COVID-19 and Indian Agriculture: From Crisis to Opportunities

Volume-1 | Issue-1 | July 2021

COVID-19's Impact on Indian Agriculture and Migrants

India's Food Inflation Imbroglio

Agricultural Options Market-New Alternative for Farmers
From the Director’s Desk
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This first issue brings together seemingly disparate issues in the agriculture sector to a coherent narrative by highlighting the role of the government in times of pandemic. It draws from the team’s research during the April-June quarter to anchor the research findings around three crucial events: the frightening resurgence of COVID-19, escalating food prices, and record government procurement of wheat and rice.

Prima facie these events seem discrete. But the articles bind them along a single thread, which is that of governance. While the pandemic makes the need for strengthening safety nets felt more palpably, the modality of such safety nets and allied issues of government interventions for price support and control become more pressing than ever.

The pandemic has been a body-blow to this country, and we are still reeling under its threat. But it is also the time for renewal and revival. At this juncture an evidence-based, analytical publication like this one, holds the potential to inform our policymakers to rebuild a more resilient India. And because of this glimmer of hope, we at ICRIER, have lovingly named the publication AF-TAB, which (minus that small hyphen) also means “the sunshine.”

Deepak Mishra
Director & Chief Executive
ICRIER

From the Chief Editor's Desk

Research from the Last Quarter

- COVID-19’s Impact on Indian Agriculture and Migrants
  Shyma Jose and Ashok Gulati

- India’s Food Inflation Imbroglio
  Shweta Saini, Sandip Das, Aishwarya Pothula and Vijay S. Bangari

- Agricultural Options Market- New Alternative for Farmers
  Harsh Wardhan and Kavery Ganguly

From the Innovation Kiosk

- FPC- Farm Technology Interface: The Case of Sahyadri FPCL
  Kavery Ganguly

- Private Sector Innovations in Dairy Sector
  Ayushi Khurana and Ashok Gulati

- Innovations to Tame Food Loss
  Prerna Terway

Whither Are We Bound

- Land Degradation and its Costs on Agriculture
  Bharat R. Sharma, Ashok Gulati and Priya Rampal

Bibliothèque
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Looking at Indian agriculture in the context of COVID-19, is like looking at a half-filled glass and wondering whether to call it half-full or half-empty. Resilience shown by agriculture in terms of robust production, record government procurement of wheat and rice, and annual growth of agricultural exports - despite disruptions caused by the pandemic - makes the glass look half full. Healthy production and procurement is good news at this time when the government has doled out various (food) support schemes for the poor / vulnerable/ migrant laborers who have lost their livelihoods to the contagion.

But the loss of 85% of the income of migrants’ households in the rural areas, as estimated in the first article, COVID-19’s Impact on Indian Agriculture and Migrants, intuitively implies a fall in consumption expenditure, and potentially a burden of excess supply on an already production-surplus agriculture. This is from where the glass appears half-empty. And the void becomes more worrisome when food prices actually escalate. Is it because of rising costs of production and marketing, or is there some excess demand for food articles, or is it that global prices are pulling up domestic prices of food- is explored in the next article on India’s Inflation Imbroglio. In particular, the authors have discussed the inflation in pulses and oilseeds, where inflationary pressures are relatively high and government has taken some extreme action of stocking limits on traders and processors of pulses. They figure out that a lack of stable trade policy environment and knee-jerk reaction on pulses policy is not good either for farmers or consumers in the long run, and therefore, should be avoided.

Our third article, very subtly, uses the context of government’s dominance in the grain economy to explore the potential of commodity options as an alternative for MSP and a variant of price insurance for farmers. This inquiry is also relevant for understanding what constrain the outreach and acceptability of commodity derivatives trading in this country.

Inclusiveness of such alternative marketing arrangements, however, is a matter of valid concern for India’s smallholder agriculture. In the case study of Sahyadri FPCL, the author demonstrates how deepening the interface of institution and technology can foster farmer-market linkages through the federation of farmers’ collectives or FPOs. Supplementing this piece are the next two: one, looking at private sector R&D for leveraging smallholder-led dairy farming; and the other at post-harvest innovations for managing food loss. The safety and hygiene protocols infused by the pandemic can potentially take Indian agriculture on a futuristic course if there is an enabling policy environment for such transition.

But most importantly, the contagion has brought forth the relevance of a sustainable way of living. In congruence, the United Nation declared 2021–2030 as the Decade on Ecosystem Restoration. APSI, too, has launched a study to estimate the costs of ecosystem degradation for Indian agriculture. A key finding from this ongoing research is that the per hectare cost of not practicing sustainable land management can be 8.5 times higher than the cost of practicing it. Without loss of generality, if inaction is costlier than action, should we not turn around the COVID-19 crisis into an opportunity for effecting our long-overdue agricultural reforms?

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COVID-19’s Impact on Indian Agriculture and Migrants
Shyma Jose and Ashok Gulati

The second wave of COVID-19 has caused devastating health and economic shocks in India. With the single-day spike crossing 4 lakh during the first week of May 2021, India’s second wave has been much stronger and more intense than the first one. The spike in the daily COVID-19 cases was roughly about four times that of the highest daily cases recorded during the first wave (Figure 1). The most affected states in terms of cumulative Covid cases were Maharashtra, Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Uttar Pradesh and Delhi.

However, the fatality ratio (measured as Covid related deaths in relation to cumulative caseloads) tells a different story. Punjab has the highest fatality ratio during the second wave (as well as the whole period), followed by Uttarakhand, Goa, Jharkhand, Delhi and Maharashtra (Figure 2). The lack of covid-appropriate behaviour, particularly during religious congregations, new year festivities and farmer’s protests could presumably be the factor for high fatality rates in some of these states.
To control the surge of COVID-19 cases and to prevent the health system from being overwhelmed, many Indian states and UTs went into complete or partial lockdown. This, consequently, triggered an exodus of migrant workers from industrial centres and cities to their native villages; however, the magnitude of reverse migration was much smaller compared to last year.

Nonetheless, the second wave is bound to reverse the economic recovery achieved during the last quarter of the financial year (FY) 2020-21. During the first wave, the disruption of economic activities and supply-chains caused a considerable decline in GDP growth (down by almost 24.4% in the first quarter (April-June) of FY 2020-21), and an increase in the unemployment by 23.5% in April 2021. With the easing of the lockdown coupled with the prompt measures by the government to address supply-side shocks, the economy and other major sectors started to recover by the second quarter of FY 2020-21. By the fourth quarter of FY 2020-21, the GDP was growing at 1.6%, albeit the overall GDP growth rate contracted by 7.3% during FY 2020-21 (Figure 3). Not only that, all major sectors such as manufacturing, construction, and trade and services, recorded negative growth during the FY 2020-21. Remarkably, agriculture is the only sector that recorded a positive growth rate of 3.6% during the same period, enabling a robust recovery in rural areas. The pertinent question is: can agriculture again provide a cushion to keep the rural economy afloat during the second wave?

Source: Ministry of Health and Family Welfare, Government of India (as on June 28th, 2021)
Note: Second wave has been considered from February 3rd, 2021, as the number of new cases troughed on February 2nd, 2021. Since then, the new cases have been increasing.
Despite the pandemic, the foodgrain production achieved a new record of 305.4 million tonnes in the current crop year 2020-21 (as per the 3rd Advance Estimates 2020-21) due to good monsoon rains last year. Simultaneously, wheat procurement is at an all-time high and recorded 43 million tonnes in the ensuing rabi marketing season (RMS) 2021-22, exceeding the previous high of 39 million tonnes of RMS 2020-21 (as on June 27, 2021). Similarly, rice procurement in kharif marketing season (KMS) 2020-21 was 57.4 million tonnes (as on June 27, 2021) against 50.5 million tonnes in the previous year (as on date).

In addition, exports of agricultural and allied commodities recorded a growth of 18% in FY 2020-2021 over the previous year. This has helped improve domestic farm prices, particularly for pulses and oilseeds. All in all, remarkable foodgrain production coupled with bumper procurement and reasonable farm prices give hope that agriculture can register a similar growth rate as last year, provided monsoon rainfall is normal.

Impact of the Pandemic on Migrants: The First Wave Vs Second Wave

Last year, lockdown induced closure of economic activities threatened livelihood security of millions of workers, their access to food, shelter, and basic necessities. The worst hit were migrant workers. According to government estimates, around 10.4 million migrant workers had returned to their native place during the last lockdown (Lok Sabha Unstarred Questions No. 174).

Although it is difficult to capture the potential impact of the second wave of COVID-19 infections on migrants, as real-time information on migrants is unavailable. But findings from the first wave may provide valuable insights to ameliorate the negative impact of the second wave.

In a recent study by Gulati et al. (2021), the authors examined the impact of the pandemic on migrant workers using a survey of 2,917 migrants in six states — Bihar, Chhattisgarh, Jharkhand, Odisha, Uttar Pradesh and West Bengal. The study found that the sudden imposition of the nationwide lockdown had a severe impact not only on employment but consequently on the earnings and savings of the migrants once they reached their villages. At their native place, with no proper employment opportunities, the household income of migrants fell by 85% during June-August 2020. With the revival of economic activities post-lockdown, the study found that 63.5% of migrants had returned (re-migrated) to the destination areas by February 2021, while 36.5% were still in their native villages. Although the migrant’s household income has increased after remigration, there was still a contraction of 7.7% relative to the pre-lockdown level. The household income of the migrants who were still at their native place post-lockdown contracted by more than 82% compared to pre-lockdown.

Clearly, these migrants, who faced the brunt of the pandemic, have not fully recovered from their last year's experiences. Emergence of the second wave and consequent lockdowns in several states, would have further exacerbated their vulnerabilities.

With a gradual lifting of the lockdown restrictions in several states, migrant workers have started remigrating to the cities and urban areas. The latest data from MGNREGA website also show a continuing slump in the person days generated which fell from 371.9 million in May 2021 to 283 million in June 2021, corroborating a revival in industrial activities. The Centre for Monitoring Indian Economy (CMIE) depicts that all-India unemployment has also fallen from 11.9 to 9.2% between May and June 2021. But how far migrants will be able to get engaged in any economic activity after returning will depend on the pace of economic revival.

The central government has announced a series of stimulus packages to revive the economy and ameliorate the hardships that the vulnerable population re-encounter with the re-surging of the pandemic. These included an additional 5 kg of subsidised foodgrains under the Public Distribution System (PDS) to 80 crore beneficiaries covered under National Food Security Act (NFSA) from May to November 2021. The total outlay of the stimulus package announced by the centre during the second wave is around Rs 6.29 lakh crore inclusive of food subsidy of Rs. 93,869 crore under the Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY), additional fertilizer subsidy of Rs. 14,775 crore and the rest include the government guarantee to banks and microfinance institutions for loans.

The government’s fiscal conservatism approach has excluded most of the support cum relief measures for the poor that were announced last year. This can further increase the plight of the
migrant workers, especially under a high inflationary pressure. More than the relief measures, government needs to intervene to check distress migration by creating large-scale employment opportunities, especially in the eastern state. Additionally, a local platform at the Gram Panchayat level can be created to register and connect these workers and employers so that they get the opportunity to work closer to their native place. Again, the scale of permissible work under MGNREGA could be broadened to absorb the wide range of skilled and unskilled migrants.

Importantly, the portability of entitlements and social safety nets need to be addressed urgently, be it cash-for-food or grain in-kind via the “One-nation, one-ration card” scheme, or by providing health insurance and treatment at any place or through a universal social protection programme for the vulnerable population. Lastly, a periodic database on migrant workers, say every five years, must be carried out, for any meaningful policy design and implementation.

Reference

India’s Food Inflation Imbroglio
Shweta Saini, Sandip Das, Aishwarya Pothula and Vijay S. Bangari

Despite disruptions in economic activities and supply chains during the first wave of COVID-19, India’s performance in the agricultural sector has been impressive for the FY 2020-21, in terms of overall agricultural production, procurement (especially of wheat and rice) and growth in the exports of agricultural and allied commodities. Yet, during this ongoing phase of the pandemic, the consumer price index (CPI) in the country has been rising. First, since December 2019 till October 2020, and then again since February 2021 to peak at 6.3% recently in June 2021 (Figure 1). About 30% to 40% of CPI inflation in recent months, is due to the inflationary pressures from the food and beverage category (Figure 2).

The consumer food price index (CFPI), a sub-index of CPI tracking retail price movements of 10 sub-categories of food/food-items, grew at 5.15% (year-on-year) and about 1% (month-on-month) in June 2021. The largest contribution to this inflation came from categories of “oil and fat” (58%), followed by “fruits” (16%), “pulses” (11%) and “meat and fish” (8%) and “milk” (6%) (Figure 3).
The pressing issue now is to ascertain the availability of food items at ‘affordable’ prices. More so, as the need for augmenting food security for the poor is becoming more persistent than ever before with the onslaught of the pandemic on their livelihoods and income.

Monsoons, food production and availability

Monsoons, one of the key factors determining the level of agricultural production in India, are predicted to be normal (94 to 106% of LPA) in 2021, according to the IMD’s forecast. As on July 13, 2021, monsoon rains are within the normal range with a deficit of about 6% compared to their average levels (LPA). High rainfall deficits, however, are reported in important agricultural states like Punjab (-22%), Western UP (-48%), Haryana (-38%), Rajasthan (-25%), and Gujarat (-39%).

As per government estimates of production, availability does not appear to be an issue as production of major agricultural commodities has increased since last year. There is, however, a minor dip reported in production of crops like tomatoes (-4.87%), rabi maize (-0.54%); and chicken meat (-0.3%).

However, overall robust rains are likely to encourage higher acreage, ceteris paribus, and result in high production of crops next season. This may help mitigate further price rise. Food inflation in the coming months will also be determined by the government’s strategy of offloading the procured grains, mainly pulses. More recently, pulses have caught much of the nation’s attention with the central government’s recent move of introducing stocking limits on private trade, as an anti-inflationary measure.

Monitoring Prices on Pulse-o-metre

The CPI index on pulses has been rising sharply since the past two years. But as per the GoI estimates, production of major pulses has been high and rising. What then can explain this inflation? Based on the assessment from traders in the market, we attribute two plausible reasons to
this: (i) traders’ perception of lower production of pulses and (ii) presumably higher stocks with private trade.

Traders’ perception of the actual production of pulses is much lower than the official estimates. For example, in case of tur, traders predict the 2021 crop to be at 3.4 MMTs vis-à-vis the GoI’s estimate 4.1 MMTs, while for gram, their prediction is 9-9.3 MMTs compared to the official estimate of 12.6 MMTs. Traders feel that pressure on production reduces availability and pushes prices upwards.

On the other hand, as per our market assessments, there were at least 6.5 MMTs of pulses in stock with private trade in the country by the end of June 2021. Spruced by the Essential Commodities Act (ECA) 2020, private traders/importers/millers (and in some states even farmers) have been holding back stocks of pulses to sell at remunerative prices in coming months. Higher stocks with private players reduced domestic availability further pushing up prices of major pulses.

To dampen the building price pressures, GoI undertook a multipronged approach.

To increase domestic supplies, it removed the import quota restrictions (viz. 4 LMT in tur and 1.5 LMT in moong, annually) on moong, urad and tur, on May 15, 2021, while the duties on these remained unchanged. India is a net importer of pulses and custom duties on pulses imports range between 11% (tur) and 66% (garbanzo or chana). Imports from LDCs are at zero duty, though.

To augment domestic supplies, the government also signed two memoranda of understanding (MOUs). One was with Malawi, on 16 June 2021, for annual imports of 50,000 tonnes of tur or pigeon pea. The other with Myanmar, was signed on 26 June 2021, for the annual export of 2.5 lakh tonnes of urad and one lakh tonne of tur or pigeon pea for the next five years till 2025-26. In both cases the imports will be through private trading. Further to this, the government has also extended its MoU with Mozambique for importing tur with an annual import commitment of 2 lakh tonnes, by another 5 years.

To curb down high private stocks, it invoked the ECA and came up with two consecutive directives: (i) On June 18, 2021, the Department of Consumer Affairs (DoCA) requested states to declare their private stock levels (with millers, traders, importers, and stockists of pulses) to assess real-time availability of pulses across the country; (ii) On July 2, 2021, it imposed stock limits for all the pulses, but moong, till October 31, 2021. For wholesalers, stock limit would be 200 tonnes (provided not more than 100 tonnes of one variety of pulses), while the retailers are allowed 5 tonnes of pulses. For millers, stock limits are the last 3 months’ production or 25% of annual installed capacity, whichever is higher. For importers, the stocks limit is same as that of wholesaler for stocks imported prior to 15th May 2021. Imposing stock limits will force players to slowly unload their stocks into the market, moderating price pressures.

In addition, the government has also directed NAFED to start selling chana or gram from its stocks to provide immediate relief to the market. About 3 lakh tonnes of gram would be sold during July-August, 2021.

Can stock-limiting douse inflation?

Our recently failed attempt of dousing onion price inflation in 2020 by invoking the ECA is evidence enough to reveal that such a measure is rather a knee-jerk response at the very sight of any inflationary trends in prices. In case of pulses, too, it is not likely to be much different.

The sudden invocation of stocking limits goes against the ECA 2020, which stipulated imposition of stock limits only under war, famine or natural calamities of grave nature, and/or extraordinary price rise. However, none of these events are holding right now for the agricultural sector in general, and the pulses sector perse.

The current declaration comes at a time when the retail price of pulses has evidenced a rise that is way below the ECA stipulated price rise threshold of 50% or more over the levels prevailing in the last 12 months. For example, for tur, the 12-month average retail price, for June 2020 to May 2021, is estimated at Rs. 101.75 per kg, vis-a-vis the retail price of Rs. 107.41 a kg, in June 2021. Thus, the retail price rise of tur is only at about 6%. Under such circumstances, ad-hoc restrictions create an environment of uncertainty. This will not only dampen the trade sentiments, but also harm farmers in the forthcoming kharif season. Traders, millers and other stakeholders in the chain will be extremely cautious in buying the harvested crops from the farmers, in anticipation of the stock limits being extended beyond October 31, 2021. Likewise, importers, too, are likely to dither from buying new stocks, potentially defeating the very purpose of the MOUs for imports for ensuring long-run supply of pulses.
In the absence of any extraordinary production-side shocks, is India’s food inflation then a resultant of short-sighted policies? While the intermittent invocation of the ECA illustrates a case of short-sighted domestic trade / marketing policy, similar example also exists with regards to external trade. A case at hand is that of edible oils. While the CPI of edible oils showed a year-on-year increase of about 35% and a month-on-month increase of about 3% as on June 2021, according to FAO the global prices of edible oil have risen by about 82% from June 2020 to June 2021. With edible oil having a weight of about 9% in CFPI, and more than 60% of our consumption needs being met via imports, this rise in global edible oil prices is bound to transmit into domestic prices.

The standard policy practice for softening the domestic retail prices of edible oils in India has been through the reduction in import duty and liberalizing imports. To reduce the domestic impact of rising global prices, in June 2021 the government has announced (via a notification) the reduction in import duty on crude palm oil (CPO) to 10% from the earlier rate of 15%. With the additional agri-cess (at 17.5%) and social welfare cess (10%)\(^1\), effective import duty on CPO currently comes down to 30.25% as against the previous rate of 35.75%. Similarly, after adjusting for the two cesses, the current effective duty on refined palm oil or palmolein comes to 41.25% from 45%. While the import duties on other oils like edible soybean oil (49.5%), and rapeseed oil (49.5%) continues unchanged. Another key policy decision has been to put the import policy for refined bleached deodorized (RBD) palm oil and RBD palmolein from ‘restricted’ to ‘free’ category.

All these policies are short-lived (to sporadic) – reduction in import duty being applicable between 30 June – 30 September 2021, and liberalization of RBD import until 31 December, 2021. However, upward pressures on edible oil prices are likely to continue due to the sharp upward rally in global prices of crude soya and palm oil. Without any robust strategies for the long-run in place, India’s ability to cushion its domestic edible oil markets from this price spiraling is dubious.

While the immediate focus of our trade policies has been on pulses and oilseeds, there seems lesser cognizance of the fact that for other globally traded crops like maize, and SMP, a contagion of global volatility into domestic borders is appearing inevitable. As per data from the World Bank, the global price of maize was at $292 per MT in June 2021, which is a 97% increase over the prices in June 2020. Rising prices have incentivized Indian maize exports to increase by nearly 711% from 0.35 MMTs in 2019-20 to about 2.8 MMTs in 2020-21. This puts pressure on the domestic availability of the crop, which is already expected to see a smaller-than-expected rabi crop in 2021. Currently, maize imports are also subject to license and have a duty of about 50%.

With clear signals of price pressures, GoI will do well in preempting the building pressures and rethinking its trade policy not only in terms of accommodating global price volatility, but also recognizing the inter-sectoral effect of such volatile prices. Maize being an important input for the domestic livestock industry, particularly poultry, pressures from higher maize prices pushes up the costs of production, both for broiler and layer industry, and subsequently the prices of poultry products too. In June 2021, CPI of eggs and poultry meat grew by 19.4% and 5.4% (year-on-year), respectively.

Another example in this regard is of yellow pea, which is a cheaper substitute of gram. Most of this pea is imported from Canada and finds an extensive use in domestic production of besan. Since April 2020, yellow pea faces an effective ban as there is no import quota allocated to it. Currently, the production deficit in chana appears palpable and is likely to put extensive price pressures on gram in the coming months of 2021. Retaining a ban on yellow pea imports today appears uncoordinated and is a counter-productive measure for inflation mitigation.

The need of the hour, therefore, is to reimagine policies that are far-sighted, comprehensive, dynamic yet stable. Policies should be dynamic to the extent that it can be maneuvered in case of an ‘extreme crisis’ and should be stable as to be able to give predictability to all the players involved. In tandem to this, we make the following recommendations in particular:

\(^1\)Effective duty is estimated as the sum of the base duty and agri-cess, to which the social welfare cess is added as a percentage. For example, in case of CPO, base duty is 10%, and agri-cess is 17.5%. This makes a total of 27.5%. The social welfare cess of 10% is added as a percentage to this total, i.e., 27.5% + 10% of 27.5% = 27.5% + 2.75% = 30.25% which becomes the effective duty.
1. Create a stable and predictable trade policy environment with clear and sacrosanct rules of interventions. Unless under “extraordinary” predefined situations, the rules should stay stable.

2. The ad-hoc implementation of ECA is a knee-jerk reaction and does not hold to benefit anyone, including the farmer, in the longer run. The recent implementation of ECA flies straight into the face of the ECA amendment Act enacted as part of the three farm laws recently. With over 65 years of implementation history and its documented (Economic Survey 2019-20) inability to douse price pressures, the time is opportune to repeal the archaic Act.

3. While the country is fighting inflationary pressures, the need to correct the structural gaps in agriculture cannot be overemphasized. This includes correcting the skewed incentive structure between crops, where apart from rice, wheat and sugarcane, other crops are to be brought at financial parity. To make farming sustainable, a mechanism to ensure resource-use efficiency is critical.

References
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COVID-19 induced lockdown has impacted Indian agriculture in many ways. While disruptions in supply chain and consumer demand affected farmer incomes, it also exposed the weakness in the existing agricultural marketing system. Agricultural marketing in India has been dominated by physical markets with a fairly large role of the government in food grains procurement, stocking and distribution. In addition to the fiscal burden imposed on the public resources, farmers have not benefited adequately and have been exposed to risks of market failure.

While a free market transition needs thoughtful policy reforms, the same can be attempted with due support and championship of the government. With agricultural futures already in place since 2003, India needs to leverage these digital platforms for higher price discovery and improved price risk management. Here, we explore options as an alternative to price insurance and minimum support price, by looking at existing literature on the evolution of agricultural options market in India, its current status and suitability as a preferred tool for hedging price risk.

A Brief Overview of Options

Options are derivative contracts which give the buyer/holder (of the option) the right, but not the obligation, to buy/sell a particular commodity at a pre-agreed date and price. The price at which the option can be bought is known as Option Premium. The seller of the option has the obligation to honour the contract if the buyer chooses to exercise the option. Depending on what right the option gives the holder of the contract, there are two types of options: put options and call options. While put option gives the contract holder the right to sell a commodity, call option gives the holder the right to buy a commodity at a given date and pre-agreed price. In India, commodity options, banned for a large part of post-independence period, was relaunched by NCDEX in 2018, following the approval of Securities and Exchange Board of India (SEBI) in 2016.

In pre-independence India, agricultural options were traded on a large scale. In fact, cotton options were very popular and were traded in Mumbai through 'teji' mandi with annual volumes ranging between 6 to 9 lakh bales, the highest in the world (Pavaskar, 2006). However, due to the onset of World War II, Government of Bombay prohibited options trading in cotton in September 1939. This was followed by a complete ban on options of all other commodities (food grains, spices, oilseeds and sugar) by 1943 by the Defence of India Act (Rajib, 2014), for government to have more control on commodities markets. Several committees constituted by the government favoured the ban on options and recommended its continued suspension owing to its high speculative nature, such as the Cabinet Committee of government of Bombay (1945), Shroff Committee (1950), and Dantwala committee (1967) and also a joint World Bank-UNCTAD report (1996). While the Khuroo committee (1979) favoured opening of futures contract for several agricultural commodities, it remained silent on the issue of options. It was only the Kabra committee (1980), that proposed a removal of ban on options through amendments in the Forward Contract Regulation Act (FCRA) (Pavaskar, 2006).

Despite attempts to lift ban on options through amendments in FCRA in 2006 and 2008, options could not be legalized. Finally, SEBI allowed commodity exchanges to launch options in 2016 in consultation with the Commodity Derivatives Advisory Committee (CDAC), a year after the merger of Forward Markets Commission (FMC). The purpose was to boost overall commodities market and to complement futures market.

Initially, SEBI had allowed options on futures contract, in which the underlying is the futures contract of that particular commodity. Later, in 2019, it allowed options on goods contract to be settled directly based on spot prices instead of futures prices. As a result, NCDEX which had launched options in futures in January 2018, continued it only till July 21, 2020. Since then options in futures have been discontinued and options in goods was launched on July 27, 2020, which is being traded till date.
In India, options trading follows the European style of options, where delivery can be made only on the expiration of the contract, unlike the American options, where it can be done any time before the expiry date. Currently, only NCDEX deals with commodity options for eight agricultural commodities. The volumes of options traded between 2017 and 2020 are still small and being promoted. Figure 1 shows the volume of agricultural options traded on NCDEX since 2017-18, the year it was relaunched. Data for 2019-20 shows that participation in futures and options derivatives by FPOs/farmers and value chain participants/hedgers has been very low at 0.01% and 4%, respectively, compared to proprietary traders at 47% and others at 50% (SEBI, 2021).

![Figure 1: Volume of Agriculture Options Traded at NCDEX](image)

Source: SEBI Handbook of Statistics, 2020

To incentivize farmers to participate in options market and benefit from price locking, NCDEX initiated Options Familiarization Program for FPOs in November 2020. Under this program, FPOs registered as clients of NCDEX, could buy put options of chana and mustard seeds. The regulatory fee foregone by SEBI was used to reimburse the premium cost incurred by the FPO. More than 40 FPOs participated in the program and premium cost worth Rs 80 lakh plus was subsidized (PTI 2021). Encouraging FPOs to participate in options market can be effective in convincing the individual farmers of the gains and expand this portfolio in a way that benefits the farmers directly.

Options: A Price Insurance for Farmers

Option premium can act as a price insurance for the farmer, which insulates him from the adverse fallout of price volatility. Buying a put option gives the farmer the right but not the obligation to sell on the platform. If on the expiry day, market price of the given commodity is higher, the farmer has the right to sell in the spot market, forgoing the premium paid towards the option. The money lost in terms of premium would be much less than what the farmer would suffer if exposed to spot market volatility. The farmer can still use options to plan his cropping schedule and secure a price guarantee.

Options: An Alternative to MSP

Options trading is like a Minimum Support Price (MSP) and it can be made available across all commodities and geographies (Sabnavis, 2020). It guarantees a floor price for the farmers, which he can take or leave. Unlike MSP, price discovery is market driven in case of options. So, these prices signal market demand better and farmer’s choice of crop is more market aligned.

Government can participate as a seller of put option or buyer of call options and reduce the burden of physical procurement, storage, and distribution of food grains.

Instead of procuring and spending huge amount of money on stocking, the government can buy call options, which will give them the right to buy a certain commodity, and not an obligation, during price increase. Alternatively, the government may also procure up to the buffer stock norms and any purchase beyond that can be met through selling put options to farmers. By doing this, risks can be transferred from government to market players who are willing to participate, and can hedge price risks better (Shukla, 2018). This will not only reduce the need for accumulating physical stocks, but will also make sure there is transparency by setting clear set of rules for government intervention. This will also dissuade potential speculators from hoarding and create any artificial demand situation (Srinivas, 2016). Since all purchases will be according to actual demand in the market, there will be minimum wastage.

1 Chana, Guar Seed, Guar gum, Soybean, Refined Soy Oil, RM Seed, Maize and Wheat
The only drawback of options compared to MSP, however, is the loss of the option premium. If options are promoted as an alternative to MSP, government can devise mechanism through which the cost incurred on the premiums can be compensated by the government. The cost of subsidizing the options premium will be much lower than the cost of buying, storing and distributing that grain (Bhanwala & Kumar, 2019).

Policy Recommendations

While options could be a promising way to transition towards more efficient agricultural markets, and delivering higher returns to the farmers, there are important challenges confronting the policymakers and regulators. To deepen options in agricultural commodities, the following issues will need to be addressed.

Firstly, as options are new derivatives and yet to pick up, there is limited technical knowledge among farmers about trading options contracts. Hence significant efforts will have to be made towards building awareness, demonstration of market operations, and capacity building and training of farmers as well as FPOs.

Secondly, skepticism around options needs to be overcome to build positive market sentiments. Efforts to create data backed evidence on the gains from options need to be undertaken. This will guide policies that are in the interest of the farmers and market better. Options would also necessitate a greater and continuous dissemination of price and demand information to farmers/FPOs. A pilot could include technology savvy farmers and FPOs who have some understanding of derivatives market, especially the options market and the risk involved therein. Once the success is demonstrated and fellow farmers/FPOs share their experience, more of them can be convinced to invest in options. The options familiarization program for FPOs undertaken by NCDEX is one such promising effort.

Thirdly, there is inadequate infrastructure to cater to any increased volumes of options. As options contracts entail assured physical delivery at the end of the expiration period, infrastructural development in terms of transportation, storage, grading, assaying and packaging will be necessary for a successful options market to function.

Options could emerge as preferred tool for price hedging as it has the potential to serve as price insurance for farmers as well as an alternative to minimum support price (MSP). This could be a good start to get farmers on the derivatives markets through FPOs, and also one of the effective ways to extend agricultural marketing beyond physical markets, governed by the APMC Laws.

References


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References


FROM THE INNOVATION KIOSK

FPC-Farm Technology Interface: The Case of Sahyadri FPCL¹

Kavery Ganguly

Farmer collectives have played an important role in bringing together small and marginal farmers; creating economies of scale; and thereby, improving farmer-market linkages. Indian agriculture has witnessed several such collectives - co-operatives, self-help groups, farmer interest groups, farmer producer companies, among others. Co-operatives in India pioneered the inclusive growth of dairy value chains; self-help groups have been successful in securing livelihood options for women in primary processing as well as livestock sector. The need to further institutionalize farmer collectives was recognized and piloting of Farmer Producer Organizations (FPOs) was launched in 2010-11 by the Ministry of Agriculture and implemented by Small Farmers’ Agribusiness Consortium (SFAC). Since then, FPOs have been evolving as grassroot organizations pivotal to linking farmers to markets. After almost a decade, in February 2021, the Government announced a central sector scheme - Formation and Promotion of 10,000 Farmer Produce Organizations (FPOs) with a budgetary allocation of Rs 6865 crores. Implementing agencies (IAs) through the Cluster Based Business Organizations (CBBOs) will undertake the creation, capacity building and professional management of the FPOs for a period of five years (PIB 2021).² The FPOs will be integrated into the ecosystem of One District One Produce covering selected aspirational districts. The Farm Laws 2020 also pivots FPOs central to farmer-market linkages and lends a larger role in contract farming arrangements.

In the present agricultural landscape where profitability and sustainability of farming for small and marginal farmers continue to be a major challenge, and farmer-market linkages are weak due to skewed distribution of power and resources; technology and institutions are playing a significant role in overcoming many such challenges and bridging the gaps.

What a deepening interface of institution and technology can achieve is demonstrated by Sahyadri Farmer Producer Company Limited. With a turnover of Rs 465 crores in FY 2020, Sahyadri inspires many entrepreneurs and FPOs in terms of how farming can be transformed into agribusiness, professionally managed by the farmers, for the farmers. It is not just a FPC but a federation and an emerging agri-tech powerhouse, which has various technology enabled plugins that have rendered farming, logistics, and marketing seamless, and transparent for the farmers, and other actors in the chain. A strong belief and vision into how technology can truly empower farmers, Sahyadri has been a partner, investor and incubator, leading innovations in farm management, and marketing. Experimenting and piloting technology solutions for its own business and creating greater good in the agri-tech space, is another novel contribution of Sahyadri.

Among the many milestones (Figure 1) achieved by Sahyadri in its journey, we focus on how emphasis on market linkages, technology adoption, and inclusive business strategy has brought phenomenal success to this FPC.

• Securing forward B2B market linkages (for instance, export market for grapes, private label manufacturer for Kissan ketchup for HUL, and front-end retail, as also own branded store and e-commerce retailing) has been one of the strongest USPs of Sahyadri. With a global footprint in nearly 42 countries, Sahyadri has partnered with global brands like Tesco, Metro Cash & Carry, etc. The grape exports increased from 3094 MT (221 containers) in 2012 to 21141 MT (1458 containers) in 2019. Sahyadri’s business with HUL resulted in assured procurement of 20,000 MT in 2018-19, going up to 55,000 MT in 2019-20 and will be 100, 000 MT in 2020-21. It is evident that assured markets have been driving the increasing farmer membership from around 140 in 2010 to more than 8000 in 2021.

- With so many farmers at the back end characterized by so much heterogeneity, ensuring standardized pre-harvest and post-harvest practices has been critical for the agribusiness to grow and diversify. Right from the package of farm practices, to access to quality inputs, agri-related information and intelligence, and access to logistics and markets, determined the economic returns to the farmers. Technology played an enormous role in standardizing and streamlining both pre- and post-harvest practices.

  - In 2018, Sahyadri brought in Vesatogo (agri startup) to optimize time taken for collection and transportation of tomato from the farmers spread across different villages to the Sahyadri processing facility. An app enabled farmers to avail transport; transporters to connect with farmers; reroute transportation to ensure that vehicles are fully loaded, which helped save costs and improve efficiency. As a result, the fleet reaching the Sahyadri gates could be optimized and the average waiting time (from pick up to offloading) of 18 hours was reduced to 3 hours. This not only saved time and money for the farmers but also brought down wastage in tomatoes from 2-3% to less than 0.5%. This technology has also enabled Sahyadri to expand its procurement of tomatoes as part of its business commitment with HUL.

- Digitalizing warehousing by Godaam has enabled Sahyadri farmers to reduce their onion spoilage by 20-25%. The IoT monitoring solution informs the farmers about the brewing wastage in the warehouse, following which they take the decision to market the produce immediately.

- For Sahyadri that caters to a large consumer base – domestic as well as global, guaranteeing food safety and quality is absolutely necessary and hence

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**Figure 1: Overview of key milestones of Sahyadri FPCL**

<table>
<thead>
<tr>
<th>Year</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 – 2013</td>
<td>Growing Farmer &amp; Shareholder Base</td>
</tr>
<tr>
<td>2014 – 2015</td>
<td>Diversifying Agri-business</td>
</tr>
<tr>
<td>2017 – 2018</td>
<td>Expanding Infrastructure</td>
</tr>
<tr>
<td>2019 – 2020</td>
<td>Technology Uptake</td>
</tr>
</tbody>
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Source: [https://www.sahyadrifarms.com/milestones.html](https://www.sahyadrifarms.com/milestones.html) and ICRIER Agtech study 2021
compliance is a major responsibility. With small and marginal farmers at the back end, technology enabled traceability has enabled the FPC to bring in transparency not just at the consumer end but also at the farmer end. Agrotrust is a blockchain technology that connects all players and practices in the Sahyadri value chain in a tamper proof manner.

- With different pieces of technology solutions catering to the needs of a smart value chain, Sahyadri plans to eventually bring all these solutions on a single integrated platform—Sahyadri Setu.

- Sahyadri, through its soft contract with tomato farmers again demonstrates the impact and offers lessons for other contract farming arrangements.

- With an assured minimum price of Rs 3.5 per kg of tomato and loyalty reward of Rs 0.50 per kg, Sahyadri has been able to secure steady supply of tomatoes from farmers in Nashik, Maharashtra. Also, it offers the farmers Re 1 more than the prevailing mandi price for the C grade quality of tomato, which is used for processing. With 70% of the output being in this category, farmers selling to Sahyadri are able to earn assured incomes that cover their cost of cultivation (Rs 2.5-3 per kg). The forthcoming ICRIER Agtech study (2021) reports the net price realization of farmers selling tomato to Sahyadri as 68% more than farmers selling elsewhere.

Sahyadri FPCL has graduated from an FPC to a federation of FPCs and champion of advanced technology solutions. The success of Sahyadri clearly demonstrates that technology and institutions can play a remarkable role in an integrated ecosystem. In dealing with small and marginal farmers, significant amount of risks needs to be underwritten without which mainstreaming them is difficult. But long-term market aligned business strategy can result in a win-win outcome. FPCs are not just meant to compete with traditional markets in offering higher incomes to the farmers but can be powerhouse of technology deployment that ensures farming is market driven, environmentally sustainable and inclusive in nature.
Private Sector Innovations in Indian Dairy Sector
Ayushi Khurana and Ashok Gulati

Over the last decade, India’s milk production has grown at an average annual rate of 5.5%. India has emerged as the largest milk-producing country globally, with an estimated production of 208 million tonnes in 2020-21. What is more interesting is that the organized private players are increasing their portfolio in milk procurement. The projections made in the National Action Plan For Dairy Development - Vision 2020 show that procurement by private companies have already surpassed the procurement levels of dairy co-operatives in FY 2019-20. Private milk procurement is likely to touch 2,465.8 lakh litres per day (LLPD) in 2023-24, which is 50% more than the procurement of dairy co-operatives during the same period (DoAHD&F, 2018) (Figure 1).

Note: *Projections

Despite its tremendous performance on the production front, Indian dairy sector is constrained by low yields. According to the OECD estimates, the average yield in India between 2017 and 2019 stood at a meagre of 1.3 tons per in-milk animal, substantially lower than the yields recorded by some of the leading milk producers like United States (10.5 tons per in-milk animal), the European Union (7.2 tons per in-milk animal), and New Zealand (4.3 tons per in-milk animal) (OECD, 2020) (Figure 2).
While the NDDB estimates India’s demand for milk and milk products to reach 266.5 million tonnes by 2030 (Economic Survey 2020-21), the low levels of yield can pose a major challenge for the sector to leverage this demand-side potential. First, despite being home to the largest dairy herd in the world with 192.4 million cattle and 109.8 million buffaloes, the actual potential of the dairy herd remains underutilized due to low genetic potential and lack of nutrition, arising out of acute fodder shortage in the country. Second, predominated by smallholders with an average size of 4-5 animals, the Indian dairy farmer does not seem to be well-gearied to tap the benefits from an expanding market.

Amidst the fundamental challenges of low productivity, fodder deficit (estimated at 30% in 2030 by the Indian Grassland and Fodder Research Institute), and lack of an efficient supply chain to support production, the emergence of several “dairypreneurs” with innovative and cost-effective interventions at different stages of the dairy supply-chain infuses much optimism for the sector. Most of these companies are run by private investors who come with financial and human capitals to invest in research and development.

Private companies like Genus Breeding India (ABS India)\(^1\), BAIF Development Research Foundation, and JK BovaGenix (an initiative of JK Trust) are heavily investing and developing Assisted Reproductive Technologies (ART). Artificial insemination using the sexed sorted semen and In-Vitro Fertilization (IVF) focus on pre-determining the sex of the offspring and ensure genetic superiority, which has a high milk yield.

BAIF Development Research Foundation\(^2\), for example, has conducted more than 1,50,000 sorted-semen insemination with a conception rate of 44.3% and 90% female births. For IVF, JK Bova Genix\(^3\) is leading the initiative by offering Mobile Cattle ET & IVF labs at the farmer’s doorsteps. They were one of the first organizations to produce 14 IVF calves from a single Gir Donor Cow named ‘Radha’ in one year. They also achieved a landmark in August 2020 by reproducing the first batch of IVF buffalo calves who took birth on a buffalo farm in the Pune district.

On the feed and fodder front, Hydrogreens, a Bangalore based startup, has come up with a hydroponic green fodder unit “Kambala” that allows farmers to grow fresh green fodder all year round.

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2. https://sire.baif.org.in/
round without soil controlled environment and limited water resources. It has set up more than 130 units across the country to overcome the green fodder deficit.

The recent development in genetic engineering of fodder crops by introducing foreign genes from unrelated species has improved the physical appearance, nutrients, yield, and growing conditions (Kapoor et al., 2018). The most prevalent genetic engineering has been between Bajra and Napier, popularly known as the “Hybrid Napier,” which has the better yield and ability to adapt to climatic conditions across India. Organizations like Indian Agricultural Research Institute (IARI), IGFRI, and the Tamil Nadu Agricultural University (TNAU) have developed many varieties/crossbreeds of the Hybrid Napier over the last few years.

On the marketing front, Country Delight, for instance, has enabled delivery of fresh milk at the consumer’s doorstep within 24 - 48 hours of milking. The company assures that milk quality is tested through scientific methods, checked for adulteration at each stage, and free of toxins and impurities. It relies on tight-knit supply chains with temperature control, quality checks, and consistency at each node.

In general, the perishable nature of dairy products requires effective supply chain management to ensure appropriate quality and minimum wastage. Startups like Stellapps Technologies\(^1\) come into play and offer solutions to digitize the dairy supply chain by enabling traceability across the milk supply chain. The company has digitalized cattle health, milk production, milk procurement, milk testing, and cold chain management through the Internet of Things (IoT) and sensor-based SmartMoo cloud. They touch about 11.5 million liters of milk every day and impact 2.6 million farmers and one million cattle in about 35,000 Indian villages. Country Delight, Hatsun Agro Products, and Thirumala are a few private companies that have adopted these solutions and realized better operational results with improved earnings.

Further to this, India has also stepped into the realm of milk fortification with the dairy co-operatives and private companies providing 220 and 196 LLPD of fortified milk, respectively. About 18 state co-operatives across India offering with private companies like Heritage Foods Ltd., Prabhat Dairy, Nestle India Pvt. Ltd., and Britannia Industries Ltd., are marketing fortified milk. In December 2020, the Food Safety Standard Authority of India (FSSAI) had released a draft notification for mandatory fortification of packaged toned, double toned, skimmed milk or standardized milk with Vitamin A and Vitamin D. Simultaneously, with the outbreak of COVID-19, concerns regarding the nutrition and safety parameters of milk have also grown among consumers, and are likely to boost up the demand for fortified milk and milk products in the coming years.

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\(^1\)https://www.stellapps.com/about/
Innovations to Tame Food Loss

Prerna Terway

“Decrease in quantity or quality of food along the food supply chain” – is how the United Nation’s Food and Agriculture Organisation (FAO) has defined food waste and loss. The Sustainable Development Goals (SDG) Target 12.3, calls for halving per capita global food waste and loss by 2030 in alignment with the overarching target of ensuring food security and ending global hunger. With two successive years of food sector-led inflation concuring with pandemic-driven loss of livelihoods and income of the poor and vulnerable, India’s commitment to mitigate such losses along the food supply chain has become more crucial. More so, are the losses occurring from harvest – but not including the retail level – that the FAO calls ‘food loss’.

According to FAO estimates, post-harvest losses accounted for 13.8% of the food produced in 2016 across the globe. We have estimated the total post-harvest loss from grains, oilseeds, fruits, vegetables, plantation crops, and spices and livestock produce to be Rs 1,30,481 crore for the year 2020-21, in India. Post-harvest loss on grains and oilseeds has evidenced a staggering increase of 62.4 per cent from Rs 32,853 crore in the production year 2012-13 to Rs 53,341 crore in 2020-21.

Inadequate mechanisation, limited market connectivity, and poor storage facilities have led to significant post-harvest losses. Due to poor storage facilities, smallholders in India are often compelled to sell their produce at low prices immediately after the harvest, resulting in low farmers’ income and seasonal food shortages at the household level. This calls for technological innovations for both pre and the post-harvest management of the crops. In this context, we look at three types of innovations – at harvest, for drying, and (near-farm) storage – that are gaining traction in recent years.

Farm Mechanisation

Modern mechanisation, such as a well-trained combine harvester can minimise losses and delays in harvesting. Besides being cost-efficient, these machines work well in paddy fields with waterlogged and wet conditions. The usage of these machines can be promoted through custom hiring centres. Also, Farmer Producer Organisations may encourage group leasing by placing the liability of making lease payments on the group instead of individual farmers.

From Sun Drying to Dry Chains

Maintaining a dry chain to minimise mycotoxin accumulation and insect infestations, particularly in a country like India that faces humid climatic conditions, is one of the biggest challenges in combating post-harvest losses. Most farmers in the country, however, rely on open-air drying, which is labour intensive, leads to contamination and losses of grain, and is often unreliable, especially in the context of climate change. To prevent losses, most grains must be dried to a moisture content of under 14% from a harvest moisture content of about 20% prior to storage.

An effective innovation in the context, is the use of dryers based on natural gas, charcoal, electricity, or solar power. Examples of best practises in this regard can be drawn from countries like Bangladesh and Kenya. The charcoal fuelled BAU-STR dryer is increasingly being used in Bangladesh. Using this technology, post-harvest drying loss can be saved by 2.5-4% compared to the traditional sun drying methods. Similarly, EasyDry M500, having the ability to reduce the moisture content in grains in about three hours, is widely used by farmers in sub-Saharan African countries like Kenya.

Hermetic Technology for Storage

Another important part of the dry chain involves appropriate storage of grains, allowing farmers to safely store their produce. The use of hermetic technology minimises losses by creating unfavourable conditions for the development and reproduction of insects. A few common hermetic technologies include silos (metal and plastic), cocoons, and hermetic plastic bags.

1For these estimates, we have used the loss percentages reported by CIPHET Study (Jha et. al., 2015) and then multiplied those numbers with production of the current year.
Hermetic bags, for instance, help in retaining 40% more grain weight and appropriate moisture levels per 100 cowpea grain as compared to conventional woven bags (Manandhar, Milindi and Shah, 2018). These are estimated to enable an additional income realisation of Rs 117.25 per 50 kg of hermetic bags, assuming the entire produce was sold in the market (Shukla, Baylis and Pullabhotla, 2019). Currently priced at less than USD 2 in India, which still is more than traditional jute bags, these can be used for up to four agricultural seasons, and generate additional revenue in one season that is sufficient to cover the full cost of these bags. The use of hermetic cocoons having a capacity of 5 tonnes to 200 tonnes can be another alternative to reduce food loss. They can be placed within a conventional warehouse and filled with jute sacks of grain.

Metal silos also help to improve the qualitative and nutrient value of grain through reduced usage of insecticides and prevent the entry of rodents and insects. However, given their high initial investment costs, the adoption of modern storage could only be triggered through public sector investment.

With the use of such technologies gradually finding traction among farmers across various developing countries, now is the time for a concerted effort towards scaling up their usage and making these more affordable for the Indian smallholders. Such innovations in packaging can help contain post harvest losses in a significant manner.

References


WHITHER ARE WE BOUND

Land Degradation and its Costs on Agriculture

Bharat Sharma, Ashok Gulati and Priya Rampal

The United Nations (UN) has declared 2021–2030 the 'UN Decade on Ecosystem Restoration', and aims to restore 350 million hectares (Mha) of degraded land worldwide by 2030. The effects of ecosystem degradation on food and nutrition security, livelihoods of the rural poor, and other sectors of economic development are humongous. In tandem, ICRIER has launched a study focusing on the impact of land, water, and air (quality) degradation on productivity, profitability and sustainability of Indian agriculture.

This note summarises some of the salient results from the study on the costs of land degradation for agriculture. For this study, we have defined degraded land as ‘the sum of barren and unculturable land, cultivable wasteland, and fallow lands excluding current fallow land’. The area under degraded land thus defined, is estimated to have declined from 31% to 18% between 1950-51 and 2016-17. The maximum decline was in the period from 1950-51 to 1980-81, with the sharpest decline being in the barren and unculturable land. This was the era when agricultural growth largely depended upon an increase in the cultivated area and degraded lands with very low productivity and fragile nature were brought under agriculture. These lands still yield the least productivity.

This study developed a different approach for estimating the extent of lands with the least productivity as a proximate to the degraded lands in different districts and states of India. Fifteen major crops were chosen from four crop groups: cereals (wheat, rice, maize), coarse cereals (barley, ragi, bajra, jowar, small millets), pulses and oilseeds (arhar, gram, rapeseed, mustard, and groundnut), and other high-value crops (cotton, sugarcane, and potato). Considering all the 15 crops together, 16.5 Mha (about 8.25% of the GCA) are in the lowest productivity quintile.

Potential production loss has been calculated by using the productivity gap between the lowest productivity quintile and national average productivity for each crop and state. The potential production loss from these degraded lands under cultivation is about Rs 351,320 million, or about 0.2% of the GDP in 2019-20. The states which are the largest contributors to this cost are Maharashtra (30%) followed by Andhra Pradesh (13.25%), Rajasthan (11.7%), and Karnataka (11%). All the states are mainly affected by water erosion, the potential production loss of which is around Rs. 296,468 million.

Employing the Total Economic Value approach, at the all-India level, Rs 259,246 million is the cost of land use and land cover change, the majority of which is due to a change in the forest cover and cultivable wasteland. This is about 0.22% of the GDP in 2017. Almost Rs. 84,770 million is the cost of forest degradation from the conversion of very (and/or moderately) dense forests to no forests, while Rs 95,312 million is the cost of land use and cover change from the cultivable wasteland. Thus the total cost due to land degradation (including land use and land cover change (LULCC)) is Rs. 610,566 million, about 0.45% of GDP.

The study has examined the major sustainable land management (SLM) policies and programs with a focus on those for watershed management and identified the necessary pre-requisites for its adoption towards the restoration of degraded agricultural lands. The analysis revealed that for good economic returns, it is not essential to cultivate the entire holding with traditional crops. Alternatively, the selection of smart cropping patterns with permanent fixtures like orchards, agro-forestry systems, and vegetables along with traditional crops only in part of the farm can potentially enhance the economic returns by 140 to 200% and also help in the restoration of the degraded lands.

Estimates of the costs for implementing SLM practices in the identified degraded lands works out to be Rs. 253,770 million. The suggested SLM practices are validated over several years and have proven their efficacy under a wide variety of agro-ecological and socio-economic conditions. The proposition is economically viable even when...
the entire cost is lumped in the first year of its implementation (B:C ratio of 1.38). With annualized cost the B: C ratio is favorable at 8.50. In most cases, 'the cost of action is much lower than the cost of inaction.' (Figure 1)

As a signatory to United Nations Convention to Combat Desertification (UNCCD), India has set for itself a target of restoring 26 Mha of degraded lands up to 2030. This will need a total expenditure of about Rs. 390 billion during the next 10 years. The annualized cost, adjusted at 10% interest rate, works out to be Rs. 63.46 billion (Rs. 6346 crore/annum). The annual budget of the government and other agencies for the restoration of degraded lands is estimated at around Rs. 2000 crore/ annum. To realize the target of achieving 'Zero Net Land Degradation' by 2030, India needs to enhance the budget allocations at least by three times for the next 10 years.

**Figure 1: Per hectare costs of action vs. inaction in implementing SLM practices on least productive degraded lands**

![Figure 1: Per hectare costs of action vs. inaction in implementing SLM practices on least productive degraded lands](image)

Source: Authors’ estimates

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*Figure 1: Per hectare costs of action vs. inaction in implementing SLM practices on least productive degraded lands*
Op-eds during April to June quarter

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