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Subject: Western India: Industrialized States Adopt Contrasting Approaches to Tackle Climate Change

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Subject: Western India: Industrialized States Adopt Contrasting Approaches to Tackle Climate Change

1. (SBU) **Summary:** The climate change action plans of the western states of Maharashtra and Gujarat, epicenters of India’s economic growth and industrialization, have significantly different approaches to climate change adaptation and greenhouse gas mitigation. Maharashtra’s plan candidly acknowledges systemic deficiencies that could impede climate change adaptation and identifies specific actions that enhance carbon mitigation. The plan proposes innovative measures like building solar biomass-powered cold storage infrastructure to enhance food security; “climate proofing” public infrastructure; and mandating “green roofs” for all new and old structures in peri-urban areas (the transition zone between rural and urban) to conserve native biodiversity. In contrast, Gujarat’s action plan focuses more on policies and programs that are already in place and recommends leveraging these to develop complementary programs. Its action plan, similar to the plans of the central Indian states of Madhya Pradesh and Chhattisgarh (refTel), focuses on research and development (R&D), institutional linkages, and capacity building, with additional components of policy support and infrastructure development. Neither Maharashtra’s nor Gujarat’s plan identifies a significant role for the private sector. **End Summary.**

India’s Industrial Giant – Maharashtra – Remains Predominantly Agrarian

2. (U) Maharashtra, India’s second most populous state with over 112 million people, is the largest contributor to the country’s Gross Domestic Product (GDP). It has traditionally led all

other states as a recipient of Foreign Direct Investment (FDI). Mumbai – India’s commercial and financial capital – and the urban centers of Pune, Nashik, and Nagpur, are the principal contributors to this economic engine. Despite high levels of industrialization, nearly 60 percent of its population remains engaged in agriculture and particularly vulnerable to the effects of climate change. Over 80 percent of cultivated land is monsoon-dependent but one-third of the state receives scanty and erratic rainfall. The state is also prone to droughts as over 90 percent of the land area contains non-porous basaltic rock that prevents rainwater percolation. The state also suffers from floods due to improper storm water drainage, excessive release of dam water, and runoff resulting from unplanned urbanization. The Marathwada (east and central region) and western Maharashtra regions are dry and drought prone, and the coastal Konkan belt and far eastern Vidarbha regions experience rainfall variability.



Maharashtra Engages Environmental Research Organization to Assess Climate Change Vulnerability

3. (U) In 2010, the Maharashtra government engaged The Energy & Resources Institute (TERI) to conduct a vulnerability assessment of the state to study the impact of climate change. In partnership with the U.K. Met Office, TERI assessed the likely cumulative regional changes in climate parameters resulting from greenhouse gas emissions by the end of the 2030s, 2050s, and 2070s compared to the average climate during 1970-2000, assuming no comprehensive agreement on greenhouse gas mitigation. Climate modeling studies projected an overall increase in temperature and rainfall across the state and across all time periods studied. The projected

increase in minimum temperature of 1-1.5 degrees Celsius during all seasons is greater than the projected 1-2 degree Celsius rise in maximum temperature compared to the baseline. The Konkan, Pune, and Nashik districts are poised to experience higher minimum temperatures in the 2030s. The study posits that this temperature increase could impact crops sensitive to high night temperatures, like rice and potatoes, and could also impact the yields of sorghum, soya bean, and even cotton. Warmer temperature is also likely to increase precipitation; the study projects an increase in rainfall across the state with increased intensity in northern Maharashtra (Aurangabad and the northern part of Nashik) as compared to the Konkan belt (west) and Vidarbha region (east). The study also projects an increase in pest incidence due to increased rainfall, but notes that higher precipitation and proper management of water resources could improve the yield of rain-fed crops, such as cotton. Parts of south and central Maharashtra may experience more dry days in the 2030s. Sea levels are also projected to rise along Maharashtra's coastline (similar to the projected rise of global sea levels for 68 percent of the world's coastline). [**Comment:** The TERI analysis is scholarly with detailed forecasts of climate change impacts for individual regions. However, it does not conclude that its forecast climate change effects require major responses in order to avoid significant adverse impacts on the state's economic development. Some of the forecast changes (e.g. moderate increased rainfall) would likely be positive to economic development. **End Comment.**]

Maharashtra State Action Plan Focuses on “Building Resilience”

4. (U) The state's climate change action plan primarily focuses on protecting the livelihoods of its largely agrarian population. The report calls for policy interventions “to encourage usage of water efficient irrigation techniques” along with sensitization about the benefits of the technology. Maharashtra is the largest producer of cotton and the second largest producer of sugarcane, both water-intensive crops. The state also ranks first in fruit production and is the largest producer of seedless grapes, mandarin oranges, and alphonso mangoes, which the action plan notes are susceptible to changing weather patterns. The report also acknowledges that an estimated 30-35 percent of fruit and vegetable production is lost due to lack of post-harvest infrastructure. In light of these losses, TERI recommends the decentralized deployment of renewable solar-biomass powered cold storage systems to increase storage capacities and minimize wastage while contributing to climate change mitigation. It also advocates the creation of agricultural zones around large urban centers like Mumbai, Pune, Nashik, Nagpur, and Aurangabad. The plan calls for water conservation through recharging underground aquifers; mandating water recycling and reuse by industry; mandatory rainwater harvesting for new and existing structures in cities with a million-plus population; augmentation of storm water drainage infrastructure; and mandatory treatment and reuse of sewage water for gardening and flushing. [**Comment:** Each of these recommendations is supported by data in the TERI study, and each will have positive effects on both the quality of life and the development potential of the state's urban centers. However, none of these recommendations are directly related to how climate change is projected to affect the state. Though not insignificant, the carbon mitigation effects of these measures and those that follow are not the driving force behind the recommendations. **End Comment.**]

5. (U) The plan also cautions against continuing “business as usual” practices where forest cover has decreased over the years because forest degradation and diversity loss decrease resilience to

climate change. It proposes launching a “Green Maharashtra” Mission 2020 (similar to the central government’s National Mission for a Green India) for biodiversity conservation to enhance forest cover and restore forests and wetlands. It also makes a strong argument for land use zoning and development planning. To address health issues associated with increased temperature and rainfall variations, the plan proposes creating a digital health database with the help of World Bank funding to improve surveillance. It also recommends early warning tools and health advisories for different communities – farmers, fisherman, and urban residents – and regulating working hours for labor and constructing shelters near their work to reduce direct heat exposure.

Special Focus on Planning and Development in the Mumbai Metropolitan Region

6. (U) TERI also conducted a detailed study of the Mumbai Metropolitan Region. Unsustainable urban planning and development of Mumbai and its suburbs make the city prone to flooding during the July-September monsoons. The action plan underscores the need to strengthen the storm water drainage network and groundwater percolation systems as well as establishing flood rescue centers. It also suggests “climate proofing” new public infrastructure like bridges, roads, and ports by incorporating additional elements of temperature, rainfall, and sea level increases into the project design specifications. The plan argues in favor of mandatory construction of “green roofs” in new and large developments in peri-urban areas to foster re-generation of native flora and fauna lost through encroachments due to increasing migration and commercial pressures on land. It calls for covering at least 20 percent of the structures in the next five years and 30-40 percent of old and new construction in the next 10 years.

Gujarat’s Coastal Population Vulnerable to Rising Sea Levels

7. (U) Maharashtra’s neighboring state, Gujarat, contributes 17 percent of India’s industrial output and around 20 percent of India’s exports. It accounts for 98 percent of soda ash, 80 percent of diamond exports, 75 percent of salt, and 62 percent of petrochemicals in India. However, like Maharashtra, over half of Gujarat’s population is engaged in agriculture, with over 51 percent of the state’s land under cultivation. Gujarat has the longest coastline in India, and 37 percent of its population lives along the coast, making it especially vulnerable to the projected global rise in sea levels. The state has the second largest area of mangroves after West Bengal. The low-lying Great Rann of Kutch is extremely vulnerable to rising sea levels. The seasonal salt marsh is the only remaining habitat for around 2,000 Indian wild asses and also hosts a large population of flamingoes. The federal Ministry of Environment & Forests climate report of 2010, assessing regional and sectoral analysis for 2030s, indicates a warming trend across Gujarat for annual mean, maximum and minimum temperatures and a possible increasing trend of extreme rainfall. The report estimates a projected rise in temperature of 1.5-2.5 degrees Celsius for the 2030s and an increase in intensity of rainy days in the state.

Gujarat Action Plan Touts Its Existing Progressive Climate Change Policies

8. (U) When India’s Prime Minister Narendra Modi was the Chief Minister of the state, Gujarat was the first Indian state to establish an independent Department for Climate Change in

2009. The current state action plan, authored by this department, outlines existing policies and programs that are already in place to ensure sustainable development, including: energy efficiency audits; adoption of a bus rapid transport system to reduce congestion in Ahmedabad city; and establishing an integrated state-wide gas grid. The plan cites the new Industrial Policy of the state which promotes: use of renewable power; water conservation; recycling; co-firing of wastes with coal; use of market-based mechanisms to finance clean technologies; and reduction of carbon footprints to foster sustainable waste management. Gujarat's action plan argues that development leading to improved economic circumstances reduces vulnerability and enhances the capacity to cope with climate change. It points out "the stronger the economic and institutional capacity, the greater the resilience and adaptability to climate variability." Nonetheless, it does acknowledge that development initiatives can also exacerbate climate change vulnerability and recognizes the need to create explicit adaptive strategies that complement the on-going development process. Although specific funding sources are not specified, the plan proposes projects worth 248 billion rupees (USD 3.8 billion) to be undertaken with funding assistance from the central government, bilateral, and multilateral mechanisms to support the existing climate change mitigation initiatives of the state.

Gujarat Aims to be India's Renewable Energy Hub

9. (U) The plan notes state government action to improve power plant efficiency, use better quality (washed or imported) coal, conduct regular energy audits, and have reduced carbon emission intensity despite an increase in net generation capacity. Gujarat is also aggressively promoting renewable energy which currently accounts for almost 20 percent of installed electricity capacity in the state. The state's Wind Power Policy aims to tap an estimated potential of over 10,000 MW of wind power which could potentially save 4.68 million tons of coal and reduce CO₂ emissions by 6.70 million tons each year. Gujarat also accounts for a quarter of India's installed solar power generation capacity. The state government estimates that there is a potential for solar power to replace one million tons of coal and eliminate 1.43 million tons of CO₂ emissions each year. In addition, pre-dating the plan, the state is looking to leverage its vast coastline to harness tidal power and is evaluating the feasibility of generating 6,000 MW of power from tidal waves during peak hours from the Kalpasar project, which is one of the largest man-made fresh water reservoirs. This project would also have a 33-km-long dam-cum-bridge to store rain water flowing down the river for irrigation.

Developing Gujarat's Capital Gandhinagar as a Solar City

10. (U) The Gujarat government is transforming the state capital Gandhinagar into a "solar city." Rooftop systems of 5 MW capacity have been installed on roofs of some government and private buildings (photo below). House owners have two meters – one measuring the solar power generated and the other the household's electricity consumption. The solar developer pays 3 rupees per unit of electricity generated to the house owner as part of a roof-rent agreement. Solar water heating systems and energy efficient street lights have also been installed resulting in annual electricity savings of 14.9 million units, which translates to a carbon emission reduction of 14,900 tons – or 10,430 tons of coal.



Solar rooftop system in Gandhinagar

11. (U) Gujarat is also implementing an urban energy efficiency program covering all municipal corporations to realize energy savings of 30 percent. Initiatives include: conversion of furnaces in crematoriums from electric to CNG; replacement of bulbs with CFLs in commercial and residential buildings; stringent enforcement of the Energy Conservation Business Code; and encouraging decentralized solar energy technologies for cooking and heating. The state is also looking at constructing regional landfill sites for 36 clusters to address municipal solid waste management. Major cities are also implementing waste-to-energy projects. The Surat municipal corporation is implementing nine sewage treatment plants and has set up a sewage gas-based power plant to harness the methane gas generated through the treatment process.

12. (SBU) **Comment:** The Maharashtra state government’s action plan proposes targeted intervention strategies to mitigate the impact of scientifically assessed climate change vulnerabilities. In contrast, the Gujarat government’s report notes that the state is pursuing climate change adaptation and mitigation strategies “despite the gaps and limitations in scientific literature and research on climate change.” The plan, instead, touts existing “comprehensive and forward looking policies” and “efficient governance” that it claims directly or indirectly address climate change. Maharashtra’s goal is to build resilience and protect livelihoods through its action plan; the Gujarat government believes that economic development builds additional resilience against climate change. While Maharashtra’s plan warns against continuing with “business as usual” practices, Gujarat’s action plan underscores the need to adopt “win-win strategies” and “no regrets options” so that carbon mitigation initiatives reap benefits large enough to offset implementation costs. One telling statistic is that of the 248 billion rupees (USD 3.8 billion) worth of projects proposed for climate change adaptation and mitigation under the Gujarat climate change action plan, but only 42 million rupees (USD 650,000) is for creating climate change safeguards for women, landless labor, marginal workers, and tribal and other vulnerable communities, while 33.4 billion rupees (USD 515 million) and 7.3 billion rupees (USD 113 million), respectively, are proposed allocations for urban development and supporting renewable energy. **End Comment.**

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