Initiative of increasing green cover to minimize the impact of dust pollution on account of traffic, leaving of space on both sides of highways for tree plantation and expansion • Panchavati plantation at 134 places of Kurukshetra pilgrimage for agroforestry promotion on vacant land • Cultivation and propagation of medicinal plant outside forest for conservation and meeting the demands of medicinal plants, herbs and shrubs. 58 herbal parks established in the State during 2016-17 • Plantation in households of General/ SC families under 'Har Ghar Hariyali" campaign, in 1500000 number of households	4252	4931
Institutional lands	Yes	Green belt in Urban Areas	S	• 3966 ha. tree plantation in Institutional lands • 50000 number of plantation on institutional lands (tall plants with a tree guard) and maintenance during 2016-17	4140.38	4140.38
FB/3. Agro-forestry and Social Forestry (increasing biomass & creating carbon sink)						
3.1 Agro Forestry plantation on agricultural field, farm boundary and in block (in Ha)	Yes	Development of Agro forestry in	S	• Under Agro Forestry plantation on agricultural field, farm boundary 27178 ha area has been taken up • Plantation, Raising & maintenance of	37161	39536

		Community/ Farmlands		nurseries, tall plants and other plants for free supply / sale • Raising & maintenance of nurseries, tall plants, Poplar ETPs and other plants for free supply & Plantation • 5500 ha. of Farm forestry on private Farmlands during 2016-17 • Plantation of clonal eucalyptus on 500 ha. farmlands of SCs		
3.2 Plantation in Village Community and Panchayat Land are under tree cover	Yes	Development of Agro forestry in Community/ Farmlands	S	• 7360 ha area has been taken up under Plantation in Village Community and Panchayat Land are under tree cover • Plantation on 10% of 8 lakh acres of Panchayat land, named as Oxy Forest • Village woodlots on Panchayat/ community lands and maintenance in 1000 ha. during 2016-17 • Maintenance and protection of green cover created under "Aravalli Afforestation Project" with the help of Village forest Communities and other stakeholders		
3.3 Corridor plantation	Yes	Green belt in Urban Areas	S	• Tree plantation activity in urban areas along roads, parks and in blank areas available in various localities for increasing tree cover		
FB/4. Plantation and tree resource as carbon sink and biodiversity conservation and employment generation						
4.5 Bio drainage plantation in waterlogged areas	Yes	Soil Conservation on Watershed Basis	S	• 11457 ha. waterlogged area covered under bio drainage plantation	1578.88	1578.88
FB/5. Soil and Moisture Conservation						
5.1 Check dams	Yes	Soil Conservat	S	• Bio-remedial measures are taken up by the Dept, including	3173.68	3312

		ion on Watershed Basis		vegetative/brushwood check dams across channels, vegetative spurs, vegetative filters and grass barriers, vegetative gully plugs		
5.2 Gully plugging	Yes	Soil Conservation on Watershed Basis	S	• Construction of gully plugging particularly in ecologically fragile areas along with tree plantation in their catchments, which will help in soil and water conservation in the concerned areas		
5.3 Small and big water harvesting structures	Yes	Soil Conservation on Watershed Basis/ Rehabilitation of Aravalli Hills	S	• Construction of protection trenches/ ponds and other structures in Aravalli hills covering 550 ha. in 2014-15 and 670 ha. in 2015-16		
5.4 Water collection ditches in plane and staggered trenches on hill slopes	Yes	Soil Conservation on Watershed Basis	S	• Small earth-fill dams, stone masonry dams, water percolation dams and sub-surface dams constructed to tap sub-surface channel water for irrigation and water supply • Afforestation in barren hills by enrichment plantation with trench-cum-pit method • Construction of stone wall fencing on barren hills, so that the natural root stock available in the area gets regenerated • Construction of protection trenches in foothills of Aravalli to obstruct possible illegal mining activities		
5.5 Rainwater harvesting in urban areas and forests	Yes	Soil Conservation on	S	• More than 200 Rainwater Harvesting Structures constructed in Shivalik's and Aravalli's for water conservation		

		Watershed Basis		under the Integrated Watershed and Afforestation Projects in the State		
5.6 Digging and renovation of village ponds	Yes	Soil Conservation on Watershed Basis	S	• Rehabilitation of village ponds initiated by Forest Department • Village johads have been rehabilitated under JICA projects and State schemes • Stabilization of pondage areas by plantation of trees and mulching with locally available biomass		
FB/6. Wildlife Management						
6.1 Development and maintenance of NP, WLS, Mini Zoo and Breeding Centres	Yes	Strengthening, Expansion and Improvement of Sanctuaries	C and S (60:40)	• Wildlife habitat management in Protected Areas and maintenance of Vulture Conservation and Breeding Centre in the state • Maintenance of Zoos, Deer parks and Breeding Centres in the state • Total area covered under the National parks and wildlife sanctuaries is 303.62 km2 • Public awareness & education, habitat improvement, plantation, fencing of boundary wall, weed removal, digging of new area and tube well facility, construction of platform for feeding of birds, fixing of artificial wood nest, digging and refilling of soil, protection of plantation, board and hoarding and publicity material in Sultanpur National Park • Removal of water hyacinth from lake for lakebed habitat improvement for birds in Bhindawas Wildlife Sanctuary • Research on Red jungle fowl and	4031.75	2897.26

				other endangered species • Eco-development activities undertaken for human habitations living in corridor area between Rajaji National Park and Kalesar National Park • Creation of Artificial water sources, removal of lantana weed and plantation of fruit trees in the gaps of Eucalyptus plantation, to phase out Eucalyptus gradually in Bir Shikargah Wildlife Sanctuary		
		Integrated Development of Wildlife Habitats	C and S (60:40)	• Research projects to monitor behavior and adverse effects on the health of animals in captivity for zoos in Haryana • Protection of Wildlife outside Protected areas • Recovery programmes for saving critically endangered species and habitat • Under Ex-situ conservation, breeding of red jungle fowl is done at Berwala and Morni (Panchkula) • Establishment of jatayu (vulture) conservation and breeding centre at Bir-Shikargah near Pinjore in collaboration with Bombay Natural History Society • Peacock and Chinkara conservation breeding centre established at Jhabua, Rewari • In-situ protection of chinkara and black bucks at Kairu in Biwani and at Nahar in Jhajhar • Elephant rehabilitation centre established at Ban Santor in Yamunanagar district		

				• Deer Park at Hisar and small zoos at Bhiwani, Rohtak and Pipli (Kurukshetra) established by Wildlife Department		
FB/7. Research						
7.1 Identification of new drought resistant, pest resistant and frost resistant species for farm forestry with high yield with less water	Yes	-	-	No activities conducted under the proposed strategy	1076.75	1076.75
7.2 Modern plantation techniques	Yes	-	-	No activities conducted under the proposed strategy		
7.3 Modern logging techniques and tool	Yes	-	-	No activities conducted under the proposed strategy		
7.4 Establishment of modern nurseries and High-tech Mist Chamber and laboratory	Yes	-	-	No activities conducted under the proposed strategy		
FB/8. Capacity Building and Awareness						
8.1 Establishment and training of SHG, VFC and HRMS	Yes	Forest Publicity, Education, Working Plan and Research	S	• 55 number of trainings conducted for SHGs, VFC and HRMS	1014	1096
8.2 Training of field staffs in modern forestry, forest and general management, Law, social science and humanity	Yes			• 30 number of trainings conducted for field staffs in modern forestry and related subjects		
8.3 Publicity of Government schemes and extension activities by conducting field visits of various stake holders	Yes			• 733 number of IEC activities conducted for publicity of government schemes		
8.4 (a) Publicity and extension by audio visual and print media (b) Print media (Poster, Booklet and Stickers) 8.5 The Haryana State Biodiversity Board is conducting capacity building	Yes			• 227 number of publicity and extension programmes carried out • 2541265 number of print media activities conducted by the Department		

and awareness program towards biodiversity conservation and preparation of Peoples Biodiversity Registers (PBRs) across the State.						
				Total	**62698.66**	**64427.27**

GAP/BARRIER ANALYSIS

Table 46: Gap/Barrier Analysis of Forest & Biodiversity Sector

Type	Gaps
Technical/Infrastructural	• Low availability of land for extension of forest • Slow momentum of SMAF, due to longer gestation period of fast-growing soft wood species like Eucalyptus, Poplar, Melia as compared to agriculture crops
Policy & Regulatory	• Absence of stringent policy, laws, and arrangements to check encroachments and changing land use patterns • Unplanned and increasing development activities
Institutional	• Lack of awareness and knowledge about changing climate and its likely consequences • Agroforestry/ Farm forestry is restricted to plantation of fast-growing soft wood species to feed the paper and match wood industry
Socio-Economic/Cultural	• Dependency of people on fuel wood • Burning of crop residue as a major agriculture practice

SECTOR PLANNING

National/State-Level Targets and Linkages

The sector planning may be aligned as per the National Biodiversity Targets proposed by the MoEF&CC and Post 2020 Global Biodiversity Framework proposed by CBD- UNEP. The Post 2020 Global Biodiversity Framework: The framework builds on the Strategic Plan for Biodiversity 2011-20 and sets out an ambitious plan to implement broad-based action to bring about a transformation in society's relationship with biodiversity, ensuring that by 2050, the shared vision of 'living in harmony with nature' is fulfilled.

SITUATIONAL ANALYSIS- NDC PERSPECTIVE

NDC Commitments	Key State level Initiatives to comply with NDC Targets
NDC 5: To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030	• National Mission for a Green India • Intensification of Forest Management Scheme • National Afforestation Programme (NAP) • Compensatory Afforestation Fund Management and Planning Authority (CAMPA)

SPECIFIC TARGETS UNDER SDG FOR THE SECTOR

SDG Goals	Key State level Initiative to comply with SDG Goals
SDG 13: Take urgent action to combat climate change and its impacts	• Forest Publicity, Education, Working Plan and Research • Afforestation of Wastelands and Agro forestry • Green belt in Urban Areas • Rehabilitation of degraded forests • Forest Fire Prevention and Management • National plan for conservation of aquatic eco-system
SDG 15: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	• Oxy Forest initiative, Karnal and Panchkula • Panchavati Plantation • Pran Vayu Devta Pension Scheme • Development of Agro forestry in Community/ Farmlands • Har Ghar Hariyali • Rehabilitation of Aravalli Hills • Herbal Nature Parks • Strengthening, Expansion and Improvement of Sanctuaries

	• Integrated Development of Wildlife Habitats (IDWH) • Protection of Wildlife in Multiple use areas

Description of Strategies/Activities

The description of activities below is based of mitigation and adaptation options. The activities that are named "FB/N" are transformative activities and other set of activities are named as "FB", which are incremental activities. Incremental activities are those which are old activities proposed under earlier SAPCC (2014-19) and will be continued for upcoming years as per agreement of the nodal departments and transformative activities are those which are newly proposed by the nodal departments for the upcoming years under "**Forest and Biodiversity**" sector.

FB/1- Enhancing Quality of forest cover and improving ecosystem services

Description- The strategy is sub-divided into two components, which the Department intends to continue for a period of 9 years. The Sub-components are Afforestation in degraded land under the State Scheme Afforestation of special sites for desert control and Forest fire management and prevention under Central scheme Forest fire prevention & management and State Scheme on protection of forests.

FB/2- Enhancing tree cover in Urban and Peri-urban areas

Description- The Strategy is planned by Forest Department, Haryana for continuation up to 9 years in the State. The component of the strategy includesPlantation along roadsides in urban areas under State scheme Green belt in urban areas, Structural interventions and plantation work under State scheme for Revitalization of institution in Aravalli Hills and Afforestation activities and capacity building of institutions under Central scheme National Afforestation Programme.

FB/3- Agro-forestry and Social Forestry

Description- Development and maintenance of Herbal park under the Herbal Nature Parks scheme. The activity will be taken up in different districts of Haryana under financial assistance of the State Scheme and targeted for 9 years to complete the plantation of medicinal plants, herbs and shrubs.

FB/4- Plantation and tree resource as carbon sink and biodiversity conservation and employment generation

Description- The strategy will involvePlantation on Degraded notified forests under State scheme and Rehabilitation of Degraded Forest and Plantation of clonal and non-clonal plants species on farmlands, panchayat and institutional lands under State scheme Development of agro-forestry clonal and non-clonal. The activity will be carried out by the Forest Department for a duration of 9 years.

FB/5- Soil and Moisture conservation

Description- Soil and Moisture conservation works will be carried out by the Forest Department, Haryana for a duration of 9 years under the financial assistance of the State Scheme Soil Conservation on water shed basis. The strategy aims for training on afforestation of special site (Cho training).

FB/6- Wildlife Management

Description- The strategy includes multiple sub-components planned by the Wildlife Department of Haryana. The strategy includesmaintenance of protected areas under State scheme Wildlife protection in multiple use area. The scheme aims at protection of wildlife in multiple use area, control of poaching and illegal trade, nature education and wildlife extension as well as translocation of wild animals from human habitation to forest areas. Maintenance of zoo and deer parks under on-going State plan Scheme Extension of zoo and deer park, taking up maintenance of mini zoo at pipli, Rohtak and Bhiwani, deer park at Hisar and Rescue Centre at Meham, Peacock & Chinkara Breeding centre at Jhabua. Strengthening expansion and improvement of wildlife sanctuaries and maintenance of Rehabilitation centres under Centrally sponsored scheme (60:40) Strengthening, expansion and improvement of sanctuaries. The scheme aims at necessary actions for improvement of wildlife habitats, provision of water, plantation of fruits and fodder species, erection of watch

towers, development of camping sites and Eco-development activities in villages adjoining Protected Areas. Maintenances of Water ponds, Awareness camps and removal of weeds under Central scheme Integrated Development of Wildlife Habitats. Removal of weeds and water hyacinth under the national plan for conservation of aquatic eco-system for Conservation and management of wetland in Haryana.

FB/7- Research

Description- Modernization of nurseries is planned by the Forest Department under the Centrally sponsored scheme National Mission on Sustainable Agriculture (NMSA) for a duration of 9 years. Under Sub-Mission on Agro forestry (SMAF), quality seedlings are planned to be sold to interested farmers and other tree growers to plant the seedlings on their farms and other lands. The activity will include protection works along strips using concrete fencing posts and barbed wire. Nursery development and raising of plantations of host plants like Mulberry, Asan, Arjuna, Som, Soalu, Kesseru, Bada Kesseru, Phanat (Quercus) is planned to be taken up both as plantations and on bunds of farmlands under SMAF, with post convergence with silk industry thereafter. Plantation of Sericulture based tree species has tremendous potential of creating additional income opportunities to farmers by establishing linkage for an assured market for the producer and the Central Silk Board.

FB/8- Capacity Building and Awareness

Description- Workshops for capacity building, training of field staff and publications under the State Scheme Forest publicity public relation and extension. The strategy is planned for a duration of 9 years with financial assistance from the State Plan.

FB/N/1- Habitat improvement of Protected Areas

Description- Wildlife wing of the forest department has adopted two-pronged strategy for the Wildlife Conservation through habitat improvement: protection and awareness generation. The department is giving emphasis on habitat protection as well as protection against poaching. The aim of wildlife conservation is being achieved through in-situ and ex-situ conservation strategies. For in-situ conservation of wildlife inside their natural habitat, 2 National Parks, 8 Wildlife Sanctuaries and 2 Conservation Reserves have been established in the state. As part of ex-situ conservation efforts breeding of Red Jungle Fowl is being done near Pinjore. Necessary action for improvement of wildlife habitats, provision of water, construction of fence, plantation of fruits and fodder species, erection of watch towers, development of camping sites, provision for guided tours and nature education, procurement of necessary equipment for bird watching, creation of nature trails, etc. will be taken in the protected areas. Eco-development activities in villages adjoining Protected Areas will be undertaken to the extent possible.

FB/N/2- Development of Oxy-Van

Description- Amid the ongoing pandemic, several states including Haryana witnessed a crisis of medical oxygen that was needed for severely ill Covid-19 patients. To avoid such a deficit in the future, the Haryana government has come out with is a “unique and first of its kind initiative”. Oxy Forests will be planted on land ranging from 5 acres to 100 acres in the cities of Haryana.

FB/N/3- Development of Nagar Van

Description- Nagar Van (Udyan) is a forested area in the vicinity of a city accessible to the city dwellers suitably managed for providing wholesome natural environment for recreation, conservation education, biodiversity conservation and supported services like water and soil conservation, pollution abatement, reduction of heat islands effect of the city with the essential elements for regular use. Nagar Van-Udyan Yojana is a Pilot scheme for implementation for a period of five Years (beginning 2015-16) by the Ministry of Environment, Forests & Climate Change.

FB/N/4- Promotion of Eco-tourism

Description- The eco-tourism activities included are nature camps, eco-friendly accommodation, trekking and nature walks, wildlife viewing, educational tours and excursions, herbal eco-tourism, medical and health activities, religious and cultural eco-tourism and visitor interpretation centres.

FB/N/5- Promotion of Green buildings (Residential and offices)
Description- These buildings are designed to meet certain critical objectives like:

- Protecting Occupant Health.
- Improving Employee Productivity.
- Conservation Of Energy, Water, And Other Fast Depleting Resources.
- Reduce The Use of Energy, Water, And Other Fast Depleting Resources.
- Lower Carbon Footprint.
- Reducing The Overall Impact to The Environment.
- Better Indoor Air.

FB/N/6- Promotion of Miyawaki Plantation
Description- Invented by and named after Japanese botanist Akira Miyawaki, the 'Miyawaki Method' is a unique technique to grow forests. Under the approach, dozens of native species are planted in the same area, close to each other, which ensures that the plants receive sunlight only from the top and grow upwards than sideways. It requires very little space (a minimum of 20 square feet), plants grow ten times faster, and the forest becomes maintenance-free in three years.

FB/N/7- Modernization of nurseries
Description- Setting up of high-tech nurseries is proposed in each division/district. High Tech Nursery is a combination of Poly green house and Agrinet house. Vegetative reproduction is used in such nurseries to ensure genetic similarities with the source. High Tech Nurseries overcome the limitations like poor control over climatic factors, low germination percentage, longer duration and high cost involved in conventional methods of plant raising.

FB/N/8- Plantation of Climate resilient species
Description- The State government of Haryana, under the National Afforestation Programme and National Mission for a green India, has planned to be taken up planting of Climate Resilient Species during the plantation drives of the department.

FB/N/9- Reclamation of waterlogged saline area
Description- Department of Forest, Haryana has planned to take up Reclamation of waterlogged saline area under the CAMPA scheme. The state government will plant selected species that reclaim waterlogged saline. The transpiration principle of plants is used in bio-drainage treatment to reclaim such problematic areas sustainably. Evergreen broad-leaved species recorded high transpiration rate and contribute highly in reclamation of waterlogged saline soils will be selected. Short rotation fast growing tree species are the suitable species for such areas.

FB/N/10- Greening of Highways
Description- State department of Forest, Haryana will take up increasing green cover to minimize the impact of dust pollution on account of traffic, leaving of space on both sides of highways for tree plantation and expansion, preventing direct access to the highways without bye-lanes/exit routes and regulating the opening of access to the buildings directly from the highways.

FB/N/11- Greening of Common lands
Description- Common lands in Haryana State, India have suffered severe degradation, continuous erosion and are becoming transformed to open access regimes due to increasing population pressure. In order to alter the environmental damage, the Government will initiate action for greening the common lands, the government and the people will come together to establish a participatory planning and development process at the village level.

FB/N/12- Aerial seeding/seed ball Technology

Description- The forest department of Haryana has taken up a new approach to plant seeds across areas that are hard to access and makes plantation difficult. Aerial seeding is a process where seed balls are sprayed on the ground with aerial means. This is be done with the help of drones. Drones disperse the seed balls across a targeted area. The mixture covering the seeds ensures that they don't disperse with wind and fall on the area that has been selected. With rains and the soil mixture, these seeds grow.

FB/N/13- Protection and conservation of Heritage Tree (>75 Years)

Description- The state government has taken an initiative to honour all those trees which are of the age of 75 years and above and have served humanity throughout their life by producing oxygen, reducing pollution, providing shade and so on. Such trees will be identified throughout the state, and these will be looked after by involving local people in this scheme. For maintenance of trees older than 75 years, a "pension amount" of Rs 2,500 would be given per year in the name of PVDPS. This 'tree pension' shall continue to increase every year, on lines similar to the Old Age Samman Pension Scheme in the state.

FB/N/14- Rehabilitation and rejuvenation of village Banis and sacred grooves

Description- In an effort to increase the green cover of the state, state government is trying to restore and rejuvenate the Banis and Sacred grooves. The state government had already declared a 677-acre area of the grove as a no construction zone. Despite the notification, the Mangar Bani sacred grove faces numerous challenges. Therefore, the Government is planning to take initiatives towards rehabilitation and rejuvenation of village Banis & Sacred grooves.

FB/N/15- Creation of urban green space through vertical forestry

Description- The State government will take up greening of urban spaces through vertical forestry in an effort to attain the "Healthy City" by 2030.

Promotion of plantation of native and medicinal plant species and its implementation is a major recommendation by the Biodiversity Board of the State, which will play a significant role for forestry and biodiversity. The concept of Biodiversity Finance Initiative (BIOFIN) quantifying the biodiversity finance gap at national level, for improving cost-effectiveness through mainstreaming of biodiversity into national development and sectoral planning, and for developing comprehensive national resource mobilizing strategies. provides a systematic and flexible approach to identify and mobilize the financial resources needed for implementing the National Biodiversity Action Plan (NBAP) and making progress towards achieving the National Biodiversity Targets (NBTs). In this prospect, climate finances can be channelised for actions proposed under the Forest and Biodiversity Sector.

KEY PRIORITIES SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Table 47: Synopsis of Planned Activities for Forest & Biodiversity Sector

Code	Activities/Interventions	Scheme	Source	Duration (in years)	Proposed budget during (2021-30) in INR Lakh	Amount likely from existing Central scheme (Amount in INR Lakh)	Amount likely from State Budget (Amount in INR Lakh)	Amount likely from External Aid (Amount in INR Lakh)	Implementing Dept.
Continuation of activities from SAPCC-1									
FB/1	Afforestation in degraded land	Afforestation of special sites for desert control	S	9	3686.00	0	3686.00	0	Forest Dept.
FB/1	Forest fire management and prevention	Protection of forest	S	9	2080.00	0	2080.00	0	Forest Dept.
FB/1	Forest fire management and prevention	Forest fire prevention & management scheme	C	9	3536.00	3536.00	0	0	Forest Dept.
FB/2	Plantation along roadsides in urban areas	Green belt in urban area	S	9	17246.00	0	17246.00	0	Forest Dept.
FB/2	Structural interventions and plantation work	Revitalization of institution in Aravalli Hills	S	9	25531.00	0	25531.00	0	Forest Dept.
FB/2	Afforestation activities and capacity building of institutions	National Afforestation Programme	C	9	32999.00	32999.00	0	0	Forest Dept.
FB/3	Development and maintenance of Herbal park	Herbal Nature Park	S	9	20799.00	0	20799.00	0	Forest Dept.
FB/4	Plantation on Degraded notified forests	Rehabilitation of Degraded Forest	S	9	45040.00	0	45040.00	0	Forest Dept.
FB/4	Plantation of clonal and non-clonal plants species on farmlands, panchayat and institutional lands	Development of agro-forestry clonal and non-clonal	S	9	255464.00	0	255464.00	0	Forest Dept.
FB/5	Soil and Moisture conservation works	Soil Conservation on	S	9	9360.00	0	9360.00	0	Forest Dept.

		water shed basis							
FB/6	Maintenance of protected areas	Wildlife protection in multiple use area	S	9	3390.00	0	3390.00	0	Wildlife Dept.
FB/6	Maintenance of zoo and deer parks	Extension of zoo and deer park	S	9	6593.00	0	6593.00	0	Wildlife Dept.
FB/6	Strengthening expansion and improvement of wildlife sanctuaries and maintenance of Rehabilitation centres	Strengthening expansion and improvement of sanctuaries	C	9	624.00	624.00	0	0	Wildlife Dept.
FB/6	Maintenances of Water ponds, Awareness camps and removal of weeds	Integrated Development of Wildlife Habitats	C	9	7280.00	7280.00	0	0	Wildlife Dept.
FB/6	Removal of weeds and water hyacinth	National plan for conservation of aquatic eco-system	C	9	7280.00	7280.00	0	0	Wildlife Dept.
FB/7	Modernization of nurseries	NMSA	CCS	9	3320.00	3320.00	0	0	Forest Dept.
FB/8	Workshops for capacity building, training of field staff and publications	Forest publicity public relation and extension	S	9	4056.00	0	4056.00	0	Forest Dept.
Proposal of New activities to be added in SAPCC-2									
FB/N/1	Habitat improvement of Protected Areas	Integrated Development of Wildlife Habitats	C	9	24749.00	24749.00	0	0	Wildlife Dept.
FB/N/2	Development of Oxy-Van	Herbal Nature Park	S	9	51997.00	0	51997.00	0	Forest Dept.
FB/N/3	Development of Nagar Van	Herbal Nature Park	C	9	24749.00	24749.00	0	0	Forest Dept.
FB/N/4	Promotion of Eco-tourism	Herbal Nature Park	S	9	16499.00	0	16499.00	0	Forest Dept.
FB/N/5	Promotion of Green buildings	Building	S	9	16499.00	0	16499.00	0	Forest Dept.
FB/N/6	Promotion of Miyawaki	Development of	S	9	164991.00	0	164991.00	0	Forest

	Plantation	agro-forestry clonal and non-clonal							Dept.
FB/N/7	Modernization of nurseries	NMSA	CCS	9	164991.00	0	164991.00	0	Forest Dept.
FB/N/8	Plantation of Climate resilient species	NAP	S	9	148492.00	0	148492.00	0	Forest Dept.
FB/N/9	Reclamation of waterlogged saline area	CAMPA	S	9	263985.00	0	263985.00	0	Forest Dept.
FB/N/10	Greening of Highways	CAMPA	S	9	181490.00	0	181490.00	0	Forest Dept.
FB/N/11	Greening of Common lands	NAP	S	9	181490.00	0	181490.00	0	Forest Dept.
FB/N/12	Aerial seeding/seed ball Technology	Rehabilitation of Degraded Forest	S	9	148492.00	0	148492.00	0	Forest Dept.
FB/N/13	Protection and conservation of Heritage Tree (>75 Years)	Rehabilitation of Degraded Forest	S	9	131993.00	0	131993.00	0	Forest Dept.
FB/N/14	Rehabilitation and rejuvenation of village Banis and sacred grooves	Development of agro-forestry clonal and non-clonal	S	9	197989.00	0	197989.00	0	Forest Dept.
FB/N/15	Creation of urban green space through vertical forestry	Green belt in urban area	S	9	65996.00	0	65996.00	0	Forest Dept.
Total					**2232686.00**	**104537.00**	**2128149.00**	**0**	

WATER MISSION

SECTORAL OVERVIEW

Haryana, an irrigated semi-arid state is one of the major agriculturally developed state of India. The average annual rainfall in state is 617 mm. It receives limited rainfall ranging from 300 mm in the southwest to 1,100 mm in the northeast in the state. A major part of the state except the Shivalik predominant region in north-east has a semi-arid climate. There are no perennial rivers running through the state, Ghaggar is the only seasonal river flowing in the northern region, while Saraswati and Yamuna also flow in the state. River Yamuna, is a major source of irrigation activities of the state and forms eastern boundary with Uttar Pradesh. Haryana is partly a co-basin state for Indus and Ganga Basin. While most of the tributaries of the river, turns seasonal and carry floodwater at the time of monsoon The large part of the state is underlain by alluvium except the south and north-eastern regions which have hilly formation.

With respect to surface and ground water resources, Haryana is a water deficit state. The fresh ground water zone is depleting due to overexploitation. The annual groundwater withdrawal in state is 137% of its extractable groundwater resources. According to the government records, annual groundwater recharge from rainwater and canal water in the state is 10.15 billion cubic meters (bcm) (one cubic meter is 1,000 liter) of which 9.13 bcm is extractable. But the current annual groundwater extraction in the state is 12.50 bcm, of which 11.53 bcm is alone used for irrigation and the remaining goes for domestic (0.63 bcm) and industrial use (0.34 bcm). The state's average decline in water table from June 1974 to June 2018 is 10.38 mtr. The huge depletion of ground water is observed in districts like Kurukshetra, Karnal, Bhiwani, Fatehabad, Panipat, Rewari, Sirsa and Mahendragarh due to fresh ground water zones and paddy irrigation. Based on the categorization by Dynamic Ground water resource estimation as in 2013, out of the 119 assessed blocks, 64 are overexploited, 14 are critical and 11 are semi critical. Along with the declining water table, other issues include the quality of groundwater of the state, which is assessed not good in 45% of the area of state due to salinity based on electric conductivity; and water logging condition in 10% area of the state.

According to the analysis of agriculture experts, 3000 to 4000 liters of water is required to produce 1 kg of rice which is a major crop in Haryana.[59]

State Level Nodal Agency (SLNA) under the Rural Development Department

The implementing body for Watershed Development Component of Pradhan Mantri Krishi Sinchayee Yojana in the State of Haryana. The watershed development programmes has been proved important for efficient and effective management of natural resources and a tool to cope up with the impacts of climate change. Fore better strengthening of the Department towards the impacts of climate change, emphasis is given on training and capacity building of various stakeholders. GIS based planning and geo-tagging of works at various stages for regular monitoring and transparency in implementation of the programme.

IMPACTS OF CLIMATE CHANGE IN THE SECTOR

The Haryana state falls under the area with high climate sensitivity. Events like droughts, heavy rains, unseasonal rains, hailstorms, floods, are on the rise due to climate change. The climate profile of the Haryana suggests a decline in annual average precipitation in major parts of the state in near term, which would likely lead to shortage of water. Along with-it different climate scenarios have shown high probability of uneven distribution of precipitation by the end of century, which might lead to more instances of drought. Hence, the predicted change in rainfall patterns will have direct impact on the water resources of the state. The temperature profile of the state has also shown an overall increase in the average annual temperature in the past two decades.

[59]Grid/Solar Powered Micro Irrigation INFRASTRUCTURE ON EXISTING CANAL COMMANDS AND ITS OUTCOME IN PADDY CROP neeraj sharma Executive Engineer, Command Area Development Division, Kurukshetra, Haryana SUMIT KUMAR Sub Divisional Officer, CAD Sub Division No. II, Kurukshetra Command Area Development Authority, Haryana 1st International Conference on Sustainable Water Management, 10-11 December 2018, Chandigarh, India)

The unregulated groundwater extraction has led to its overuse in the state, this situation is getting worse as the groundwater exploitation is exceeding the replenishment. The replenishment of groundwater sources is quite slow in the state due to changing rainfall patterns and high temperatures. There are already visible challenges of water supply in the state as there is a gap of 1.65 million ha. of the total water demand and the water available. The shortage in water supply for irrigation will have direct impact on yields of high-water requirement crops like rice in Ambala, Kurukshetra, Karnal and Jind districts.

KEY ISSUES AND CHALLENGES

Table 48: Key Issues and Challenges of Water Sector

Area	Issues/Challenges
Technical/Infrastructural	• Using Static (far deep groundwater) Groundwater (Kurukshetra) • Water Logging (Due to salinity, the groundwater can't be used for irrigation purpose and intense canal irrigation)
Policy & Regulatory	• No benchmarks for water use for irrigation and other agricultural activities
Institutional	• Flood Irrigation Techniques • Exploitation of ground water wastage in the form of flood irrigation • Missing groundwater usage data
Environmental	• Ground water pollution and poor-quality groundwater table • High content of Fluoride in Groundwater (Siwani Block, Bhiwani district, Haryana) Earlier Reported in the district of Jind, Hisar, Gurugram, Bhiwani, Sirsa and Sonipat with influx of saline water • Over exploitation of groundwater and salinity • Agricultural toxins and industrial effluents • Water-logging issues due to higher groundwater level (Rohtak, Jhajjar, • Declining discharges in the canal • The Regional Plan-2041 National Capital Region by National Capital Region Planning Board (NCRPB) highlights the water shortage in 2021. In 2005, the total water available was 5,224 MCM/annum and total demand in 2021 was 9,775 MCM/annum showing 4,551 MCM/annum water deficit in 2021

PROGRESS MAPPING (IN LAST 5 YEARS)

Physical Progress

The achievements under the strategies of the Water Mission sector are highlighted below for Haryana State Action Plan on Climate Change (HSAPCC)

Table 49: Physical Stocktaking of Water Sector

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Scheme	Source	Physical Progress (2014-2019)	Expenditure (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
WM/1 Comprehensive water database and assessment of climate change on water resources						
1.1 Development of real time Hydrological Information System	Yes	Jal Jeevan Mission (JJM) Central	C	• Haryana has rolled out the tenders for IoT based remote monitoring systems • Several other Union Government initiatives like Aatmanirbhar Bharat, Smart Village, Smart City Project, Digital India will also be boosted	200	0
1.3 Development of modern real time water quality monitoring system	Yes	ABBY-NHP	C	• The Haryana State Pollution Control Board (HSPCB) will install 5 monitoring stations 2 for Ghaggar River (at Panchkula and Sirsa at the river) and 3 for Yamuna (Yamuna Nagar, Sonipat and Panipat at the canal) by Dec 2021 (Pilot Project) • 1700 piezometers are installed at the critically red blocks for monitoring of groundwater	3000	0
WM/2 Efficient management of water resources						
2.1 Better management practices	Yes	JJM	C	• Rainwater Harvesting/ Subsurface Drainage constructed in the State by the Department	1162325	0
				• Public health Engineering Department. Haryana, the Functional Household Tap Connection (FHTC) under JJM		

				since 1st Dec, 2019, 7,20,954 FHTC has been provided up to 31st Mar,20 and 18,14,068 total FHTC till now • 7339 habitations are covered under Rural Water supply, 193 habitats with < 40 LPCD, 1546 habitats with 40-55 LPCD and 5600 habitats with > 55 LPCD • 31 towns covered where water supply status is more than 135 LPCD and 25 town with water supply status between 110-135 LPCD • 53 towns are covered where more than 50% area covered with Sewerage system		
2.2 Establish State Water Tariff Authority	Yes	JJM	C	• State Water Tariff Authority has been established in the State		
2.3 Promote Participatory Irrigation Management	Yes	JJM	C	• Participatory Irrigation Management under Jal Kranti Abhiyan (2015-16) and Micro Irrigation and Command Area Development Authority (MICADA)		
2.4 Rehabilitation, Remodelling of irrigation infrastructure	Yes		S	• In 2017, the government of Haryana formed Haryana Pond Authority for rejuvenating and management of 14,000 ponds (johad) by digging out the silt every year. • Development of around 50-60 lakes which fall under National Capital Region within Haryana so as to store water to meet the growing demands. • tapping the excess water and diverting it to the ponds		
2.5 Flood Control Works and Rehabilitation of flood protection works	Yes	-	S	• Continuous activities taken up by the PHED and IWRD Department		
WM/3 Groundwater Management						

3.1 Groundwater legislation	Yes	Atul Bhujal Yojana And The World Bank	C and S and E	• Implementation of the scheme for a duration of 5 years (2018-23) in the areas with more groundwater depletion • Out of 22 districts the project is being implemented in 14 districts (36 blocks and 1669 Gram Panchayat) Yamunanagar, Kurukshetra, Kaithal, Karnal, Panipat, Fatehabad, Sirsa, Bhiwani, Charkhi Dadri, Mahendragarh, Rewari, Faridabad, Gurgaon and Palwal where the speed of groundwater depletion is higher than the national average • Provision of an amount of 238 Crore on water security plan under the scheme • Rainwater harvesting and other water conservation activities carried out by the Irrigation and Water Resource Department • Under the scheme the first "Jal Panchayat" was organised in Beholi village of Panipat district • Research on groundwater management issues was conducted along with water quality issues through community participation • Capacity building programmes for NGO volunteers	67800	0
WM/4 Rainwater harvesting & judicious recharging of groundwater						
4.1 Implementation of programme for conservation of water through ground water recharge including rainwater harvesting and artificial recharge in areas/situations sensitive to climate change	Yes	JJM, Scheme for Development of Ground Water	C and S	• Increasing the recharge points by Haryana Water Resource Authority • Digging of canals to prevent groundwater depletion • 80 Rainwater Harvesting systems will be installed in Kurukshetra (each	1750	0

		and Implementation		block will have 10-15 RWH system as well as government schools and offices by PWD (B&R) • Construction of 44 Rainwater Harvesting Structures • Around 850 roof top rainwater harvesting structures has been constructed on the Government buildings (preferable schools) (Up to 2018-19) and it was assessed that 8.50 lakh cubic meter of rainwater was recharged from these structures in 2018 by PWD (B&R) • 2402 soil & water conservation-102-soil conservation, sb-80 scheme for aiding on adoption of water saving technologies through NABARD		
WM/5 Waterlogging & salinity control						
5.1 Task Force for effective measures to combat Waterlogging & soil salinity	Yes	Mera Pani Meri Virasat	S	• Increase in the recharge points by the Irrigation Department	16616	0
WM/6 Measures to control Waterlogging & soil salinity						
6.1 Take up the issue of construction of dams in the catchments of rivers	Yes		S	• Beneficiary State of the Lakhwar Dam project where the Government of Haryana has signed the MoU • Provision of 47% of water to the State from the Dam project	22345	0
WM/7 Crop diversification						
7.1 Task Force for Crop Diversification Plan	Yes	Mera Pani Meri Virasat Scheme	S and C	• Incentivising farmers to grow maize, pearl millet, cotton, pulses, and horticulture crops instead of paddy • Restricting paddy cultivation in gram panchayat agriculture land with	70000	0

		and JJM		groundwater level above 35 metres • The government of Haryana has successfully diverted 97,000 acres of land which was under paddy cultivation to other crops during 2020 • Application of Direct Seeded Rice (DSR Technique) used by sarpanch of Bara Village (Ambala District)		
WM/8 Promote water saving technologies						
8.1 Sprinkler Irrigation System	Yes	National Mission on Micro Irrigation and PMKSY	C	• Introduction of Sprinkler Irrigation System has helped in irrigation of undulating uplands • 1.81 lakh sprinklers have been installed in the state with the subsidy of 60% to general category farmer, 70% to small and marginal and 85% to the schedule caste farmers with a limit of 5 ha/beneficiary. • Mini sprinklers have been installed which were first introduced in 2017-18 • The scheme provides subsidies for mini irrigation • 1902 water harvesting structures in all the districts of State. 705 check dam/ Drop structure/ CSMS/ SDD/ Sub-surface Dam, 293 Percolation tank/ pond/ farm pond, 315 renovation and desiltation of pond, 419 Rooftop rainwater harvesting tank/ injection well/ recharge borewell/ water storage kund, 38 gully plugs, 92 earthen embankment with or without spillway/ marginal bund/ diversion bund/ guide bund, 40 irrigation tanks by SLNA under	1409.34	0

				PMKSY-WDC • 75 projects of Watershed Development programme were implemented in 13 districts of Haryana, Panchkula, Ambala, Yamuna Nagar, Hisar, Bhiwani, Mahendragarh, Rewari, Gurgaon, Mewat, Palwal, Rohtak, Sonepat and Jhajjar districts from FY 2013-14 to 2020-21		
8.2 Drip Irrigation System	Yes	Mera Pani Meri Virasat Scheme	S	• Successful experiments conducted in few areas using drip irrigation for direct paddy sowing technique • 85% subsidy for installation of Drip Irrigation System for alternate diversified crops • A lift and drip irrigation has been developed by the Sarpanch of Bara Village operated on Solar Power (with the help of Kurukshetra Command Area Development Authority) under Jal Kranti Campaign • The state has covered an area of 5196 hectare under the drip irrigation system by providing the subsidies to the farmers. • Provision of subsidies under the Scheme, incurred by the Department of Agriculture, Haryana		
8.3 Underground Pipeline System	Yes	RKVY	C	• They have laid UGPL system for the two principal cropping, rice-wheat and cotton wheat. Around an area of 2.15 lakh hectares has been brought under this system • Under the flagship of RKVY, the Department of Agriculture launched		

				the Underground Pipeline Project		
WM/9 Legislation, Policies & Guidelines to handle climate change impact						
9.1 Frame policies, law for climate change situation on water sector	No			• No activities taken up	0	0
WM/10 Research & development by partnering with academic institutions						
10.1 Set up R&D cell in HID for research in water sector & climate change	Yes	Mera Pani Meri Virasat	S	• Establishment of a National Water Quality Monitoring Network (NWMP) under CPCB and SPCB to access the water quality and facilitate prevention and control of pollution in water bodies • Awareness creation through IEC activities under Mera Pani Meri Virasat Scheme	0	0
WM/11 Capacity building						
11.1 Implementation Plan for Extensive Capacity Building & Training	Yes	Jal Jeevan Mission, Atul Bhujal, Yojana and World Bank	C	• Educating and spreading awareness amongst the people for rainwater harvesting, ground water conservation and management • Capacity building conducted under Jal Kranti Abhiyan (2015-16) • Strengthening grassroot involvement of all stakeholders including PRIs and local bodies in water security and development schemes • The Adoption/ utilisation of traditional knowledge in water resources, conservation and its management • Utilisation of sector level expertise from different levels in government, citizens and NGOs • Enhancement of livelihood security through water security in rural areas	7197	0

				• Capacity building of NGO/ volunteers conducted under Atal Bhujal Yojana		
				Total	**1352642.34**	**0**

GAP/BARRIER ANALYSIS

Table 50; Gap/Barrier Analysis of Water Sector

Type	Gaps
Technical/Infrastructural	• Metering of Domestic Water Connections, Sewerage Management
Financial	• Assured Mechanism to buy the other crops from the farmers
Policy & Regulatory	• Integrated Water Resource Management • Cultivation of Water Intensive Crops • Proper guidance and policy for crop diversification
Institutional	• Early warning for floods • Demand-Supply Gap
Planning	• Flood Irrigation Techniques (Consumes more water) • Regeneration of Groundwater Aquifers • Protection Of Urban Wetlands • Solid Waste Management

SECTOR PLANNING

National/State-Level Targets and Linkages

SITUATIONAL ANALYSIS- NDC PERSPECTIVE

NDC Commitments	Key State level Initiatives to comply with NDC Targets
NDC 6: To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health, and disaster management	• Jal Jeevan Mission • Swachh Bharat Mission • Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) • Integrated Watershed Management Programme • National Rural Drinking Water Programme • Accelerated Irrigation Benefit Program (AIBP) • Rainwater Harvesting Programme • Accelerated Rural Water Supply Programme • Desert Development Programme • Indira Gandhi Drinking Water Supply Scheme in Rural areas

SPECIFIC TARGETS UNDER SDG FOR THE SECTOR

SDG Goals	Key State level Initiative to comply with SDG Goals
SDG 6: Ensure availability and sustainable management of water and sanitation for all	• State Water and Sanitation Mission (SWSMH) • Haryana Water Resources (Conservation, Regulation and Management) Authority Act,2020 • Haryana State Groundwater Management and Regulation Act,2008 • Mera Pani Meri Virasat Yojana 2021
SDG 13: Take urgent action to combat climate change and its impacts	• Scheme for aiding on adoption of Water Saving Technology • Soil Conservation on Water-shed basis
SDG 14: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development	• Scheme for the Soil Conservation and Water Management on Agricultural Land in Haryana • Scheme for Pilot Project for the reclamation of saline soil and Waterlogged land

Description of Strategies/Activities

The description of activities below is based of mitigation and adaptation options. The activities that are named "WM/N" are transformative activities and other set of activities are named as "WM", which are incremental activities. Incremental activities are those which are old activities proposed under earlier SAPCC (2014-17) and will be continued for upcoming years as per agreement of the nodal departments and transformative activities are those which are newly proposed by the nodal departments for the upcoming years under **Water Mission** sector.

WM/1- Water Quality Monitoring and Surveillance WQMS

Description- The Public Health Engineering Department has planned to carry forward water quality monitoring and surveillance in the State in 2021-22. The activity is planned under the financial assistance from the centrally Sponsored scheme NRDWP.

WM/2- Incentivizing the Irrigation

Description- Through the **"Mera Pani Meri Virasat",**which is a state initiative of Government of Haryana, the government is encouraging the farmers for crop diversification and micro-irrigation for rationalizing the groundwater. As per NASA, the ground water level in Haryana is depleting at the higher rate (3 meters per year) as compared in India (1 meter per year) due to the paddy irrigation. Through this initiative, the government is encouraging farmers to grow maize, pearl millet, cotton, pulses (Arhar, guar, urad), and horticulture crops instead of paddy for which an incentive of Rs.7,000/hectare will be provided to the farmer. It is also restricting the paddy cultivation in gram panchayat agriculture land with groundwater level above 35 meters. Moreover, a subsidy of 80% will be provided for drip or micro-irrigation systems to farmers growing crops other than paddy.

WM/2- Drainage and Flood Control project

Description- Drainage and flood control is a planned activity under the Public Health Engineering Department of the State for 2021-22. The activity will ensure proper drainage and sewerage management in the State with financial assistance from the State.

WM/8- Watershed Management

Description- The State Level Nodal Agency (SLNA), Rural Development Department has planned watershed management under PMKSY- WDC (Watershed Development Component). 28 projects are planned under Batch-IV and Batch V with Centrally Sponsored Scheme mechanism for 7 years. The State sponsored component will take up 13 projects under Batch VI. For new generation watershed projects guidelines are under preparation in the State. Several districts are planned to be covered under the watershed management programme in 2021-22, namely Gurugram, Mewat, Rohtak, Palwal, Sonipat and Jhajjar. Target of 356 water conservation & water harvesting structures are taken up by the SLNA, including 92 percolation ponds/ desiltation of ponds/ renovation of ponds, 25 injection wells/ recharge pits, 85 Rooftop Rainwater harvesting structures, 5 check dam/ drop structures/ earthen embankment bund, 98 retaining/ protection wall & inlet/ outlet/ ramp of pond and 51 Water conservation structures/ drainage channels/ waste water channel in the above-mentioned districts of the State. SLNA has also taken up 13 projects under the Batch- VI with a project cost of Rs. 71.13 Crore during the FY 2021-22, in Bhiwani, Hisar, Mahendragarh, Rewari, Ambala, Gurgaon and Yamuna Nagar districts. 9 more projects under the New Generation Watershed Projects (WDC-PMKSY 2.0) with a project cost of Rs. 80.59 Crores is planned for the FY 2022-23 in Bhiwani, Charkhi Dadri, Mahendragarh, Gurgaon and Yamuna Nagar. Detailed project Reports for the projects are in process and will be implemented over a span of 5 years i.e., 2021-22 to 2025-26.

WM/11- Institutional Strengthening of Public Health Engineering Department

Description- Strengthening of the line Department is an essential strategy for taking up activities and better functioning of the Department in the field of water management, conservation, water quality maintenance and monitoring. The Capacity building of the Department and technical trainings to resources for assessment of

impact of climate change on water resources in the State is planned to be taken up during 2021-22 by the Nodal Department, Public Health Engineering Department.

WM/N/1- Jal Jeevan Mission
Description- The Strategy will cover all the components of water conservation and management in the State. The activities will be assisted through Centrally Sponsored Scheme for a duration of 1 year.

WM/N/2- Upgradation of existing STPs and construction of new STPs
Description- Upgradation of existing Sewage Treatment Plants (STPs) and construction of new plants for management of waste water generated in the State. The activity will be undertaken by PHED through State Scheme of Urban sewerage for a duration of 3 years.

WM/N/3- Rural Sanitation
Description- The activity for Rural Sanitation is aimed for providing proper sewerage system and facilities in village/ rural areas of the State. The activity is planned under the State Plan Scheme Mahagram Yojana in 2021-22 by the Public Health Engineering Department.

WM/N/4- Rural Water Supply
Description- Rural water supply in planned to be undertakenfor updation of Drinking water supply in villages under the State plan scheme Mahagram Yojana in the State during 2021-22. The activity will be carried out by Public Health Engineering Department in the State of Haryana.

WM/N/5- Urban Water Supply
Description- Urban water supply is planned in different urban areas of Haryana for the year 2021-22 by the Public Health Engineering Department.The activity is planned under State Plan scheme of Urban Water Supply.

WM/N/6- Urban Sewerage and Sanitation
Description- Urban sewerage and sanitation is planned in different urban areas of Haryana for the year 2021-22 by the Public Health Engineering Department. The activity is planned under State Plan scheme of Sewerage and Sanitation.

KEY PRIORITIES SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Table 51: Synopsis of Planned Activities for Water Sector

Code	Activities/Interventions	Ongoing / New scheme	Source	Duration (in years)	Proposed budget during (2021-30) in INR Lakh	Amount likely from existing Central scheme (Amount in INR Lakh)	Amount likely from State Budget (Amount in INR Lakh)	Amount likely from External Aid (Amount in INR Lakh)	Implementing Dept.
Continuation of activities from SAPCC-1									
WM/1	Water Quality Monitoring and Surveillance WQMS	NRDWP	CCS	1	520.00	312.00	208.00	0	SPCB
WM/2	Incentivization the Irrigation	Mera Pani Meri Virasat	S	1	0	0	0	0	Irrigation Dept.
WM/2	Drainage and Flood Control project	-	S	1	4000.00	0	4000.00	0	PHED
WM/8	Watershed Management	PMKSY-WDC	CSS	7	2562.00	2562.00	0	0	SLNA (RDD)
			S	5	7113.00	7113.00	0	0	
WM/11	Institutional Strengthening of Public Health Engineering department	-	S	1	700.00	0	700.00	0	PHED
Proposal of New activities to be added in SAPCC-2									
WM/N/1	Jal Jeevan Mission	JJM	C/S	1	4,00,000.00	2,02,800.00	1,97,200.00	0	PHED
WM/N/2	Upgradation of existing STPs and construction of new STPs	Urban sewerage	S	1	1000.00	0	1000.00	0	PHED
WM/N/3	Rural Sanitation	Mahagram Yojana	S	1	1200.00	0	1200.00	0	PHED
WM/N/4	Rural Water Supply	Mahagram Yojana	S	1	4500.00	0	4500.00	0	PHED
WM/N/5	Urban Water Supply	Urban	S	1	14706.00	0	14706.00	0	PHED

		water supply scheme							
WM/N/6	Urban Sewerage and Sanitation	-	S	1	20050.00	0	20050.00	0	PHED
Total					**456351.00**	**212787.00**	**243564.00**	**0**	

HEALTH MISSION

SECTORAL OVERVIEW

Climate change can be linked to both social and environmental health determinants like clean air, good and safe drinking water quality etc. It can create some unanticipated health problems in particular areas where those problems were non-existent in the recent past like for example increase in the rate of extreme weather events. Between 2030 and 2050, climate change is expected to cause approximately 250 000 additional deaths per year, from malnutrition, malaria, diarrhea and heat stress. Climate change results in increase in sensitivity to water borne diseases and shows seasonal variation. During rainy season diarrheal diseases are a common occurrence, also change in rainfall pattern can also affect freshwater supply. Water Scarcity affects 4 out of 10 people globally. Lack of access to freshwater can lead to various types of diseases like diarrhea which kills approximately 2.2 million people every year. Climate change has also led to the increase in flood frequency and intensity. Floods results in contamination of various freshwater supplies and the risk of water borne diseases are also increased. Flood water when contaminated can cause various diseases like cholera, leptospirosis or an outbreak of rotavirus may occur. Flood as well as droughts causes various waterborne diseases. The transmission season and the expansion of geographical distribution of various vector-borne diseases like dengue, malaria is enhanced by climate change because warmer temperature and humidity are favorable grounds for insect vector breeding. Change in weather patterns are like heat stress results in cardiovascular, respiratory, renal diseases etc. During extreme heat air pollution and aeroallergen levels are high which results in various respiratory diseases and also could be one of the main reasons for triggering asthma. Secondary pollutants like ground-level ozone which is a mixture of NOX and Volatile Organic Compounds causes various health problems like diminished lung function, emergency hospital visits for asthma and increased premature deaths.[60]

According to Health Department, Haryana there are 68 Civil Hospitals, 119 Community Health Centers, 532 Primary Health Centers, 2667 Sub Centers, 11 Polyclinics, 11 Urban Health Centers and 4 Dispensaries at present (2020-21). If we look at the most recent health data of Haryana provided by SRS Bulletin 2018 birth rate decreased from 20.3 to 20.1. The Infant Mortality Rate of Haryana reduced from 30 per 1000 live births in 2018 to 27 per 1000 live births in 2019 against the National Infant Mortality rate of 30.

National Programme on Climate Change and Human Health (NPCCHH) under National Health Mission (NHM) was approved in February 2019. The three key areas of focus for NPCCHH currently include air pollution, heat related illnesses and creation of green and climate resilient healthcare facilities. According to the report by NPCCHH on 17th December 2021 all the districts of Haryana initiated the program of IEC on air pollution, strengthening of district level organizational structure. The state action plan climate change and human health inclusive of air pollution and heat action plans are in progress.[61]

The key objectives of NPCCHH are:

- Development of Information Education Communication (IEC) materials on climate variability and change health impacts
- To advocate on various climate variability and change health impacts,
- Healthcare system to be strengthened in context of climate change,
- Capacity building at various level for vulnerability assessment in liaison with centre
- Monitoring and surveillance systems for climate sensitive diseases are to be developed and strengthened
- Early warning systems, alerts, mechanisms to be developed for responses at state, district and below district level

[60] https://www.nhp.gov.in/health-and-climate-change_pg

[61] https://ncdc.gov.in/WriteReadData/linkimages/NPCCHHPPT/HaryanaNPCCHH.pdf

- Adoption, integration and implementation of various environmentally friendly measures which are suggested in other missions on climate change.
- To strengthen healthcare services based on research on climate variables and impact on human health

According to the Central Bureau of Health Intelligence the vector borne diseases like Dengue, Malaria, Japanese Encephalitis showed a marked decrease from past years. There were no cases of Japanese encephalitis found in 2020 compared to one case which was found in 2017. The number of Dengue cases decreased from 4550 in 2017 to 1377 in 2020. The number of Malaria cases decreased from 5696 in 2017 to 111 in 2020[62].

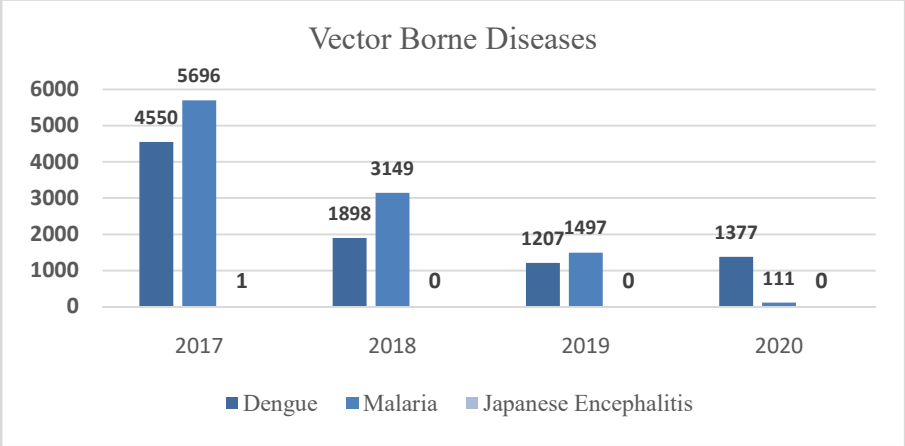


Figure 36: Number of Vector Borne Diseases in Haryana from 2017 to 2020

A comparative study of health indicators in Haryana for the year 2018 and 2019. The Birth Rate of Haryana is higher than the National average, but the overall birth rate of Haryana has decreased from 20.3 in 2018 to 20.1 in 2019. The Death rate of Haryana is lower than the national average and the death rate were same in both 2018 and 2019. The Natural growth rate is higher than the national average and the overall natural growth rate of Haryana has decreased from 14.4 in 2018 to 14.2 in 2019. The Infant Mortality Rate is lower than the national average and the overall Infant Mortality Rate of Haryana has decreased from 30 in 218 to 27 in 2019[63].

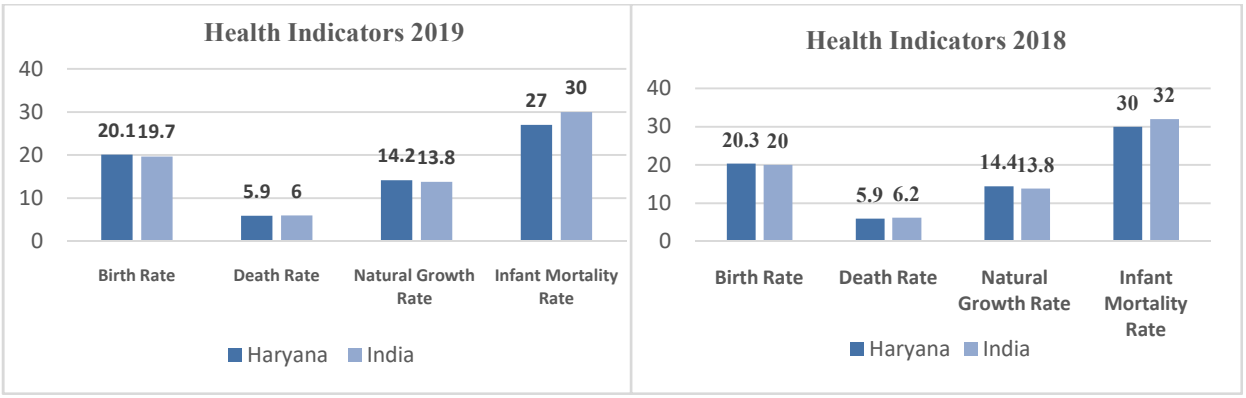


Figure 37: Comparative Health Indices India and Haryana 2018 and 2019

[62] https://www.cbhidghs.nic.in/showfile.php?lid=1160

[63] https://censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS%20Bulletin%202019.pdf

IMPACT OF CLIMATE CHANGE IN THE SECTOR

Due to the change in climate millions of people especially from vulnerable sections faces greater challenge in terms of extreme events, health effects, food security, livelihood security, migration, water security, cultural identity, and other related risks. Climate Change has varied health impacts on Human health both directly and indirectly.

- The **Direct impacts** of climate change include death, illness or injury from extreme frequent weather events like floods, droughts, storms, heatwaves, cold waves.
- The **Indirect impacts** of climate change include water borne and vector borne diseases increase incidence of non-communicable diseases low food production leading to malnutrition.

KEY ISSUES AND CHALLENGES

Table 52: Key Issues and Challenges of Health Sector

Area	Issues/Challenges
Technical/Infrastructural	• Shortfall of PHC's, CHC's, Sub-centres • Construction of new facilities
Institutional	• In house experts like surgeons, OB&GY, Physicians, Paediatricians, Radiographers in rural and urban areas (Absence or human power crisis in healthcare.) • IPHS norms to be followed.
Socio economic/Cultural	• Intervention to bring attitudinal changes at par with improvement of maternal health care service.

PROGRESS MAPPING (IN LAST 5 YEARS)

Physical Progress

The achievements under the strategies of the Health sector are highlighted below for Haryana State Action Plan on Climate Change (HSAPCC) 2014.

Table 53: Physical Stocktaking of Health Sector

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Scheme	Source (C/S/ CSS)	Physical Progress (2014-2019)	Expenditure (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
HEL/1. Addressing enhanced diseases burden With reference to Climate Change						
1.1 An assessment needs to be carried out to understand the extent of disease burden that may occur due to climate change and population projections	Yes	India State Level Disease Burden Initiative	C	The initiative was started in 2015 and its first report released in 2017. The initiative was based due to the fact that all the drivers of health loss and health status varies in different states, so a systematic knowledge of local health status and trends are required for each state. The study found out that infectious and associated diseases are reducing but still high in many states, large difference between states in changing disease profile, there is a rising burden of non-communicable diseases in all states.	3063.06	
1.2 Identification of vulnerable areas for each disease	Yes	National Programme on Climate change and Human health	C	IEC- BCC under NRHM Planning, Implementation and Monitoring		
1.5 IDSP to continue to monitor disease prevalence and outbreak	Yes	Integrated Disease Surveillance Program	C	In 2015 block level data entry started in phase manner all over the country, offline data entry at IDSP portal in phased manner.		
1.6 IDSP to include private, public as well as all village level health care centres for	Yes	Integrated disease surveillance	C	In 2015 block level data entry started in phase manner all over the country, offline data entry at IDSP portal in phased manner.		

surveillance		program				
1.7 Putting in place additional health care centres and medical personnel	Yes	State Health Mission Plan	C and S	95 urban PHCs established in all the districts of Haryana in the year 2016-17		
HEL/2. Reduction targets for Vector Borne diseases						
2.1 Reduction in Malaria incidence by at least 50%	Yes	Urban Malaria Scheme, NRHM, National Center for Vector borne diseases control, National Framework for malaria elimination, National Strategic plan for malaria intervention.	C	Malaria incidence decreased by 50 per cent,	182.28	
2.2 To bring API below 1 in all the NVBDCP Districts of the State	Yes	National Strategic Plan for Malaria elimination	C	All states/UTs have included malaria elimination in their broader health policies and planning frameworks		
2.3 Enhanced use of ITBNs (especially in High-Risk Areas) by 50% among Below Poverty Line (BPL) Population	Yes	The National Vector Borne Disease Control Programme	C	Advocacy workshops on blocks, districts, sub-districts, Social mobilization through Intersectoral Collaboration initiatives for example - creation of national taskforce for observance of AMM		
2.4 Enhanced use of larvivores fish in 75% villages of high-risk areas 50% villages of all areas	Yes	The National Vector Borne Disease Control	C	Schemes under Integrated Vector Control for promotion of larvivores fish.		

		Programme				
HEL/3. Control of TB						
3.1 Under RNTCP the aim is in terms of Universal Access is 100% case detection. At present in Haryana is 57% total TB Cases and 56% NSP cases in the year 2010	Yes	Nikshay Poshan Yojana, National Strategic Plan for Tuberculosis Control	C	Nutritional services provided from 2018, free services to be provided to TB patients in govt. hospitals including sputum examination and X-ray	0	0
3.2 Expansion of DOTS Plus services	Yes	Revised National Tuberculosis Programme	C	The dots plus services were extended to more districts in Haryana – Bhiwani, Jind, Jhajjar, Karnal, Panipat, Sonipat and Rohtak.		
3.3 Extend services in private hospitals with OPD patient intake of 100-150 per hospital	Yes	NIKSHAY – TB Notification incentive for Private Sector	C	An incentive of 1000 rupees given to private providers on notification till treatment outcomes through Direct Benefit Transfer (DBT)		
HEL/4. To control NCD						
4.1 To control NCDs main emphasis will be given on IEC activities to reach out target communities, continuous monitoring and independent evaluation of the program and research, Promotion of public private partnerships, Mainstreaming AYUSH – revitalizing local health traditions	Yes	Asha Incentives, Centre for Non-communicable disease Control Program, NHM, National AYUSH Mission	C	AYUSH institutions functioning in rural and remote areas. AYUSH wings set up at 21 district hospitals, 98 AYUSH IPD (Polyclinic) at CHCs, 109 AYUSH OPD at PHCs providing medical relief to the masses also participation in National Health Program in the Haryana State. Mainstreaming of AYUSH	652.10	
HEL/6. Enhanced provision of Primary, Secondary and Tertiary health care facilities and implementation of public health measures, including vector control, sanitation and clean drinking water supply						

6.1 Primary level: Awareness and sensitization to all sectors on Climate change 6.2 Secondary level: Early diagnosis and treatment i.e. Testing kits and drugs 6.3 Tertiary level: Testing kits and treatment with drugs	Yes	NMSKCC, SPLICE Climate Change Program	C and S	Hospital strengthening, National Mobile Medical Units, National Ambulance Service. Constitution of Climate Change Cell in State shall consider aiming at coordination among various departments (Department of Science and Technology, Department of Biotechnology, Council of Scientific and Industrial Research, Ministry of Earth Sciences, Ministry of Environment and Forests, Ministry of Water Resources)	4837.09	
HEL/7. Providing high resolution weather and climate data to study the regional pattern of diseases						
7.1 Through IDSP (Integrated Disease Surveillance Project) which is a project by GOI on Disease Surveillance and is engaged in Outbreak/ Epidemic forecasting and investigation/ management	Yes	IDSP, Haryana	C	In 2019 Total 5 outbreaks are detected under IDSP, 2 of Diarrhea from (1 Kaithal, 1 Yamunanagar), 1 Jaundice from Yamunanagar, 2 Cholera from (Panchkula) and managed in a timely manner, State and District level surveillance committees are set up for co-ordination with other departments, Complete disease data collected from government and private sector, Media verification cell is established in state.	0	
HEL/8. Development of a high-resolution health impact model at the state level						
8.1 Assistance of department. Of Science and Technology, Remote Sensing section will be taken for real-time high-resolution weather and climate data	Yes	Real Time Analysis of Products and Information Dissemination (RAPID), BHUVAN	C	Research, Studies and Analysis	40.00	-
HEL/9. GIS mapping of access routes to health facilities						
9.1 Both State Remote Sensing Health departments, under NVBDCP will be utilized for GIS mapping	Yes	NHM, Haryana	C and S	The Health, Finance and Governance project with National Health Mission, Haryana developed Haryana Health GIS (HHGIS) an interoperable GIS application that pulls together data from different health information	0	

				systems and brings it onto one interactive interface for easy access and analyzing data in visual format. HHGIS has linked 12 existing applications: Supportive Supervision (SS), Concurrent Evaluation (CE), Civil Registration System (CRS), Anemia Tracking Module (ATM), Maternal and Infant Death Reporting System (MIDRS), Rashtriya Bal Swasthya Karyakram (RBSK), Referral Transport (RT), District Health Information System-2 (DHIS-2), District Level Household and Facility Survey-3 (DLHS-3), District Level Household and Facility Survey-4 (DLHS-4), Home-Based Post Natal Care (HBPNC), and Medical Mobile Unit (MMU)		
HEL/10. Development of a disaster Risk reduction plan						
10.1 In association with the National Disaster Management Authority develop plans for risk reduction of diseases escalation and outbreaks due to climate change	Yes	NRHM	C	Development of Health Action Plans including blocks and villages	21.00	-
HEL/11. Climate change coordination committee						
11.1 A committee needs to be formulated with members from all disease control programmes who will ensure integration of climate change concerns in planning and implementing diseases control measures for existing and new and emerging diseases	Yes	Climate Change cell Haryana, NVBDCP, National Program on Climate Change and Human Health (NPCCHH)	C and S	Establishment of State level Health resource Centre (SHSC)	458.06	-
				Total	**9253.59**	**0**

GAP/BARRIER ANALYSIS

Table 54: Gap/Barrier Analysis of Health Sector

Type	Gaps
Technical/Infrastructural	• Man power shortage in Departments with climate change knowledge
Institutional	• Limited coordination of NHM and ICDS
Planning	• Limited planning on climate relevant actions for health sector

SECTOR PLANNING

National/State-Level Targets and Linkages

SITUATIONAL ANALYSIS- NDC PERSPECTIVE

NDC Commitments	Key State level Initiatives to comply with NDC Targets
NDC 1: To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation	• The state aims to extend public health care services with affordable prices, under **"health care for all"** with particular to poor and backward, providing adequate and qualitative preventive and curative health care • Effective steps for ensuring greater access to primary health care by providing medical institutions as close to the people as possible • Taking effective preventive health measures through 100% vaccination under various disease prevention programmes like **Mission- Indra Dhanush** • Ensure nutritional and food supplement to all segments and ages especially in TTAADC • The state will give highest priority for improving maternal and child health care to reduce the maternal and infant mortality rates • The State will ensure effective coverage of affordable quality health care through allopathic as well as homeopathic, ayurvedic system of medicine etc. of **AYUSH programme**. • Training programmes for Medical officers and health workers related to Climate Change and Health

SPECIFIC TARGETS UNDER SDG FOR THE SECTOR

SDG Goals	Key State level Initiative to comply with SDG Goals
SDG 3: Ensure healthy lives and promote wellbeing for all at all ages	• National Health Mission • Integrated Disease Surveillance Program • Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (PM-JAY) • Pradhan Mantri Bharatiya Janaushudhi Pariyojana • Pradhan Mantri Suraksha Bima Yojana • Chiranjeevi Yojana • Janani Shishu Suraksha Karyakaram (JSSK) • Kasturba Poshan Sahay Yojana (KPSY) • Rashtriya Kishor Swasthya Karyakaram (RKSK) • NIKSHAY- DOT provider Honorarium • ASHA incentives
SDG 6: Ensure the availability and sustainable management of water and	• Swachh Bharat Abhiyan • Jal Jeevan Mission

sanitation for all	
SDG 13: Take urgent action to combat climate change and its impacts	• National Programme on Climate change and Human Health • TB notification incentives for private sector • TB patient incentives for nutritional support • National Rural Health Mission • National Vector Borne Disease Control Programme • National Strategic Plan for Malaria elimination • Urban Malaria Scheme • National Strategic plan for malaria intervention • India State Level Disease Burden Initiative

Description of Strategies/Activities

The description of activities below is based of mitigation and adaptation options. The activities that are named "**HEL/N**" are transformative activities and other set of activities are named as "**HEL**", which are incremental activities. Incremental activities are those which are old activities proposed under earlier SAPCC (2014-17) and will be continued for upcoming years as per agreement of the nodal departments and transformative activities are those which are newly proposed by the nodal departments for the upcoming years under **Health Sector**.

HEL/N/1- Prevention and control of diseases
Description- The action is proposed by the Department of Health, Haryana to control and prevent spread of diseases in the State. The vector-borne and zoonotic diseases are a direct impact of climate change and to mitigate the same, the Department has taken initiative to curb the disease spread.

HEL/N/2- Public Health Laboratories
Description- Public Health laboratories are proposed by theDepartment of Health, Haryana. The action is proposed to strengthen the public health care system in both urban and rural set up. The laboratories will help in early identification of diseases and their treatment.

HEL/N/3- Public Health Education
Description- Education is an important tool for adaptation and mitigation of climate change. Strengthening of public health education is proposed by the Department of Health, Haryana. Education on climate change impacts on health and mechanisms to cope with the same, awareness of common people on diseases burden of the State will be included.

HEL/N/4- Health Statistics and Evaluation
Description- Health Statistics and Evaluation is proposed by the Department of Health, Haryana. The statistics of infected people, spread of disease and disease burden in the State is an integral part to combat the disease spread and its prevention.

HEL/N/5- Bio medical waste management
Description- Bio medical is the waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities. The proper management of biomedical waste is essential as ill treatment can cause spread of diseases. Bio medical waste management is proposed by theDepartment of Health, Haryana.

HEL/N/6- Strengthening of urban hospitals and dispensaries for research and training
Description- Research on health care and training of health care personnel are an integral part of health care system and its strengthening. The activity is proposed by the Department of Health, Haryana.

HEL/N/7- Urban Health Mission

Description- Urban Health Mission is proposed by the Department of Health, Haryana to provide a comprehensive health service to the people of the state living in urban areas. The focus of the mission is to carter to the urban poor population who have lesser exposure to better medical facilities available in the state. Under the activity numerous health centers are proposed in the State.

HEL/N/8- Haryana State Health Resource

Description- Haryana State Health resource is the body for strategic planning and development of Health & Family Welfare in the State. The strengthening of the Health Resource body is proposed by the Department of Health, Haryana.

The National Programme on Climate Change and Human Health (NPCCHH) is aimed towards reduced morbidity, mortality, injuries, and health vulnerability amongst the population in the country due to climate variability and extreme weathers. The NPCCHH has recommended action points.

Action Point	Recommendations
Prevention of control of diseases	• Awareness and Capacity building to the health care workers, vulnerable population on climate sensitive health issues like air pollution, heat etc.
Public Health Laboratories	
Public Health Education	
Health Statistics and Evaluation	• Early Warning and Alert Response System- EWARS for predicting outbreaks can be implemented
Bio medical waste management	
Strengthening of urban hospitals and dispensaries for research and training	• Implementation of climate resilient and green measures in health care facilities such as replacement of existing lighting with LED, solar panel installation, energy auditing, rainwater harvest system as per IPHS standards. Adopting climate resilient measures such as retrofitting of existing healthcare facilities in disaster (flood, drought, heat) prone areas.
Urban Health Mission	
Haryana State Health Resource	

KEY PRIORITIES SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Table 55: Synopsis of Planned Activities for Health Sector

Code	Activities/Interventions	Scheme	Source	Duration (in years)	Proposed budget during (2021-30) in INR Lakh	Amount likely from existing Central scheme (Amount in INR Lakh)	Amount likely from State Budget (Amount in INR Lakh)	Amount likely from External Aid (Amount in INR Lakh)	Implementing Dept.
Proposal of New activities to be added in SAPCC-2									
HEL/N/1	Prevention and control of diseases	State Plan	S	1	2757.80	0	2757.80	0	DoH
HEL/N/2	Public Health Laboratories	State Plan	S	1	64.32	0	64.32	0	DoH
HEL/N/3	Public Health Education	State Plan	S	1	18.44	0	18.44	0	DoH
HEL/N/4	Health Statistics and Evaluation	State Plan	S	1	38.50	0	38.50	0	DoH
HEL/N/5	Bio medical waste management	State Plan	S	1	0	0	0	0	DoH
HEL/N/6	Strengthening of urban hospitals and dispensaries for research and training	NRHM	C	1	602.50	602.50	0	0	DoH
HEL/N/7	Urban Health Mission	UHM	C	1	2751.09	2751.09		0	DoH
HEL/N/8	Haryana State Health Resource	State Plan	S	1	2886.00	0	2886.00	0	DoH
				Total	**9118.65**	**3353.59**	**5765.06**	**0**	

STRATEGIC KNOWLEDGE MISSION

SECTORAL OVERVIEW

The Department of Environment and Climate Change established the Strategic Knowledge Mission Centre under the Haryana Climate Change Cell to address the climate change induced challenges focusing on the climate-sensitive and vulnerable sectors of the State. The Cell acts as a functional knowledge center, aligning to the National Mission on Strategic Mission for Climate Change (NMSKCC). Haryana being an agriculture intensive State, the major focus of knowledge enhancement will be directed towards agriculture and water issues, however other issues are also addressed to facilitate the development of a climate proofed society.

Creation of Climate Change Information Bank, Strengthening of Knowledge Network, Enhancing the Knowledge Access and Information sharing, documentation, capacity building of various stakeholders, Research and Development initiatives with Research institutes are few strategic actions taken up the body. Integration of climate change concerns in policies and programmes, monitoring and evaluation of implementation of Climate change programmes are articulated by the Department for a holistic approach and penetration at various governance levels.

The Climate Change Cell also aims at enhancing the technical expertise of the concerned departments to handle the climate change impact assessment, adaptation capability, monitoring, awareness creation and financial management. Establishing an interactive knowledge portal is a step towards accomplishment of the mainstreaming climate change in development programmes of the State.

Haryana State Council for Science Innovation & Technology (HSCSIT) is an advisory body to State Government on policies and measures for promoting Science and Technology in the State and implementation of the same. HSCSIT has carried out initiatives and activities in the State, Aryabhatta Vigyan Kendra, Setting up of Science City for NCR in Haryana, Honoring Haryana Vigyan Ratna and Yuva Ratna awards, Research and Development projects and innovation in State, Haryana Science Talent Search Scheme, Promotion of Science Education (POSE) Scholarship Scheme, HSCST Fellowship Scheme, Setting up of Science Clubs and Kalpana Chawla Memorial Planetarium (KCMP), Kurukshetra.

Lala Lajpat Rai University of Veterinary & Animal Sciences (LUVAS), Haryana is conducting research on methane production reduction from animal husbandry sector. The project objectives involve In-vitro analysis of plant extract/or candidate molecule in solo or in combination on rumen fermentation parameters and bacterial population, Effect of supplementation of best selected plant extract on rumen fermentation and bacterial population pattern in growing buffalo calves and on milk production and milk composition parameters in dairy animals. Methane is one of the major contributors of global warming. It is produced by farm animals due to their fermentation pattern. In this project, some herbal extracts for less methane production are being tried that can modulate the rumen fermentation pattern. This project is funded by HSCSIT Haryana.

Ashoka University has established the Centre for Climate Change and Sustainability (3CS) in 2019 to conduct research and advocacy on issues of climate change.

The J.C Bose University of Science and Technology, Faridabad has also contributed and conducted activities on climate change adaptation and mitigation. Plantation, awareness activities, FDPs for capacity building, distribution of saplings, implementation of sustainable solid waste management in the university premise with preparation of compost from bio-degradable waste and implementation of rainwater harvesting system in the University for groundwater recharge are taken up. Rooftop solar power generation plant with 240 kW capacity, deployment of EV, installation of LED lights, composting plant, enhancement of coverage of for rooftop solar power generation plants, development of solar panel enabled parking are the initiatives taken to contribute to climate change mitigation. Research activities on energy utilization in urban residential sector, application of solar energy for hybrid water purification and steam generation for COVID Centre and feasibility of ground coupled heat exchanges for space-conditioning in India are planned by the University in coming years.

Research and Development Cell, Department of Biotechnology, MMEC has conducted many activities related to Climate Change waste management, conservation of electricity, water conservation, Biodiversity management and novel strategies to avoid pollution.
GD Goenka University is also an eminent organization contributing towards climate change research and capacity building programs on environment protection and climate change mitigation and adaptation in the region. The university has installed their own solar power plant for the use of conventional energy sources to reduce carbon footprint.

LiFE Mission and Strategic Knowledge Development-
To translate the vision of LiFE into measurable impact, Mission LiFE is designed with an objective to mobilise at least one billion Indians and other global citizens to take individual and collective action for protecting and conserving the environment in the period 2022-23 to 2027-28. Within India, at least 80% of all villages and urban local bodies are aimed to become environment-friendly by 2028.
In the period 2022-23 to 2027-28. the Environment and Climate Change Department Haryana is actively involved in implementation of activities for Global Mission LiFE.
Environment and Climate Change Department Haryana has successfully initiated a scheme Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP) Programme Centre Haryana. These centresare working in following seven themes for Mission LiFE:

- Energy Saved
- Water Saved
- Single Use Plastic Reduced
- Sustainable Food Systems Adopted
- Waste Reduced (Swachhta Actions)
- Healthy Lifestyles Adopted
- E-Waste reduced

EIACP Haryana is conducting many awareness programme and outreached activates among all the Government Departments, all educational/technical/research institutions, Boards and Municipal Corporations, within the State.

KEY ISSUES AND CHALLENGES

Table 56: Key Issues and Challenges of Strategic Knowledge Sector

Area	Issues/Challenges
Policy & Regulatory	• Hilly areas not covered under the National Mission on Sustaining Himalayan Ecosystem
Socio economic/Cultural	• Migration of landless labour • Increase in weed flora/wild species (Lantana camara)
Environmental	• All the blocks fall under over-exploited category which leads to constant decline of water level over past years in whole district except some of the area • The wells are lined and dried

PROGRESS MAPPING (IN LAST 5 YEARS)

Physical Progress

The achievements under the strategies of the Strategic Knowledge sector are highlighted below for Haryana State Action Plan on Climate Change (HSAPCC) 2014

Table 57: Physical Stocktaking of Strategic Knowledge Sector

Strategies/ Actions (SAPCC-1)	Continuation of Activity (Yes/No)	Scheme	Source	Physical Progress (2014-2019)	Expenditure (2014-19) as per SAPCC-1 (in INR Lakhs)	Financial Allocation (2014-19) as per SAPCC-1 (in INR Lakhs)
SKM/1. Research and Development						
1.1 Identify, study and disseminate latest EE technologies required to increase agricultural production	Yes	-	S	• Study of plant/candidate feed supplement to reduce methane production without affecting productivity in buffaloes by Haryana State Council for Science Innovation & Technology (HSCSIT) • SPLICE Climate change programme • Natural Resources Data Management System by Energy & Power Department and Science & Technology • Micro-propagation of high-quality Planting material through Tissue Culture Technology • Ghaggar & Markanda Action Plan	899.64	0
1.2 Identify, study and disseminate latest EE technologies in commercial and industrial sectors	Yes	-	S	• Development of process for bioremediation Chromium from industrial effluents using Microbial Consortium funded by Haryana State Council for Science and Technology • Climate change adaptation by promoting solar charging stations in the State of Haryana with reference to lighting and electric vehicles by GD Goenka University • Hazardous waste/Solid waste	133.30	0

				Management / Municipal effluents Management • Promotion of CETP including Sewerage in old industrial Areas of various towns • Sewerage Treatment Plant in Haryana State • Common Bio-Medical Waste Management and Treatment Facility • Recycling Facility for Mercury Contaminants from CFL/FTLS		
1.3 Research to study adverse impacts of climate change on various sectors and locations in Haryana state	Yes	-	S	• Long-term study on Impact of climate change in small mammal communities and risks of spill over infections by Ashoka University • Cost effective air quality monitoring with decision support by Ashoka University • Sustainability initiatives at Ashoka University • Impact of climate change on Health by Ashoka University • Solar installation of 250 kW capacity has been installed in the University premises of OM Sterling Global University. 100 kW installed in School of Pharmaceutical Sciences and School of Health Sciences, 50 kW in TCS Building, 50 kW in Admin building and 50 kW in School of Technology and School of Commerce and Management • Groundwater recharge system constructed for reduction of runoff by OM Sterling Global University • 5000-6000 plants (herbs, shrubs and large trees) planted in University campus and periphery by OM Sterling Global University	3184.44	0

				• Common Transport Facility to help control GHG emission by OM Sterling Global University • Mapping of Dry wells in Karnal District Using High Resolution imagery and GIS Techniques by HARSAC • Enhancing the livelihood of remote villagers in Shivalik range, by building their adaptive capacity to cope up with the impacts of climate change in Morni block of Panchkula district • Workshop on 'National Level Vulnerability Mapping' in coordination with Indian Institute of Science (IISc.), IIT Mandi and IIT Guwahati, 2020 • Capacity Building Workshop on Vulnerability Assessment in Haryana State' at Chandigarh for State Government Officials and Stakeholders towards capacity building of the state for vulnerability assessment • Awareness Programme on World Wetland Day in various schools in Mahendragarh, Fatehabad, Yamuna Nagar, Bhiwani, Sirsa and Hisar • Assisting the State government in implementation and monitoring of State Action plan on Climate change (SAPCC) and projects approved under MOEF, GOI • Assisting in preparation of State specific Strategies for Mitigation, Adaptation, Loss and Damage related to climate change • Organizing of meeting, Workshop,		

				Training, programme, Information Dissemination and preparation of scientific and technical reports on climate change • Training needs assessment and Training Partners • Environmental Training Education Awareness Programme • Establishment of Eco Club • Setting up of Environment Training Institute at Gurgaon • State Environment Impact Assessment Authority • Science and Technology Programme		
1.4 Identify, study and disseminate latest EE technologies in commercial and industrial sectors	Yes	DST	C	• Energy efficiency in Green buildings using Geothermal pile for cooling by JC Bose University of Science and Technology, Faridabad with funding from DST, GoI • Investigation of load transfer mechanism of geothermal energy pile groups in sand JC Bose University of Science and Technology, Faridabad with funding from CSIR-HRDG, GoI • Training and awareness programmes conducted by JC Bose University of Science and Technology, Faridabad	46.98	
				Total	**4264.36**	**0**

GAP/BARRIER ANALYSIS

Table 58: Gap/Barrier Analysis of Strategic Knowledge Sector

Type	Gaps
Financial	• Absence of financial allocation for proposed strategies of SAPCC-1 • Programme level/ activity wise financial allocation
Policy & Regulatory	• Absence of programme level information
Planning	• Activities were not planned with inter departmental convergence

SECTOR PLANNING

National/State-Level Targets and Linkages

SITUATIONAL ANALYSIS- NDC PERSPECTIVE

NDC Commitments	Key State level Initiatives to comply with NDC Targets
NDC 7: To mobilize domestic and new & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap	• Preparation of State Action Plan on Climate Change (SAPCC-1) • Revision of State Action Plan on Climate Change (SAPCC-2)
NDC 8: To build capacities, create the domestic framework and international architecture for quick diffusion of cutting-edge climate technology in India and for joint collaborative R&D for such future technologies	• Strengthening of Haryana Climate Change Cell • Green Skill Development Programme (GSDP)

SPECIFIC TARGETS UNDER SDG FOR THE SECTOR

SDG Goals	Key State level Initiative to comply with SDG Goals
SDG 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all	• Environmental Training Education and Awareness Programme
SDG 13: Take urgent action to combat climate change and its impact	• National Mission on Sustaining Himalayan Ecosystem (NMSHE) • State Action Plan on Climate Change
SDG 15: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	• Eco Club programme
SDG 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development	• National Mission on Strategic Knowledge on Climate Change (NMSKCC)

Description of Strategies/Activities

The description of activities below is based of mitigation and adaptation options. The activities that are named "**SK/N**" are transformative activities and other set of activities are named as "**SK**", which are incremental activities. Incremental activities are those which are old activities proposed under earlier SAPCC (2014-19) and will be continued for upcoming years as per agreement of the nodal departments

and transformative activities are those which are newly proposed by the nodal departments for the upcoming years under **Strategic Knowledge Mission** sector.

SK/N/1- Research and training in secondary education
Description- Research and training in secondary education is proposed by the Department of School Education, Haryana. It will involve research on climate change at secondary school level, to carter the young population in to the research area.

SK/N/2- Setting up of State Council of Research and Training
Description- Setting up of State Council of Research and Training, Gurugram is proposed by the Department of School Education, Haryana.

SK/N/3- Science and Technology Programme
Description- Science and Technology Programme is proposed by the Department of School Education, Haryana. The programme will involve the young minds to focus and grow interest in climate change research and gain knowledge on technological advancements.

SK/N/4- Environmental Research and Ecological Regeneration
Description- Environmental Research and Ecological Regeneration is proposed by the Environment and Climate Change Department, Haryana. The environmental issues are at rise in the State and worldwide and research on environmental parameters and quality conservation is main objective of the Department. Ecology is impacted highly due to climate change and initiatives for ecological regeneration is the focus of the proposed activity.

SK/N/5- Setting up of Environment Training Institute
Description- Setting up of Environment Training Institute at Gurugram is proposed by the Environment and Climate Change Department, Haryana. Environmental training facilities will assist researchers and students to train on issues related to climate change and dissipate it further.

SK/N/6- Effects of Climate Change on dairy animals
Description- Effect of Climate change on dairy animals is proposed by LUVAS, Haryana. Attempts will also be made to use different strategies that can minimize the methane production in dairy animals. The project will be submitted to the Science and Technology department for consideration and funding.

SK/N/7- Aryabhatta Vigyan Kendra
Description- A Science Centre,Aryabhatta Vigyan Kendra is planned by the Haryana State Council for Science Innovation and Technology (HSCSIT).

SK/N/8- Setting up of Science City for NCR in Haryana
Description- The Haryana State Council for Science Innovation and Technology (HSCSIT) has planned to set up Science City, approached by the Ministry of Culture, Govt. of India. The Science City is proposed for NCR area in Haryana with financial assistance from Govt. of India.

SK/N/9- Long-term study on Impact of climate change in small mammal communities
Description- The project is proposed by 3CS, Ashok University and aims to use a long-term integrated approach combining both molecular and ecological methods across a habitat gradient, to understand the

potential of zoonotic spill overs. The project will also establish a monitoring regime for potential zoonotic diseases and generate critical information on ecological and evolutionary consequences of climate change on biodiversity. The ongoing research has proposed for grant requirement for 2 years.

SK/N/10- Air quality monitoring with decision support

Description- The project is by 3CS, Ashok University and aims to create a cost-effective and scalable one-stop system to monitor and assess air quality. The system will provide users real-time local information, helping them make informed decisions regarding their exposure and will also allow public to make their concerns known to decision makers. The ongoing research has proposed for grant requirement for 2 years.

SK/N/11- Impact of climate change on Health

Description- The research project is proposed by the 3CS, Ashok University in collaboration with the Zoonotic and Vector- Borne Diseases (ZVBD) Research and Training Centre, a transdisciplinary research Centre based in Shillong. The project will conduct modelling studies to identify the burden and risk of zoonotic diseases and their relation to land use, climatic, meteorological and other determinants.

SK/N/12- Research Innovation

Description- Research Innovation is proposed by JC Bose University of Science and Technology. The research will be based on development of carbon management plans for the University (carbon reduction targets, carbon foot printing, policy making to reduce carbon footprints) and identification of key sectors involved with generation of green house gases and development of sustainable solutions to reduce the emission (flux and mitigation of methane emission using Bio tarp system at landfill sites, sulfur and nitrogen co-doped hierarchical porous carbons from agricultural waste carbon sequestration and capturing of CO2 from industrial emission through algal biomass.

SK/N/13- Research Actions by HSCST

Description- The research activities are proposed by Haryana State Council for Science and Technology. It would involve vermi-composting for improvement of socio-economic status of farmers, farmer sensitization, development of salt tolerance in mungbean (Vigna radiata L. wilczek) for sustainable agriculture production, Genetic improvement of Eucalyptus Feedstock quality for ethanol production , Processing of field Crop Biomasss for sustainable Environment, Production and characterization of microbial Naringinase for potent application in debittering of Citrus fruit juice, To develop a process for Co-degradation of chlorpyrifos and Phorate from contaminated agriculture sites of Haryana using microbial consortium, Simulation studies on bio-removal of Cr and Ni from electroplating Industry effluents of Haryana using Metagenomics approach, Developing a facile and cost-effective method for testing metal induced toxicity using yeast model for environmental and industrial benefits and Parallel photocatalytic approach for (I) the treatment of waste water and (II) the splitting of water for the production of hydrogen a potential future fuel.

Action Plan for LiFE Mission

EIACP Haryana has prepared their action plan for 2023-24 on Mission LiFE.

Sl. No.	Component	Activities	Tentative Date/ Week/ Month	Target Audience/Beneficiaries	Measurable Indicator/Impact
1.	AWARENESS	Webinars	Every month	Youth- School and college students	Number of participants benefited
		Celebration of Great Days	Environment day, wetland day, Biodiversity Day		
		Conducting competitions (Swachh Bharat)	Aug 15, Oct 2, Jan 26		

		Public awareness though social media, newspaper etc.	Every Month		
2.	CONSERVATION	Workshops, Hands on training programmes, LiFE Ambassadors	Twice a year	Students, Researchers Artists, Nature enthusiasts, Teachers/ Farmers/ NGOs/ Stakeholders/ General public- Community groups and other Citizens	• Sensitization of Target audience towards Mission LiFE, • Establishment of LiFE ambassadors Network • Development of P3 Community through LiFE ambassadors
		Programme- Green Kitchen	Twice a year		
		Regional Workshop on Mission LiFE	Once a year		
		Development of knowledge products: e-posters, newsletter	quarterly		
3.	SCIENTIFIC INNOVATION	Hackathon- Innovative design (to reducewaste, environment friendly alternative products,	Once a year	Students, researchers and Public	• Sensitization of Target audience towards Mission LiFE, • Establishment of LiFE ambassadors Network
		Technical presentations – 1 day workshop on the design of conservation technologies (biogas, organic manure, alternative household products	Quarterly		
		Development of mobile apps	Quarterly		
		Videos	Quarterly		
4.	CREATIVITY	Online/Offline competitions • Poster making competitions • Drawing/Painting competitions • Essay and Story writing competitions • Quiz competitions • Photography/Short film/ Documentary Competitions • Creating programmes for dissemination through electronic media involving brand ambassadors	Quarterly	Students, Researchers Artists, Nature enthusiasts, Teachers/ Farmers/ NGOs/ Stakeholders/ General public- Community groups and other Citizens	• Sensitization of Target audience towards Mission LiFE, • Establishment of LiFE ambassadors Network • Development of P3 Community through LiFE ambassadors

KEY PRIORITIES SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Table 59: Synopsis of Planned Activities for Strategic Knowledge Sector

Code	Activities/Interventions	Scheme	Source	Duration (in years)	Proposed budget during (2021-30) in INR Lakh	Amount likely from existing Central scheme (Amount in INR Lakh)	Amount likely from State Budget (Amount in INR Lakh)	Amount likely from External Aid (Amount in INR Lakh)	Implementing Dept.
Proposal of New activities to be added in SAPCC-2									
SK/N/1	Research and training in secondary education		S	1	127.40	0	127.40	0	DSE
SK/N/2	Setting up of State Council of Research and Training		S	1	1234.00	0	1234.00	0	DSE
SK/N/3	Science and Technology Programme		S	1	568.73	0	568.73	0	DSE
SK/N/4	Environmental Research and Ecological Regeneration		S	1	5.00	0	5.00	0	E&CC Dept.
SK/N/5	Setting up of Environment Training Institute		S	1	125.00	0	125.00	0	E&CC Dept.
SK/N/6	Effects of Climate Change on dairy animals	DST	C	1	0	0	0	0	DST (for approval)
SK/N/7	Aryabhatta Vigyan Kendra	MoC	C	1	8500.00	8500.00	0	0	HSCSIT
SK/N/8	Setting up of Science City	MoC	CSS	1	19100.00	19100.00	0	0	HSCSIT
SK/N/9	Impact of climate change in small mammal communities	3CS	Grant	2	85.13	85.13	0	0	AU
SK/N/10	Air quality monitoring with decision support	3CS	Grant	2	11.35	11.35	0	0	AU
SK/N/11	Impact of climate change on Health	3CS	Grant	2	14.00	14.00	0	0	AU
SK/N/12	Research Innovation	Dept. fund	Grant	2	50.00	50.00	0	0	JCBUST
SK/N/13	Research action by HSCST	Dept. fund	Grant	2	2500.00	2500.00	0	0	HSCST
				Total	**32320.61**	**30260.48**	**2060.13**	**0**	

CHAPTER 7: FINANCING SAPCC

7.1 FINANCING STRATEGY

India is doing its best to meet the promised adaptation and mitigation actions as per Paris agreement, finance remains a critical issue. It is estimated that India's climate adaptation gap by 2030 will be around 1 trillion USD . Therefore, creative financing strategy by the states is the need of the hour. It has become apparent since the last SAPCC, that additional finance is hard to come by. Therefore, high impact areas must be identified from the state's ongoing sectoral activities for mainstreaming and tagged. In addition, more and more private sector involvement should be pooled in for high priority activities in a systematic way including public-private partnership mechanism. In addition there will be additional climate finance from international climate funds (Green Climate Fund, Global Environment Facility, Adaptation Fund) Bilateral Cooperation (additional financial and technical support for climate change outcomes like SDC, GiZ, JICA, DFID), Multilateral facility (loan and grant projects through WB, ADB, UNDP, etc.), National Climate Fund (National Adaptation Fund for Climate Change, Small Grants programme, mission-specific allocation, regular schematic allocation having climate relevance).

7.2 APPROACH

The approach taken for financing mechanism is explained in the table below. Various types of financing windows are listed down and source of fund against each of them is figured. Many kinds of instruments can be used to access the funds. The key sectors in which the funds can be used are also mentioned in the table along with the modalities and challenges faced in the process.

Table 60: Available climate finance options

Financing Window	Source of Fund	Instrument	Key sectors	Access modalities and challenges
International climate fund (budget additional)	Green Climate Fund	Loan and grant, guarantee, equity	Food and water, health, Livelihood, infrastructure and built environment, ecosystem (for both adaptation and mitigation	Micro up to 10 million USD Small (10-50) Medium (50-250) Large (>250)
				National Designated Authority (MoEFCC) as focal point
				Through (Direct Access Entity and multilateral access entities) approved as NIE or MIE by NDA (MoEFCC)
				1-2 years, elaborate process
	Adaptation Fund	Grant, But Loan as co-finance (by NIE or MIE) maximum up to 50% of the project cost	Natural resource systems (addressing climate risks), eco-system, hazard	Regular project size >1 million USD Small <1 million USD Through NDA through NIE and MIE 8-12 months Maximum cap for country 10 mn USD (India exhausted)

National Fund	GEF	Grant	Based on the sectors under the star allocation both for adaptation and mitigation. 1) Food systems, Land Use and Restoration; 2) Sustainable Cities; and 3) Sustainable Forest Management (under GEF 7 series)	Full sized project > 2 million USD Medium size (up to 2million USD) Enabling activity (strategy development under a convention) Minimum 12 months
	NAFCC	Grant, Co-finance, convergence fund from state	Agriculture, horticulture, agro-forestry, environment, allied activities, water, forestry, urban, coastal and low-lying system, disaster management, human health, marine system, tourism, habitat sector and other rural livelihood sectors to address climate change related issues. Climate scenarios, capacity building, consultation, monitoring	Though no upper limit specified typical maximum for a state is about Rs 25 crore. Through NIE Typically, 6 months for preparation and sanction Maximum preparation cost is Rs 10 lakh, NIE fee capped at 3% of the project cost
Bilateral and Multilateral projects/programmes	Programs/Projects linked to clear climate outcomes	Loan, Grant	Sectoral (both for adaptation and mitigation)	On state partnership basis and through the concurrence of national government
INGOs	Programs/Projects linked to clear climate outcomes	Grant	Sectoral (both for adaptation and mitigation)	On state partnership basis and through the concurrence of national government
CSR	Programs/Projects linked to clear climate outcomes	Grant	Sectoral (both for adaptation and mitigation)	As per statutory requirement under Company Act for the eligible companies, private foundations with voluntary pledge with programmatic convergence
Budgetary (National and State)	Regular schematic (may not be additional)	Budget (grant in aid) state, central and centrally sponsored schemes	Sectoral (both for adaptation and mitigation)	Some of the schemes are listed in the report, not all required/proposed strategies/priorities are covered under the scheme guideline. This needs to be classified as climate relevant and possible have a climate tag for reporting. Currently,

				there is no standard approach available
Budgetary (Mission specific)	As per mission guideline	Both demands driven and also as per target	Sectoral (both for adaptation and mitigation	Some of these have been specified in the report

There are four broad steps to be taken for the financing in climate change domain. Typical process to be followed in the climate finance area is explained stepwise as follows:

Table 61: Generic processes for developing climate finance proposals

Step 1a: Identify high impact/high priority activity/strategy having linkage to SDG/NDC	**Identify relevant schemes in the state budget and put in the right demand (some examples have been given in the report). The expenditures can be treated a climate relevant expenditure based on how many components of the project activities have been covered.**
Step 1b: identify activities linked to national missions	Draw down resources form relevant mission based on the demand/target
Step 2: There is no correspondence or availability of funds from state budget/national missions	Map to CSP, external aided projects or sources under bi-lateral or multilateral cooperation. Prepare proposal under the formats/processes given by the agency. The lead department/agency can initiate the process.
	Look for grants from CSR and INGO sources
Step 3: There is correspondence or availability of funds from special climate funds available nationally	• For NAFCC, prepare project concept note, do a preliminary go-no go check with NIE • If agreed go ahead with the detailed project report and submit through NIE to National Designated Authority • Executing agency signs the grant agreement and project cycle operation starts. • Baseline and end line assessment conducted by external agencies track outcomes as per the project result framework
Step 4: There is correspondence or availability of funds from special climate funds available internationally	• Assess the concept based on the result/impact areas and investment criteria (for GCF) 1) Impact potential 2) Paradigm shift potential 3) Sustainable development potential 4) Needs of the recipient 5) Country/state ownership 6) Efficiency and effectiveness • Submit proposal to NDA through NIE or MIE as per the format. Once approved by relevant board sign subsidiary agreement with NIE/MIE • Executing agency starts the project cycle operation.

7.3 SYNTHESIS

There has been thorough analysis of climate strategies in the context of NDC-SDG alignment through several deliberations. There are 73 actions proposed in the SAPCC V2 (2021-30), out of which 37 are strongly linked to adaptation, 28 linked to mitigation and 8 strategies have linkages to both adaptation and mitigation. The total proposed budget for these activities in 10 years (2021-30) amounts to Rs 39,371.80 crore. The distribution of these climate strategies has been presented in the figure below:

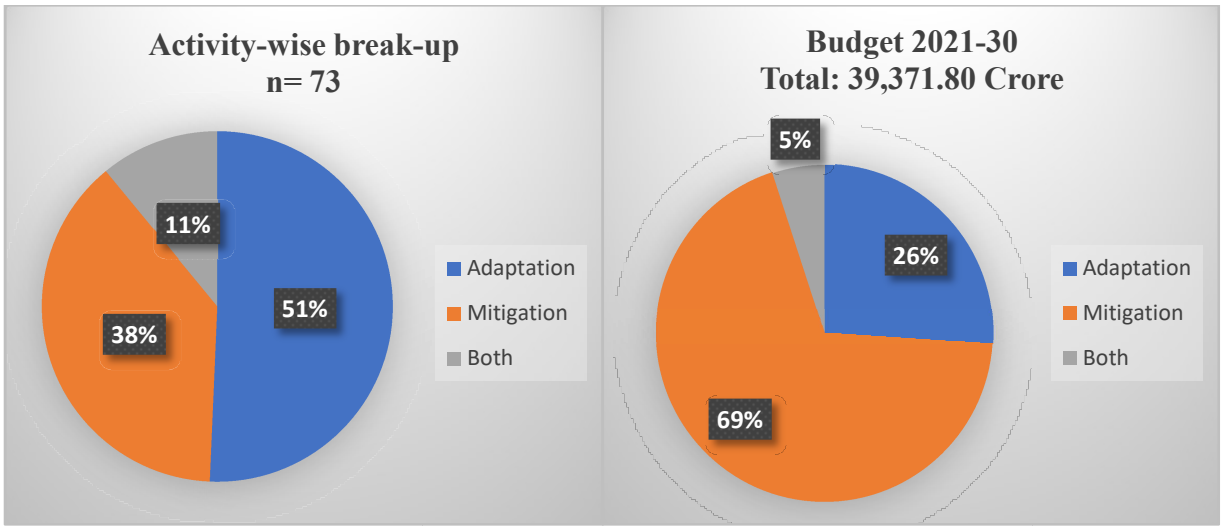


Figure 38: Overall distribution of climate strategy

Out of all the activities proposed by the various sectors and respective Departments, 51% of the activities are linked to adaptation, 38 % are linked to mitigation and 11% are linked to both. The Sustainable Habitat, Sustaining Himalayan Ecosystem and Energy Mission sector, have a strong linkage with NDC targets and focusses entirely on mitigation, with the forest sector activities majorly focused on mitigation, along with adaptation-based strategies. Similarly, Agriculture and allied sector, water sector, health and strategic knowledge mission has strong adaptation focused activities.

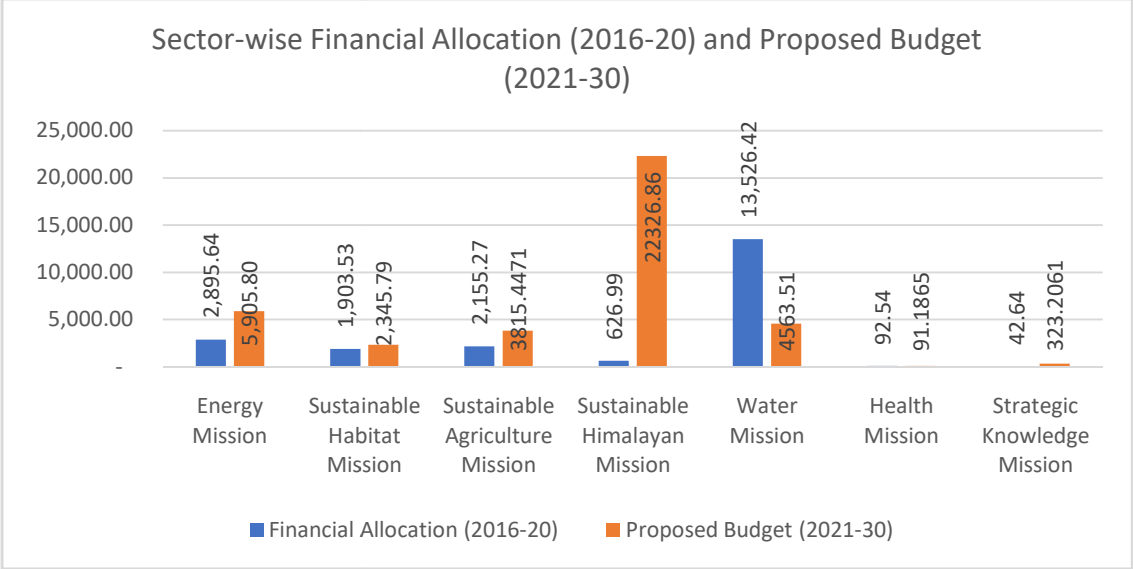


Figure 39: Sector-wise Financial Allocation (2016-20) and Proposed Budget (2021-30)

The sector wise Financial proposal amounts to 39,371.80 Crore. Sustainable Himalayan Mission has proposed major activities on mitigation with adaptation co-benefits, with 57% of the total budget. The sector is followed by 15% of the budget to Energy sector and Water sector and Agriculture and allied sectors comprising of 11% and 10% of the budget respectively.

The following figures give the distribution of proposed climate investment for next 10 years.

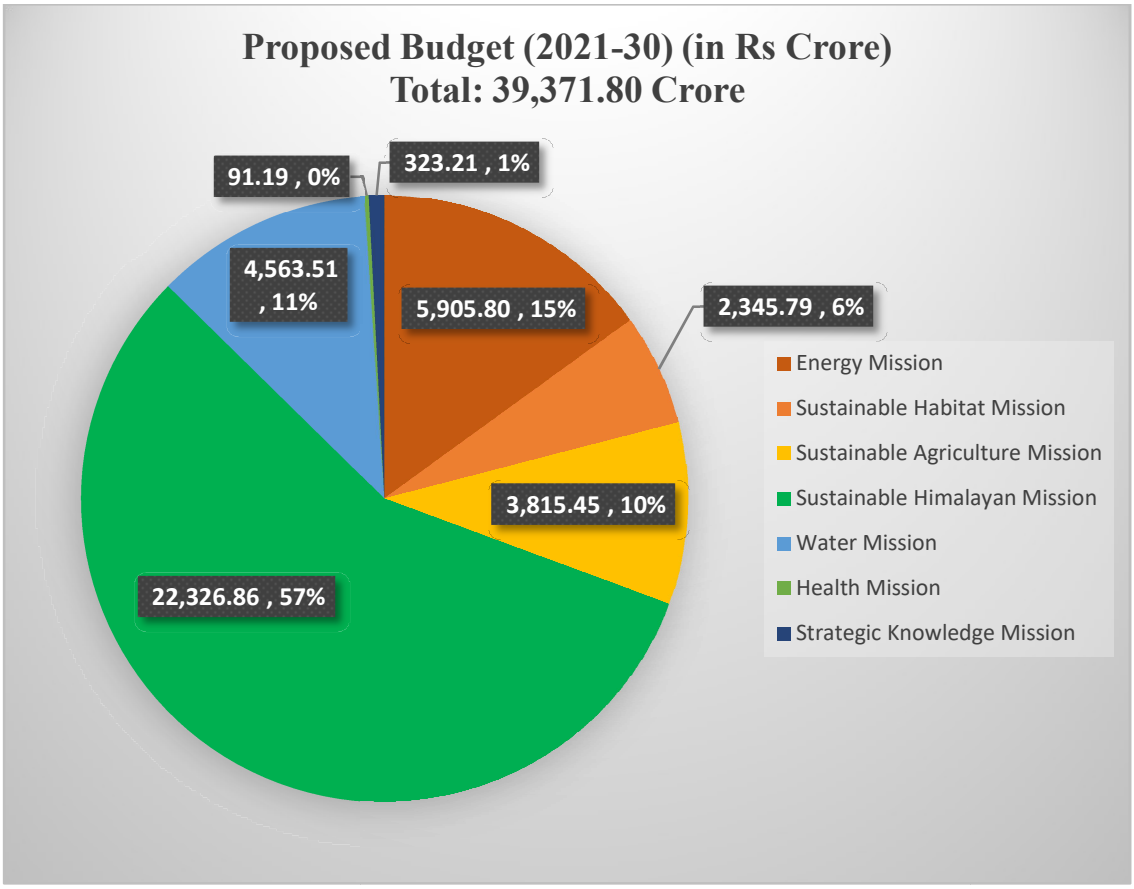


Figure 40: Share of sector wise proposed budget (2021-30)

7.4 Summary of Prioritized Interventions

After the discussion with all relevant stakeholders and departments, 73 planned activities have been identified in 7 sectors. This has been examined based on its linkages to SDG-NDC, funding linkage and implementation potential.

Of the 73 planned activities that have been identified in 7 sectors for prioritization, the financial allocation has been proposed merging similar activities. The key method of prioritization is driven by the following:

- ✓The adaptation activities that address high vulnerability and fits in to the impact chain (as relevant to sector)
- ✓Low carbon development linked to mitigation activities
- ✓There are some activities where adaptation and mitigation both possible, the co-benefit approach has been taken

Though for prioritization of activities, a multi criteria analysis-based score card was used, first the activities were screened based on vulnerability/impact as well as low carbon development processes. Thereafter, NDC-SDG linkage was assigned highest weight of 50%. Implementation potential based on low barriers was assigned 30% weight and funding linkage was assigned 20% weight (since our funding is mostly schematic and climate relevance for proposed activities is still not standardized). The activities based on this were scaled as (1) no linkage (2) meagre (3) reasonable (4) significant. The weighted averages were used for ranking and prioritization.

Table 62: Overall Linkage of the Proposed Activities

Sectoral Funding Linkages						
Sector		**Funding**				**Total**
		Limited or None	**Meagre**	**Reasonable**	**Significant**	
Agriculture	No.	1	2	4	2	9
	% of Total	1.4%	2.7%	5.5%	2.7%	12.3%
Energy	No.	0	3	2	1	6
	% of Total	0.0%	4.1%	2.7%	1.4%	8.2%
Forest & Biodiversity	No.	0	2	16	5	23
	% of Total	0.0%	2.7%	21.9%	6.8%	31.5%
Health	No.	1	3	1	3	8
	% of Total	1.4%	4.1%	1.4%	4.1%	11.0%
Strategic Knowledge	No.	1	3	6	3	13
	% of Total	1.4%	4.1%	8.2%	4.1%	17.8%
Sustainable Habitat	No.	1	1	2	0	4
	% of Total	1.4%	1.4%	2.7%	0.0%	5.5%
Water	No.	0	1	8	1	10
	% of Total	0.0%	1.4%	11.0%	1.4%	13.7%
Total	No.	4	15	39	15	73
	% of Total	5.5%	20.5%	53.4%	20.5%	100.0%

Sector and SDG-NDC Linkages

Overall, about 73.9 % of planned activities have reasonable and significant funding linkages and 5.5% of the planned activities have limited or no funding linkages. Forestry and biodiversity sectors have maximum reasonable or significant funding linkages, followed by strategic knowledge sector.

Table 63: Funding of Planned Activities with SDG-NDC Linkages

SDG-NDC and Sectoral Linkages					
Sector		**SDG-NDC**			**Total**
		Meagre	**Reasonable**	**Significant**	
Agriculture	No.	4	3	2	9
	% of Total	5.5%	4.1%	2.7%	12.3%
Energy	No.	0	0	6	6
	% of Total	0.0%	0.0%	8.2%	8.2%
Forest & Biodiversity	No.	4	6	13	23
	% of Total	5.5%	8.2%	17.8%	31.5%
Health	No.	2	2	4	8
	% of Total	2.7%	2.7%	5.5%	11.0%
Strategic Knowledge	No.	3	1	9	13
	% of Total	4.1%	1.4%	12.3%	17.8%
Sustainable Habitat	No.	0	2	2	4
	% of Total	0.0%	2.7%	2.7%	5.5%
Water	No.	0	5	5	10
	% of Total	0.0%	6.8%	6.8%	13.7%
Total	No.	13	19	41	73
	% of Total	17.8%	26.0%	56.2%	100.0%

Funding and SDG-NDC Linkages

Overall, 78.2% of planned activities having links to NDC-SDG linkages. About 17.8% of the activities have meagre linkages with NDC-SDG and mostly business as usual types. The fact the rest 78% of the planned activities have both NDC-SDG links validates a good and focussed planning process for the departments.

Table 64: Funding and SDG-NDC Linkages

Funding and NDC-SDG Linkages					
Funding		**SDG_INDC**			**Total**
		Meagre	**Reasonable**	**Significant**	
Limited or None	No.	1	1	2	4
	% of Total	1.4%	1.4%	2.7%	5.5%
Meagre	No.	5	2	8	15
	% of Total	6.8%	2.7%	11.0%	20.5%
Reasonable	No.	6	13	20	39
	% of Total	8.2%	17.8%	27.4%	53.4%
Significant	No.	1	3	11	15
	% of Total	1.4%	4.1%	15.1%	20.5%
Total	No.	13	19	41	73
	% of Total	17.8%	26.0%	56.2%	100.0%

Funding and Implementation Linkages

Only 6.8% of the activities have meagre funding and NDC-SDG Linkages. 1.4% have limited or meagre funding linkages. 82.2% of the activities have reasonable and significant funding and NDC-SDG linkages which reflects a focused planning process.

Table 65: Sector and SDG-NDC Linkages

Funding and Implementation Linkages of Planned activities						
Funding		**Implementation**				**Total**
		Limited or None	**Meagre**	**Reasonable**	**Significant**	
Limited or None	No.	3	1	0	0	4
	% of Total	4.1%	1.4%	0.0%	0.0%	5.5%
Meagre	No.	2	13	0	0	15
	% of Total	2.7%	17.8%	0.0%	0.0%	20.5%
Reasonable	No.	2	16	20	1	39
	% of Total	2.7%	21.9%	27.4%	1.4%	53.4%
Significant	No.	0	3	8	4	15
	% of Total	0.0%	4.1%	11.0%	5.5%	20.5%
Total	Count	7	33	28	5	73
	% of Total	9.6%	45.2%	38.4%	6.8%	100.0%

Only 4.1% of the activities have no funding or implementation linkages. More importantly 54.8% activities are constrained for implementation due to limited/meagre funding. However, 45.2% of the activities have reasonable funding and implementation scope.

CHAPTER 8: IMPLEMENTATION MECHANISM

8.1 FRAMEWORK FOR IMPLEMENTATION

The SAPCC implementation must be supplemented by a mechanism for not only as a mode of ensuring that the detailed activities are implemented as planned, but also, as a method for systematic review and programme improvement. Interdepartmental coordination has an important role when it comes to effectively implementing the climate-relevant strategies for getting the desired results. A systematic and synchronized approach along with a sincere effort is required for the proposed strategies. For every strategy proposed in the SAPCC, the principle implementing department along with collaborative departments has been identified. Moreover, if required, further association with other departments as well as agencies is also possible depending on the planned intervention.

The state is responsible to ensure complete implementation of the SAPCC through the incorporation of a robust framework and mechanism. The framework must capture the implementation of operational plans as well as act as a tool for systematic review and continuous improvement of the programs. For an effective implementation of the climate change strategies, interdepartmental coordination has a crucial role to play for desired outcomes. The proposed activities will demand sincere efforts along with a systematic and synchronized approach.

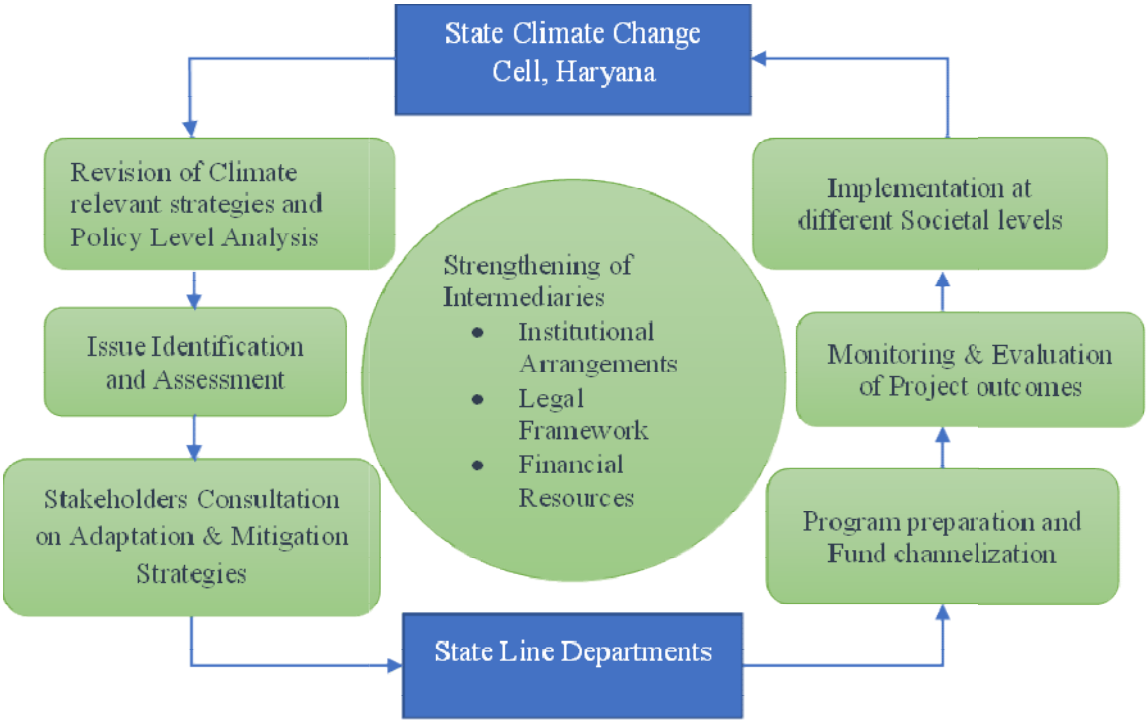


Figure 41: Implementation Mechanism of Haryana SAPCC

CHAPTER 9: MONITORING AND EVALUATION

Monitoring and Evaluation (M&E) of climate change interventions is essential to monitor and evaluate the effectiveness of implemented adaptation and mitigation measures. In COP26, Prime Minister Sri Narendra Modi has announced ambitious climate pledge for the country and putting the onus on developed countries to assist in fulfilling these to save the world from climate catastrophe.

Indian commitment at COP 26

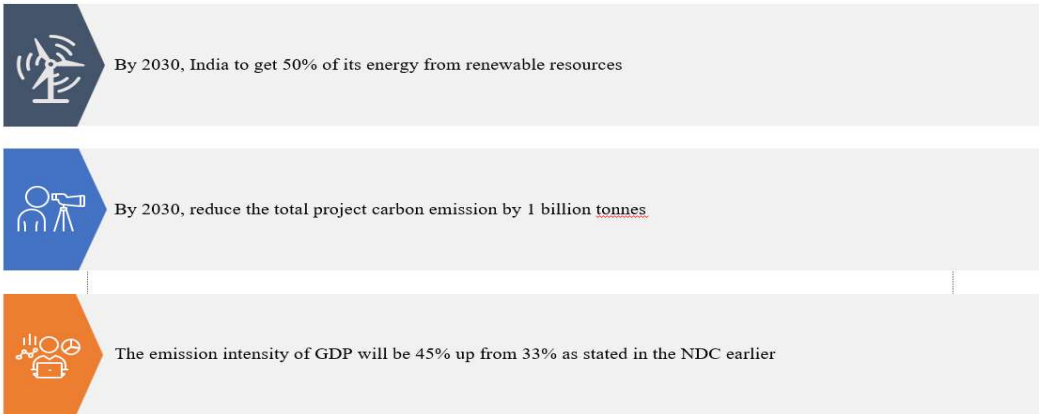


Figure 42: Indian commitment in COP26

The Paris Agreement has necessitated countries to have harmonized measurement and reporting systems for the countries as per their NDC mitigation commitments. Indian NDC also has several areas in adaptation that needs systematic monitoring and assessing the change in vulnerability due to the investments made. Some of these investments are through the budget and some others are off-budget supported through bi-lateral and multilateral agencies, philanthropic bodies, and national and international climate funds. All these information have to be consolidated nationally and a seamless harmonization of measurement and reporting is also required at state level.

M&E for Haryana SAPCC envisages to determine States' overall progress towards climate resilience and can also help to assess the SAPCCs' contribution for achieving the country's NDCs and SDGs. Individual strategies proposed under respective sectors in SAPCC will have their respective result framework highlighting the output and impacts. In order to aggregate the outputs/impact of each strategy under the missions proposed under SAPCC up to the national level, following approach (provided in figure below) is envisaged to monitor and evaluate the interventions. This uses a sectoral approach for measuring the achievement towards India's NDC and SDGs.

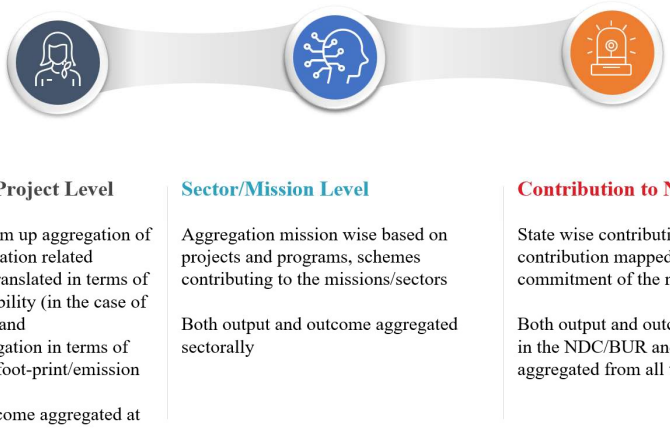


Figure 43: Approach for measuring impact of proposed intervention and its contribution towards NDC and SDG

Example of measurement and reporting in the light of COP 26 commitment in the context of the state.

The State Govt. aims to achieve a minimum of 10% (i.e. 500 MW)of the total capacity addition of 5000 MW of conventional power to be generated through Renewable Energy Power Projects. 561 MW capacity of renewable energy have been in the state by 2020. As per the action plan of HREDA, 2020, overall, the state is likely to add 1190 MW clean energy (including the avoided emission through energy sector). This however will be possible not trough one department but will require involvement of department of town and country planning, department of urban local bodies, agriculture, water resources, energy and HREDA acting as the focal point.

In the SAPCC the attempt has been made to follow a structured process of monitoring which is given as follows.

- Analysis of state circumstances (various, policy targets/achievements)
- Change in vulnerability and risk (as compared to the last SAPCC baseline)
- Stock Taking (sectoral both for adaption and mitigation sectors as per the last SAPCC)
- Analysis of climate relevant investment (on and off budget)
- Category of support as per their climate relevance
- Linkages to SDGs and NDCs goals
- A score card for prioritization of planned actions based on the linkages to both the goals

There is an **institutional mechanism** to be followed for uniform reporting to MoEF&CC. The following diagram shows such a process.

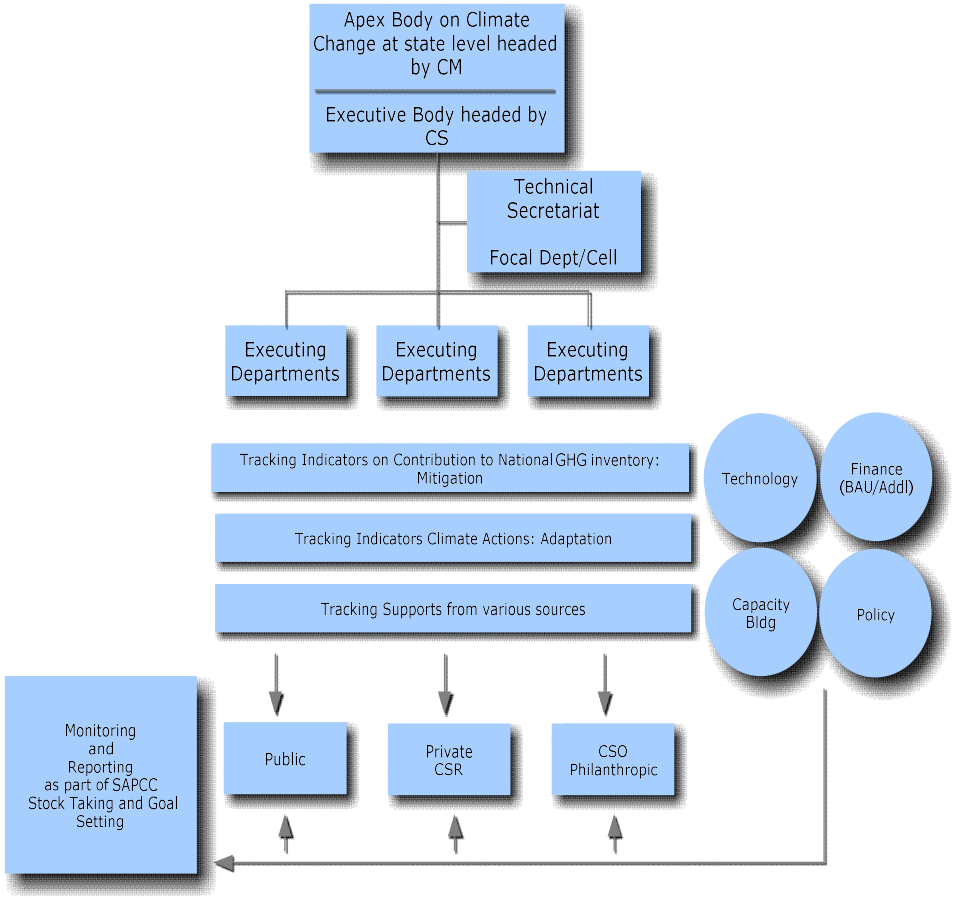


Figure 44: Institutional Mechanism for M&E

Key to M&E system is the proper institutional arrangement. The M&E system will be grounded in the existing institutional framework driven by the focal department/climate change cell within the focal department with higher level political and executive bodies providing policy guidance and governance. The cell/focal department will act as the technical secretariat and will interface with executing departments/line departments for data collection. Each department may constitute a small working group with at least one member in the working group dealing with departmental finance. The working group can be headed by a nodal officer who will interface with the cell/focal department for data/MIS updation.

The working group members and nodal officers must be trained by the focal department on kind of data requirement and their frequency. In addition to the line department officials, members drawn from the finance, statistics and planning should also be part of the training process.

The **M&E protocol** will be activity/strategy based and indicators (both categorical and outcome wise) that should fit this protocol have been given below:

M&E Dashboard

Sl #	Activity Code	Sector	Activity	Climate relevance (A=Adaptation; M=Mitigation; B=Both*	Category (e.g. Policy; Tech Demo/Pilot; Investment; CB, R&D)	Linked to SDG (if yes number)	Linked to NDC (if yes category key word)	Allocation in INR	Climate relevance (%)	Adjusted allocation in INR	Source (On Budget, Off Budget)	If Off Budget (Category: Bilateral, Multilateral, CSR, INGO)
1												
2												

Illustration

Based on the above approach, the state had (after finalisation of sectoral chapters)

- 28 no of mitigation actions
- 37 no of adaptation actions
- 8 no of both adaptation and mitigation actions
- Climate relevant budget for adaptation and allocation and their breakup. However, in the absence of budget coding, the climate relevance % can be subjective

Indicator system

The indicators can be classified broadly into the following categories (a) output indicator – as outlined in the physical progress (b) process indicators (c) outcome indicators (aggregation of a and b). The other ways to classifying the indicators can be as follows:

Table 66: Indicator system for monitoring and reporting

Category	Explanation	Remark
Climate Impact[64]	Indicators that depict a particular climate change risk/impact	Only after ex-ante and ex-post assessment, periodicity as per the project, may be exceptionally long term in case of adaptation
Adaptation Measure	Indicators that depict the adaptive measures undertaken	This can be easily tracked in form of relevant activities leading to adaptation
Adaptation Outcome	Indicators that depict the outcomes of the adaptive measures	Aggregate indicator as defined in the project logical framework/result framework
Mitigation Measure	Indicators that depict the mitigation measures undertaken	This can be easily tracked in form of relevant activities leading to mitigation
Mitigation Outcome	Indicators that depict the outcomes of the mitigation measures	Aggregate indicator as defined in the project logical framework/result framework
Process Indicators	Indicators that depict the policies/processes in place that facilitate implementation of adaptation/mitigation measures	Can be reported in form of presence and absence of certain polices or activities that may lead to outcome but not necessarily always leads to a positive outcome, in case of adaptation sometimes may lead to mal-adaptation another sector

Some of the examples of indicators are given below:

Table 67: Indicators and their monitoring and reporting cycle

Sector	Indicators	Level	Remarks (periodicity and challenges)
Agriculture and allied	Reduced key risks and adverse impacts of climate change	Outcome	Aggregate indicator, impact indicator-medium to long-term periodicity
	Irrigation Intensity or % of area under irrigation	Output	May be annual, easy to report
	Cropping intensity	Outcome	Annual easy to report
	Agricultural insurance policy including new crops	Process	Presence of the policy will reduce the risk
	Crop diversification (areas under different crops)	Both output and process	Paddy to Non-paddy may reduce the risk due to climate
	% of individuals who have diversified sources of income	Outcome	Challenges in attribution of rise in income, sometimes direct cash transfer an adaptive policy may result in temporary rise in income
	% emission reduction from agriculture land use change	Output	Based on change in CO2 and methane
Water	Enhanced food and water security	Outcome	Aggregate indicator, impact indicator-medium to long-term periodicity
	Rise in ground water level	Output	May be short to medium term (pre-monsoon post monsoon reporting possible)
	State water policy addressing climate risks specific to the state	Process	Presence of the policy

[64]Based on a GiZ report on monitoring adaptation projects

Forest	Increased ecosystem resilience in response to climate variability and change	Outcome	Aggregate indicator, impact indicator-long-term periodicity can be combined from various provisioning services
	Increase in plantation area	Output	Short term (if area) to medium term (if based on survival percentage)
	Potential mitigation through forest sector by 2030	Output	Numeric measure: 169.92 MTCo2 equivalent
	Incentive or Policies on tree outside forest, urban forestry	Process	Presence of the policy
Health	Reduction in vector borne and water borne diseases	Outcome	Aggregate indicator, impact indicator medium to long-term periodicity
	Improvement in dealing with heat wave conditions	Outcome	Aggregate indicator, impact indicator medium to long-term periodicity
	Health policy addressing climate risks specific to the state	Process	Presence of the policy
Energy	Reduction in energy intensity of state GDP	Outcome	Short to medium term considering all factors and leakage
	Share of renewable energy in the energy mix of the state	Output	Easy to report
	Potential to have more than 10% of the total energy requirement from renewable sources by 2030	Output	Easy to report
	Implementation of energy conservation building code in public building	Process	Easy to report from compliance
Urban habitat	% Reduction in Migration of local population directly and indirectly dependent on concerned sectors for their livelihoods	Outcome	Aggregate indicator (short to medium term reporting possible after survey)
	Open defecation free status	Output/Process	Short term
	Amount of solid waste converted to energy	Output	Short term
	Smart city policy on bi-cycle tracks or car pooling	Process	Short term, presence of policy

The above list is only indicative, and the process of indicator selections should be possible after wider consultation with departments. First priority is climate relevant scheme specific indicators (mostly output indicators) that the department report as routine. The second is project level indicators as defined in the result framework. The third is sector/mission level indicators as defined under mission document or state/national priority (e.g. doubling farm income, reduction of energy intensity of GDP).

Tools and methods for harmonization

- Key aspects in this are to choose indicators/proxy that has relevance to SDG/INDC
- IPCC defined methods on emission inventory (since the state level inventory is not available, proxies on share of renewable, energy efficiency, etc. can be reported)
- For project level emission reduction, Co-benefit tracking tools, sustainable development potentials can be tracked and consolidated. If required, state share reflected in NAMAs can be reflected.
- For adaptation investments, change in vulnerability (mostly the change in adaptive capacity and sensitivity) to be tracked. Those should follow IPCC AR5 methods and tools (presented in the vulnerability section). This tracking can be spatial or temporal.
- The project level vulnerability reduction can be tracked against committed targets based on the project level assessment reports.
- Policy level assessment can be done by tracking policy goals and targets for various sectors.

- Finance data for effective harmonization requires budget coding, without that the nodal department can discuss with technical working groups to fix climate relevance % based on scheme components.

Data management System

- Collect a relevant economic and social data to develop the state circumstances (macro)
- Collect departmental level data based on the proposed strategies by the departments and their output and outcome
- Collect project level data from project MIS (may be externally aided and off budget projects)
- Delegate responsibility for the collection of particular data sets to authorized individuals and agencies of the government.
- Work with industry associations/ NGOs for collecting relevant data having impact on NDC/SDG

Capacity Building

Generally, awareness and capacity to plan and deliver on climate change strategies is low at cutting edge. Therefore, efforts should be made to demystify the climate strategies proposed by the departments at regular interval. The process will be facilitated by the focal department and technical working group members (both department and inter-department) will take part in it. This process should be a quarterly affair each year.

Data frequency

The data sets should be divided in to two categories (a) static e.g. GDP data (b) dynamic data. In essence nothing is static, but some statistics are annual or more. The dynamic datasets change more frequently. However, for such data sets monthly or quarterly cycle of updation will be adequate.

Data consolidation and validation

The data will be validated by the focal department/cell in assistance with experts and also the nodal officers who in turn will provide clarification if any after due consultation with sectoral working group members.

Reporting

The dashboards for key indicators will have regular updation. The climate strategy and action plans should be revised every five years as is the process now. The monitoring of results will be part of that stock taking.

ANNEXURE 1: SCORE CARD

Sl.No	Code	Sector	Proposed Activities	Funding (20%)	Implementation (30%)	SDG-NDC (50%)	Marks	Overall rank	Sub Rank
1	EN/1	Energy	Promote Grid Interactive Solar Energy Technology (Ground-mounted and Rooftop technology)	3	2	4	3.2	29	2
2	EN/2	Energy	Increase share of Biomass-based Power generation unit including cogeneration unit	3	2	4	3.2	29	2
3	EN/3	Energy	Deployment of Solar powered irrigation pump	4	3	4	3.7	4	1
4	EN/4	Energy	Promote end use energy efficiency	2	2	4	3	36	4
5	EN/N/1	Energy	Mainstreaming Energy Storage infrastructure	2	1	4	2.7	47	5
6	EN/N/2	Energy	Promotion of Electric Mobility	2	1	4	2.7	47	5
7	SH/1	Sustainable Habitat	Integrated Solid Waste Management in ULBs and sewage treatment plants	3	3	4	3.5	10	1
8	SH/3	Sustainable Habitat	Bioremediation of Legacy Waste	2	2	3	2.5	56	3
9	SH/N/1	Sustainable Habitat	Integrated Solid Waste Management	3	3	4	3.5	10	1
10	SH/N/2	Sustainable Habitat	Re-use of treated wastewater	1	1	3	2	66	4
11	AG/2	Agriculture	Organisation of Kisan Mela, Farm Mechanisation in Sugarcane and Strengthening Tissue culture lab in Karnal	2	2	2	2	66	7
12	AG/3	Agriculture	Promotion of cotton cultivation scheme in Haryana State	2	2	2	1	73	9
13	AG/4	Agriculture	In-situ Management of Crop residue (2020-21)	4	4	4	4	1	1
14	AG/6	Agriculture	Increase production of wheat and pulses, distribution of certified seeds of paddy, bajra, Wheat and Barley	3	3	3	3	36	4
15	AG/8	Agriculture	Promotion of Crop Diversification in Haryana	3	3	4	3.5	10	2
16	AG/9	Agriculture	Promotion of Vertical farming cultivation technologies in Haryana	4	4	3	3.5	10	2
17	AG/14	Agriculture	Extension works and advisory for fruits and vegetables	3	2	3	2.7	47	5

18	AG/15	Agriculture	Integrated Post Harvest Management Unit of Fruits	3	2	2	2.2	62	6
19	AG/16	Agriculture	Weed Management	1	2	2	1.8	72	8
20	WM/1	Water	Water Quality Monitoring and Surveillance WQMS	3	3	3	3	36	4
21	WM/2	Water	Incentivization the Irrigation, Drainage and Flood control Project	3	3	4	3.5	10	6
22	WM/8	Water	Watershed Management	3	2	3	2.7	47	2
23	WM/11	Water	Institutional Strengthening of Public Health Engineering department	2	2	3	2.5	56	1
24	WM/N/1	Water	Jal Jeevan Mission	4	4	4	4	1	10
25	WM/N/2	Water	Upgradation of existing STPs and construction of new STPs	3	3	3	3	36	4
26	WM/N/3	Water	Rural Sanitation	2	3	3	2.8	46	3
27	WM/N/4	Water	Rural Water Supply	3	3	4	3.5	10	6
28	WM/N/5	Water	Urban Water Supply	3	3	4	3.5	10	6
29	WM/N/6	Water	Urban Sewerage and Sanitation	3	3	4	3.5	10	6
30	FB/1	Forest & Biodiversity	Afforestation in degraded land	3	3	4	3.5	10	3
31	FB/2	Forest & Biodiversity	Plantation along roadsides in urban areas	4	3	4	3.7	4	1
32	FB/3	Forest & Biodiversity	Development and maintenance of Herbal park	3	2	3	2.7	47	15
33	FB/4	Forest & Biodiversity	Plantation on Degraded notified forests	3	2	4	3.2	29	9
34	FB/5	Forest & Biodiversity	Soil and Moisture conservation works	3	2	4	3.2	29	9
35	FB/6	Forest & Biodiversity	Maintenance of protected areas	3	3	4	3.5	10	3
36	FB/7	Forest & Biodiversity	Modernization of nurseries	3	2	3	2.7	47	15
37	FB/8	Forest & Biodiversity	Workshops for capacity building, training of field staff and publications	2	2	2	2	66	22
38	FB/N/1	Forest & Biodiversity	Habitat improvement of Protected Areas	3	3	4	3.5	10	3
39	FB/N/2	Forest & Biodiversity	Development of Oxy-Van	3	2	2	2.2	62	20
40	FB/N/3	Forest & Biodiversity	Development of Nagar Van	3	2	2	2.2	62	20

41	FB/N/4	Forest & Biodiversity	Promotion of Eco-tourism	3	1	3	2.4	61	19
42	FB/N/5	Forest & Biodiversity	Promotion of Green buildings	2	2	4	3	36	13
43	FB/N/6	Forest & Biodiversity	Promotion of Miyawaki Plantation	3	3	4	3.5	10	3
44	FB/N/7	Forest & Biodiversity	Modernization of nurseries	3	2	3	2.7	47	15
45	FB/N/8	Forest & Biodiversity	Plantation of Climate resilient species	4	2	4	3.4	23	7
46	FB/N/9	Forest & Biodiversity	Reclamation of waterlogged saline area	4	3	4	3.7	4	1
47	FB/N/10	Forest & Biodiversity	Greening of Highways	4	2	4	3.4	23	7
48	FB/N/11	Forest & Biodiversity	Greening of Common lands	3	2	4	3.2	29	9
49	FB/N/12	Forest & Biodiversity	Aerial seeding/seed ball Technology	3	1	2	1.9	71	23
50	FB/N/13	Forest & Biodiversity	Protection and conservation of Heritage Tree (>75 Years)	3	2	3	2.7	47	15
51	FB/N/14	Forest & Biodiversity	Rehabilitation and rejuvenation of village Banis and sacred grooves	4	2	3	2.9	45	14
52	FB/N/15	Forest & Biodiversity	Creation of urban green space through vertical forestry	3	2	4	3.2	29	9
53	HEL/N/1	Health	Prevention and control of diseases	4	3	4	3.7	4	2
54	HEL/N/2	Health	Public health laboratories	2	2	2	2	66	7
55	HEL/N/3	Health	Public Health Education	2	2	4	3	36	5
56	HEL/N/4	Health	Health Statistics and Evaluation	2	2	2	2	66	7
57	HEL/N/5	Health	Bio medical waste management	1	1	4	2.5	56	6
58	HEL/N/6	Health	Strengthening of urban hospitals and dispensaries for research and training	3	4	3	3.3	25	3
59	HEL/N/7	Health	Urban Health Mission	4	4	4	4	1	1
60	HEL/N/8	Health	Haryana State Health Resource Centre for Quality Improvement of Health Institution & HMIS	4	3	3	3.2	29	4
61	SK/N/1	Strategic Knowledge	Research and training in secondary education	3	3	3	3	36	7
62	SK/N/2	Strategic Knowledge	Setting up of State Council of Research and Training, Gurugram	4	3	4	3.7	4	1

63	SK/N/3	Strategic Knowledge	Science and Technology Programme	4	3	4	3.7	4	1
64	SK/N/4	Strategic Knowledge	Environmental Research and Ecological Regeneration	2	3	4	3.3	25	4
65	SK/N/5	Strategic Knowledge	Setting up of Environment Training Institute at Gurugram	3	3	2	2.5	56	11
66	SK/N/6	Strategic Knowledge	Effects of Climate Change on dairy animals	1	1	4	2.5	56	11
67	SK/N/7	Strategic Knowledge	Aryabhatta Vigyan Kendra	3	2	2	2.2	62	13
68	SK/N/8	Strategic Knowledge	Setting up of Science City for NCR in Haryana	4	3	2	2.7	47	10
69	SK/N/9	Strategic Knowledge	Long-term study on Impact of climate change in small mammal communities	2	2	4	3	36	7
70	SK/N/10	Strategic Knowledge	Air quality monitoring with decision support	2	3	4	3.3	25	4
71	SK/N/11	Strategic Knowledge	Impact of climate change on Health	2	2	4	3	36	7
72	SK/N/12	Strategic Knowledge	Research Innovation	2	3	4	3.3	25	4
73	SK/N/13	Strategic Knowledge	Research action by HSCST	3	3	4	3.5	10	3