Climate Resilient Agriculture Roadmaps For Hazaribagh (2025-2035)

A Comprehensive Framework for Food System Transformation

www.SwitchON.org.in

Table of content

List of Abbreviations and Full Forms

Abbreviation	Full Form
AI	Artificial Intelligence
APMC	Agricultural Produce Market Committee
ATMA	Agricultural Technology Management Agency
BAU	Birsa Agricultural University
BGL	Below Ground Level
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CBBO	Cluster-Based Business Organization
CSR	Corporate Social Responsibility
DCCB	District Central Cooperative Bank
FGD	Focus Group Discussion
FPC	Farmer Producer Company
FPO	Farmer Producer Organization
GIS	Geographic Information System
GI	Geographical Indication
IFS	Integrated Farming System
ICAR	Indian Council of Agricultural Research
ICT	Information and Communication Technology
IPM	Integrated Pest Management
JSLPS	Jharkhand State Livelihood Promotion Society
JSWM	Jharkhand State Watershed Mission
KCC	Kisan Credit Card
KPI	Key Performance Indicator

KVK	Krishi Vigyan Kendra
MEL	Monitoring, Evaluation and Learning
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MT	Metric Tonne
NABARD	National Bank for Agriculture and Rural Development
NABCONS	NABARD Consultancy Services
NARP	National Agricultural Research Project
NRM	Natural Resource Management
NTFP	Non-Timber Forest Produce
ODOP	One District One Product
ONDC	Open Network for Digital Commerce
PACS	Primary Agricultural Credit Society
PGS	Participatory Guarantee System
PMFBY	Pradhan Mantri Fasal Bima Yojana
PMMSY	Pradhan Mantri Matsya Sampada Yojana
PRI	Panchayati Raj Institution
SAPCC	State Action Plan on Climate Change
SHG	Self-Help Group
SFAC	Small Farmers' Agribusiness Consortium
TDS	Total Dissolved Solids
WUA	Water User Association

Executive Summary

Hazaribagh is facing big challenges in farming—rainfall is uneven, groundwater is reducing, soil health is getting weaker, and many farmers still depend only on the monsoon. At the same time, the district also has great opportunities: good land for agroforestry, growing interest in fisheries and horticulture, active SHGs and FPOs, and strong community energy. This roadmap shows how Hazaribagh can become a **climate-resilient and water-secure district by 2035**, where farmers can earn better incomes and manage climate risks with confidence. The plan focuses on improving soil health, protecting natural resources, using sustainable farming methods, and supporting tribal and small farming households.

The roadmap highlights simple but powerful solutions—**agroforestry, bamboo cultivation, integrated farming systems, natural farming, better use of water, and fishery development**. It promotes building check dams, recharge pits, and micro-irrigation systems to store and save water. It also supports renewable-energy irrigation so farmers can reduce costs. To help farmers make better decisions, the plan introduces ICT-based advisories, weather alerts, and market information that can reach farmers directly on their phones.

The vision is that by working together—**government (Sarkar), community institutions (Samaj), and markets (Bazaar)**—Hazaribagh can build strong and **sustainable value chains**, create more rural jobs, and restore its natural environment. With better soil health, secure water, diversified crops, and strong FPOs and SHGs, Hazaribagh can become a **model district** for **climate-resilient agriculture** and **livelihood diversification** in Jharkhand.

Keywords: Hazaribagh, Climate-Resilient Agriculture, Water Security, Soil Health, Agroforestry, Natural Farming, Integrated Farming Systems, Renewable Energy Irrigation, Sustainable Value Chains, Ecological Restoration.

1.Introduction and Context

1.1 The Imperative for Transformation

Hazaribagh is a predominantly rural district, with about **84%** of its population living in villages, and agriculture is the main livelihood. But the sector is under serious pressure. The district receives **1,200–1,300 mm** of annual rainfall, yet more than **80%** of it falls only during the monsoon, making farming highly rainfall-dependent. Irrigation coverage is still limited, leaving most small farmers vulnerable to erratic rains. Around **39%** of the district's area is cultivable, while nearly **45%** is under forest, which restricts expansion of farmland but offers potential for agroforestry and NTFP-based livelihoods.

Soil health is another major concern—large parts of Hazaribagh have acidic soils (pH < 5.5), leading to nutrient loss, low productivity, and higher fertilizer needs. Many blocks also report declining groundwater levels, especially in upland areas. With rising temperatures and frequent dry spells, climate risk for farmers is intensifying every year. Socially, the district has around 17.5% Scheduled Caste and 7% Scheduled Tribe population, many of whom depend on low-resource farming and forest-based livelihoods.

1.2 A Participatory Foundation

The designed roadmap for Hazaribagh has been shaped through a collaborative process that brings together the knowledge of local communities and the expertise of district institutions. Drawing on updated field observations, block-level data, and ground realities shared by farmers, the planning process involved continuous dialogue with key stakeholders across the district. During the 2025 district-level discussions on climate-resilient agriculture, officials from Agriculture, Horticulture, Water Resources, Forestry, Fisheries, and Animal Husbandry departments joined hands with FPCs, SHGs under JSLPS, NABARD, KVK Hazaribagh, and several local civil society groups to identify the most urgent needs and workable solutions.

These combined challenges—rainfall variability, water scarcity, soil acidity, climate stress, and fragile livelihoods—make transformation necessary. Hazaribagh urgently needs a shift toward **climate-resilient crops, better water management, soil health restoration, agroforestry, fisheries development, ICT advisories**, and **stronger farmer institutions**. Without this, rural and tribal households will face growing risks; with it, Hazaribagh can secure a more stable, productive, and climate-resilient future.

The roadmap is built on shared understanding and collective problem-solving, ensuring that each recommendation reflects both scientific evidence and the lived experiences of rural and tribal households. By grounding the strategy in systems thinking and practical insights from the field, the approach ensures that Hazaribagh's transition toward climate-resilient agriculture is community-owned, realistic, and capable of delivering long-term, sustainable impact.

2.Current State Analysis: A District at a Crossroads

2.1 Demographic and Socio-Economic Profile

Hazaribagh district has a population of about **1.73 million**, with a balanced spread of men and women. The district's **population density** is around **403 people per sq. km**, across a total area of **4,302 sq. km**. Literacy levels are steadily improving, with an overall **literacy rate** of about **70%**, including over **80% for men** and about **59% for women**.

The district has a significant young population, with children below six years making up **around 16%** of residents. The **sex ratio** stands at **946 females per 1,000 males**. Hazaribagh contributes roughly **5.26%** to the total population of Jharkhand.

2.2 Agro-Ecological Assessment

Physiography & Climate:

Hazaribagh lies in the **Eastern Plateau and Hills Region** as classified by the **Planning Commission**, and falls under the **Central and North Eastern Plateau Zone (NARP Zone)**, covering districts like Bokaro, Giridih, and Chatra. According to the **ICAR Agro-Ecological Sub-Region**, Hazaribagh consists of **moderately to gently sloping terrain** with **deep loamy to clayey red and yellow soils**, typical of the Chotanagpur plateau landscape.

The district sits at an elevation of around **611 m**, giving it a slightly cooler plateau climate. Rainfall patterns, as shown in the district contingency plan, indicate an annual average of about 783 mm, mainly received during the **Southwest monsoon**. Summers are warm and dry, while winters remain mild. Support services for climate advisories and agricultural guidance come from the **KVK Hazaribagh (Goriya Karma)** and the **Agro-Met Field Unit at Birsa Agricultural University**, which help farmers adapt to rainfall variability and climate risks.

Soil Resources:

Hazaribagh's soils are mainly red lateritic and loamy soils, classified by ICAR as deep loamy to clayey red and yellow soils across the plateau landscape. The district contains a mix of red lateritic (Ultic Paleustalfs), loam (Haplustalfs), fine loam (Rhodustalfs), and fine mixed loam (Paleustalfs) soils, most of which show medium to low natural fertility. Surface soil pH ranges from **4.5 to 7.8**, and about **88%** of the district area is acidic, which significantly affects nutrient availability—particularly phosphorus and micronutrients. These soils also tend to have low organic carbon, weak nutrient-holding capacity, and limited moisture retention, especially in upland areas. As a result, micronutrient deficiencies—especially **Zinc, Boron, and Iron**—are widespread, making liming, organic matter enrichment, and integrated nutrient management essential for improving crop performance in Hazaribagh.

2.3 Water Resources: A Crisis in the Making

Surface Water:

Hazaribagh's surface water system is shaped by several plateau rivers, most notably the Konar, Damodar, and Siwane, which drain the district's undulating terrain. These rivers, along with numerous seasonal streams, support small irrigation pockets but carry highly variable flows due to the plateau's steep slopes. The district also depends on a **network of tanks (279)**, **check dams (187)**, and a limited number of **canal structures (2)** that together form the backbone of its local water storage and distribution system.
However, rapid runoff from uplands, siltation of community tanks, and the short-lived nature of streamflow greatly reduce the district's irrigation potential. Check dams and tanks often fail to retain adequate water through the rabi season, weakening both agriculture and local ecosystems. As a result, strengthening water harvesting, desiltation, and surface storage systems is crucial for improving water security in Hazaribagh.

Groundwater:

Groundwater is an important irrigation source in Hazaribagh, supported mainly through **open wells (2,752)** and **borewells (44)**, but overall availability remains limited due to the district's **hard-rock geology** and **rapid surface runoff**. Most blocks fall in the safe to semi-critical category, yet farmers regularly experience falling water levels toward the end of the dry season, especially in upland areas where aquifers are shallow and recharge is slow. In years of weak monsoon rainfall, many open wells hold water only until late winter, reducing irrigation reliability for rabi crops. **Water quality concerns** such as **iron and acidity** are common in several pockets, though large-scale chemical contamination is not reported. With only a small share of land under irrigation and increasing dependence on groundwater during dry spells, the district faces growing pressure on its limited aquifers. Strengthening recharge through check dams, tanks, contour trenches, and watershed measures is essential for sustaining irrigation and drinking water security in Hazaribagh.

2.4 Agricultural Production Systems and Infrastructure

Cropping Patterns:

Farming in Hazaribagh is largely **rainfed**, with **rice dominating the kharif season** in midland and lowland areas. Uplands support **maize, pigeon pea, and pulses,** though many parts remain underused due to limited irrigation. The rabi season is smaller, focused on wheat, chickpea, pea, and lentil, mostly where groundwater is available. Vegetables like cauliflower, cabbage, tomato, and cucurbits grow in pockets with better water access. With most holdings being small and marginal, cropping patterns remain monsoon-dependent but offer scope for diversification.

Irrigation Infrastructure:

Hazaribagh's irrigation system is limited and mainly depends on small structures suited to its hard-rock terrain.The district has **2 canals, 279 tanks, 187 check dams, 2,752 open wells** and **44 borewells**, yet irrigation coverage remains low with only about **23,000 ha** under irrigation. Most irrigation relies on wells and tanks, which depend heavily on monsoon recharge, making water availability uncertain in upland areas.

Marketing Infrastructure:

Hazaribagh's agri-marketing relies mainly on **local rural haats** and small aggregation points, with key markets at Hazaribagh, Ichak, Bishnugarh, Katkamsandi, and Barkagaon. **FPCs and SHGs** support limited aggregation of vegetables, pulses, and NTFPs. Storage, grading, and processing facilities remain minimal, forcing most produce to be sold quickly or transported to larger markets like Ranchi and Ramgarh. Strengthening **storage, transport, and market linkages** is essential to improve farmer price realization.

2.5 Allied Sectors: Livestock, Fisheries, and Horticulture

Livestock: Hazaribagh has a strong livestock base, with around **3.16 lakh cattle and buffaloes** (2012 census) and **1.25 lakh goats** (2019 census), making animal husbandry a key livelihood for small and marginal farmers in this largely rainfed district. Livestock provides income security where irrigation is limited and crop yields are uncertain, but productivity remains low due to limited fodder, weak veterinary services, and small-scale backyard rearing systems. The district also faces a milk supply deficit (per capita milk availability was ~**158 g/day**, lower than state and national averages)—indicating under-utilization or **low yield per animal**—highlighting the potential for improving dairy breeds, fodder resources, and producer cooperatives. Overall, livestock continues to be a critical allied sector that supports rural stability and offers strong scope for income enhancement in Hazaribagh.

Fisheries: Hazaribagh has around **1,052 hectares** of water area suitable for fisheries and produces roughly **6,000 metric tonnes** (MT) of inland fish annually, with production peaking at **8,050 MT** in 2016–17, indicating strong untapped potential.Reservoirs, ponds, and community water bodies support aquaculture growth, and government schemes have encouraged farmers to adopt pond culture and reservoir-based fisheries.

Despite this potential, many waterbodies remain underutilized, meaning significant scope exists to expand fish farming and enhance rural incomes in the district. Ongoing efforts under PMMSY include brood banks for species like *Hyriopsis cumingii* and NABCONS gap analysis for pearl clusters, positioning the district for 10x returns in high-value aquaculture.

Horticulture: Hazaribagh has strong potential for horticulture, with farmers widely cultivating vegetables such as **cauliflower, cabbage, tomato, brinjal, okra and gourds,** as noted in the district agricultural contingency plan. The region's agro-climatic conditions also support fruit and spice cultivation, making horticulture an important diversification option where rainfed farming dominates. However, limited irrigation and upland soils restrict productivity, and horticulture remains under-developed despite being recognized as a high-value opportunity across Jharkhand. With improved water management and extension services, horticulture can become a key income-enhancing sector for small and marginal farmers in Hazaribagh.

2.6 Institutional Landscape

Hazaribagh's institutional landscape includes a network of government departments, agricultural and allied institutions, Panchayati Raj bodies, financial institutions, and grassroots community organizations that shape development across the district. Key actors include the **District Agriculture Office, KVK Hazaribagh, ATMA, Fisheries and Animal Husbandry Departments, Forest Department, JSWM for watershed work, and horticulture extension units**. These are supported by cooperatives, FPOs, SHGs, banks, and NGOs that provide training, credit, market linkages, and livelihood support, together forming an ecosystem that drives agricultural growth, water management, rural development, and community welfare in Hazaribagh.

3.Challenge Analysis and Problem Statement

3.1 The Water Security Crisis

Physical setting and water resources:
Hazaribagh is a plateau district with undulating terrain, shallow soils, and small streams, which limits the development of large irrigation systems. **Irrigation coverage** remains low (**about 18–22%**), so farming is largely rainfed and dependent on tanks, rivulets, wells, and pump sets, with only partial support from the Damodar Valley Project. Groundwater levels are shallow in parts of the district but increasingly stressed due to rising tube-well extraction over the past two decades. In the 2021 pre-monsoon season, Hazaribagh recorded Jharkhand's shallowest water table at **0.03 m below ground level**, illustrating high local variability.

Surface Water:
In years of poor monsoon rainfall, Hazaribagh frequently faces drinking-water shortages and irrigation stress due to limited surface-water infrastructure. The Jharkhand SAPCC notes that over **80%** of rainfall occurs in a short monsoon window, making the district highly sensitive to climate variability and rising temperatures. With **55–60%** of state agriculture being rainfed, drought years cause significant pressure on limited water resources.

Groundwater:
Studies in Hazaribagh, including around Konar and Charwa reservoirs, show mostly acceptable groundwater quality but with pockets of high TDS, hardness, and ion concentrations affecting long-term drinking suitability. Statewide assessments also report **fluoride** levels **above 1.5 mg/L** and **iron above 1 mg/L** in several areas, highlighting the need for consistent monitoring. Audit reports indicate that many deep tube wells in Hazaribagh become non-functional due to drying or mechanical failure, forcing thousands of rural households to rely on handpumps, dug wells, and ponds—especially in summer—thereby heightening both water-quantity and water-quality risks.

3.2 Intensifying Climate Change Impacts

Temperature Trends:
Projections for Jharkhand indicate a rise of **1.5–2.0°C** in minimum and maximum temperatures by mid-century, leading to hotter summers and warmer winters across all districts. Recent climate profiles show that Hazaribagh now reaches peak summer temperatures of **44–45°C**, which is higher than earlier historical norms.

Climate scenarios also project an overall increase in annual rainfall but with greater variability, shorter high-intensity spells, and shifts in monsoon onset and withdrawal. Trend analysis in the Nagwan watershed (1981–2019) records significant changes in rainfall distribution and a statistically rising minimum temperature trend ($Z \approx +2.08$), which directly affects runoff, groundwater recharge, and crop water availability.

Extreme Weather Events:
Block-level assessments for Hazaribagh show frequent meteorological droughts about 16–20 drought years between 1983 and 2017 in many blocks (Barhi, Padma,Ichak ,Tati Jhariya,Dadi,Bishnugarh,Barkagaon,Churchu, Darbhanga,Chauparan etc) covering early, mid and late monsoon phases.

With over **55–60%** of agriculture rainfed and irrigation coverage low, even small delays in monsoon arrival or short dry spells cause large reductions in kharif crop establishment and yields. Rising temperatures and altered moisture conditions have been linked with higher pest and disease incidence in rainfed crops, a trend the State Action Plan expects to intensify.

In the northern Hazaribagh belt, climate-induced shocks—such as unseasonal rains, frost, and extreme cold—have contributed to declining lac yields, affecting traditional forest-based livelihoods.

3.3 Soil Health Degradation: The Foundation is Failing

Chemical Degradation:
Hazaribagh has predominantly acidic soils, with about **88%** of the district falling within a pH range of **4.5–6.5**, which restricts phosphorus availability and reduces crop productivity. Additionally, nearly **9%** of the land is barren or unculturable, **1–2%** is classified as culturable wasteland, and about **20%** remains under fallows, indicating widespread soil-related limitations to agricultural use.

Physical Degradation:
Soil fertility assessments show that organic carbon varies between **0.08–5.54%**, with **15.9%** of soils still low in organic carbon. Around **18%** of soils are nitrogen-deficient, and phosphorus deficiency is severe, with about **58%** of soils low and **39%** medium in available P. Potassium deficiency also affects around **12%** of the district, while one-third of soils are sulphur-deficient, reflecting broad nutrient stress. At the state level, Jharkhand soils are reported to be biologically depleted, with **66% P-deficient** and **18% K-deficient**, highlighting the structural nature of nutrient depletion.

3.4 Market, Value Chains and Financial Exclusion

Limited Value Addition:
In Hazaribagh district, market and value-chain development is constrained by multiple, interlinked factors affecting agriculture and allied sectors. Limited value addition remains a core challenge, as production is dominated by small and marginal farmers operating under low-input, largely rainfed systems with minimal mechanization. This leads to low and scattered marketable surplus, making aggregation difficult and weakening farmers' bargaining power in markets.

Financial Exclusion:
Financial and market access constraints persist due to limited APMC coverage in the district. As a result, most farmers continue to sell their produce through village traders and weekly haats. Although Hazaribaghh has one of the higher e-NAM registration figures in Jharkhand (over 1,000 registered farmers), effective utilization is limited by poor physical market infrastructure, inadequate price information, and low transaction volumes.

Cold-chain infrastructure remains insufficient; across Jharkhand there are only about 25 cold storages with a combined capacity of roughly 80,600 MT, unevenly distributed and largely inaccessible to smallholders in Hazaribaghh.

Infrastructure Gaps:
Infrastructure gaps across key value chains further reduce farmers' incomes. Lac growers face long intermediary chains, weak local processing facilities, and a low share in final consumer prices. Dairy producers are constrained by low animal productivity, irregular milk procurement, and limited chilling and collection centers. In horticulture, the absence of pack-houses, grading facilities, and cold storage leads to high post-harvest losses, restricting access to larger urban and institutional markets.

Labour Shortage and Low Mechanization:
Labour shortages and low mechanization add to these challenges, increasing production costs and reducing timeliness of farm operations. While initiatives such as JOHAR and natural farming clusters have begun to strengthen producer aggregation and market linkages, progress remains slow. Weak local processing capacity, limited access to finance for enterprises, and inconsistent food-safety and quality assurance systems continue to limit the scaling of efficient, inclusive, and resilient value chains in Hazaribaghh district.

4. Vision, Strategic Framework & 2035 Targets

4.1 Vision Statement

Hazaribagh envisions a **resilient, inclusive, and sustainable rural economy** where farming households thrive through **diversified livelihoods, climate-smart agriculture, secure water systems, restored soil and forest ecosystems**. By 2035, the district aims to become a **model of regenerative growth**, driven by empowered communities, strong farmer institutions, vibrant local markets, and equitable access to technology, natural resources, and public services. This transformative vision aspires to ensure that every village in Hazaribagh enjoys **stable incomes, safe water, healthy environments, and improved human capabilities,** forming the foundation for long-term well-being and ecological balance.

4.2 Theory of Change

Inputs & Enablers (What We Invest In)
Strengthened farmer institutions (FPOs/SHGs), climate-smart agriculture tools, improved seeds and livestock, digital advisories, enhanced irrigation and water-harvesting assets, soil health interventions, and capacity-building of frontline workers and communities.

Activities (What We Do)
Expand diversified and climate-resilient farming; promote residue-free/organic/natural farming; improve water-use efficiency; restore soils through balanced nutrition and organic matter; strengthen market linkages; enhance value-chain infrastructure; build forest and ecosystem resilience; and deliver targeted support to vulnerable households.

Outputs (Immediate Results of Actions)
Increased adoption of improved practices; expanded irrigation and recharge structures; stronger farmer groups; better access to inputs, credit and advisories; reduced post-harvest losses; improved storage and processing capacity; and enhanced community preparedness for climate risks.

Outcomes (What Changes for Communities)
Higher and more stable farm incomes; improved soil fertility and water security; reduced climate vulnerability; better livestock and horticulture productivity; stronger participation in markets; enhanced nutrition outcomes; and improved resilience of forest-fringe and tribal households.

Long-Term Impact (What We Aspire to Achieve by 2035)
A resilient, water-secure, and diversified rural economy where Hazaribagh's communities achieve sustainable livelihoods, ecological regeneration, and climate-adaptive growth. The district becomes a model for regenerative agriculture, inclusive markets, and green development, ensuring wellbeing for all households.

4.3 Strategic Objectives and Quantifiable (2035 Targets)

Objective 1: Resilient Agriculture and Climate Planning

Primary Target (by 2035):
Strengthen the climate resilience of 35,000 small and marginal farming families across drought-prone blocks such as Bishnugarh, Barkagaon, Churchu, Chauparan, and Daru, which have recorded 16–20 drought years between 1983–2017.

- **Supporting Targets:**
- Promote climate-smart agriculture on 25,000 hectares, focusing on drought-tolerant crops, mulching, mixed cropping, and moisture-retention practices.
- Achieve **50%** improvement in **water-use efficiency** through micro-irrigation, water-harvesting systems, and improved on-farm water management.
- Ensure **70%** of farmers in high-vulnerability blocks adopt community-based climate and disaster preparedness plans.
- Install **500+ solar-powered irrigation systems** to reduce diesel use and ensure reliable irrigation in plateau uplands.
- Scale Integrated Farming System (IFS) models across **10,000 households**, integrating crops, livestock, poultry, fisheries, and horticulture for year-round income.
- Expand agroforestry to **4,000 hectares** (with cumulative potential of 8,000–10,000 ha through ATMA, Forest Department, NGOs, CAMPA, and MGNREGA), focusing on fruit-timber-fodder species on uplands and degraded sites.

Objective 2: Livelihood Strengthening and Diversification

Primary Target (by 2035):
Increase real farm household income by **70%** through diversification, value-chain development, and enterprise growth.
(Hazaribagh's estimated average farmer income: approx. **₹60,000–₹65,000/year** → Target: **₹1.05–1.10 lakh** by 2035.)

Supporting Targets:
- Achieve **20–25%** productivity gains in major crops such as paddy, maize, pulses, oilseeds, and vegetables.
- Enable processing of **40%** of local agricultural and forest produce (lac, horticulture, dairy, honey, millets) through FPOs, SHG enterprises, and rural clusters.
- Facilitate **1,000+ women and youth-led agri-enterprises** in processing, mushroom, lac value-addition, goatery, poultry, dairy, vegetables, NTFP crafts, and bamboo.
- Develop **2-3 Hazaribagh-branded products** under ODOP-like initiatives (e.g., Hazaribagh Lac, Charhi Potato, bamboo crafts, Sohrai Art etc.).
- Establish **50 value-chain clusters** integrating production, aggregation, storage, processing, and marketing across key commodities.
- Train and skill **12,000 rural youth** in agri-business management, food processing, digital agriculture, and e-commerce platforms.

Objective 3: Eco-Resilience and Sustainable Land Management

Primary Target (by 2035):
Restore and sustainably manage **18,000 hectares** of degraded, forest-fringe, and upland agricultural land to enhance ecological resilience.

Supporting Targets:
- Bring **4,000 hectares** under natural farming, prioritizing uplands and areas dependent on traditional water-conserving systems.
- Expand certified organic farming to **3,000 hectares** in blocks with high potential for horticulture and niche products.
- Achieve a **60% reduction in synthetic pesticide** use through widespread adoption of IPM, bio-pesticides, and pheromone traps.
- Reduce chemical fertilizer use by **40%** through composting, green manure, and soil-organic-matter enhancement.
- Rejuvenate nearly **2,000 water bodies**, ponds, and check dams to enhance recharge and ecosystem functioning.
- Implement soil and water conservation across **12,000 hectares** through contour trenches, bunding, vegetative barriers, and mulching.

- Establish **250 community-managed nurseries** and **bio-resource centers** providing seeds, saplings, and bio-inputs for agroforestry and regenerative farming.
- Scale fisheries development through scientific pond rejuvenation and integrated aquaculture in **2,000 farm ponds / community water bodies**.
- Strengthen livestock resilience by establishing **400 climate-resilient goatery, dairy, and poultry units**, supported by community fodder banks.

Objective 4: Institutional Capacity & Governance Reform
Primary Target (by 2035):
Create a robust, integrated governance ecosystem that ensures effective coordination between departments, FPOs, PRIs, and community institutions for sustainable rural transformation.

Supporting Targets:
- Achieve **35%** convergence across major schemes (ATMA, MGNREGA, NRLM, Agriculture, Horticulture, Water Resources, Forest, CAMPA) through unified block-level planning.
- Ensure **50%** of Hazaribagh's FPOs become financially sustainable, professionally managed, and market-linked (with NABARD, SFAC, JSLPS, KVK support).
- Link **40%** of farmers to formal and digital markets through FPOs, cooperatives, e-NAM, and ONDC-like platforms.
- Enable **40%** of farmers to access institutional credit through banks, cooperatives, and SHG-linked credit programmes.

4.4 The Four Pillars Strategic Framework

Pillar 1: On-Farm Production Systems

Scope:
Transforming Hazaribagh's rainfed, drought-prone, and soil-stressed agricultural landscapes by promoting climate-adaptive, resource-efficient, and diversified production systems suited to plateau agro-ecology.

Core Components:

a. Sustainable Crop Production
Promote crops aligned with Hazaribagh's acidic upland soils and variable rainfall—including pulses (arhar, urad, lentil), oilseeds, maize, millets (sorghum, finger millet), vegetables, and improved paddy.

b. Integrated Farming Systems (IFS)
Develop diversified crop–livestock–goatery–backyard poultry–horticulture–fishery models for small and marginal farmers. Promote lac-based IFS in northern forest-fringe blocks (e.g., Barkagaon, Katkamsandi), where Kusum and Palash support traditional lac livelihoods.

c. Soil Health Management
Address widespread soil acidity (pH 4.5–6.5 in nearly 88% area) through structured liming, balanced fertilization, composting, green manuring, and micronutrient application. Improve soil organic carbon in uplands (often <0.5%) by scaling bio-inputs and residue management.

d. Water Conservation & Micro-Irrigation
Adopt moisture conservation measures suited to Hazaribagh's undulating terrain—contour bunding, trenches, staggered pits, mulching, farm ponds, and rooftop runoff capture. Prioritize micro-irrigation (drip/sprinkler) to combat moisture stress in low-recharge plateau areas, where pre-monsoon water tables vary widely (even reaching 0.03 m BGL in 2021).

e. Biodiversity Enhancement
Integrate native, high-value, and NTFP species —Mahua, Kusum (lac host), Sal, bamboo, Ber, Jackfruit—into agroforestry models to restore degraded uplands, enhance carbon stocks, and generate diversified income streams.

Pillar 2: Off-Farm Value Addition & Rural Enterprises

Scope:
Enhancing farmer incomes by expanding post-harvest handling, processing, branding, and market integration for agriculture, lac, dairy, horticulture, forest products, and emerging rural enterprises in Hazaribagh.

Core Components:

a. Primary Processing Infrastructure
Establish decentralized processing units for maize, pulses, vegetables, spices, fruits (jackfruit, mango), lac, and bamboo in key clusters such as Barhi, Hazaribagh Sadar, Katkamdag, Barkagaon. Reduce post-harvest losses through sorting, grading, packhouses, cold storage, and village-level dryers.

b. Secondary Processing & Micro-Enterprises
Promote women and youth-led enterprises for products such as jackfruit chips, mango pulp, pickles, lac jewelry, bamboo crafts, dairy products (paneer, ghee), honey, mushroom and local snacks. Use SHG/FPO incubation models under JSLPS and ATMA.

c. Quality Assurance & Certification
Develop clusters for organic/PGS, residue-free horticulture, and lac value-chain certification. Promote GI-based branding of Hazaribagh Lac and bamboo crafts. Introduce traceability for safe-to-eat fruits and vegetables entering urban markets.

d. Branding & Market Linkages
Create a unified district brand—"Hazaribagh Naturals"—for lac, honey, fruits, bamboo products, and safe vegetables. Enable FPOs and SHGs to access e-commerce (ONDC, Amazon Saheli), institutional buyers, and private aggregators. Upgrade rural haats and strengthen linkages to e-NAM.

Pillar 3: Commons and Natural Resource Management (NRM)

Scope:
Restoring and climate-proofing Hazaribagh's forest–agriculture interfaces, water bodies, upland catchments, degraded mines, and groundwater recharge zones through scientific and community-driven NRM.

Core Components:

a. Community-Based Water Resource Management
Rejuvenate traditional water bodies—ahars, ponds, tanks, check dams—and improve the neglected minor irrigation network in plateau blocks. Establish and strengthen Water User Associations (WUAs) to regulate water allocation, adopt irrigation scheduling, and reduce seasonal scarcity.

b. Ridge-to-Valley Watershed Development
Implement watershed interventions in erosion-prone uplands—contour trenches, staggered trenches, gully plugs, check dams, vegetative barriers, percolation tanks. Reduce runoff and soil erosion on Hazaribagh's slopes while improving soil moisture and shallow aquifer recharge.

c. Agroforestry & NTFP Intensification on Commons
Promote Mahua, Sal, Kusum (lac host), bamboo, jackfruit, fodder species on community lands and degraded forests. Develop lac-based NTFP clusters, particularly in Barkagaon–Katkamsandi–Churchu, reviving traditional livelihoods and enhancing carbon sequestration.

d. Landscape-Level Restoration & Risk Reduction
Use climate hazard mapping, erosion hotspot analysis, and community-led early warning systems to address risk from extreme rainfall, drought, and heatwaves. Develop climate-resilient infrastructure, including slope stabilization, flood bunds, and community shelters.

e. Mine-Affected Area Restoration
Rehabilitate mining-degraded landscapes through soil amendments, deep-pit water body restoration, and green cover regeneration in Barkagaon, Keredari, and adjoining areas, integrating community monitoring and livelihood benefits.

Pillar 4: Enablers (Markets, Finance, Institutions, & Knowledge Systems)

Scope:
Strengthening the enabling environment—markets, enterprises, financial systems, institutions, and governance to drive scalable, inclusive, and sustainable development in Hazaribagh.

Core Components:

a. Financial Inclusion & Risk Mitigation
Expand access to KCC, climate-resilient credit, and livestock-based credit through DCCB, PACS, and banks. Promote insurance uptake (PMFBY) and bundled finance for micro-irrigation, bio-inputs, and IFS units.

b. Market Development & Value Chain Integration
Upgrade and digitize local haats, build aggregation hubs, and integrate FPOs with e-NAM, ONDC, and institutional buyers. Strengthen horticulture, lac, dairy, and bamboo value chains with better logistics, storage, and price intelligence systems.

c. Institutional Capacity Building
Strengthen FPOs, SHG federations, WUAs, and producer groups through training in governance, digital bookkeeping, value chain assessment, and climate-smart practices. Promote CBBO-led professionalisation of FPOs.

d. Knowledge, Innovation & Extension Systems
Enhance extension through digital advisories, AI-enabled weather alerts, Farmer Field Schools, participatory demonstrations, and ICT-enabled decision support tailored to the plateau's climate risks. Integrate indigenous knowledge, especially in tribal villages and forest-fringe communities.

e. Policy Convergence & Governance Mechanisms
Strengthen an ATMA-led convergence architecture linking Agriculture, Horticulture, Water Resources, Animal Husbandry, JSLPS, Forest Department, and Rural Development. Institutionalize joint planning, integrated district action plans, and shared monitoring dashboards for evidence-based governance.

5. Integrated Implementation Framework and Strategic Way Forward (2025–2035)

Vision 2035:
Hazaribagh will evolve into a climate-resilient, water-secure, diversified, and institutionally strong agricultural district, where smallholder farmers—especially women, youth, and forest-fringe communities—achieve sustainable incomes, ecological regeneration, and improved quality of life.

5.1 Phase 1: Foundation Building & Piloting (2025–2027)

Focus: Baseline mapping, targeted pilots across drought-prone blocks (Bishnugarh, Barkagaon, Churchu, Chauparan, Daru), strengthening water security, digital advisory systems, and early institutional activation.

A. Comprehensive Baseline (2025–2027)

- Conduct district-wide assessments on soil acidity, organic carbon, nutrient deficiencies (noting **58% low P soils**), groundwater fluctuations (as shallow as **0.03 m bgl recorded**), and water-body condition.
- Map cropping patterns (**paddy, maize, pulses, vegetables**), lac-producing belts, livestock distribution, horticulture potential (**mango, jackfruit, guava, lemon**), and forest–agriculture interfaces.
- Identify vulnerable households in forest-fringe and mining-affected villages for targeted livelihood interventions.

B. On-Farm Interventions

- Establish **60 demonstration plots** showcasing millet–pulse–vegetable systems, climate-smart paddy, IFS, and agroforestry models suited to acidic uplands.
- Restore **5,000 hectares of degraded and cultivated land** using natural farming, bunding, mulching, and soil amendments (lime, compost).
- Introduce **1,500 hectares** of horticulture (mango, guava, lemon, jackfruit, moringa, vegetable clusters).
- Promote **5 organic/natural farming** clusters across **2,200 ha**, focusing on high-acidity blocks.
- Distribute drought-tolerant seeds (paddy, maize, arhar, urad, millets) to **6,000 farmers**.
- Establish **250 orchard demonstrations**, **150 vermipits** and **200 azolla/fodder units** for livestock nutrition.
- Develop agroforestry plantations across **1,400 hectares**, prioritizing Kusum–Palash–Mahua for lac and NTFPs.
- Set up **180 climate-resilient livestock and backyard poultry units**.
- Renovate **100 fish ponds** with improved carp culture and training for women and youth.

C. Water Security Interventions

- Rejuvenate **180 farm ponds/community water bodies**.
- Construct/revive **30 check dams/percolation structures** to improve recharge.
- Install **350 micro-irrigation** (drip/sprinkler) units.
- Deploy **300 solar-powered irrigation pumps** for upland farmers and women's groups.

D. Institutional Strengthening

- Train **18 FPOs** in governance, processing, business planning, and value-chain management (horticulture, lac, dairy, pulses).
- Form and activate **55 Water User Associations (WUAs)**.
- Operationalize Block-level ATMA Convergence Committees in all blocks.

E. Digital & Advisory Systems

- Launch a district-level AI advisory dashboard for crop, soil, livestock, fishery, climate alerts, and market information.
- Deliver digital and field-based advisories to **30,000 farming families**.

5.2 Phase 2: Scaling and Integration (2028–2030)

Transition from pilots to district-wide integration across all major production clusters and climate-risk zones.

A. Geographical Scaling

Scale integrated interventions across 7 priority blocks: Bishnugarh, Barkagaon, Churchu, Katkamsandi, Chauparan, Hazaribagh Sadar, and Daru.

- Restore an additional **8,000 hectares** of degraded land.
- Expand natural/organic farming to **5,500 hectares** total.
- Scale IFS to **4,200 hectares**, linking to market and processing hubs.
- Establish **250** more horticulture orchard clusters covering **2,200 hectares**.
- Expand agroforestry by **2,000 hectares**, focusing on lac hosts, bamboo, fodder.
- Strengthen convergence across Agriculture and Horticulture, Animal Husbandry, Water Resource Department, JSLPS, Forest and Fisheries departments.

B. Value Chain Development

Set up 7 Integrated Value-Chain Hubs for:

1. Jackfruit
2. Vegetables
3. Lac & NTFPs
4. Maize & Pulses
5. Dairy & Goatery
6. Bamboo
7. Fishery Products

These hubs will include grading, storage, processing, packaging, logistics, and market facilitation.

C. Livestock & Fisheries Expansion

- Support **10,000 livestock farmers** with breed improvement, fodder, vaccination, and AI services.
- Establish **600 backyard poultry, 350 goatery, and 180 dairy micro-enterprises**.
- Expand fisheries to **600 ponds**, integrating feed supply, nurseries, and local market linkages.

D. Renewable Energy Integration

- Install **250 additional solar irrigation** systems via subsidies, credit, CSR, and farmer contributions.
- Promote solar-powered cold storage, dryers, feed mills, and fish-drying units.

E. Enterprise Development

- Promote **2,500 women and youth-led enterprises** in lac, bamboo, dairy, mushrooms, honey, horticulture, composting, and food processing.
- Ensure SHGs and FPOs receive training in enterprise planning and mobilize credit through banks and JSLPS.

F. Digital Integration

- Expand e-NAM integration and mobile advisory applications.
- Deliver real-time climate, market, disease, and cropping advisories to **50,000 farmers**.

5.3 Phase 3: Consolidation and Replication (2031–2035)

By 2035, Hazaribagh becomes a self-sustaining, climate-resilient, enterprise-driven agricultural district.

A. Target Scale-Up

- Achieve **10,000 hectares** of restored land.
- Expand organic/natural farming to **6,000 hectares.**
- Reach **3,500 hectares** of IFS adoption.
- Rejuvenate **2,000+ ponds and tanks** for irrigation and fisheries.
- Establish **400 livestock–poultry units**, integrated with fodder, bioenergy, and veterinary support.
- Expand horticulture to **5,000 hectares**.
- Achieve **3,500 hectares** of agroforestry for carbon sequestration and lac revival.

B. Institutional Maturity

- Ensure 18 FPOs become financially viable and professionally managed.
- Empower SHG federations to manage livestock, fisheries, and rural enterprise ecosystems.

C. Climate & Natural Resource Management

- Scale climate-smart, IFS, and ecological farming to **22,000 hectares**.
- Reduce diesel dependency by **60%** through solar irrigation and renewable systems.
- Restore all major water bodies, drainages, and watershed structures.

D. Value Chain & Local Market Integration

- Develop **2-3 branded Hazaribagh products**: Hazaribagh Lac, Hazaribagh Mango, Jackfruit, Bamboo Crafts, Honey, Safe Vegetables, Pulses.
- Ensure **40%** of all produce is locally processed, packaged, or value-added.

E. Knowledge, Innovation & Finance

- Establish AI-enabled precision advisory systems for every farming cluster.
- Conduct third-party impact evaluations.
- Launch a Hazaribagh Climate Resilience & Rural Enterprise Fund to support scaling.

5.4 Implementation & Monitoring Framework – Sarkar, Bazaar, Samaj Sarkar (Government)

- ATMA leads convergence, planning, and technical backstopping.
- Agriculture, Water Resources, Horticulture, Animal Husbandry, JSLPS, and the Forest Department coordinate infrastructure, extension, irrigation expansion, soil-water conservation, and livelihood systems.
- Prioritize mining-affected & drought-prone blocks for resource allocation.

Bazaar (Market)

- Strengthen lac, mango, jackfruit, bamboo, dairy, pulses, fishery value chains.
- Establish cluster-based processing hubs and FPO-led aggregation centres.
- Integrate with private buyers, processors, wholesale mandis, digital marketplaces (e-NAM, ONDC).

Samaj (Community)

- SHGs, FPOs, tribal groups, WUAs, and youth collectives lead implementation.
- Promote gender inclusion, youth entrepreneurship, and community ownership.
- Encourage behavioural change towards soil conservation, water saving, ecological restoration.

Monitoring, Evaluation & Learning (MEL)

- KPIs track yield growth, water-use efficiency, diversification, restoration progress, community participation, and institutional performance.
- Use remote sensing, GIS dashboards, mobile apps, field surveys, and community scorecards.
- Annual reviews to adjust strategies based on climate variability and market conditions.

6.Institutional Framework – Sarkar, Bazaar, and Samaj

Monthly:
Block-level technical reviews led by **ATMA Hazaribagh** to monitor progress on agriculture, water security, livestock, fisheries, and extension activities.

Quarterly:
District-level reviews chaired by the **Deputy Commissioner, Hazaribaghh**, to assess inter-departmental convergence, target achievement, fund utilization, and key bottlenecks.

Annual:
District-wide integrated review and learning forum involving government, FPOs, SHGs, NGOs, financial institutions, and private partners to evaluate outcomes, share best practices, and refine strategies.

6.1 Government Departments (The Sarkar Arm)

ATMA, Hazaribaghh
The nodal convergence agency responsible for integrated planning, coordination, and monitoring. ATMA will chair interdepartmental reviews, facilitate block-level convergence committees, and ensure alignment of agriculture, horticulture, livestock, fisheries, and watershed interventions.

Department of Agriculture
Lead implementation of climate-resilient crop planning, promotion of drought-tolerant varieties, soil health restoration (liming, INM), natural farming clusters, and Integrated Farming Systems (IFS).

Water Resources Department & JSWM
Plan and execute minor irrigation, watershed development, check dams, tank rejuvenation, recharge structures, and ridge-to-valley soil–water conservation interventions.

Department of Horticulture
Drive crop diversification through fruits, vegetables, spices, and orchards; establish nurseries; support micro-irrigation; and promote market-linked horticulture clusters.

Department of Animal Husbandry & Fisheries
Implement breed improvement, fodder development, vaccination, backyard poultry and goatery units, dairy strengthening, scientific aquaculture, and pond rejuvenation under PMMSY.

Forest Department
Support agroforestry, NTFP-based livelihoods (lac, bamboo, mahua), forest-fringe restoration, CAMPA convergence, and mine-affected area rehabilitation.

JSLPS (NRLM)
Promote women-led SHGs, federations, and community enterprises in livestock, fisheries, processing, NTFPs, and value-added products; strengthen financial inclusion and entrepreneurship.

6.2 Community Organizations (The Samaj Arm)

Farmer Producer Organizations (FPOs)
Serve as the backbone of aggregation, input supply, custom hiring, collective marketing, and value-chain development. In Hazaribaghh, FPOs will receive intensive handholding in governance, business planning, processing, branding, and market integration for commodities such as lac, vegetables, pulses, maize, dairy, bamboo, and fisheries.

Self-Help Groups (SHGs)
Act as the foundation of women-led livelihoods and social mobilisation. SHGs will drive micro-enterprises in poultry, goatery, mushroom cultivation, composting, food processing, lac value addition, and bamboo crafts, while also supporting climate adaptation, savings, and credit access.

Water User Associations (WUAs)
Manage community irrigation assets, regulate water use, promote irrigation scheduling, and ensure equitable access to water resources, particularly in water-stressed upland and plateau areas.

Panchayati Raj Institutions (PRIs) & Tribal Collectives
Facilitate local planning, convergence with MGNREGA and watershed works, social oversight, and community ownership of natural resource management initiatives.

6.3 Private Sector and Financial Institutions (The Bazaar Arm)

Banks, DCCB & NABARD
Provide timely institutional credit, KCC-linked finance, crop insurance (PMFBY), and climate-smart loan products for irrigation, livestock, renewable energy, and agri-enterprises. NABARD and NABCONS will support FPO strengthening and value-chain diagnostics.

Agri-Businesses & Processors
Partner with FPOs and SHGs for aggregation, contract farming, processing, branding, and market access for high-value commodities such as lac, jackfruit, mango, vegetables, dairy products, bamboo goods, and fishery products.

Technology & Service Providers
Supply solar irrigation systems, micro-irrigation, mechanization, digital advisory platforms, and post-harvest technologies, with training and after-sales support to ensure adoption and sustainability.

Input Suppliers
Ensure availability of quality seeds, bio-inputs, lime, organic fertilizers, and climate-resilient planting material suited to acidic soils and plateau conditions.

Logistics, Storage & Cold Chain Partners
Strengthen transport, warehousing, packhouses, cold storage, and rural haats to reduce post-harvest losses and improve farmer price realization.

Conclusion: A Collective Covenant

Hazaribagh stands at a pivotal moment, shaped by the dual realities of rich natural resources and persistent structural challenges. Its rainfed agriculture, acidic plateau soils, recurring droughts, and uneven market access continue to constrain rural livelihoods, while mining pressures and land degradation intensify ecological vulnerability. Yet the district also holds remarkable potential—fertile valleys, diverse horticultural crops, a historically strong lac belt, widespread forest-fringe communities, and a growing network of FPOs and SHGs equipped for change.

A future-ready Hazaribagh will depend on its ability to restore ecosystems, secure water, improve soil fertility, diversify livelihoods, and build strong institutions. By scaling climate-smart agriculture, strengthening value chains, empowering women and youth, and enabling convergence across government, markets, and communities, the district can transition from vulnerability to resilience. With sustained investment, scientific planning, and community-centered governance, Hazaribagh can emerge by 2035 as a model of climate-resilient, inclusive, and sustainable rural development, ensuring prosperity for its farming families and long-term ecological balance for generations to come.

www.SwitchON.org.in **@SwitchONIndia**

SwitchON Foundation, established in 2008, is a leading non-profit organisation focusing on Environment Sustainability and Equal Opportunities. Operating in 10 Indian states. It leads initiatives in Clean Energy Access, Sustainable Agriculture, Skilling, Clean Air and Sustainable Cities. Key strengths encompass innovative project implementation, capacity building, field support, awareness and advocacy.