

Farming in the Flood's Shadow: Small and Marginal Farmers of Odisha's Mahanadi Basin

He owns 1.2 acres in Jagatsinghpur's Balikuda block. He has farmed it his whole life, as his father did before him. In an average year, the paddy crop gives him enough for household food and a small surplus to sell. In a flood year — and there are flood years — the Mahanadi or th...

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Agriculture & Markets

Published: June 2026 · Last reviewed: June 2026

When the flood recedes, the immediate problem is the paddy. But the next problems arrive in waves: the seed for the next planting cycle, the repayment of the kharif loan, the input costs for rabi if the soil allows a rabi crop after waterlogging, and the food security of the household through the months between what was supposed to be the harvest and whatever can be scraped together from day labour or relatives or moneylenders.

He is not a poor farmer in the way that the system counts poverty. He owns land. He has a ration card. He is registered in the PM-Kisan beneficiary list. By most administrative definitions, he is a "smallholder" — a category that welfare systems treat as fundamentally different from "landless labourer." But a smallholder in a flood-prone area, with 1.2 acres and no irrigation, an annual crop cycle interrupted every two to three years by flooding, and no savings buffer, is in a precarious economic position that administrative categories don't adequately describe.

This Convergence Note examines small and marginal farmers in Odisha's Mahanadi basin flood-prone districts — who they are, what the flooding cycle means for their

livelihoods, what the scheme architecture provides, and where the gaps are.

The Mahanadi Basin Flood Zone: Geography and Vulnerability

The Mahanadi is Odisha's largest river and one of India's major river systems. It rises in Chhattisgarh and flows 857 kilometres to the Bay of Bengal, draining a basin of approximately 1.42 lakh square kilometres. The lower Mahanadi delta — the flat coastal zone where the river spreads into multiple distributaries before meeting the sea — is one of the most agriculturally productive regions in Odisha and one of the most flood-vulnerable.

The districts of the lower Mahanadi basin and coast that experience the most regular riverine and coastal flooding are: Cuttack (through which the Mahanadi flows directly), Jagatsinghpur (where Mahanadi, Devi, Kathajodi, and Biluakhai all pass through and coastal flooding adds to riverine risk), Kendrapara (Mahanadi delta coast, Gahirmatha coast), Puri (coastal flooding and cyclone exposure), and to a lesser extent Khurda, Bhadrak, and Balasore.

Jagatsinghpur deserves special attention. The district covers 1,759 square kilometres, with 194 gram panchayats and 1,294 villages. Four major rivers pass through it. The Odisha State Disaster Management Authority (OSDMA) has built multipurpose cyclone and flood shelters at strategic locations across the district — testimony to the regularity of the disaster cycle, not to its resolution.

What makes this geography particularly important for agriculture is the paddy calendar. Kharif paddy transplantation happens in June–July; harvest in November. The peak flood season in Odisha is typically August–October, perfectly overlapping with the crop's most vulnerable growth stages — when it is in the water but not yet able to withstand extended inundation. A flood that lasts eight to twelve days during this period destroys the crop. A farmer who planted in June has no recovery option within the season.

Who Are Small and Marginal Farmers in This Context?

The agricultural classification system distinguishes:

- **Marginal farmers:** Holdings below 1 hectare (2.47 acres)
- **Small farmers:** Holdings between 1 and 2 hectares (2.47 to 4.94 acres)
- **Semi-medium and above:** 2 hectares and more

Odisha's agricultural landholding pattern is heavily skewed toward small and marginal holdings. The majority of agricultural households in the flood-prone districts hold below 2 hectares. In Jagatsinghpur, Kendrapara, and the coastal blocks of Puri, the average operational holding is below 1 hectare for most farming households.

These farmers have several characteristics that define their vulnerability:

Single-crop dependence. Most small and marginal farmers in the flood zone grow paddy as their sole kharif crop. The waterlogged soil and saline intrusion from coastal flooding in post-cyclone years make rabi cropping difficult or impossible in low-lying fields. Diversification to non-paddy crops or vegetable cultivation requires irrigation, which most smallholders do not have access to.

Credit from informal sources. Despite PM-Kisan registration and the availability of KCC (Kisan Credit Card) from banks, many small farmers in flood-prone areas rely on informal moneylenders for crop input financing — because bank credit requires collateral documentation that small farmers often lack (land records in their name, not in a grandfather's name, not subject to legal dispute), and because informal credit is faster and does not require the paperwork journey to a bank branch. Moneylender interest rates are 24–36 percent annually. After a flood year, the unpaid informal loan carries forward at this rate.

Submergence-tolerant seed adoption. Research from IRRI and from Odisha's own agricultural research system has demonstrated that varieties like Swarna-Sub1 — a

high-yield paddy variety with submergence tolerance built in through conventional breeding — can withstand inundation for 14–17 days with significantly better survival than standard varieties. Studies in Odisha's flood-prone districts confirm that farmers in submergence-prone areas are willing to pay a meaningful premium for these traits when they have access to them. Distribution of submergence-tolerant seed is a key agricultural intervention; its reach in the most vulnerable blocks is incomplete.

PMFBY enrollment gaps. Pradhan Mantri Fasal Bima Yojana (PMFBY) is the primary crop insurance mechanism. For loanee farmers — those with a KCC crop loan from a bank — PMFBY enrollment is automatic (the premium is deducted from the loan account). For non-loanee farmers — which includes a significant proportion of small farmers who use informal credit — enrollment is voluntary and requires proactive registration. Non-loanee farmer PMFBY enrollment has been improving nationally (total enrolled farmers rose from 3.17 crore in 2022–23 to 4.19 crore in 2024–25, a 32 percent increase) but voluntary enrollment in remote blocks is still well below the loanee penetration rate.

The Flood Cycle: What Happens After Inundation

Year 1 (flood year): The paddy crop is lost or severely damaged. The farmer accesses SDRF (State Disaster Response Fund) ex-gratia if the district is notified as flood-affected. SDRF rates per hectare for paddy crop loss are set by state notification; they rarely cover actual input costs. If enrolled in PMFBY, a crop loss claim is initiated — but the Area Approach Basis for yield estimation means the claim is processed for the notified insurance unit (which may be a circle or block), not for the individual farm. If the surrounding area's average yield is above the threshold despite local losses, individual farmers within that area may receive no claim.

Year 1–2 (debt accumulation): With no harvest income and SDRF compensation that may be insufficient, the farmer borrows — from moneylenders, from relatives, from advance payments to contractors for future labour. The family may reduce food

intake, pull children from school if fees are due, or sell livestock that serve as the household's asset reserve.

Year 2–3 (recovery attempt): With some credit available from KCC renewal or new moneylender borrowing, the farmer replants. If no flood occurs, the crop succeeds, and the debt is partially repaid. If the cycle floods again — and in the lower Mahanadi delta, flooding every two to three years is not exceptional — the debt compounds.

This is not theoretical. It is what agricultural household surveys in Odisha's flood-prone districts consistently document: that farming households in high-frequency flood areas carry debt that they never fully clear, that their net assets erode over time despite regular cropping, and that the combination of low productive land and irregular income creates a persistent vulnerability that is invisible in the data until a crisis event makes it visible.

The Scheme Architecture: What Exists

PM-Kisan

The Pradhan Mantri Kisan Samman Nidhi provides Rs 6,000 per year (in three Rs 2,000 instalments) directly to small and marginal farmers registered in the PM-Kisan portal. Coverage in Odisha has been expanding; the scheme does not distinguish between flood-prone and other farmers, but it represents a direct income transfer that provides some resilience.

PMFBY (Pradhan Mantri Fasal Bima Yojana)

The flagship crop insurance scheme. For flood-inundated paddy, PMFBY covers:

- Prevented sowing (if flooding prevents planting): up to 25 percent of sum insured
- Standing crop loss (standard): yield-based, at area-average level
- Post-harvest losses (cyclonic rains, unseasonal rain): up to 14 days after harvest

- Localised perils including inundation: individual farm-level assessment allowed

A critical update from November 2025: the Ministry of Agriculture approved the inclusion of paddy inundation as a specific Localised Calamity Cover under PMFBY from Kharif 2026, explicitly responding to requests from states like Odisha, Assam, West Bengal, and Tamil Nadu where paddy submergence is a regular risk. This is significant because it means losses from paddy flooding can now be assessed and compensated at the individual farm level — not just the area average — for this specific cause. From Kharif 2026, farmers in Jagatsinghpur, Kendrapara, and other flood-prone blocks can potentially receive individual inundation claims even when the surrounding area's average yield does not trigger a standard PMFBY claim.

The technology integration under PMFBY has also improved: YES-TECH (Yield Estimation System based on Technology) now assigns 30 percent weight to remote sensing data for yield estimation in paddy from Kharif 2023, reducing dependence on physical crop cutting experiments which were slow and manipulable.

PMKSY (Pradhan Mantri Krishi Sinchayee Yojana)

The irrigation scheme, operating under the "Har Khet Ko Pani, More Crop Per Drop" framework. Small farmers with access to groundwater can access PMKSY-supported micro-irrigation systems (drip, sprinkler). In the coastal districts, the soil conditions and high water table make some forms of irrigation more accessible; the challenge is that farmers who need PMKSY most (those dependent on rain for kharif) are the least likely to have made the capital investment in even basic irrigation infrastructure.

SDRF (State Disaster Response Fund)

The primary immediate-relief mechanism for flood-affected farmers. SDRF ex-gratia for crop loss is released by the Revenue Department of Odisha after a district is declared flood-affected. The rates are set under the NDMA (National Disaster Management Authority) guidelines and are periodically revised. In flood years, SDRF release to Odisha has been substantial — but the per-farmer payment is typically

small relative to actual loss, and the processing time means money arrives weeks or months after the need is acute.

PMJAY and Health Coverage

Flooding creates significant health risks — waterborne disease (typhoid, diarrhoea, leptospirosis), skin conditions from prolonged water exposure, mental health impacts from repeated economic shocks, and snake-bite incidents during flooding. PMJAY coverage for flood-prone district farmers who are in the SECC 2011 eligible list provides hospitalisation coverage; but rural health infrastructure in the lower Mahanadi delta is thin, and post-flood health burden spikes that the system cannot absorb.

Mission Shakti SHGs as Credit Buffer

In several flood-prone blocks, Mission Shakti SHGs have functioned as informal insurance mechanisms — pooling small savings that can be borrowed by members in a flood emergency at lower rates than moneylenders. This is informal risk-sharing, not formal insurance, but it performs a similar function. Strengthening SHG capitalisation in flood-prone areas is a concrete CSR programme model.

Submergence-Tolerant Varieties: The Most Tractable Agricultural Intervention

Among all the interventions available to improve the resilience of small farmers in flood-prone Odisha, the distribution of submergence-tolerant paddy varieties to the most vulnerable blocks is arguably the most directly impactful and cost-effective.

Research published in PMC (based on discrete choice experiments in rural Odisha) found that farmers in flood-prone areas are willing to pay a significant premium for rice with submergence tolerance. Swarna-Sub1, developed by IRRI in partnership with ICAR, has been released in Odisha and is available through the seed distribution system. The distribution is not uniformly reaching the highest-risk farming households.

An NGO programme that partners with Krishi Vigyan Kendras (KVKs) and Block Agriculture Officers to ensure submergence-tolerant variety seed reaches the farmers in the most flood-vulnerable gram panchayats — combined with field demonstration plots that show the variety's performance relative to standard Swarna — is a high-ROI agricultural intervention that CSR can fund and agriculture departments can co-implement.

For NGOs: Programme Priorities in Flood-Prone Agricultural Areas

PMFBY enrollment facilitation for non-loanee farmers. The gap between loanee and non-loanee PMFBY enrollment is the most immediately addressable risk gap. An NGO field worker who visits GPs in flood-prone blocks before the Kharif season, facilitating voluntary PMFBY enrollment for small farmers who do not have crop loans, converts potential flood victims into insured farmers. From Kharif 2026, the new paddy inundation provision makes this even more valuable.

Seed distribution partnerships. Partnering with KVKs and the state's OSSC (Odisha State Seeds Corporation) to ensure submergence-tolerant variety seed is available and promoted in the highest-risk blocks. This is a programme where agriculture department co-implementation gives NGO work both reach and institutional credibility.

Post-flood welfare linkage. In the immediate post-flood period, an NGO present in the district can help affected farmers navigate SDRF application (which requires revenue officer documentation), PMFBY claim initiation (which requires the crop loss to be reported within the scheme's timeline), and access to emergency food support through ICDS mobile nutrition services or NHM health camps.

SHG savings mobilisation. Working with Mission Shakti SHG clusters to build a specific "flood reserve" within SHG savings — a designated pool that members can access interest-free in flood emergencies. This requires only policy understanding and facilitation; the infrastructure is the SHG itself.

For CSR: Agriculture in Difficult Geographies

CSR in agriculture typically gravitates toward model farms, precision agriculture demonstrations, and agricultural value chain programmes in regions where success stories are producible within a three-year CSR cycle. Flood-prone smallholder farming in the Mahanadi delta is not that environment. A three-year CSR programme in Jagatsinghpur will almost certainly encounter at least one significant flood, which will disrupt whatever was built and require adaptive response.

This is not a reason to avoid the geography. It is a reason to design differently — with contingency planning, with a focus on risk reduction rather than pure production increase, and with a multi-year commitment that understands the farming system the investment is entering.

Companies with operations in coastal Odisha — port-related industries, the Paradip refinery cluster, coastal infrastructure — have a particular responsibility and opportunity to invest in the farming communities adjacent to their operations. These communities' flood vulnerability is often exacerbated by changes in coastal land use and drainage patterns that major infrastructure development produces. CSR investment in submergence-tolerant agriculture, PMFBY facilitation, and post-flood welfare linkage in these communities is both ethically appropriate and practically beneficial to community relations.

Schemes at a Glance

Scheme	Relevance	Nodal Department
PMFBY (incl. 2026 paddy inundation cover)	Crop insurance; now includes flood-specific individual cover	Agriculture & Farmers Welfare
PM-Kisan	Rs 6,000/year direct income support	Agriculture & Farmers Welfare

Scheme	Relevance	Nodal Department
PMKSY	Irrigation support, micro-irrigation	Agriculture / Jal Shakti
SDRF	Immediate disaster relief for flood-affected farmers	Revenue Department, Odisha
KCC (Kisan Credit Card)	Working capital credit for crop inputs	Agriculture / Banks
RKVY (Rashtriya Krishi Vikas Yojana)	Agricultural technology demonstration, KVK support	Agriculture
Swarna-Sub1 / Submergence-tolerant varieties	Seed-level resilience for flood-prone farmers	OSSC / KVK / Agriculture Dept
Mission Shakti SHGs	Informal flood-emergency credit buffer	Women & Child Development
PMJAY	Post-flood health coverage	Health & Family Welfare
OSDMA	Flood shelter, early warning, disaster preparedness	Revenue / OSDMA

The Patience of a Flood-Country Farmer

The farmer in Jagatsinghpur's Balikuda block does not think of himself as a disaster victim. He thinks of himself as a farmer in a flood country — someone whose land is productive and fertile because of the alluvial deposits the Mahanadi has been bringing for centuries, and whose livelihood is precarious for the same reason. He has adapted. He has chosen paddy varieties that mature fast, reducing flood exposure window. He keeps some of his savings in the form of his wife's jewellery, which is liquid enough to sell if the season fails. He has relationships with the mahajan that are uncomfortable but functional.

What he doesn't have is the crop insurance that would convert flood loss from a catastrophe to an insured event. He doesn't have the submergence-tolerant seed that might save half the crop instead of all of it. And he doesn't have a welfare system that knows how to respond to his situation in the two weeks immediately after the flood, when the need is acute and the administrative machinery is still assessing the damage.

These are not complex policy problems. They are implementation problems — the gap between a well-designed scheme and a farmer in a flooded field who has never heard of it. Closing that gap is practical, measurable, and within the reach of NGO programmes and CSR budgets that are willing to work in difficult geographies with long time horizons.

Sources: PMC — "Do Farmers Value Rice Varieties Tolerant to Droughts and Floods? Evidence from Odisha" (2019); Global Agriculture — PMFBY paddy inundation coverage update (November 2025); PIB — Implementation of PMFBY (July 2025); Arxiv — Flood Evacuation study in Jagatsinghpur (2020); PIB — PMFBY comprehensive risk cover note; OSDMA flood shelter documentation; Down to Earth — Odisha agricultural flood coverage; IRRI Swarna-Sub1 documentation.

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