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Social protection for climate adaptation: how India can adjust to a warming world

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Summary

India has one of the world's largest social protection systems. The Government of India spends roughly 7.9% of GDP, or 26.6% of its budget, on social protection programmes. In 2025, social security coverage extended to 64.3% of the population: around 920 million people. Climate change is projected to put a significant strain on India's social protection system, especially given the country's high exposure and vulnerability to extreme weather events. As such, social protection coverage is becoming increasingly vital in areas such as water, resilient infrastructure, poverty alleviation, agriculture and health. India will need to leverage these sectors if it is to finance adaptation that protects the most vulnerable sections of society.

The costs of climate change in India are estimated to reach US\$2 trillion by 2030 (Reserve Bank of India [RBI], 2023). Accordingly, the country will require significant investment in adaptation and resilience to mitigate these costs. While there is no clear consensus on how much India will need to invest, estimates suggest that this could amount to an additional US\$750 billion by 2030. If the country fails to meet its adaptation investment needs, it could incur greater costs due to the growing impact of climate events on livelihoods and physical capital. These costs are likely to fall on central and state governments, increasing their fiscal burdens.

To generate sufficient financing for its growing adaptation needs, India will need to rely on several sources of funding, some of which will come through the following social protection schemes:

- **Mahatma Gandhi Rural Employment Guarantee Scheme (MGNREGS):** a rural employment guarantee for seasonal workers that embeds climate resilience as a core objective in four priority areas: water security, rural infrastructure, livelihood infrastructure, and extreme weather mitigation.
- **Jal Jeevan Mission:** provides rural tap water coverage, reorienting from infrastructure construction to the sustainability of service delivery and groundwater recharge, combating the effects of drought-related water depletion.
- **Pradhan Mantri Fasal Bima Yojana:** the world's largest public crop insurance scheme, covering losses from drought, flooding, heatwaves and other extreme weather events.
- **Pradhan Mantri Gram Sadak Yojana:** a rural road connectivity scheme with climate-resilient design features, including heat-resistant materials, improved drainage and flood-resistant construction.
- **Pradhan Mantri Awas Yojana–Urban:** an urban affordable housing scheme that adopts disaster-resilient and green construction standards.
- **Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (PMJAY):** the world's largest publicly funded health insurance scheme. Its climate–health linkages are underdeveloped but could help provide adequate healthcare to people suffering from extreme weather-related illnesses.

Core recommendations

Adaptation financing is being generated as a co-benefit of social protection schemes, but these programmes lack a consistent methodology for distinguishing between adaptation-specific expenditure and broader development spending. The absence of a standardised taxonomy, combined with persistent implementation gaps, makes it difficult to systematically track or scale the adaptation value already embedded in the programmes. To ensure that adaptive capacity adequately reinforces India's social protection system in the face of the intensifying climate crisis, policymakers should

prioritise three main areas. First, they should ensure that social protection schemes converge with initiatives linked to climate adaptation by:

- Aligning social protection programmes with the National Adaptation Plan, and mapping them against adaptation objectives to make their climate co-benefits visible in government budgets and planning.
- Coordinating existing climate- and disaster-relevant mechanisms and integrating them into social protection schemes, so that they address structural vulnerabilities rather than merely respond to shocks.
- Developing national and state-level climate risk and vulnerability assessments to target fiscal allocations more precisely.

Second, policymakers should align social protection and climate adaptation with states' needs by:

- Allocating sufficient resources to schemes that states primarily implement, supporting state-led experimentation and policy diffusion more than centralised planning.
- Developing state-specific financing tools, such as parametric insurance, and integrating them into existing programmes by using localised data to reduce basis risk.

Third, policymakers should mobilise finance by:

- Embedding automatic shock-responsive top-up payments in existing direct transfer programmes, leveraging the Jan Dhan–Aadhaar–Mobile trinity and the Direct Benefit Transfer infrastructure.
- Incorporating climate vulnerability as a standalone criterion into fiscal devolution to states, using the Finance Commission formula.
- Scaling up parametric insurance products for informal and outdoor workers. This should build on the Self Employed Women's Association's heat insurance pilot and the Regulatory and Development Authority of India's Regulatory Sandbox, with payouts linked to the Mahatma Gandhi National Rural Employment Guarantee Act and the PMJAY.
- Mobilising blended finance through the National Bank for Agriculture and Rural Development and the National Investment and Infrastructure Fund to attract private capital for climate-resilient water, housing, transport and health infrastructure.

1. Introduction

This report assesses whether the development of India's social protection system is sufficient to address the growing impacts of climate change. We present options for closing financing gaps in the system and explore the potential consequences of a failure to do so.

India has one of the world's largest social protection systems. The Government of India spends roughly 7.9% of GDP on social protection programmes (Ministry of Finance, 2026). This is equivalent to 26.6% of its budget, which is in line with other middle-income countries but well below the 20–25% spent by OECD states. However, the extensive nature of India's flagship welfare programmes means that, in 2025, its social security system covered 64.3% of the population, or around 920 million people, including a large share of informal workers (Ministry of Finance, 2026; Press Information Bureau [PIB], 2025).

Rural employment and food security are a cornerstone of India's social protection framework. This framework has three flagship programmes: rural employment guarantees (Mahatma Gandhi National Rural Employment Guarantee Act – MGNREGA), food transfers via the Targeted Public Distribution System (TPDS) and public health insurance through Ayushman Bharat, an initiative designed to help India achieve its target of universal health coverage by 2030. A variety of additional schemes target specific groups, such as informal workers, civil servants and farmers, as well as elderly, widowed and disabled people.

Climate change is projected to place a significant strain on India's social protection framework. As one of the countries most exposed to the physical impacts of climate change, India is projected to experience prolonged droughts and extreme heat episodes, increasingly erratic and variable monsoons and rainfall patterns, and more frequent and extreme storms and other weather events. These impacts will increase demand for India's social protection programmes, especially its food security and rural employment schemes.

The Government of India has expanded these programmes and introduced a variety of new ones in recent decades, partly in response to the increasing impacts of climate change. MGNREGA has recently been overhauled to extend the rural employment guarantee from 100 days per year to 125 days, while explicitly including climate resilience as a core objective for the first time. Other schemes, such as those focused on rural road building (Pradhan Mantri Gram Sadak Yojana [PMGSY]) and housebuilding (Pradhan Mantri Awas Yojana–Urban [PMAY–U]), have gradually adopted climate- and disaster-resilient design and construction requirements. The Government of India has also pivoted its rural water supply programme (Jal Jeevan Mission [JJM]) towards groundwater recharge in a direct response to climate-driven water stress.

However, it is unclear whether existing developments in India's social protection scheme are sufficient to address the growing impacts of climate change. Between 2019 and 2026, India's overall expenditure on social protection has remained relatively stable at between 6.8% and 7.9% of GDP (Ministry of Finance, 2026). If India fails to meet its adaptation investment needs, it could face greater costs due to the growing impact of climate change on livelihoods and physical capital. These costs are likely to fall on central and state governments, increasing their fiscal burdens.

The aim of this report is to assess whether India's current progress in adaptation and resilience investment is sufficient to address the growing impacts of climate change, presenting options for closing financing gaps. The report provides a high-level comparison of climate change impacts with existing social protection efforts, identifying current gaps and those that are likely to emerge in future. Crucially, it provides policymakers with options for addressing these gaps using public, private and hybrid solutions based on international best practice. The analysis covers five key areas: water, agriculture, resilient infrastructure, poverty alleviation and health.

The remainder of the report is structured as follows. Section 2 provides an overview of the history and structure of India's social protection system. Section 3 provides new, evidence-based estimates of the likely impact of climate change on social protection needs. Section 4 illustrates how India's social protection system is responding to growing climate impacts and identifies where future gaps in provision are likely to emerge. Section 5 makes recommendations on how the Government of India can better implement climate adaptation measures across sectors and states, and can mobilise finance to address the twin goals of adaptation and social protection.

2. India's social protection system

India's welfare state is grounded in the Constitution, which lays down the state's commitment to social, economic and political justice. Since the 1990s, the system has shifted from poverty-targeted relief towards a more universal, rights-based model. This has been reinforced by expanding public services and digital infrastructure, including the world's largest publicly funded health insurance scheme and Aadhaar-based benefit delivery, which increased social protection coverage from 19% of the population in 2015 to 64.3% in 2025.

A brief history of India's welfare state

The Constitution of India (1950) laid the foundations for India's comprehensive welfare system (Kattumuri and Singh, 2013; Kumar, 2005). The Directive Principles of State Policy in Part IV of the Constitution specify that "the State shall strive to promote the welfare of the people by securing and protecting as effectively as it may a social order in which justice, social, economic and political, shall inform all the institutions of the national life", including the right to adequate means of livelihood, equal pay for equal work and safe working conditions (Article 38(1) of the Constitution of India). Before Independence, the colonial administration had been conservative in its commitment to fulfil the welfare requirements of the Indian people, resulting in high poverty, poor life expectancy and high rates of infant mortality. This was despite previous administrations' long tradition of providing welfare to the people, dating back to ancient India (Kattamuri and Singh, 2013).

Until the 1990s, India's welfare system was largely centred on food security. Early efforts to extend welfare support were driven by India's history of famines (Rahman, 2024). Those that occurred during the 1870s and 1880s resulted in the Famine Codes, which established a formal administrative obligation to provide relief works and food assistance during subsistence crises (Drèze and Sen, 1989). The TPDS was initially established as the Public Distribution System (PDS) in the context of the Second World War and the 1943 Bengal Famine with a focus on cities (Rahman, 2024). Recurrent droughts and the persistence of undernutrition also led to the introduction of programmes such as the Maharashtra Employment Guarantee Scheme in 1973 and the Integrated Child Development Scheme on a pilot basis in 1975, before they were gradually expanded into nationwide programmes such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) or the Mid-Day Meal Scheme (MDMS) in the 1990s and 2000s.

Since the 1990s, India's welfare policies have increasingly focused on the poor. For example, the redesign of the PDS was intended to target households classified as below the poverty line and above the poverty line. The replacement of the PDS with the Targeted Public Distribution System (TPDS) in 1997 was intended to target households classified as below the poverty line and above the poverty line. This effort was expanded in 2013 under the National Food Security Act (NFSA), which continues to provide coverage to 'priority' and 'non-priority' households on this basis. Non-contributory pensions were introduced for the elderly, widows and disabled people under the National Social Assistance Programme (NSAP) in 1995. In 1996–97, the introduction of a programme for the provision of basic minimum services (BMS) led to a rapid increase in public social expenditure on safe drinking water, primary education, primary health, housing, school meals, rural roads and the PDS (Kumar, 2005). These efforts resulted in a decline in the poverty rate from 54.9% in 1973–74 to 26.1% in 1999–2000 (Kumar, 2005), but the effects varied across Indian states. The Government of India also expanded its efforts to improve conditions in the labour market (including women's participation and the eradication of child labour), healthcare, education, family welfare and equality more broadly.

Traditionally, India's states have taken on substantial responsibilities in social policy (Kattamuri and Singh, 2013). The Constitution specifies that health and education are the responsibilities of the central government, which shares responsibility for social security (including social insurance, unemployment protection and family welfare programmes) with state governments. The central government has

become more active in the field of social policy since the 1980s, paving the way for the introduction of a more comprehensive and rights-based nationwide welfare system in the 2000s. Yet states continue to play a major role in implementing most centrally sponsored and designed programmes. They are also able to initiate their own policies to supplement these schemes. This has resulted in some variation in the design and coverage of social protection systems between states, with Tillin (2022) identifying four clusters of welfare regimes among India's states.

Therefore, India has traditionally been categorised as having an 'informal security' or a 'protective' welfare regime rather than a comprehensive welfare state (Wood and Gough, 2006; Rudra, 2007). Given the high levels of informal work in India (and most developing countries), non-market and non-state actors such as families, communities and non-governmental organisations play a relatively pronounced role in supporting livelihoods and mitigating risk (Tillin, 2022). However, since the 2000s, India has adopted an increasingly universal, rights-based and centrally sponsored approach to social policy (Marshall, 1992), with a strong emphasis on social assistance programmes that are not linked to employment (Roy, 2023). State-level initiatives such as the Chhattisgarh Food Security Act complement major national programmes. This gradual expansion constitutes a shift from "schemes" to "systems" (Rahman, 2024).

India's modern social protection system

India's modern welfare system consists of three tiers that reflect the structure of the labour market (Kapur and Nangia, 2015). The top two tiers cover public sector workers and the formal private sector, who form just 6% of the country's labour force. These tiers consist of several contribution-based programmes that are largely for public sector employees. They include the Employees' Provident Fund, Atal Pension Yojana and the Employees' State Insurance Scheme (Kumar, 2025). The third tier covers informal workers, who constitute around 94% of the total labour force and are mainly covered through taxation-funded and means-tested benefits that are paid out based on poverty status (below the poverty line, above the poverty line, other), place of residence (urban, rural) or familial relations (mother, daughter, widow).

India adopted comprehensive social welfare programmes in the early 2000s, the most notable of which came under the flagship Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in 2005. The Act enshrined the right to work in law and thereby extended and harmonised coverage of the existing network of state-level rural employment programmes (such as the 1973 Maharashtra Employment Guarantee scheme). It was designed to enhance the "livelihood security of households in rural areas of the country" while creating "durable assets", including interventions in watershed management, afforestation, conservation and drought-proofing that increase climate resilience (Mahatma Gandhi National Rural Employment Guarantee Act, 2005: 2; 25). The programme requires the government to provide at least 100 days of employment per financial year to all rural households with adults who are willing to do unskilled manual labour on community and local infrastructure development projects in exchange for cash transfers. If the government is unable to provide employment, applicants are entitled to an unemployment allowance. By 2011–12, nearly one-third (29%) of rural households were employed on public works as part of MGNREGA, making it a core pillar of India's social protection system (Roy, 2023). This is one of the largest social welfare programmes in the world, covering a group of people as large as the entire US population.

Alongside MGNREGA, four other major programmes form the remaining pillars upon which India's modern welfare system rests: school meals (via the MDMS), the Integrated Child Development Services Scheme (originally piloted in 1975), the aforementioned PDS (now the TPDS, via the NFSA), and the social security pension scheme for widows, the elderly and disabled people (via NSAP). These programmes now cover a vast proportion of young children, elderly people and households (Roy, 2023).

The expansion of India's social protection schemes has been complemented by the creation of comprehensive public services. In the past, India focused on social protection schemes at the expense of public services, even if some individual states emphasised these services more than others did (Kapur and Nangia, 2015). In 2007–08, RSBY was launched to provide subsidised healthcare insurance to households below the poverty line. RSBY was absorbed by Pradhan Mantri Jan Arogya Yojana (PMJAY) in 2018 as the world's largest publicly funded health insurance scheme, consolidating over 20 state-level schemes into a single platform. Today's welfare system is also largely digitalised and

administered through Aadhaar, a mandatory biometric authentication scheme that is also used to distribute welfare benefits. For example, the PDS platform has largely been digitised, with eligibility determined via the One Nation One Ration Card system. Thanks to the hundreds of schemes India introduced, social protection increased from 19% in 2015 to 64.3% in 2025 (PIB, 2025).

Box 2.1. The Targeted Public Distribution System and the National Social Assistance Programme

India's food subsidy programme is channelled to beneficiaries through the **TPDS**. The PDS was designed as an urban food rationing scheme in the 1960s and converted to a universal, means-tested scheme targeted at people living below the poverty line in 1997, before it was further expanded under the NFSA in 2013. The scheme provides subsidised wheat, rice and some other commodities for purchase via fair-price shops.

NSAP provides immediate relief from life-cycle vulnerabilities. Such vulnerabilities include old age and widowhood, as well as disability. In addition, the Indian state provides a series of risk-mitigating programmes such as Janani Suraksha Yojana for incentivising institutional deliveries among pregnant women, to reduce infant mortality; Rashtriya Swasthya Bima Yojana (RSBY), which provides a health insurance scheme for the poor; and Aam Aadmi Bima Yojana, which provides life insurance to the poor in the event of the death or disability of the main breadwinner.

3. The impacts of climate change on India's social protection system

Climate change has substantial economic and social costs for India in water stress, declining agricultural productivity, weakened infrastructure and worsening health outcomes. These impacts are unevenly distributed across regions and income groups, with poorer, agriculture-dependent and rural populations bearing a disproportionate burden through lost livelihoods, food price shocks and reduced access to essential services. The scale of adaptation finance required far outstrips current investment, with persistent gaps between allocated budgets and actual spending, as well as a heavy reliance on domestic and private sources over concessional or multilateral finance. Left unaddressed, these compounding pressures risk deepening poverty and straining India's fiscal and social protection systems well beyond the sectors that are directly affected.

3.1. Climate impacts on India's economy

Climate change has increasingly negative socioeconomic consequences, such as increased poverty, inequality and social instability. Globally, the growing frequency and intensity of extreme weather events caused by warming could push an estimated 720 million more people into poverty (Granoff et al., 2015) and force 140 million others to become climate refugees (Rigaud et al., 2018) by 2050.

India is particularly exposed to the physical impacts of climate change. The country ranked ninth in the Global Climate Risk Index for 1995–2024, having experienced a high number of fatalities and severe economic losses due to floods, landslides, heatwaves and damage to agriculture, along with large-scale displacement caused by cyclones and heavy monsoons (Germanwatch, 2025). Examples of this include the 1998 Gujarat and 1999 Odisha cyclones, Cyclones Hudhud and Amphan in 2014 and 2020, and severe floods in 2013 and 2019. India is experiencing a growing number of more prolonged and extreme heatwaves, rain events and droughts, along with rising sea levels (Picciariello et al., 2021). One study suggests that declining agricultural productivity alone will increase India's poverty rate by 3.5 percentage points by 2040 compared to a zero-warming scenario (Jacoby et al., 2011). India is more affected by heat stress than any other country in the Asia-Pacific. The country is projected to lose 5.8% of its working hours, equivalent to 34 million full-time jobs, by 2030 in a moderate warming scenario, with the losses concentrated in agriculture and construction (International Labor Organization [ILO], 2019).

These impacts are unevenly distributed, with substantial regional and geographical disparity across the country. India's diverse geography makes it vulnerable to extreme weather events that have wide-ranging and geographically differentiated economic and social impacts, ranging from river flooding on the plains and in deltaic regions, heatwaves in central and northwestern states, cyclones along the coastal plains and rising sea levels that threaten coastal cities and farmland. Southern states are adversely impacted by temperature variations to a greater degree than their northern counterparts, due to persistently higher average temperatures and a sharper rise in temperature over time (Kumar and Maiti, 2025). States with a greater reliance on agriculture are also particularly exposed to a rise in temperature, leading to higher heat stress and more droughts that reduce agricultural output (ibid.).

The economic costs of climate change are mounting. In India, nearly 430 extreme weather events in the last three decades have caused 80,000 fatalities and economic losses of US\$170 billion, while affecting 1.3 billion people overall (Centre for Research on the Epidemiology of Disasters, 2025). The cost of climate change in India is estimated to reach US\$2 trillion by 2030 (RBI, 2023). In a high-emissions scenario, rising temperatures and shifting monsoon patterns could cost the Indian economy 2.8% of GDP, with the country's hotspot regions facing per capita GDP losses of up to 9.8% by 2050.

(Mani et al., 2018). Climate events reduce household welfare directly. Data from the National Sample Survey suggests that, during 1988–2012, the median household affected by a major climate event experienced a 16% fall in consumption (Aggarwal, 2019). Between 2018 and 2025, major disasters in India caused economic losses of more than US\$10 billion (INR 990 billion), 90% of which was not covered either by insurance or by disaster management allocations from the National Disaster Response Fund or the State Disaster Response Fund (World Bank, 2025a).¹

3.2. Sectoral impacts

The sectors in which India has felt these impacts most acutely correspond to the areas covered by the **Global Goal on Adaptation (GGA)**, established under Article 7 of the Paris Agreement. The GGA commits parties to “enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change, with a view to contributing to sustainable development” (United Nations Framework Convention on Climate Change). The conference of the parties (COP) 28 saw the finalisation of the GGA framework, and COP 30 the adoption of related indicators organised around seven themes: water supply and sanitation, food and agriculture, health impacts and health services, ecosystems and biodiversity, infrastructure and human settlements, poverty eradication and livelihoods, and cultural heritage (United Nations Framework Convention on Climate Change, 2025). The latter conference also saw the introduction of four iterative adaptation cycles covering assessment, planning, implementation and monitoring (ibid.). The indicators are not binding targets. Instead, they are intended to form a guiding framework for countries that seek to measure their progress in resilience and adaptation.

India’s National Adaptation Plan (NAP) covers five of the themes: water supply and sanitation, food and agriculture, health impacts and health services, infrastructure and human settlements, and poverty eradication and livelihoods.² All these areas are acutely affected by climate change and are priorities for social protection programmes.

Climatic vulnerabilities and economic factors jointly affect poverty rates in India (Behera et al., 2025). This is most pronounced in districts that are both economically dependent on the primary sector and highly drought-prone: such districts are 83% more likely to have high poverty rates than districts lacking one or both of these characteristics.

The most immediate impact of climate change is on wages and labour capability. Extreme heat directly impairs people’s physical capacity to work, reducing productivity and employment hours among outdoor and informal workers who cannot afford to stop. Income losses associated with extreme heat cost India US\$194 billion in 2024 (*The Lancet*, 2025).

Climate extremes also drive food inflation and poverty (Sharan et al., 2026) by increasing food’s share of the consumption basket of lower-income households. Monsoon failures and flood damage to crops generate spikes in the price of staple foods that most affect the poor, rural labourers and households in rain-shadow regions. When water sources are exhausted or contaminated, households must either purchase water at market rates or invest time in collection, both of which impose costs that reduce already tight budgets. These types of vulnerabilities are most acute, and India’s social protection programmes have the largest footprint, in the following areas.

Water

India faces an intensifying water crisis driven by the compounding effects of rising temperatures, shifting precipitation patterns and greater demand for agricultural and industrial production from a

¹ Estimated losses are from the following extreme weather events. Kerala experienced heavy rains and severe floods in 2018–19. West Bengal was hit by Cyclone Amphan in 2020–21. Rajasthan experienced a prolonged drought in 2021–22. Tamil Nadu was hit by Cyclone Michaung and associated floods in 2023–24. Himachal Pradesh experienced floods, cloudbursts and landslides in 2023–24.

² The implementation of the NAP will focus on nine sectors: water; agriculture; disaster management and infrastructure resilience; health; forests; ecosystems and biodiversity; poverty alleviation and livelihoods; traditional knowledge and heritage; and adaptation resourcing.

growing urban population. NITI Aayog's Composite Water Management Index (2019) assesses that India is experiencing the most severe water crisis in its history, with close to 600 million people facing high to extreme water stress and the country ranking in 120th place out of 122 nations in water quality.

India's groundwater resources are rapidly depleting. India is the world's largest user of groundwater, accounting for more than one-quarter of global extraction, with approximately 89% of this used for irrigation (UNESCO, 2022). The Central Ground Water Board classifies 730 (10.8%) of 6,762 groundwater resources in the country as overexploited, using estimates based on the stage of groundwater extraction for irrigation, industrial production and domestic use (PIB 2026a). A further 201 (3%) are in a critical state, with extraction between 90% and 100% of utilisable resources (ibid.).³ The board assesses that this stress is concentrated in Punjab, Haryana and Rajasthan, where extraction rates stand at 156%, 137% and 147% respectively (Comptroller and Auditor General of India, 2021). Annual groundwater extraction across the country stands at 247.22 billion cubic metres (bcm) against an extractable resource of 407.75 bcm, or 60.6%. However, these statistics mask acute stress in the northwestern states that are among India's most agriculturally productive.

Monsoon patterns are shifting. India's monsoons, which provide approximately 70% of the country's annual rainfall, are increasingly variable, with intense rainfall events punctuated by longer dry spells. Recent evidence suggests that extreme precipitation events have become more frequent across central India even as the monsoon season has become shorter (Roxy et al., 2017). This has severe direct consequences for household water security. In rural areas, the climate-induced failure of water resources has disproportionately pushed women and girls (who bear primary responsibility for water collection) to travel longer distances, while forcing households to reduce consumption or rely on low-quality alternatives. Evidence from the National Sample Survey and longitudinal rural studies indicates that water insecurity intensifies during both drought and flood years, contributing to adverse health outcomes and reducing school attendance and productive time. In urban areas, growing cities in water-scarce regions have experienced acute supply crises that, as climate projections suggest, will occur more often and last longer.

Agriculture

Agriculture continues to form a substantial part of India's real economy and is highly exposed to climate risks. The country's agricultural sector employs 42% of the population and contributes 18% of GDP, making it one of the most impactful segments of the labour market for determining the success of the Indian economy (World Economic Forum, 2025). Nine Indian states are in the top 50 most climate-vulnerable regions globally. They include the leading agricultural states of Bihar, Uttar Pradesh, Rajasthan, Tamil Nadu, Maharashtra, Punjab and Kerala (Ministry of Environment, Forest and Climate Change, 2024; Mongabay, 2023).

Agriculture comprises a significant portion of the Indian economy. Extreme weather events are increasingly triggering landslides and intense rainfall, which destroy crops and lead to a decline in yields. Higher average temperatures reduce the yields of temperature-sensitive crops, such as the wheat and pulses largely grown in Uttar Pradesh and Madhya Pradesh, by shortening the growing season and increasing water requirements. Excessive rainfall floods standing crops, degrades soil and changes pest and disease patterns, further impacting crop yields. These effects are especially evident for perishable crops such as the tomatoes, onions and potatoes grown in Uttar Pradesh and Maharashtra (Sharan et al., 2026; India Data Map, 2026).

Climate change directly impacts agricultural livelihoods. In rural India, the production of crops has been disrupted by excessive rainfall and droughts. This is especially true of those that are rainfed. Additionally, inorganic fertilisers are required to protect against fluctuations in temperature, which spread disease and reduce soil quality. Many farmers have very low adaptation capacity in these conditions, due to a lack of technical expertise, the absence of markets, inadequate funding for infrastructure, and inaccurate meteorological reporting in certain regions (Thein et al., 2025).

³ Categorization of Assessment Units (AU) is based on the stage of groundwater extraction (SoE) for the assessment year. An SoE of less than 70% is categorised as safe, between 70% and 90% as semi-critical between 90% and 100% as critical, and over 100% as over exploited.

Climate impacts and adaptive capability vary by region. Furthermore, given the distribution of agricultural activity across the country, there is a high degree of variability in the climate and, therefore, climate shocks. This means that adaptation has different requirements depending on the region. Districts in Odisha, a particularly vulnerable state, vary in terms of exposure, sensitivity and capacity to adapt to climate change based on their geographical and policy features (Hossain et al., 2024). It notes that adaptive capacity can be increased through well-designed policies and welfare schemes to help farmers recover from shocks (ibid.). Meanwhile, there is a divide between how rural and urban populations are affected by these shocks. Agricultural goods comprise a significant portion of the consumer price index, which applies different weights to urban and rural areas, and which varies by state. Changes in core inflation in response to temperature shocks are far stronger and more persistent in urban areas than rural areas (Sharan et al., 2026). Urban populations are more heavily impacted by price increases; the livelihoods of rural populations are directly impacted by climate shocks. This means that shocks to agriculture have far-reaching consequences across the economy, especially given the sector's significant contribution to GDP.

Resilient infrastructure

India's growth ambitions depend on efforts to meet its increasing demand for infrastructure such as roads, highways, ports, housing, energy grids and digital networks. The country will require US\$1.4 trillion in financing for infrastructure (including resilient infrastructure) if it is to become a US\$5 trillion economy (Confederation of Indian Industry [CII], 2022). However, the gap in this financing exceeds 5% of GDP. This poses a major challenge in the expansion of infrastructure and services for India's urban population, which is projected to increase from 480 million in 2022 to 951 million in 2050. Meanwhile, around 65% of Indians live in rural areas, comprising the largest rural population in the world (PIB, 2023). This is why there is an increasing focus on not only urbanisation but also support for rural economic growth and socio-economic inclusion, particularly through connectivity and infrastructure.

Intensifying climate stressors such as disasters, floods, landslides and coastal storms have an impact on both physical infrastructure and supply chains. Globally, the average annual loss (AAL) for infrastructure is an estimated 14% of GDP (2021–22), or between US\$732 billion and US\$845 billion (Coalition for Disaster Resilient Infrastructure [CDRI], 2023). There is a need to look at the short- and long-term impacts of climate change on critical infrastructure in areas such as energy, water supply, transportation and healthcare. These impacts should be assessed both in terms of direct effects on physical infrastructure and indirect effects such as the disruption of supply chains. For example, the increasing intensity of rainfall in mountainous regions of the country often results in landslides and floods that disrupt transport and road networks. This can involve both physical damage to roads and a break in connectivity that limit rural access to schools, healthcare and markets, thereby affecting livelihoods.

The increasing frequency of natural hazards also impacts asset life. In the state of Odisha, public infrastructure (which involves ten asset classes) has risk exposure of US\$19 billion (INR 1.81 trillion), with state highways alone accounting for US\$5 billion (INR 489 billion) of this (Down to Earth, 2026a). Given India's varying topography, there are marked differences between states in the damage caused by climate change and disasters. For example, damage to coastal infrastructure ranges from US\$24.3 million (INR 2,287 billion) in Mumbai, Maharashtra, to US\$38 million (INR 3.6 billion) in Balasore, Odisha (Roy, 2019). The Central Water Commission found that 593 coastal cities and districts are extremely vulnerable to sea-level rise, threatening coastal roads, residential areas and port infrastructure. I

Climate risks need to be integrated in planning for infrastructure growth. Currently, around US\$31 billion (INR 2.95 trillion) in Indian infrastructure investment is exposed to climate impacts, due to projects' location in some of the most climate-vulnerable areas of the country (Down to Earth, 2026; Bhattacharjee et al., 2026). The AAL for India's infrastructure assets is an estimated US\$31.59 billion (CDRI, 2023; 2025). In a changing climate characterised by increasing weather extremes, India's urban areas are at heightened risk of flooding and heat stress. In particular, urban dwellers are at risk of pluvial and surface flooding, which is projected to cause losses of US\$5 billion by 2030 (World Bank, 2025b). Without proper planning, the impacts of heat stress could worsen due to the urban heat island effect. In 2010–16, urban heat stress was at 10.1 billion person-hours per year, 71% higher than in 1983–90.

Similarly, between 1985 and 2015, unsustainable urbanisation expanded settlement extent⁴ in areas at very high risk of pluvial flooding by 102%.⁵ Because 40% of India's population is concentrated in dense urban areas on the coast, there are growing calls to impose 'no-build zones' (World Bank, 2025c). Nationwide, estimated losses from pluvial flooding are US\$4 billion a year and are projected to increase to US\$5 billion by 2030, while coastal flood damage is projected to cost Indian cities US\$21 billion in 2030 and US\$75 billion in 2050 if no action is taken (World Bank, 2025c). Similarly, heat stress could cost the Indian economy 2.5–4.5% of GDP by 2030 if it is left unaddressed (Down to Earth, 2026c; Garg and Rakheja, 2026). Indian cities may experience especially intense heat stress relative to models based on global estimates, with urban areas at higher risk than surrounding rural regions (Berk et al., 2025).

Road infrastructure is particularly exposed to climate hazards in the form of flooding, landslides and heatwaves, which affect its structural makeup (by causing asphalt to deteriorate). This is partly why 30% of climate exposure in South Asia is tied to the transport sector (Business World, 2024), with around US\$400 billion (INR 38 trillion) of India's transport assets extremely exposed to the changing climate (*Economic Times*, 2024). Such impacts are exacerbated by changing precipitation patterns, because road drainage systems are not designed to handle extreme rainfall. Major climate events such as flooding impacted an estimated 2,900 square kilometres of road infrastructure per year between 1981 and 2020, and will affect an estimated 7,800 sq km by 2050. The equivalent figures for heatwaves are 2,200 sq km per year and 6,100 sq km per year, and for landslides are 1,600 sq km per year and 4,800 sq km per year. The estimated costs of the damage caused by these hazards range from around US\$282 million to US\$520 million (INR 26 billion to INR 48 billion) per year (Somasundaram, 2025). In this context, lifecycle costs and maintenance expenses are projected to increase by up to 53% (in flood-prone regions) and 33% (due to heat stress) during this period (ibid.) The impact on road systems has cascading effects that extend beyond physical damage to supply chains and the broader economy.

The severity of climate change risks in Indian states depends not only on whether they are in a location vulnerable to natural disasters but also on their economic resilience. Bihar, Uttar Pradesh, Assam, Rajasthan, Tamil Nadu, Maharashtra, Gujarat, Punjab and Kerala are among the 50 states and provinces worldwide that are most exposed to physical climate risks. Measured by damage ratios,⁶ Bihar is the Indian state that is most vulnerable to physical damage due to climate extremes (Kumar, 2023).

Health and food security

There is growing recognition of climate impacts on health. Globally, there have been several studies of these impacts in relation to infectious and non-infectious diseases, and on the transmission of vector-borne diseases such as malaria, cholera and dengue (*The Lancet*, 2025; Maslin et al., 2025). The World Health Organisation (WHO) recognises climate change as an increasing health threat that impacts livelihoods, increases the risk of exposure to disease, strains health systems and deepens socio-economic inequality in access to healthcare services. Between 2030 and 2050, there could be a projected 250,000 additional deaths attributable to impacts of climate change such as malnutrition, malaria, diarrhoea and heat stress (WHO, 2023). Globally, heat exposure-related mortality has increased by 167% in people older than 65 since 1990 (*The Lancet*, 2024). Extreme weather events such as floods and droughts also have a larger cyclical impact on human health: they reduce the availability of clean drinking water, which increases the likelihood of water-related and diarrheal diseases, and impacts the supply of food, resulting in food insecurity and malnutrition. Climate change can also exacerbate pre-existing health conditions. For example, a rise in temperature of 1°C has been found to increase kidney-related morbidity and mortality (Maslin et al., 2025).

⁴ Human settlement extent is an indicator used to map interaction between urbanisation and social and environmental pressures by mapping the buildings, roads and other man-made structures (Qiu et al., 2020).

⁵ Analysis drawn out for selected Indian cities (World Bank, 2025) based on Rentschler et al. (2022) assessment of global flood and settlement data

⁶ Damage ratio is the AAL of properties damaged by extreme weather events as a share of their replacement cost.

India is increasingly vulnerable to these climate-related impacts on morbidity and mortality. In the Global Risk Index 2021, India ranked in third place for deaths caused by extreme weather events between 2000 and 2019 (Eckstein et al., 2021). In a high-emissions scenario,⁷ if heat stress is left unaddressed, the rate of such deaths in India is projected to rise from 144,000 per year to 328,500 per year by 2050 (World Bank, 2025). Various studies have estimated the impact of heat on morbidity and mortality levels in various regions of India during different periods. For instance, when the daily maximum temperature rises from less than 38°C to more than 40°C, there is projected to be a 33.3% increase in heat-related deaths in north-central India. Similarly, a 2010 heatwave in the western Indian city of Ahmedabad led to a 43% rise in heat-related deaths (Yasobant et al., 2025). Climate change will result in an estimated 1.5 million additional deaths in India by the end of the century (Centro Euro-Mediterraneo sui Cambiamenti Climatici [CMCC], 2021).

The changing climate is also affecting the geographical spread of diseases. Warmer temperatures and shifting precipitation patterns are creating conditions for the transmission of diseases. For example, climate change and extreme weather events such as flooding increase the likelihood that people will catch malaria. This is a significant public health issue in India, which accounts for 1.4% of all cases of the disease. Climate change could also spread malaria from the lowlands (where most cases occur) to places such as the Himalayan region, and could bring about unpredictable shifts in transmission patterns (WHO, 2023a; PreventionWeb, 2024; OC Academy, 2025). In a medium emissions scenario,⁸ rising temperatures will likely mean that, by 2050, 98.1% of the Indian population will be at risk of catching dengue and 97.2% at risk of catching Zika (CMCC, 2021).

Climate change and extreme weather events also have an impact on food productivity and supply chains. India ranks in 102nd place out of the 123 countries on the Global Hunger Index 2025,⁹ indicating that the country's food security is already under strain. Climate change not only increases food insecurity and malnutrition but also, through income losses, reduces people's ability to adapt and recover. This problem is especially acute in countries with a high dependence on agriculture for employment. The multidimensional impact of climate change on food security and nutrition also affects the distribution and accessibility of food (Das et al., 2025), while children living in climate-vulnerable regions are at increased risk of malnutrition (Mahapatra, 2021).

Vulnerable people in India will be disproportionately burdened with growing climate impacts on their health. Poorer citizens and those living in rural areas are more vulnerable to health risks involving inadequate sanitation, pollution, shortages of clean drinking water and a lack of access to health infrastructure. Globally, climate change is projected to cause between US\$2 billion and US\$4 billion in damages to healthcare services and infrastructure per year by 2030 (WHO, 2023). This will be especially apparent in developing countries, whose health infrastructure is poorly equipped to deal with these effects. For example, malaria damages household finances in the form of out-of-pocket expenses ranging from US\$0.34 to US\$7.66 per infection, and disproportionately affects poorer people's income through lost working hours (Severe Malaria Observatory, 2025).

The health sector's vulnerability to climate change should be assessed in terms of both exposure to extreme weather events and the adaptive sensitivity and capacity of the state, including its health infrastructure. Eastern and central Indian states such as Jharkhand, Mizoram, Odisha, Chhattisgarh, Assam, Bihar, Arunachal Pradesh and West Bengal are extremely vulnerable to not only extreme climate events such as flooding and heat stress but also poverty levels and lack of adaptive capacity in the health sector (Nandi, 2021).

3.3. Climate adaptation and resilience investment needs

India's 2015 Intended Nationally Determined Contribution (INDC) identified a preliminary financing requirement of US\$206 billion for adaptation-related initiatives in agriculture, forestry, fisheries,

⁷ SSP3-7.0 (regional rivalry) is a high emissions scenario where CO₂ emissions double by 2100, with global temperatures reaching 2.8 –4.6°C above pre-industrial levels.

⁸ SSP2-4.4 is a medium emissions scenario in which CO₂ emissions stay at their current levels before declining mid-century, resulting in temperatures that are around 2.7°C above pre-industrial levels.

⁹ Assessed on four indicators: undernourishment, child stunting, child wasting and child mortality

infrastructure, water resources and ecosystems between 2015 and 2030 (Ministry of Environment, Forest and Climate Change [MoEFCC], 2022). The country's Initial Adaptation Communication to the United Nations Framework Convention on Climate Change (UNFCCC) provides a more recent and granular set of estimates. In a business-as-usual scenario, India will need to have spent an estimated US\$700 billion (INR 56.68 trillion) on adaptation between 2023 and 2030 (MoEFCC, 2023). Climate-induced damages are projected to add an incremental cost of US\$164 billion (INR 15.5 trillion) by 2030. The cost of adapting India's building capital stock could reach US\$762.9 billion (INR 72 trillion) in this period, after accounting for climate-induced pressures and the country's broader developmental needs. The RBI estimates that, by 2030, India will require additional annual investment of at least 2.5% of GDP to repair or replace infrastructure damaged by climate events.

There has been limited mapping of sectoral climate adaptation needs at the national level.

Additionally, subnational adaptation needs differ according to the sectoral impacts of climate change. In the updated State Action Plans on Climate Change (SAPCCs) for 2021–30, the states of Odisha, Tamil Nadu, Kerala, Haryana, Himachal Pradesh and Goa have collective annual adaptation investment needs of US\$5.5 billion (INR 444.7 billion), with Odisha and Tamil Nadu accounting for the largest share of this (Climate Policy Initiative, 2024). The SAPCCs include sectoral breakdowns covering investment needs for water, agriculture, health and infrastructure, but there is a wide variation in the methodologies used to make these estimates.

Table 3.1. Variation in estimates for adaptation finance needs of India

National adaptation investment needs	Adaptation-related action	Organisation
US\$206 billion (2014–15 prices)	Initiatives in agriculture, forestry, fisheries, infrastructure, water resources and ecosystems	MoEFCC (2015)
US\$700 billion (between 2023 and 2030)	General adaptation	MoEFCC (2023)
US\$897 billion (at 2011–12 prices)	General adaptation	Department of Economic Affairs (2020); MoEFCC (2022)
US\$14 billion to US\$67 billion per year	Development interventions	MoEFCC (2015)
2.5% of GDP (at least US\$85 billion)	Efforts to close the infrastructure gap	RBI (2023)

Source: Adapted from Dasgupta and Sharma (2025).

In the water sector, there is no comprehensive estimate of India's climate adaptation financing needs.

Nonetheless, the country's Initial Adaptation Communication identifies agriculture and water as top adaptation priorities for developing countries. Urban infrastructure alone will require an estimated US\$150 billion in investment over the next 15 years, alongside major investments in water storage, irrigation and flood management (World Bank, 2026). Even within current budgets, there is a persistent gap between allocations and spending. This can be seen in the experience of the JJM, a flagship programme that the Government of India launched in 2019 to provide a Functional Household Tap Connection (FHTC) to every rural household in the country. The revised estimate for spending on the JJM was 75% less than its budget allocation in 2025–26, and actual expenditure was 68% less in 2024–25 (PRS Legislative Research, 2026d). There are emerging efforts to mobilise private finance for investment in the water sector at the subnational level. In Maharashtra, the World Bank and the International Finance Corporation are helping cities attract commercial capital through bond

financing, public–private partnerships and wastewater reuse, but these remain state-specific initiatives rather than part of a coordinated national adaptation financing strategy.

In South Asia’s agricultural sector, smallholder farmers are receiving only 1.59% of the estimated US\$150 billion (INR 12.45 trillion) in adaptation and resilience financing they require (Family Farmers for Climate Action, 2025). Between 250 million and 270 million people in India, or around 40–44% of the country’s workforce, fall into this category (World Bank, 2026; Bisht, Rana and Ahlawat, 2020). Over the years, financing for Indian agriculture has been characterised by the social protection goals of supporting farmers’ livelihoods, while also improving the resilience and adaptability of the entire agricultural value chain. In 2015, in line with the National Mission for Sustainable Agriculture and the goal of doubling farmers’ income, the Government of India began funding initiatives in areas such as climate-resilient agriculture, watershed management, integrated farming, organic farming, agricultural resources management and micro-level planning (Climate Policy Initiative, 2025). Tracked financing for sustainable agriculture¹⁰ stood at around \$US301 billion (INR 22,393 billion) annually between 2020 and 2022 (ibid.), with 99.5% of this coming from domestic sources (99.5%) and 67% of it from private financing (with public sources making up the remainder). Agricultural financing is dominated by initiatives that focus on funding farm practices and cropping choices, leaving a shortfall in financing for areas such as agricultural inputs, irrigation, storage and market connectivity. Development finance institutions and multilateral development banks have the potential to unlock high levels of financing for sustainable agriculture, but only accounted for 0.6% of the total in this period (Climate Policy Initiative, 2025).

Box 3.1. NABARD and the NAFCC

The National Bank for Agriculture and Rural Development (NABARD) plays a pivotal role in advancing climate adaptation, social protection and rural development. It acts as the implementing agency of the National Adaptation Fund for Climate Change (NAFCC), which was established in 2015 and receives annual funding that the MoEFCC distributes to support climate adaptation and resilience interventions. Around two-thirds of the US\$98 million that NAFCC distributes has gone towards climate-resilient infrastructure and agriculture (Soanes et al., 2019).

NABARD also manages financing from various domestic and international adaptation funds, making it one of the primary channels for adaptation finance in India. It is an accredited National Implementing Entity (NIE) for the NAFCC and the UNFCCC Adaptation Fund (AF), as well as a Direct Access Entity for the Global Climate Fund (GCF) (IIHS, 2024). From 2015 to 2020, there were around 40 adaptation-focused projects in India. Collectively worth US\$2.7 billion, they were largely financed by multilateral funds such as the Green Growth Equity Fund (GGEF), the GCF and the AF or by multilateral agencies such as the Asian Development Bank. Overall, the bank directs more than 28% of its funds towards climate change adaptation and mitigation, with a focus on forestry, agriculture, animal husbandry, land development and irrigation. Notable adaptation-oriented programmes include the Rural Infrastructure Development Fund, the Umbrella Programme on Natural Resource Management and the NABARD Infrastructure Development Assistance scheme. Through NABARD, the GCF will provide US\$20 million to help underwrite agricultural crop insurance plans for small and marginal farmers in India’s rural areas (GCF, 2025).

India will require US\$2.4 trillion in investment in climate-resilient and low-carbon infrastructure by 2050 if it reaches 43% urbanisation, and US\$2.9 trillion if it reaches 54% urbanisation (World Bank, 2025). The country’s development policies are implicitly designed to integrate sustainable, energy-efficient solutions into critical infrastructure through the National Mission on Sustainable Habitat. This effort covers schemes including the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), the Swachh Bharat Mission, SMART cities missions and urban transport programmes. Meanwhile, the Government has issued guidelines on disaster management that address climate risks and resilience linked to infrastructure, such as the 2010 Guidelines on Management of Urban Flooding, the 2016

¹⁰ This broadly tracks funding on activities aligned to three objectives– 1. Food security; 2. Emissions reduction; 3. Climate resilience.

Simplified Guidelines for Earthquake Safety of Buildings (under the National Building Code of India), and the 2019 National Landslide Risk Management Strategy (Irani, 2026). However, the lack of legally binding requirements and poor monitoring of the construction industry makes India's infrastructure networks more susceptible to intensifying climate extremes. At the subnational level, some Indian cities are building resilience through initiatives such as local flood forecasting (Kolkata), stormwater management schemes (Chennai) and the creation of warning systems. (World Bank, 2025).

Fiscal allocations to infrastructure have increased fivefold in recent years, rising from US\$21.25 billion in 2014–15 to US\$129.7 billion in 2026–27 (PIB, 2026). The government is also supporting the creation of infrastructure financing funds and national development banks such as the National Investment and Infrastructure Fund (NIIF) and the National Bank for Financing Infrastructure and Development (NaBFID), attracting capital from global and domestic institutional investors. NaBFID has provided more than US\$10 billion to infrastructure projects (Saroha, 2025), while NIIF, with around US\$4.4 billion equity capital, has invested in resilient infrastructure through organisations such as the GGEF, which was established in partnership with the UK Government. Similarly, there is growing asset monetisation through Infrastructure Investment Trusts and Real Estate Investment Trusts in India. However, most climate and resilience initiatives are indirectly integrated into these trusts through efforts such as ESG reporting (as per the Securities and Exchange Board of India's Business Responsibility and Sustainability Reporting).¹¹ Nonetheless, most infrastructure financing in India still leans towards conventional growth at the expense of resilience. This is due to a lack of efforts to map climate risks and exposure – and, accordingly, requirements for investing in adaptation and resilience.

India's public health sector is chronically underfunded. The country's health expenditure is at around 3.3% of GDP (WHO, 2025; Macrotrends, 2022), compared to the OECD average of around 9.3% of GDP (OECD, 2025). India's Health Mission incorporates climate change considerations into its broader health planning structure through the National Action Plan for Climate Change and Human Health. The main goal of the plan is to "...reduce morbidity, mortality, injuries and health vulnerability due to climate variability and extreme weathers" (Ministry of Health and Family Welfare, 2018). The mental health consequences of climate change have also been recognised by the Ministry of Health and Family Welfare, which developed a National Action Plan on Climate Change and Human Health (NAPCCHH). However, the implementation of related initiatives is still fragmented, there is a lack of data on climate-sensitive health outcomes, and vulnerable people tend to have only a limited awareness of the risks (Ravindra, 2025). These challenges are heightened by the fact that India is among the 56% of countries that have not mapped needs in climate adaptation for health adaptation. Global needs in this area are projected to increase to between US\$310 billion and US\$365 billion per year by 2035 (United Nations Environment Programme [UNEP], 2025). In this environment, climate change's growing impact on health outcomes in India could further increase demand for health expenditure.

¹¹ SEBI mandates ESG disclosure through Business Responsibility and Sustainability Reporting for the top 1,000 listed companies, which include Real Estate Investment Trusts and Infrastructure Investment Trusts that provide disclosures on climate-related risks.

4. Responses to the climate-driven increase in social protection needs

India's social protection system is increasingly being leveraged as a vehicle for climate adaptation, but existing schemes lack a consistent methodology for distinguishing between adaptation-specific expenditure and broader development spending. This absence of a standardised taxonomy, combined with persistent implementation gaps, makes it difficult to systematically track or scale the adaptation value already embedded in these programmes. As India develops its National Adaptation Plan, aligning social protection more explicitly with adaptation planning could unlock significant co-benefits without requiring entirely new financing streams.

4.1. Adaptation as a co-benefit to social protection

India's growing exposure to heat stress, extreme rainfall events and flooding calls for greater investment in climate adaptation and social protection projects and programmes. Social protection programmes are a potentially significant source of climate adaptation funding, especially from the public sector. They offer co-benefits in the form of social development and increased resilience against climate change, potentially helping the country achieve multiple national development goals. Increased resilience against climate change could also lead to long-term cost-saving potential for India's public finances. It is estimated that resilient investment could cut costs from US\$48.5 billion to US\$2.2 billion (Bharadwaj et al., 2025).

India has made measurable progress in total adaptation-relevant expenditure, which reached 5.60% of GDP in 2021–22, up from 3.7% in 2015–16 (MoEFCC, 2023). Domestic public finance is the main driver of adaptation initiatives. State governments alone account for more than 60% of public expenditure in this area and bear primary responsibility for sectors relevant to adaptation, including agriculture, water, health and urban development. The central government's expenditure on schemes linked to climate resilience that it sponsors stood at US\$43.8 billion (INR 3,260 billion) in 2017–18, with state governments contributing multiples of this amount. However, these figures include broader development expenditure, reflecting India's approach of treating adaptation largely as a co-benefit of development spending rather than a distinct investment category (Climate Policy Initiative, 2024).

4.2. India's adaptation policy framework

National Adaptation Plans (NAPs) are being developed across the world. Indeed, 172 out of 197 countries now have such a plan, strategy or policy (UNEP, 2025). The MoEFCC is currently leading the preparation of India's first comprehensive NAP, which provides a strategic framework for identifying adaptation priorities and estimating financing needs for adaptation. The NAP identifies nine priority sectors, including agriculture, water, health, forestry and resilient infrastructure. The NAP centres on three priorities: strengthening knowledge systems; reducing exposure to climate risks; and enhancing adaptive capacity. The plan is being developed with a long-term perspective, providing a framework for integrating adaptation into national development plans and policies (PIB, 2026).

It is increasingly important to map adaptation needs and the costs of meeting them. Government think-tank NITI Aayog is supporting the development of adaptation cost assessments, which were explicitly not included in recent efforts to cost and provide sectoral roadmaps for India's net zero and growth transition. India's Ministry of Finance released in May 2025 a draft of the Climate Finance Taxonomy, which includes a categorisation of adaptation activities. The taxonomy will be developed to include qualitative and quantitative eligibility criteria, likely aligned with the MoEFCC's NAP.

Box 4.1. Case study: MGNREGA

Initially designed to support livelihoods and durable economic infrastructure, MGNREGA has gradually evolved into one of India's main sources of financing for adaptation and resilience. There has been a paradigm shift in its operations since its introduction in 2005, with the policy documents it produces becoming more climate-conscious over time (Campbell et al., 2023). The programme has climate adaptation benefits in several areas.

Firstly, the scheme creates a social safety net by guaranteeing paid employment that allows households to maintain an income during the agricultural off-season or during climate shocks such as droughts, floods and cyclones. Secondly, the scheme supports climate adaptation and resilience through infrastructure development (Jatav and Nair, 2022; Fischer, 2019) and has piloted techniques for India's Ministry of Rural Development to integrate climate risk management into the selection, design and maintenance of rural infrastructure created under the scheme (Kaur et al., 2019). Work under the scheme contributes to public and private infrastructure in four main areas: natural resources management, community and individual assets, common infrastructure and rural infrastructure. **It is estimated that nearly 75% of MGNREGA's permissible works directly improve water security and support water conservation efforts, positioning the scheme as central to climate adaptation in rural India (PIB, 2019).**

By 2021, projects under MGNREGA had captured 102 million tonnes of carbon dioxide (Moudgil, 2021). A large percentage of carbon sequestration under the scheme took place through drought proofing, forest restoration and grassland development. By 2030, initiatives under MGNREGA may have sequestered 249 million tonnes of carbon.

There is evidence that MGNREGA projects have had a positive impact on adaptation and resilience outcomes, leading to innovative policy recommendations on how to support India's adaptation and resilience efforts (Beauchamp and Pertaub, 2022; Campbell et al., 2023). Evidence from field surveys in climate-vulnerable districts shows that MGNREGA-supported water conservation projects improved groundwater levels and reduced water scarcity, with farmers reporting a 15% to 20% increase in agricultural productivity as a result. Approximately 72% of surveyed respondents confirmed these water-related benefits. Afforestation and soil conservation activities, including tree planting and contour trenching, have helped prevent soil erosion, with 68% of workers reporting reduced land degradation and 55% of officials acknowledging improvements in local biodiversity. The programme has also helped reduce climate-induced seasonal migration, with 58% of workers reporting greater stability in year-round employment (IJRAR, 2025). Formal employment contracts offered through the scheme have also helped strengthen governance systems and build local capacity to address climate vulnerabilities (Campbell et al., 2023).

MGNREGA's effectiveness as a structured climate adaptation tool has been constrained by significant implementation gaps. Project selection has continued to be driven primarily by immediate employment needs rather than long-term climate adaptation planning, with 42% of officials acknowledging this misalignment. Delayed wage payments and irregular fund disbursement have undermined worker participation and the continuity of projects. Monitoring and evaluation mechanisms have remained weak, making it difficult to systematically assess ecological outcomes. Inadequate technical training at the panchayat (village) level has further reduced the quality of climate-focused project design and execution.

The Government has gradually expanded and reformed MGNREGA in recent years. In December 2025, it introduced the Viksit Bharat Guarantee for Rozgar and Aajeevika Mission (Gramin) Bill, proposing a comprehensive overhaul of MGNREGA aligned with the Viksit Bharat 2047 vision. The Bill has increased the employment guarantee from 100 to 125 days per rural household annually, and explicitly adopted climate resilience as a core objective by identifying four priority areas of work: water security, core rural infrastructure, livelihood-related infrastructure and special works designed to mitigate extreme weather events. Around US\$10 billion (INR 860 billion) was allocated to the scheme in 2024–25 (Ministry of Rural Development, 2025). While this is a significant amount, it is just 5% of India's overall spending on social protection. This spending includes education, health and nutrition, and was estimated at 5.1% of India's GDP in 2025, or around US\$200 billion (ILO, 2025).

4.3. Existing social protection schemes with dual adaptation benefits

India's lack of a taxonomy for adaptation finance hinders efforts to precisely define what counts as **adaptation**. The draft Climate Finance Taxonomy calls for adaptation to form part of development in sectors that are vulnerable to climate change, specifically referring to agriculture, water resources, the Himalayan region, coastal regions, and health and disaster management. The draft taxonomy refers to technologies, measures, projects and activities that are aligned with adaptation finance and that enhance resilience or mitigate risks and vulnerabilities linked to climate hazards. However, there has been no further quantification (or even qualitative alignment) of these activities. While social protection policies have been considered to enhance climate adaptation, the absence of a methodology or framework to assess how development programmes address climate risks and vulnerabilities makes it difficult to neatly distinguish between adaptation financing and development financing (Jogesh and Paul, 2020).

Box 4.2. State Action Plans on Climate Change

State-specific plans complement the national framework for climate action. The National Action Plan on Climate Change (NAPCC), which the Government of India published in 2008, provides the overarching national framework for addressing climate change while advancing development objectives. The NAPCC is organised around eight national missions in areas including solar energy, water, agriculture and the Himalayan ecosystem. Since India's quasi-federal governance structure assigns primary responsibility for most climate-relevant sectors (natural resources, infrastructure, industries) to state governments, the NAPCC cannot be implemented through central action alone. The central government mandated each state to develop a State Action Plan on Climate Change (SAPCC), following a uniform format that outlines its strategy for adapting to current and future climate vulnerabilities. Since their inception, SAPCCs have evolved considerably in both scope and ambition: early plans (2010–15) were predominantly mitigation-oriented, characterised by standalone climate projects with limited budgetary linkages. **Following a delay in which most states continued to operate using these first-generation plans,** revised plans (covering 2020 onwards) reflected a shift towards adaptation-led development and the use of state- and district-specific climate risk analysis, converging on flagship social protection schemes and outcome-focused monitoring frameworks (Economic Survey, 2025–26).

Taxonomies are being developed to standardise the classification of adaptation activities that may reduce physical climate risks or boost resilience. These taxonomies will allow for clear distinctions between adaptation activities and development initiatives in which adaptation is only a co-benefit. Globally, there are many adaptation taxonomies and frameworks. For instance: the EU Taxonomy for Sustainable Activities focuses on preventing maladaptation, based on the rule of 'do no significant harm'; the Climate Bonds Resilience Taxonomy is designed to facilitate investment through capital markets; the PMAY-U developed the Adaptation **Finance** Tracking Taxonomy to track projects that either reduce physical risks or enhance resilience or capacity to adapt to those risks; and the UN Office for Disaster Risk Reduction's Budget Tagging for Disaster Risk Reduction and Climate Change Adaptation taxonomy covers aspects of government budgets that are linked to disaster risk reduction or adaptation. However, if adaptation initiatives are to adopt a perspective that is more specific to regions and sectors, there will need to be taxonomies grounded in the local context.

Given the design of India's social protection schemes, we use the Adaptation Tracking Taxonomy. The taxonomy provides a systematic framework for identifying and classifying adaptation activities across seven thematic areas. It classifies these activities in sectors, subsectors and specific interventions, tagging each with indicators that include likelihood of adaptation, maladaptation risks and relevance to climate hazards. It establishes four criteria for adaptation finance, which are that it must target beneficiaries in settings that face material physical climate risks, materially reduce those risks, produce measurable adaptation-related outcomes, and avoid contributing to maladaptation or significant harm (Climate Policy Initiative, 2024). While the taxonomy was designed with private finance flows in mind, the adaptation activities it identifies are often the same as those that fall under India's social protection programmes.

We adopt a two-stage approach to assessing social protection schemes in five adaptation-relevant sectors: water, agriculture, resilient infrastructure, poverty alleviation and health. The first stage focuses on the scheme's design and components, and its alignment to the Adaptation Tracking Taxonomy, with the aim of identifying expenditure that qualifies as relevant to adaptation.¹² The second stage focuses on whether specific sub-components align with climate adaptation outcomes. Since adaptation is specific to the geographic and socio-economic context of a region, we explore how social protection schemes and adaptation merge at the state level.

Social protection policies that are tailored to particular regions can support context-specific adaptation initiatives. India's quasi-federal governance structure allows states to autonomously fund and adopt such schemes. All the schemes we assess are implemented by state governments, which share their costs with the central government.¹³ The insurance schemes PMFBY and PMJAY are funded entirely by the central government, but states can choose whether to adopt them.

Table 4.1. Overview of India's social protection programmes for climate adaptation and resilience

Social Protection	Sector	Scheme	Budget (2026–27)	Objective	Subcomponents	Adaptation potential (Climate Policy Initiative) ¹⁴
Social Assistance	Water	JJM	US\$7.3 billion (INR 676.7 billion)	Provides an FHTC to every rural household through individual tap connections	Tap water supply; community engagement in planning; greywater management; provision of good water quality; groundwater recharge; training local people to build and maintain water supply structures; involvement of women	Medium
	Infrastructure	PMGSY	US\$2.04 billion (INR 190 billion)	Provides all-weather road connectivity to rural households	Decentralised planning; quality management; promotion of green technologies; climate resilient design strategies that use locally available inputs, such as bituminous materials that provide resilience against extreme heat and cold; soil stabilisation; cold mix technology for cold climates	Medium

¹² Activities that could potentially receive trackable financing.

¹³ Indian government initiatives are primarily implemented as either Central Sector Schemes (CS) or Centrally Sponsored Schemes (CSS), differing mainly in their funding, implementation and objectives. CS are 100% funded and implemented by the central government, while CSS are implemented by the state governments with cost-sharing between centres and state.

¹⁴ Based on the Climate Policy Initiative's Adaptation Finance Tracking Taxonomy.

					and high-altitude regions; cell-filled concrete in places that have inadequate drainage facilities and are prone to becoming waterlogged; industrial waste	
		PMAY-U and PMAY-U 2.0	US\$2.4 billion (INR 220.25 billion)	Facilitates access to affordable housing for low- and moderate-income households	In situ slum redevelopment; credit-linked subsidy schemes; affordable housing partnerships; beneficiary-led construction; interest-subsidy schemes; affordable rented housing; technology innovation grants	High
Social Insurance	Agriculture	Pradhan Mantri Fasal Bima Yojana (PMFBY) <i>including the Restructured Weather Based Crop Insurance Scheme (RWBCIS)</i>	US\$1.31 billion (INR 122 billion)	Provides farmers with voluntary weather-based crop insurance that has low premiums	Financial resilience against weather events; farmer protection; area-based risk assessment; rural credit-market stabilisation; public and private insurance	High
	Health	Ayushman Bharat PMJAY	US\$1.05 billion (INR 95 billion)	Makes healthcare services more accessible and affordable, with a view to establishing universal health coverage by 2030; a sub-component of PMJAY developed as public health insurance for low-income families and citizens aged 70 and over	Secondary and tertiary healthcare and hospitalisation; digitalisation	Low

Source: Authors.

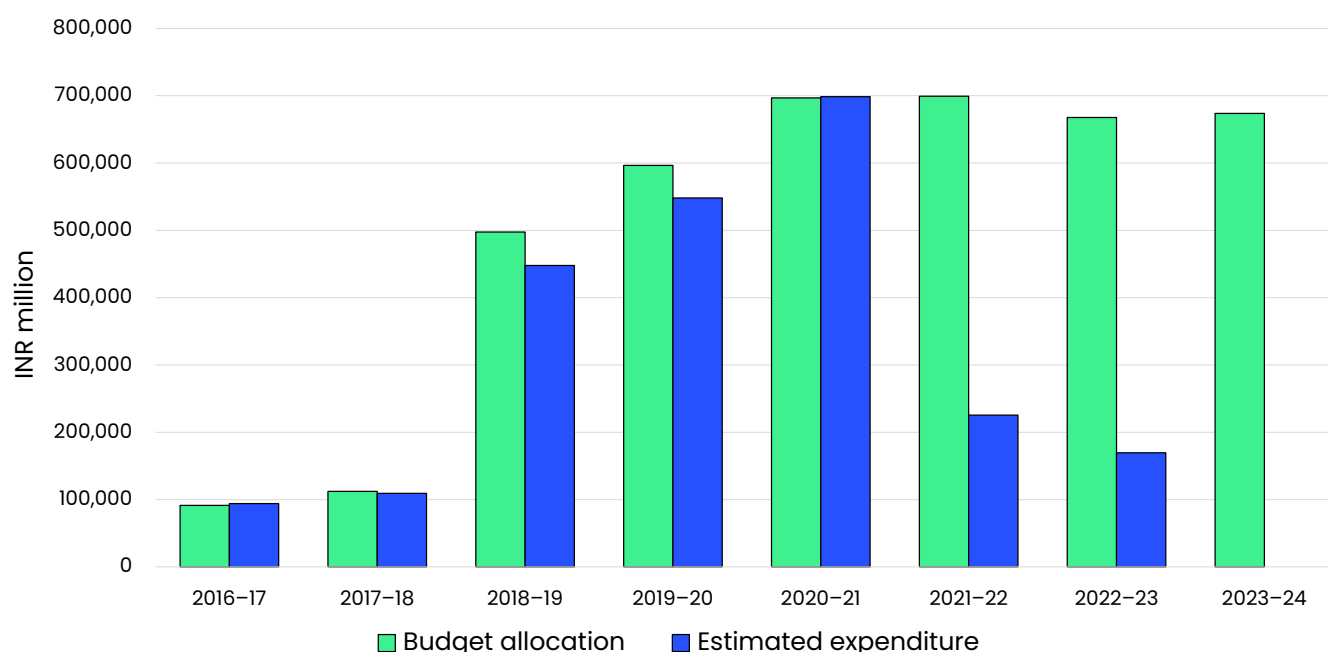
Jal Jeevan Mission

The JJM provides financial and technical assistance to states and union territories, with a focus on service delivery at the household level. When it was launched in August 2019, only 16.72% of rural households had tap water connections. By January 2026, this had risen to 81.53% (Ministry of Jal Shakti, 2026).

Rural water security is central to the JJM. The programme's approach to rural water security rests on five interlinked pillars: universal access through FHTCs; water quality assurance through end-to-end monitoring that is supported by a nationwide network of over 2,800 laboratories; source sustainability through conservation, recharge and conjunctive water use, particularly in water-stressed and climate-vulnerable regions; community ownership, operation and maintenance through Gram Panchayats (institutions of self-government constituted at the village level), Village Water and Sanitation Committees (VWSCs) and Self Help Groups; and institutional and digital reforms through digital public infrastructure, role clarification and accountability mechanisms (Ministry of Jal Shakti, 2026). The JJM has a four-tier institutional structure comprising the National Jal Jeevan Mission, which is responsible for policy guidance, funding and monitoring; State Water and Sanitation Missions, which oversee state-level implementation and coordination; District Water and Sanitation Missions, which handle district-level approvals and planning; and Gram Panchayats and VWSCs, which engage in village-level planning, implementation, operation and maintenance.

By 2025, the JJM had shifted away from a construction-led approach and towards service delivery and sustainability. This transition was supported by the integration of information on assets, sources, functionality, water quality and sustainability into unified digital data systems; the adoption of role-based dashboards at the national, state, district and Gram Panchayat levels; and the launch in December 2025 of Jal Seva Aankalan, a Gram Panchayat-led functionality assessment framework rooted in Gram Sabha deliberations. (The Gram Sabha comprises all persons whose names appear on the electoral rolls for the Panchayat at the village level.) Tap water connections have been extended to 89.62% of government schools and 85.6% of Anganwadi Centres. Household tap water coverage has reached 83.34% in districts affected by Japanese Encephalitis and Acute Encephalitis Syndrome, contributing to measurable public health outcomes (Ministry of Jal Shakti, 2026). Recognising the need to provide tap water connections to all citizens, the finance minister announced in the Union Budget 2025–26 that the JJM would be extended until 2028 and would receive additional funding.

Figure 4.1. JJM budget allocations and estimated expenditure



Source: Ministry of Finance (2025).

In the Adaptation Finance Taxonomy, the JJM most closely corresponds to the category of Potable Water Treatment and Delivery, which falls under Water and Sanitation. This category encompasses efficient water treatment plants, pipes for water delivery, boreholes, tube wells and water distribution networks. The taxonomy rates this category as having a medium level of adaptation potential. It is linked to multiple climate hazards, including heat stress, water stress and droughts. The taxonomy also highlights the potential for significant harm in this area, as climate hazards could inhibit the protection of water and marine resources. This consideration is relevant to large-scale groundwater extraction through tube wells and boreholes, which forms part of JJM's delivery model in water-scarce regions.

Pradhan Mantri Gram Sadak Yojana

The PMGSY was launched in 2000 to provide all-weather connectivity to people living in remote rural areas. Given that around 80% of India's road network is located in rural areas (Asian Development Bank, 2023), social protection schemes that cover rural road connectivity should aim to contribute to agricultural growth, employment, poverty alleviation and access to health and education services.

The PMGSY has evolved over the years. Initially sponsored entirely by the government, the scheme has since received more support from states. It is designed to upgrade the many roads that, for example, were accessible only during the dry season due to a lack of cross-drainage (PMGSY, 2024). By integrating cross-drainage into road planning, the PMGSY has reduced the likelihood of pluvial flooding during extreme weather events. Between 2019 and 2024, phase three of the scheme saw the expansion of its mandate (see Table 4.1). The fourth phase aims to provide all-weather connectivity to 25,000 more rural households, maintaining its focus on climate-resilient, innovative materials and green technologies (PMGSY, 2024). Around 15.8% of roads completed under the PMGSY have been constructed using sustainable measures,¹⁵ indicating that they contribute to climate resilience (PIB, 2025). From an adaptation perspective, there is a clear need to integrate climate-resilient technologies and disaster preparedness into road planning, and to abide by five-year maintenance clauses that ensure continuous improvement.

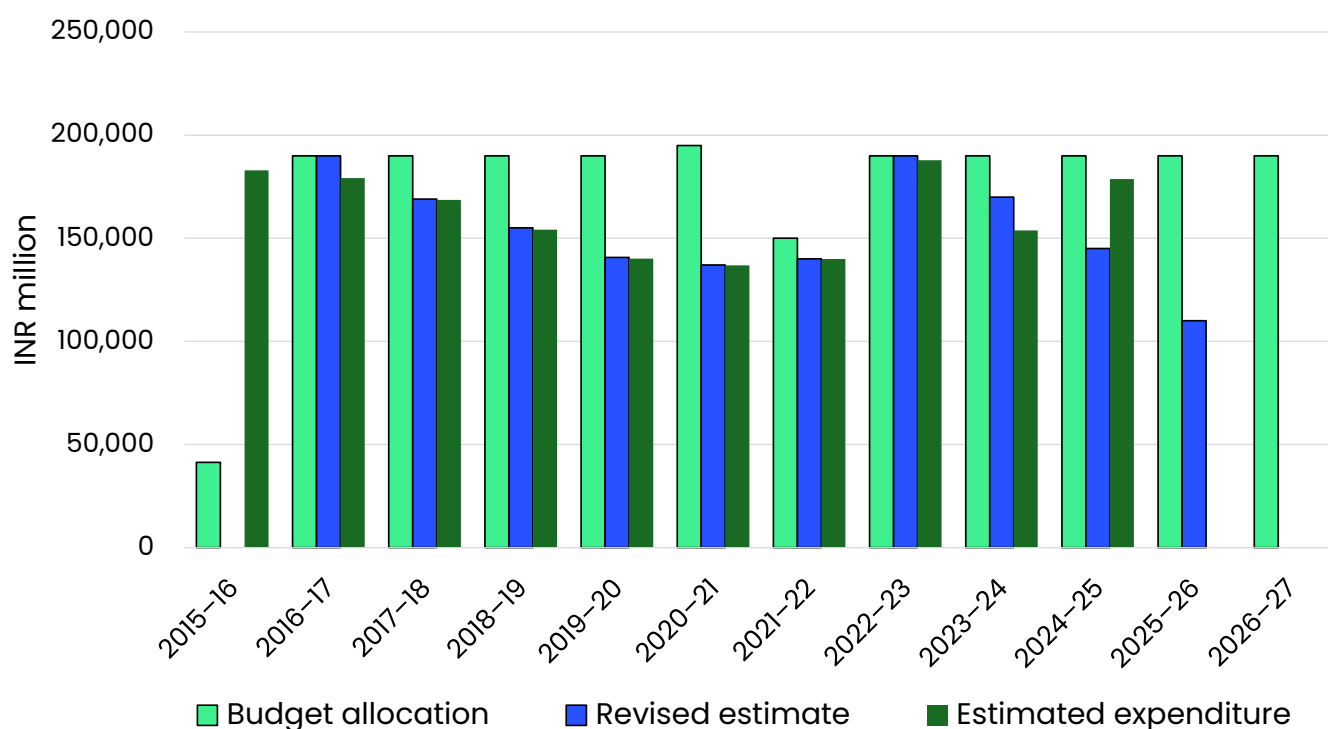
From the perspective of public funding, budget allocations to the PMGSY have been largely consistent for the last five financial years (2022–23 to 2026–27). However, expenditure has been far lower than these allocations (and revised estimates), signalling poor implementation of the scheme and underutilisation of allocated funds. The Standing Committee on Rural Development and Panchayati Raj has highlighted poor quality and weak enforcement of construction norms, as well as delays in the release of funds from the central government (Ministry of Rural Development, 2025). Costs of the PMGSY that exceed the amount provided by the central government are borne by the implementing state and, accordingly, should be assessed region by region. This would help quantify spending relevant to climate adaptation under the scheme. While PMGSY policy documents refer to a climate-adaptive solution and climate resilience is integrated into the scheme, they do not provide a quantifiable breakdown of adaptation measures. Their reference to "all-weather roads" is intended to signal adaptive capability, but the PMGSY has not integrated climate risks into planning processes.

In the Adaptation Finance Taxonomy, the scheme covers activities that have a medium level of adaptation potential. These activities include road drainage, structural measures (such as the elevation of roads) and the adoption of resilience measures through, for example, the use of materials that are resistant to extreme heat. However, due to a lack of disaggregated data on how funding is split between activities at the national level, further assessment of them would need to be made on a case-by-case basis.

Although the PMGSY is centrally sponsored scheme, its implementation depends on individual states. This allows for road planning and construction to be tailored to local geographic and socio-economic conditions. The relevant State Rural Road Development Agency is responsible for regulating the scheme. As of December 2025, the PMGSY had upgraded or constructed 825,114 km of rural roads over 25 years, completing around 95% of projects (PIB, 2025). Shortfalls in the scheme at the state level have been primarily attributed to implementation delays, land acquisition issues, and geographical constraints (in mountainous states).

¹⁵ Measures such as the utilisation of waste plastic and cold mix technologies, as well as full depth reclamation.

Figure 4.2. PMGSY budget allocations and estimated expenditure



Source: Ministry of Finance (2025). Note: COVID-19 led to a decline in expenditure.

Pradhan Mantri Awas Yojana–Urban

As part of its vision of “Housing for All”, the Government of India launched in 2015 the Pradhan Mantri Awas Yojana–Urban (PMAY–U) as a scheme that it would primarily sponsor. The mission was initially scheduled to run until 2022 before it was extended to 2025 and then 2029. The PMAY–U was designed to provide 10 million houses to residents of slums and people in Economically Weaker Sections, Low-Income Groups and Middle-Income Groups living in urban areas more broadly. PMAY–U 2.0 was launched in 2024 with the aim of providing central financial assistance for the construction, purchase or rental of 10 million more affordable houses by 2029.

Combined investment in PMAY–U and PMAY–U 2.0 has reached an estimated US\$90.6 billion, with the Government having released 86% of its US\$22.1 billion share of this. However, a total of US\$107.6 billion (including US\$27 billion from the Government) will be required for the programmes to hit their target by 2029 (Foundation for Responsive Governance, 2026).

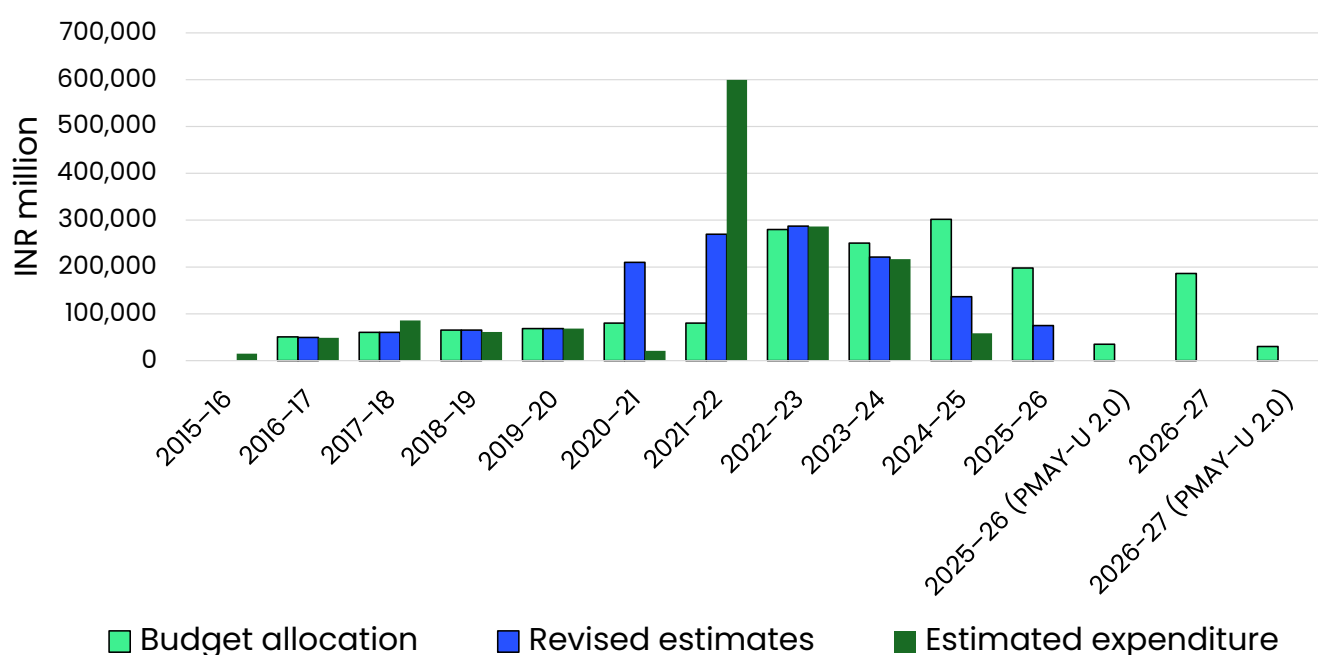
The PMAY–U has potential to become more relevant to climate adaptation. Although it is not explicitly a climate initiative, the scheme aims to integrate various elements of climate adaptation and resilience into planning. The PMAY–U Technology Sub-mission (TSM) is aimed at facilitating the preparation and adoption of building layout plans suited to different geo-climatic zones (Ministry of Housing and Urban Poverty Alleviation, 2016). This involves the adoption of green and disaster-resilient designs and technologies for construction, with the Ministry of Housing and Poverty Alleviation providing a Technology Innovation Grant to that end (Ministry of Housing and Urban Affairs, 2024). The Building Materials and Technology Promotion Council (BMTPC) is designated as the technical secretariat for the TSM and houses the National Urban Housing Fund (NUHF), which aggregates relevant loans from financial institutions. The BMTPC’s primary objective is disaster mitigation and management through vulnerability and risk reduction, retrofitting and reconstruction. The body has aggregated data from a vulnerability atlas, which maps climate and environmental hazards, to help incorporate damage risk assessments into house planning and the current housing stock (BMTPC, 2025).

The implementation of the PMAY–U is specific to individual states but comes with clear guidelines and institutional support from the Government of India. The construction of houses under the scheme is

supposed to involve resource-efficient sustainable materials and passive cooling solutions that combine with other energy-efficient systems. The PMAY-U is designed to converge with other climate-relevant initiatives such as AMRUT 2.0 (for water management) and the Swachh Bharat Mission (for sanitation). The government implemented Light House Projects under the PMAY-U in Gujarat, Jharkhand, Madhya Pradesh, Tamil Nadu, Tripura and Uttar Pradesh to implement its guidelines, showcase the scheme's potential to fit different contexts, demonstrate innovative climate-friendly technologies for construction, and promote housing that is disaster-resilient and cost-effective (Ministry of Housing and Urban Affairs, 2022). A separate institutional body works to highlight the adaptation potential of this and other schemes that adopt climate-resilient technologies.

In the **National Climate Finance Taxonomy**, the PMAY-U is highly relevant to adaptation, as its policy documents repeatedly allude to green construction, infrastructure policy and capacity building (in climate-resilient infrastructure). The BMTPC and the NUHF strengthen the institutions and governance of the scheme. The level of funding allocated to these activities that are relevant to adaptation and resilience differs by state and individual project design.

Figure 4.3. PMAY budget allocations and estimated expenditure



Source: Ministry of Finance (2025). Note: In 2021-22 the revised estimates for the scheme saw a 163% increase (INR 21000 crore) compared to the budgeted amount (INR 8000 crore). This increase was due to addition of the Affordable Rental Housing Complexes (ARHC) scheme (under the Aatma Nirbhar Bharat Scheme).

Pradhan Mantri Fasal Bima Yojana

Launched in 2016, the Pradhan Mantri Fasal Bima Yojana (PMFBY) is the world's largest public crop insurance scheme. It provides area-based payouts to farmers who suffer crop losses due to extreme weather events such as excessive rainfall or droughts. Since its inception, the PMFBY has provided insurance coverage in response to more than 57 million applications from farmers, and has paid out claims amounting to over US\$19.6 billion (INR 1.9 trillion) (IBEF, 2025). This scheme is key to bolstering adaptation and resilience efforts as it gives farmers the financial flexibility to rebuild and upgrade their holdings in response to, or anticipation of, extreme weather events (PIB, 2023). A subset of the funding allocation for this programme also covers the RWBCIS, which functions in a similar way to the PMFBY except that it uses deviations in weather as a proxy for crop losses (Generali Central Insurance, 2025).

The central and state governments help farmers pay insurance premiums by providing them with a subsidy of 0.5% to 5%, depending on the season and the type of crops they plant. State governments are involved in the scheme on a voluntary basis and, as of 2025, 23 of them had enrolled in it (PIB,

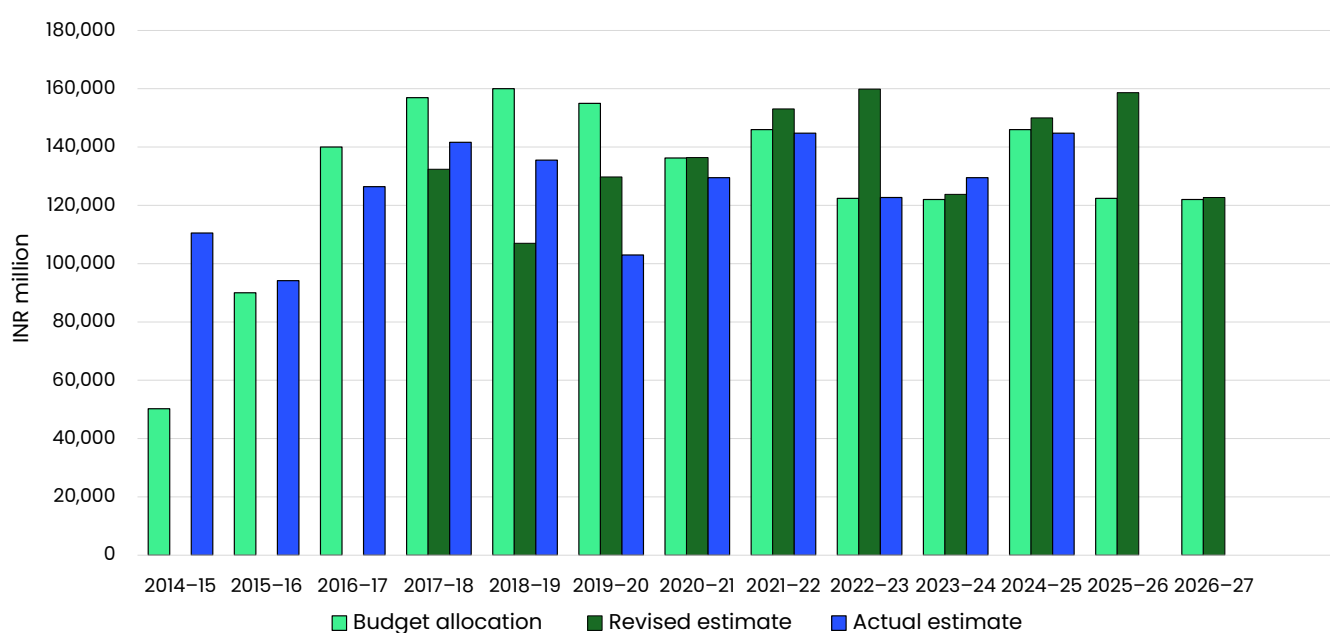
2025). Prior to 2020, it was mandatory for loanee farmers to participate in the scheme. However, they are now able to opt in to it regardless of their source of funds (World Bank, 2024).

Budget allocations to the PMFBY have largely remained steady, but estimated expenditure on the scheme has fallen in the last two fiscal years (see Figure 4.4). A possible reason for this is that, in the last three fiscal years, some of the funding originally intended for the PMFBY has been transferred to the Agricultural Infrastructure Fund (AIF) under the Crop Insurance Scheme in the budget of the Ministry of Agriculture and Farmers' Welfare (Ministry of Finance, 2024). The allocations for the AIF are US\$50.24 million (INR 47.42 billion) in, US\$61.87 million (INR 5.84 billion) in 2025 and US\$52.97 million (INR 5 billion) in 2026 (Ministry of Finance, 2026c). The purpose of the AIF is to supply concessional credit to farmers that strengthens their supply chain infrastructure, with the aim of facilitating a structural transformation of the agricultural sector (PIB, 2026).

The implementation of the PMFBY is driven by states' specific needs. This varies a great deal because states can opt in to the scheme. In 2024–25, Maharashtra received the highest payout at INR 57.75 billion, followed by Karnataka at INR 28.09 billion, Rajasthan at INR 18.99 billion, Madhya Pradesh at INR 12.94 billion and Tamil Nadu at INR 7.65 billion. Despite the wider insurance coverage provided by the RWBCIS, there has been a decrease in payouts. One key issue in this is pending claims, which remain a concern for states. As of December 2025, INR 14.26 billion in claims were still unpaid across states. Andhra Pradesh had the highest backlog at INR 8.59 billion, followed by Maharashtra at INR 1.79 billion and Rajasthan at INR 1.59 billion (Ground Report, 2026). Historically, states such as Bihar, Telangana, Andhra Pradesh, Jharkhand, West Bengal and Gujarat have chosen to temporarily opt out of the scheme for certain seasons due to risk perceptions and financial constraints (PIB, 2023). The unequal implementation of the scheme and the issue of delayed payments further increase farmers' vulnerability to climate shocks, especially in regions where the state has opted out of the scheme or there is a large backlog in payments.

In the National Climate Finance Taxonomy, crop Insurance initiatives such as the PMFBY can support adaptation and resilience efforts by addressing heat stress, cold stress, water stress, storm conditions, flooding, mass movement (such as landslides and mudslides) and wildfire conditions (Climate Policy Initiative, 2024). The risks related to this include yield losses, prevented sowing, post-harvest losses, and localised calamities in the face of natural disasters, such as fires, lightning, storms, hail, tornadoes, floods, inundation and landslides, pests and diseases, and droughts (PIB, 2025b). There is a high degree of overlap between the climatic events covered by the Adaptation Tracking Taxonomy and the work of the PMFBY.

Figure 4.4. PMFBY budget allocations and estimated expenditure



Source: Ministry of Finance (2025).

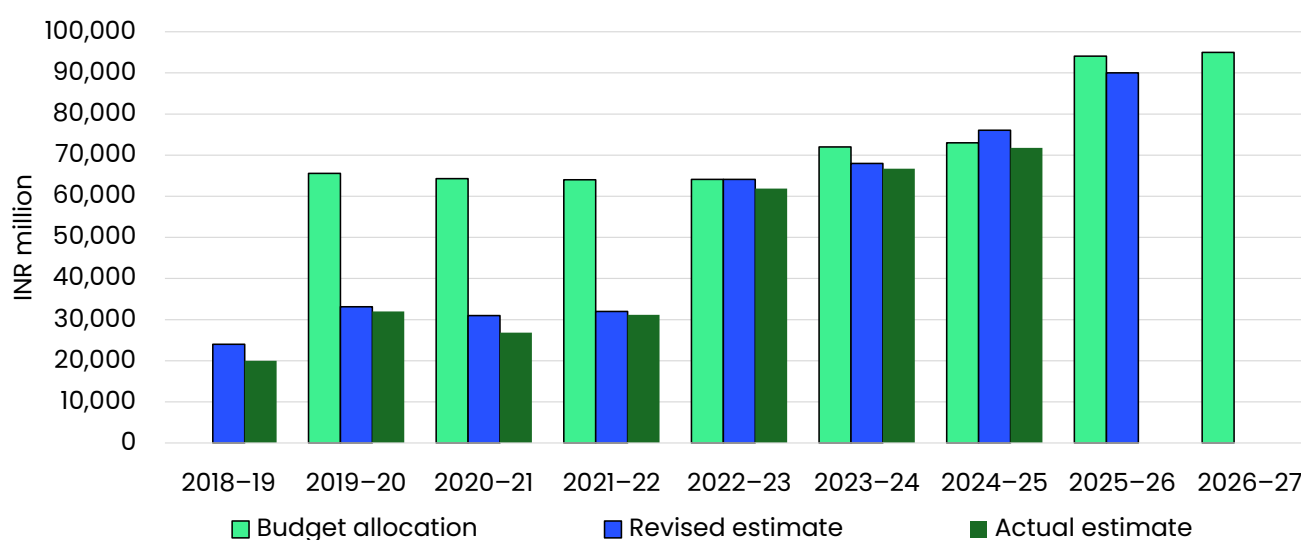
Pradhan Mantri Jan Arogya Yojana

The PMJAY was designed to be a nationwide, means-tested public health insurance scheme. It falls under the broader Ayushman Bharat scheme, which was introduced under the National Health Policy 2017 to help India achieve its target of universal health coverage by 2030. As part of the effort to ensure that every citizen has access to affordable healthcare services, PMJAY offers secondary and tertiary healthcare services to economically vulnerable populations. Families' eligibility for benefits under the scheme is tied to their economic standing in the 2011 Socio Economic and Caste Census (which was later expanded to include people over the age of 70). The PMJAY provides annual health coverage of US\$5412.80 (INR 500,000) per family to about 100 million households (or around 500 million people) at both public and private empanelled hospitals.

The PMJAY's budget allocation has steadily increased but has been underutilised at the state level. The fact that much of India's health sector is underfunded can be seen in the divide between government expenditure and household expenditure. The country's current health expenditure is dominated by households, which account for 51% of contributions (including insurance), with the central and state governments' share at 15% and 22% respectively (PRS Legislative Research, 2026a). In financial year 2026–27, the Ministry of Health and Family Welfare, which manages the PMJAY, saw a 9% increase in its budget allocation from financial year 2025–26, following a 6% increase the previous financial year. However, as always, these increased budget allocations still fell short of projected demand for grants and estimated expenditure. For example, in 2019, funds allocated were 88.5–95.5% lower than estimated costs. Per capita expenditure under the scheme has been much lower than national per capita out-of-pocket expenditure (Dubey et al., 2023; Foundation for Responsive Governance, 2026). The PMJAY has produced positive outcomes in terms of state participation and hospital admissions but, overall, there has been an underutilisation of expenditure under the scheme, which accounts for 9% of the ministry's budget (Rajya Sabha, 2025; PRS, 2026a).

Most states have opted in to the PMJAY, even if they have their own health insurance programmes. The implementation of the PMJAY is dependent not only on the state but also on the hospitals empanelled under the scheme. As of December 2025, more than 30,000 hospitals (including 15,733 private hospitals) were covered by the PMJAY. Predictably, the rate of insurance claims under the PMJAY is lower in states with a higher socio-economic standing and a lower disease burden (Dubey et al., 2023). There is a need to assess the utilisation of the PMJAY from a climate risk perspective, the first step of which would be to identify areas in which climate change increases health risks.

Figure 4.5. PMJAY budget allocation and estimated expenditure



Sources: Union Budget, Ministry of Finance; PRS Legislative Research.

The PMJAY has the potential to produce greater adaptation benefits. Regardless of its underfunding, the scheme has a policy design that hints at adaptation (even if it would have low adaptation potential in the Adaptation Finance Taxonomy). The PMJAY and the Ayushman Bharat scheme more

broadly are designed to increase healthcare outreach, deploy community healthcare workers and provide low-cost health insurance plans. These schemes would be more relevant to climate adaptation if there was greater convergence between healthcare and climate planning. Given that climate change can intensify health shocks, there is a need for measures that explicitly address this dynamic. A lack of data on climate impacts linked to healthcare creates a major gap in knowledge that has implications for the insurance market.

5. Closing the gap: financing options for climate-driven social protection

India's social protection programmes have substantial adaptation co-benefits. Yet these programmes are rarely mapped against national adaptation priorities, existing climate and disaster mechanisms remain reactive rather than anticipatory, and fiscal devolution formulas still fail to treat climate vulnerability as a standalone criterion. Addressing these problems will require initiatives to more closely align social protection with the National Adaptation Plan (NAP); develop innovative, state-specific financing tools such as parametric insurance; and mobilise blended and private capital. Operating through institutions such as NABARD and NIIF, these initiatives could cover water, agriculture, infrastructure and healthcare, with the aim of ensuring that India's welfare architecture is resourced to serve an explicitly adaptive function rather than a purely reactive one.

Climate adaptation is a co-benefit of social protection schemes. There is clear evidence that these schemes reduce vulnerability, build absorptive capacity and strengthen household resilience, even where climate action is not central to programme design (IDS, 2025). Accordingly, social protection schemes should be further enhanced and resourced as an explicitly positive force for adaptation.

However, investing in resilience could generate benefits four times greater than the costs involved (Systemiq, 2025). This is because it can reduce not only losses from climate events but also the need for expenditure on social protection and disaster management programmes. Therefore, such investment should be recognised as a positive force for adaptation in its own right.

5.1. Convergence of social protection schemes with initiatives linked to climate adaptation

As discussed, the social protection and development schemes we analyse contain elements of climate adaptation (in line with the Adaptation Finance Taxonomy) but their implementation often misses the mark. Hence, there is a need to clearly define climate adaptation in relation to the requirements of individual states and India as a whole, and to ensure that there is a system in place to assess implementation across these elements of adaptation. This should involve:

- **Alignment with the NAP.** The development of India's NAP provides a strategic opportunity to formally align social protection programmes with national adaptation objectives. The plan should explicitly map existing social protection programmes against adaptation objectives to identify gaps. The priorities of the NAP should be embedded into line ministries' planning processes rather than treated as part of a parallel track. This would explicitly make the adaptive co-benefits of social protection programmes visible in national accounting. Adaptation activities need to be more anticipatory and less reactive (hence their integration into planning).
- **Coordination of existing climate- and disaster-relevant mechanisms, and their integration into social protection schemes.** As it stands, these processes primarily focus on responses to shocks. Yet they could serve broader climate functions, such as reducing structural climate vulnerability and contributing to wider adaptation and mitigation outcomes, if they are designed and resourced with these goals in mind (Costella, 2024). There is already some integration of climate adaptation policy into other climate-relevant policies, but this should be extended to areas such as, for example, funding rural road infrastructure in line with the threat posed by its increasing climate vulnerability.

- **National risk and vulnerability assessments that guide fiscal allocations (proactive adaptation).** A national risk assessment framework that covered all of India's geographies and sectors could ensure that funding was more precisely targeted towards disaster and climate risks. This framework could also feed into fiscal devolution to states, with its implementation supported by state-level identification of these risks. The PMAY's risk atlas, which helps identify disaster-related risks and vulnerabilities, could be expanded to cover the implementation of infrastructure policies (PMGSY) or sectoral policies (JJM). Meanwhile, hazard mapping should evolve to better address the increase in the frequency and intensity of disasters due to climate change, and to identify other climate variabilities, such as changing patterns in precipitation and heat stress.

5.2. Aligning social protection and climate adaptation with state-specific needs

Efforts to align social protection and climate adaptation with states' needs should:

- **Allocate sufficient resources to schemes that states are primarily responsible for implementing.** There is precedent for effective interstate policy diffusion through social protection. For example, PDS reforms were pioneered by Tamil Nadu, Kerala and Himachal Pradesh before they were adopted by Andhra Pradesh, Chhattisgarh, Odisha and Bihar, with the central government subsequently incorporating the lessons from this process into national policy (World Bank, 2019). In various existing schemes, actual expenditure lags budget allocations due to limited implementation and governance hurdles at the state level. This is where the design of programmes should be guided by states' specific needs. State-led experimentation followed by consolidation at the national level is a replicable approach to climate adaptation reforms in the social protection framework. This would also allow state-specific resource allocation to be informed by the local context rather than centralised planning.
- **Develop innovative tools to address climate extremes, such as parametric insurance.** Parametric insurance is a non-traditional form of insurance that makes payouts automatically when a covered event meets or exceeds a predefined threshold, as measured by an objective parameter. This approach allows for faster interventions, making parametric insurance particularly suitable as a first response to an extreme weather event. State governments can help scale up parametric insurance schemes and strengthen the social safety net by integrating them into preexisting programmes. For instance, this could involve linking payouts to MGNREGS wage supplements during periods of heat stress or providing PMJAY coverage for heat-related illness. However, to reduce basis risk (the mismatch between the parameters of the product and actual losses incurred), triggers and thresholds should be determined using localised data sources that reflect actual climatic conditions on the ground (Bansal and Feyertag, 2026).

5.3. Mobilising finance

Climate adaptation finance should reach the populations most exposed to climate shocks, the same groups who India's social protection system is designed to serve. Public finance alone is not enough to close the adaptation finance gap; private capital should also be mobilised for climate-resilient water, housing and transport infrastructure. In low-income and climate-vulnerable districts, blended finance structures and public-private partnership frameworks can de-risk private investment in adaptation-relevant infrastructure. The following three financing pathways can strengthen the dimension of adaptation spending that serves India's most vulnerable people:

- **Shock-responsive development finance.** Existing direct transfer programmes operate as static entitlements that do not adjust in response to climate events. Augmenting these programmes with shock-responsive mechanisms, such as automatic top-ups triggered by climate thresholds, would allow the existing transfer architecture to serve an adaptive function without the need to build parallel systems. India is better positioned than most countries to do this: the JAM trinity (Jan Dhan–Aadhaar–Mobile) and Direct Benefit Transfer infrastructure have

demonstrated a capacity for rapid, large-scale disbursement of funds (Observer Research Foundation [ORF], 2026).

- **Adaptation financing through fiscal devolution.** Such devolution to states should integrate climate vulnerabilities into existing criteria. Through grants-in-aid and reforms linked to the Disaster Risk Index,¹⁶ disaster management is increasingly focused on proactive financing. However, fiscal transfers from the Government of India to states do not always reflect states' unique exposures, sensitivities or capacity to adapt to climate shocks (Arora and Ghosh, 2026). The 14th and 15th Finance Commissions incorporated forest cover into the devolution formula. The 16th Finance Commission, which submitted its report alongside the Union Budget 2026–27, has taken steps to strengthen the ecological dimension of devolution.¹⁷ However, the formula still does not incorporate climate vulnerability as a standalone criterion, leaving a gap between India's stated adaptation ambitions and the fiscal architecture that funds them.
- **Development of insurance products.** The gap in insurance coverage of informal and outdoor workers is a critical vulnerability. Parametric insurance products could build on a heat insurance pilot conducted by the Self Employed Women's Association, using the Insurance Regulatory and Development Authority of India's Regulatory Sandbox as a testing environment. These products could provide rapid payouts that complement existing social protection entitlements. Linking these payouts to the MGNREGA and PMJAY would embed climate risk instruments in the social protection framework rather than create standalone products.

Box 5.1. Blended finance mechanisms

Blended finance combines concessional public or philanthropic capital with commercial investment to mobilise additional private resources for sustainable development. It offers a mechanism for closing India's adaptation financing gap in sectors where public spending is insufficient by itself. Globally, around US\$213 billion has been mobilised through blended finance transactions in developing countries, with the median transaction size at US\$64 million (Nishith Desai Associates, 2024). India's development finance institutions are well positioned to deploy these instruments for climate adaptation in sectors that have co-benefits in social protection.

NABARD is India's primary channel for rural climate adaptation finance, acting as National Implementing Entity for both the UNFCCC Adaptation Fund and the Green Climate Fund. As of March 2024, NABARD had supported 40 climate change projects with financial assistance of approximately US\$237 million, with more than 28% of its cumulative disbursements linked to climate adaptation and mitigation (World Resources Institute, 2025). NABARD is developing new approaches to blended finance through the Centre for African Food Research and Innovation's programme with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). This programme integrates climate risk screening into development funds and explores private sector investment in initiatives to climate-proof agricultural value chains (GIZ, 2021). In 2024, NABARD signed a Memorandum of Understanding with the Government of Goa and the World Bank to establish a blended finance facility that leverages concessional finance from multilateral development banks, bilateral institutions and philanthropic foundations for climate action.

In 2015, the Government of India established the National Investment and Infrastructure Fund (NIIF) to attract domestic and international equity investment in infrastructure development (Department of Economic Affairs, 2025). NIIF has identified the construction of resilient infrastructure as one of the six main pillars of sustainability. The organisation's investment vehicles manage capital using different strategies. Its fund of funds is specifically designed to fill the green infrastructure gap by investing in private equity funds that focus on climate and resilient infrastructure and are managed by third parties. Flagship climate vehicle the Green Growth Equity Fund (GGEF) uses a blended fund-of-funds structure that is anchored by NIIF and the UK's Foreign, Commonwealth and Development Office, and

¹⁶ As done for 16th Finance Commission.

¹⁷ As per 16th Finance Commission, the devolution formula considers forest and ecology indicator as both a state's share in overall forest area and its share in the increase in forest area between 2015 and 2023, and has expanded coverage to include open forests alongside dense and moderately dense forests.

that is supported by concessional subordinated equity from the Green Climate Fund. NIIF already invests in roads (through its proprietary Athaang Infrastructure platform), ports, airports, renewable energy and smart metres. The GGEF model could be extended to other adaptation-relevant infrastructure, such as climate-resilient rural roads, affordable housing and water systems. This would connect NIIF's established sectoral expertise and stated commitment to investment in resilience with the social protection schemes discussed above.

More specifically, India could mobilise finance in the following sectors while aligning with existing social protection and climate schemes.

Water

There is a shift in the financing architecture of existing programmes. The JJM 2.0 was approved by the Cabinet in March 2026 with an enhanced outlay of US\$92 billion (INR 8.69 trillion). This explicitly reoriented the mission away from infrastructure creation and towards service delivery, with a focus on sustainability, operations and maintenance, as well as source protection in areas such as groundwater recharge, rainwater harvesting and greywater management (Prime Minister's Office, 2026). This shift is significant from a financing perspective: it signals that public expenditure on rural water systems is beginning to move towards the kind of climate-resilient source management that adaptation requires. MGNREGA's water conservation works such as earthen dams, check dams and recharge structures provide further potential for convergence with the JJM's source sustainability objectives. The World Bank's Country Climate and Development Reports on Water Sector Synthesis conclude that investments in water adaptation have substantial social and economic benefits, and that blended financing mechanisms and private sector participation are essential to close the water sector's investment gap (World Bank, 2024).

Agriculture

Agricultural social protection programmes could contribute to adaptation finance. The PMFBY and sister schemes such as the AIF and RWBCIS can help farmers rebuild after, and improve their resilience against, extreme weather events by granting them access to new sources of financing. Because the PMFBY covers a broad spectrum of weather events, it has the potential to generate a great deal of financing for adaptation and resilience efforts (Generali Central Insurance, 2025). Together, they also cover a wide range of activities in the Agricultural Production and Agri-Food Logistics, Processing and Retail sectors in the Adaptation Tracking Taxonomy, such as Agri-Food Transport Risk Hardening, Agri-Food Processing Risk Hardening and Efficient Irrigation (Climate Policy Initiative, 2024). All these sectors have a medium level of adaptation potential. The taxonomy is helpful in tracking the progress of efforts to build farmers' resilience against increasingly frequent and intense extreme weather events, as well as progress towards raising the US\$ 150 billion (INR 12.45 trillion) in adaptation funding needed to support smallholder farmers in South Asia (Family Farmers for Climate Action, 2025).

State-specific forms of financing could be scaled up. In 2026–27, states' average expenditure on agriculture accounted for 5.7% of their budgets, albeit with this share varying greatly between them. Bihar, Uttar Pradesh and Maharashtra allocated just 2.6%, 3.7% and 5.2% of their budgets to agriculture respectively, despite the fact that they are all states with relatively high exposure to climate risks. This unequal allocation of funds suggests that these states will have only a limited capacity to recover from climate shocks. This is especially important given that agriculture accounts for 23% of the economy in Bihar, 27% in Uttar Pradesh and 13% in Maharashtra (PRS Legislative Research, 2026). As such, there is a need to scale up state-level financing for agricultural schemes, with the aim of improving the adaptive capacity of large sections of the economy. One example of this is the Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan scheme, which sought to secure energy and water for farmers by transitioning away from diesel and towards solar power (India Brand Equity Foundation, 2026).

Resilient infrastructure

India has primarily funded infrastructure growth through public expenditure, with its budget for fiscal year 2026–27 allocating the increased amount of US\$134 billion (INR 122 million) to this. The country is working to address its significant shortfall in infrastructure financing through fund structures such as

the NIIF and the National Bank for Financing Infrastructure and Development (NaBFID). India is also taking steps to leverage private financing and attract global investors through asset monetisation, which involves organisations such as infrastructure investment trusts and real estate investment trusts, as well as the recently established Infrastructure Risk Guarantee Fund. However, it is important to view infrastructure development through the social lens of support for the poorer and more vulnerable sections of society. This is where initiatives such as the PMGSY and PMAY are vital for integrating social protection into infrastructure development. Both have the potential to attract further funding through public and private financing vehicles.

Early investments in climate resilience are key to reducing the annual costs of increasingly frequent and intense extreme weather events. One limitation of welfare housing schemes such as PMAY relates to the housing sector's absence from most climate risk assessments (Carbon Copy, 2021). Mainstreaming passive cooling solutions, such as cool roofs, in housing designs is one widely discussed solution in this area (World Bank, 2022). Others include community-driven initiatives for heat adaptation and resilience, the use of innovative building materials, and active cooling solutions that employ energy- and cost-efficient products such as air-conditioning units and brushless, direct-current fans (Self Employed Women's Association, 2024). Integrating climate-responsive assets (such as cool roofs and permeable pavements and roads) into infrastructure projects has co-benefits in social protection where improved service delivery is the main aim (Sadhukhan, 2019). However, this can result in a siloed approach to addressing climate impacts. It is preferable to address climate risks and resilience in the planning stage of infrastructure expansion, as this helps reduce losses caused by shortened asset lifespans and high maintenance requirements.

Healthcare

There is a risk that inadequate public health expenditure will push people into poverty. This is because it forces many to rely on costly private facilities. Where it coincides with this growing dependency on the private sector, supply-side funding of health infrastructure will not be enough to ease the burden of households' increased out-of-pocket expenditure. The Government of India's assessments show that medical expenses and a lack of healthcare insurance push more than 60 million citizens into poverty each year (Oxfam, 2022). Around 44% of the country's health spending comprises out-of-pocket expenditure, the highest share in the world (World Health Organisation, 2025).

Healthcare schemes need to account for climate adaptation considerations. Many Indian states are developing hard climate adaptation and resilience measures such as initiatives to strengthen warning systems and adapt building designs to increased heat stress or flooding risk. However, soft adaptation through insurance should also be explicitly addressed in policy on healthcare services. By strengthening the health insurance market in this way, India would support financing that tackles the social protection priorities of healthcare and climate adaptation simultaneously.

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