• ANNEX A: USAID/INDIA CDCS 2020-2024 CLIMATE CHANGE ANALYSIS

PURPOSE

The climate change analysis summarized in this annex aims to inform USAID/India's CDCS and ensure that the strategy is responsive to climate risks while strengthening India's resilience and self-reliance.

PART I. CLIMATE RISK SCREENING

METHODS / APPROACH

USAID/India integrated climate change in its CDCS development. In May 2019, USAID/India, with USAID/Washington support, screened climate risks for each of the intermediate results (IRs) under the four development objectives (DOs) in the proposed results framework (RF). The screening focused on these three guiding questions:

- *How might projected changes in climate stressors affect the IRs (and DOs)?*
- *Can the risks be addressed within the strategy? If not, what steps must be taken during project and activity design to address the risks?*
- *What opportunities (in policy or practice) exist to strengthen overall resilience or achieve multiple development objectives?*

USAID/India used USAID's climate risk screening and management tool to answer these questions. Acknowledging India's adaptive capacity, DO teams assessed potential climate risks to each IR based on their expertise, judgment, review of relevant sectoral annexes, India's climate risk profile, and available reports.

BACKGROUND / COUNTRY PROFILE

Climate risk management (CRM) is crucial in India as noted in India's second Biennial Update Report (BUR-2). India's climate is heterogeneous, but driven primarily by seasonal monsoons. About half of India's 1.2 billion people depend on agriculture, the productivity of which is already affected by heat stress and longer dry spells. A third of the population now resides in urban areas, which experience more frequent and severe heat waves. Hundreds of millions of people live in coastal and low-lying areas making them vulnerable to flooding from increasingly strong storms. Variations in temperature and precipitation patterns, droughts, floods, and other climate phenomenon shift annually, inter-annually, and geographically; uncertainties associated with these climate variables indicate the need to consider climate risks during the design and implementation of projects and activities.

HISTORICAL DATA AND FUTURE CLIMATE PROJECTIONS

India's historical climate trends include: increased average annual temperatures with substantially stronger warming over the last 30 years; increased frequency and intensity of heavy precipitation events; overall losses in glacial cover in the last 40 years; and continued rise in sea levels on the east coast (Sea of Bengal) of up to 20 cm in the last 50 years.

Current climate mid-century projections indicate:

- Continued increase in average annual temperatures with a tendency for increased variability, and with temperatures exceeding current climate by 10% ultimately leading to diminished glacial extent and continued sea level rise by 100-400 mm;

- Increased frequency of intense precipitation; and
- Wetter wet seasons and drier dry seasons with increased dry spells in the east.

CLIMATE STRESSORS AND RISKS

In recent years, India experienced various extreme weather events that directly and indirectly impacted people's lives. Climate stressors such as increased temperature and heat waves, increased drought and frequency of extreme precipitation, more extreme rainfall events, severe dry seasons, as well as sea level rise have significantly impacted key and vulnerable sectors including health, agriculture, and water.

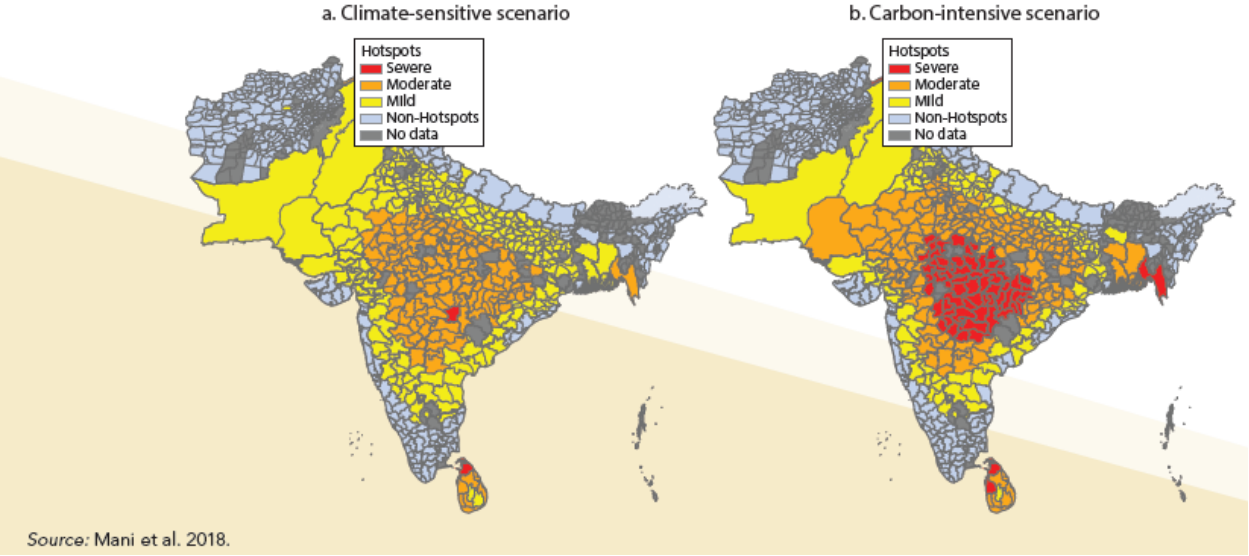
In the health sector, increased temperatures, heat waves, drought, and frequency of extreme precipitation strained sanitation systems and degraded water quality, leading to increased onset of diarrheal disease and higher rates of child mortality. The 2015 heat wave that hit India in 2015 claimed 2,330 lives in three states, and the 2013 heavy rainfall event in Uttarakhand led to flooding that affected 4,200 villages and left more than 5,500 dead. Extreme weather conditions and rises in sea level pose significant risks to the interlinked water and agricultural sectors. India's water resources are now under considerable stress due to population growth, increased production of water-intensive crops, pollution, and lack of government planning. In a country where 50% of precipitation falls in just 15 days, and over 90% of river flows occur in just four months, water resources are already over stressed. Stronger droughts and higher temperatures will exacerbate this stress, especially in years where monsoon rains are late, end early, or are diminished leading to decreased quantity and quality of water.

Drought is already an issue in India. In early 2016, after two years of below average rainfall, India's 91 reservoirs were at just 17% of capacity, leaving 300 million people with water shortages. Considering that rainfed agriculture accounts for 60% of cultivated area and 40% of national production, drought is expected to significantly impact the agricultural sector, causing expected annual losses of more than $7 billion by 2030. Depleted groundwater supply around many cities has led to increased reliance on surface water supplies that are highly seasonal and susceptible to contamination by flooding and depletion by drought. The city of Chennai, for example, is already on the cusp of running out of water.

The net loss in Himalayan glacial cover in recent decades has also exposed communities that depend on glacial water to water shortages during the dry season and flooding during the wet season. The progressive loss of glaciers will reduce the available water for agriculture, drinking and hydropower production. Increased groundwater extraction for agriculture and development in coastal areas has already caused saline intrusion issues in areas of Kerala and Goa. Reduced fresh water flows in coastal aquifers during drought may increase the risk of saline intrusion, which will be further exacerbated by sea level rise.

The World Bank's analysis of the most climate-vulnerable areas ('hotspots') in India (see Mani et al. 2018, India Snapshot accessible here) found that most of India is already experiencing negative effects of temperature on living standards, and that additional warming would likely further negatively affect living

Map 2. The Carbon-Intensive Climate Scenario Leads to More Severe Hotspots by 2050



standards. The severity of these hotspots could be reduced, the analysis found, by using climate information to improve development outcomes.

CONCLUSIONS AND RECOMMENDATIONS

India's people, ecosystems, and economy are already experiencing the negative impacts of climate variability and change. Current and projected climate risks have prompted the Government of India (GOI) to make commitments to climate mitigation and to incentivize water resource management. The GOI has also demonstrated its capacity to avoid catastrophic impacts, including minimizing loss of life, when faced with typhoons and other extreme climate events. This commitment and the substantial capacity of the private sector, academia and civil society can be leveraged to focus greater attention on managing climate risks as well as on rapidly decarbonizing its economy.

The climate risk screening found that substantial climate risks, if not managed, could negatively affect the ability of USAID India to achieve the first three of its development objectives (DO). The teams working on DOs 1, 2 and 3 concluded that climate risks could negatively affect their abilities to achieve the intermediate results envisioned under those objectives. All three teams concluded that additional, more targeted, in-depth, and specific analyses should be conducted during project and activity design. The team working on the special objective (SO) concluded that climate risks would very likely not affect the technical work envisioned under the SO, nor the desired outcomes.

PART II: GREENHOUSE GAS MITIGATION

THEME / QUESTION	ANSWER
GHG SOURCES FROM SECTORS	
What are the major sources of GHG emissions in India?	According to the 2018 USAID Greenhouse Gas (GHG) Emissions Fact Sheet for India, the country emitted 3,202 metric tons of CO_2 equivalent (mtCO2e) in 2014, the latest year for which data were available in World Resources Institute's (WRI's) Climate Analysis Indicators Tool (CAIT) database, the main source for the fact sheets. These emissions accounted for 6.55% of the global total. More than two-thirds (~69%) of the country's emissions came from the energy sector, with electricity and heat accounting for about half of energy emissions. Transportation contributed about 13% of energy emissions. About one-fifth of the country's emissions came from agriculture with enteric fermentation contributing 45% of these emissions. Industrial processes, waste, and land use change and forestry (LUCF) accounted for 6%, ~4%, and ~2% of total emissions respectively. India's 2nd Biennial Update Report (BUR-2; 2018), also using GHG inventory information from 2014, reported that total emissions was 2,607 $MtCO_2e$ excluding LUCF, and 2,306 $MtCO_2e$ including LUCF. According to the BUR-2, India's forests sequestered 301 MtCO2e, offsetting 12% of its total emissions. The BUR-2 provides a detailed inventory of emissions by sector and GHG (i.e., CO_2, CH_4, N_2O, and HFCs, PFCs and SF_6).
How has the distribution and composition of the GHG emissions profile changed over time historically and how is the profile expected to change in the future considering the major emitting sectors and/or sources?	• Growth of GHG emissions has trended with economic growth in a stepwise linear fashion. From 1990 to 2014, total emissions increased by 180% and energy emissions increased nearly 250%. The overall distribution profile of India's emissions has not changed appreciably during this period; energy related emissions still dominate. • With more aggressive renewable energy (RE) goals for the electricity sector by the GOI, growth of GHGs may slow down. For example, the USAID/India Greening the Grid study (see Table 8 in study) estimated that by meeting the 175 gigawatt (GW) renewable energy goal by 2022, CO_2 emissions would be ~20% less than a scenario where no renewable energy was added. With more aggressive renewable energy penetration (i.e., 250 GW by 2022), CO2 emissions would be 33% less (compared to the scenario in which no new renewable energy is added.) (More details on emission reduction scenarios in the energy sector can also be found in this academic study). • Transportation emissions, though significantly less than electricity sector emissions, follow a similar trend (i.e. historical increase of GHGs that tracks with economic growth). Electric-mobility policies have the potential to offset emissions from transportation. • Another source of GHGs is the combustion of biomass and other solid fuels for cooking. The trends in this sector are similar to other sectors because the population of households that use solid fuel use has been increasing over time. However, desiring to

	reduce air pollution and improve health, India has policies to move households away from these fuels which emit CO_2 and black carbon. If India is effective in moving households up the energy ladder (i.e., to either LPG/natural gas or electric stoves), these emissions will decline.
How are the sectors and sources that contribute to GHG emissions contributing to the growth and development of the economy and to meeting development objectives?	● Energy growth, specifically in the form of electricity and industrial fuel supply, and transportation, is fundamental to economic growth and as noted above, to the extent energy is dependent on fossil fuels, this will track. As decarbonized energy sources fuel the economy, this relationship can be decoupled. ● As India's economy develops, another key source of emissions, biomass cooking fuels, will likely diminish. ● The agricultural sector, due to the meat and dairy industries, has significant emissions and according to a 2016 USDA review, India has rapidly grown to become the world's largest beef exporter, accounting for 20% of the world's beef trade based on its large water buffalo meat processing industry.
What climate change mitigation or low emission development plans, targets, commitments, and priorities has the government articulated?	● In its nationally determined contribution (NDC), India pledged to reduce its GDP carbon intensity by 33-35% (relative to 2005 levels) by 2030. In its NDC, India emphasized that its GDP carbon intensity decreased 12% between 2005 and 2010. The NDC noted that India will achieve these reductions primarily in the energy and land sectors: ○ Renewable energy (RE) - achieve 40% cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 (i.e., adding 175 GW). ○ Forestry - create an additional carbon sink of 2.5 to 3 billion tons of CO_2 equivalent by 2030 through additional forest and tree cover. ● India's National Environmental Policy (NEP) and National Action Plan on Climate Change (NAPCC) provide a policy framework and specific set of strategies, respectively, for climate mitigation and low emission development. The NAPCC consolidates various other national plans including on water, renewable energy, energy efficiency, and agriculture. The NAPCC outlines mitigation (and adaptation) priorities for addressing climate change in 8 'missions': solar, energy efficiency, water, sustainable 'habitat' (buildings), sustaining the Himalayan ecosystem, 'green India' (increasing forest cover), sustainable agriculture, and strategic knowledge on climate change. State action plans, which aim to mainstream climate change considerations into planning, represent efforts to implement these national policies and priorities on the ground.
USAID WORK IN SECTORS	
Which sectors is USAID planning to program in?	USAID/India plans to work in several sectors that are included in India's NAPCC. The program areas emphasized in the new 5-year strategy include clean energy, health, WASH, and sustainable landscapes with an emphasis on reducing air pollution and improving inclusive economic growth and development in India and the South Asia region. These program areas will directly support several of the NAPCC's missions, including solar, green India, and water.

What opportunities exist to reduce emissions in those sectors?	USAID can take advantage of various mitigation opportunities in the sectors noted above. A component of the strategy that focuses on catalyzing a transformation in the energy sector directly responds to India's pledge (in its NDC) to meet its emission reduction targets by responding to its growing energy demand with deployment of renewable energy sources. ■ India's goal to electrify 30% of its public transport (in part to reduce air pollution) and its $1.4 billion in subsidies for electric vehicles could complement the RE goal. ■ Some analysts have noted, however, that the deployment of installed power capacity with RE will not necessarily replace existing coal sources, but rather add capacity on top of them. ■ Thus achieving the RE target may help India achieve a reduction in emissions intensity, but not necessarily a net reduction in emissions, which is crucial both for climate mitigation and air pollution goals. India's air pollution control efforts can also be leveraged to achieve emission reductions because many air pollutants are also GHGs. The national mission on 'green India', which aims to afforest 6 million hectares in order to increase national forest and tree cover from 23 to 33% provides an opportunity to reduce agriculture, forestry, and other land use sector (AFOLU) emissions and also sequester carbon in trees and soil. An opportunity within the health sector to reduce emissions is to maximize the use of renewable energy. The health benefits (e.g., reduced smog and pollution) of transitioning to RE sources for electricity can be elevated through inter-agency and cross-sectoral coordination. There is also a need to increase efficiencies and reduce waste as well as to emphasize responsible commodity use. Using recyclable and renewable materials where feasible and appropriate can reduce pollution (including medical waste and plastics) and contribute to emissions reductions as well.
What opportunities exist to reduce emissions associated with USAID activities?	USAID can insist that implementing partners minimize the carbon footprints of their activities as much as possible. Some possible actions include holding video conferences in place of travel where feasible, energy conservation efforts, and use of electric vehicles where feasible.

PART III: GLOBAL CLIMATE CHANGE (GCC) - SUSTAINABLE LANDSCAPES

1. **How does the CDCS integrate planning and implementation of LEDS into its DOs and/or IRs and support the host country in meeting its domestic and international GHG targets and commitments?**
   Domestically, India's policy ambition is to increase its forest and tree cover from 24% to 33%. This goal is consistent with, and represents a key pathway to achieve India's commitment to the

UNFCCC as stated in its Nationally Determined Contribution: a 33% reduction in emissions intensity by 2030 (relative to 2005 levels). Specifically, in its NDC India pledged to reduce the equivalent of 2.5 to 3 $GtCO_2e$ by 2030 in the AFOLU sector. India intends to achieve this target through enhancement of carbon stocks as well as improved land management that avoids or reduces emissions.

To help the GOI achieve this AFOLU (agriculture, forestry and other land use) target, USAID/India has ongoing and planned sustainable landscapes (SL) activities. Among other activities, Forest PLUS 2 aims to improve the management of 1.2 million ha of forests and provide ecosystem services (including water provisioning and regulation), and other economic benefits to 800,000 people. These targets include protection of standing forests as well as interventions (e.g., enrichment planting), which enhance carbon stocks of designated forests. Forest PLUS 2 will set an emission reduction target once it establishes a baseline in selected geographies.

Another activity aims to increase tree cover in areas outside of designated forests. This activity will help the GOI achieve its ambition of increasing tree cover outside of forests over an area the size of the state of Gujarat by 2030. One motivation for this activity is that the GOI cannot meet its NDC target of 2.5 to 3 billion tons through protection and improved management of its forests within designated forest lands. The GOI has calculated that it must sequester 0.6 to 1.1 $GtCO_2e$ in non-forest lands to achieve its target. USAID's Trees Outside of Forests activity will support the GOI to achieve this target through a range of interventions, including agroforestry, reduced burning of crop residues, timber tree plantations, watershed management actions that could be supported through payments for ecosystem services mechanisms. Additionally, this activity could support engagement with private sector actors to promote investments in 'SL' business models. USAID/India will adopt a 'do no harm' approach to ensure that none of these interventions create perverse incentives or result in unintended consequences.

As an important benefit of these AFOLU sector mitigation actions is cleaner air, these contributions to USAID's new 5-year strategy are reflected under DO 2, IR 2.1, which aims to help the GOI improve its air pollution mitigation efforts. In addition, the activities to improve natural resources governance in the region envisioned under DO 3, IR 3.3 also will contribute to improved planning and implementation of low emission development in the region.

2. **How does the CDCS incorporate the goal of reducing net emissions from deforestation or from other land uses such as agriculture, consistent with USAID's Climate Change and Development Strategy?**

Building on the answer to question 1, the CDCS positions its SL program under the objective to reduce air pollution for multiple benefits including human health as well as climate mitigation. The SL program will also capitalize on the fact that India has made national commitments to protect existing forests, increase forest and tree cover, and reduce air pollution. Consistent with USAID's reporting structure, the specific actions listed under question 1 will report on the number of institutions with improved capacity, the quantity of emission reductions during the activity lifetime as well as projected emission reductions as a result of the activity.

USAID/India does not directly support activities in the agriculture sector in this CDCS, but the Trees Outside of Forests activity noted above could engage the agriculture ministry and relevant agencies and private sector actors.

3. How does the CDCS enable or promote a transformational change to low emissions development?

Natural resources management and governance is a challenge in India and throughout South Asia. Improving both governance of natural resources (especially water and forest resources) would in itself be transformative and help achieve DO 3, which envisions inclusive economic growth and sustainable development in South Asia. Scaling up effective models of payments for ecosystem services (PES) mechanisms is one possible means of transforming the way water and forests are managed. Inclusivity, gender equity, and youth engagement, also crucial dimensions for transformational change to low emission development, are emphasized under DO 3, IR 3.3.

Clearance Page - CDCS Climate Change Annex CLEANED

Revised by: BFink and ELi

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Mission Clearances

USAID/India/FO: RElHamzaoui	OK	12/14/2020
USAID/India/FO: KKlimowksi	ok	12/4/2020
USAID/India/PSO: CWilliams	OK	12/3/2020

Washington Clearances: