



**DIVERSIFICATION TO AUGMENT FARMERS'
INCOMES AND
PROMOTE SUSTAINABLE AGRICULTURE IN
PUNJAB AND HARYANA**



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EXECUTIVE SUMMARY

Punjab has been a star performer in agriculture during the heydays of Green Revolution. Its agriculture GDP grew at 5.7 per cent per annum during 1971- 72 to 1985-86, which was more than double the growth rate of 2.31 per cent achieved at all-India level during the same period (Gulati et al., 2021). It was this remarkable performance of Punjab, closely followed by Haryana, first observed in large wheat surpluses and then in rice, which helped India free itself from the PL 480 food aid and its associated political strings. Punjab and Haryana became the symbols of India's grain surpluses, giving India a much-needed food security. But after 1985-86, green revolution started greying and growth in Punjab agriculture slowed down to 3 per cent per annum over the period 1985- 86 to 2004-05, almost the same as achieved at all India level. But the real challenges to Punjab agriculture emerged when its growth crashed down to just 1.9 per cent per annum during 2004-05 to 2024-25, which was less than half the all-India agriculture GDP growth of 3.8 per cent over the same period. Owing to the earlier years of high agricultural growth, Punjab continues to be among the states with the lowest poverty levels in the country, with a multidimensional poverty headcount ratio of 4.35 per cent in 2022–23, which is well below the all-India average of 11.28 per cent (NITI Aayog, 2024). Providing food security to the country and reducing its own poverty to the lowest levels within all India context have been the most laudable achievements of Punjab. But lately, as a result of its decelerating agri-growth, Punjab has lost its pre-eminent position of being the state with the highest per capita income in India, a title it carried since its inception in 1966 till 2002-03. In 2014- 15, e.g., Punjab stood at the 7th position in per capita income amongst 21 major states of India and further slipped down to 12th position during 2023-24 (MoSPI, 2026).

Alongside these income concerns, both states, however, have borne considerable environmental costs in supporting the country's food security. The spread of intensive agriculture has led to serious pressures on land, water, and air resources. These challenges began to emerge in the 1980s and have become progressively more pronounced. With nearly 82 per cent of the geographical area already under cultivation and cropping intensity among the highest in the country—201 per cent in Punjab and 196 per cent in Haryana (MoAFW, 2025d)—agricultural land in both states is under significant stress, resulting in the depletion of soil nutrients. Groundwater resources used for irrigation are also being depleted at an alarming rate. Annual groundwater extraction is estimated at about 26.27 billion cubic metres (bm³) in Punjab and 12.72 bm³ in Haryana, while annual recharge stands at only around 18.6 bm³ and 10.27 bm³, respectively, indicating unsustainable levels of withdrawal. As a result, the share of over-exploited groundwater blocks has increased to approximately 72.6 per cent

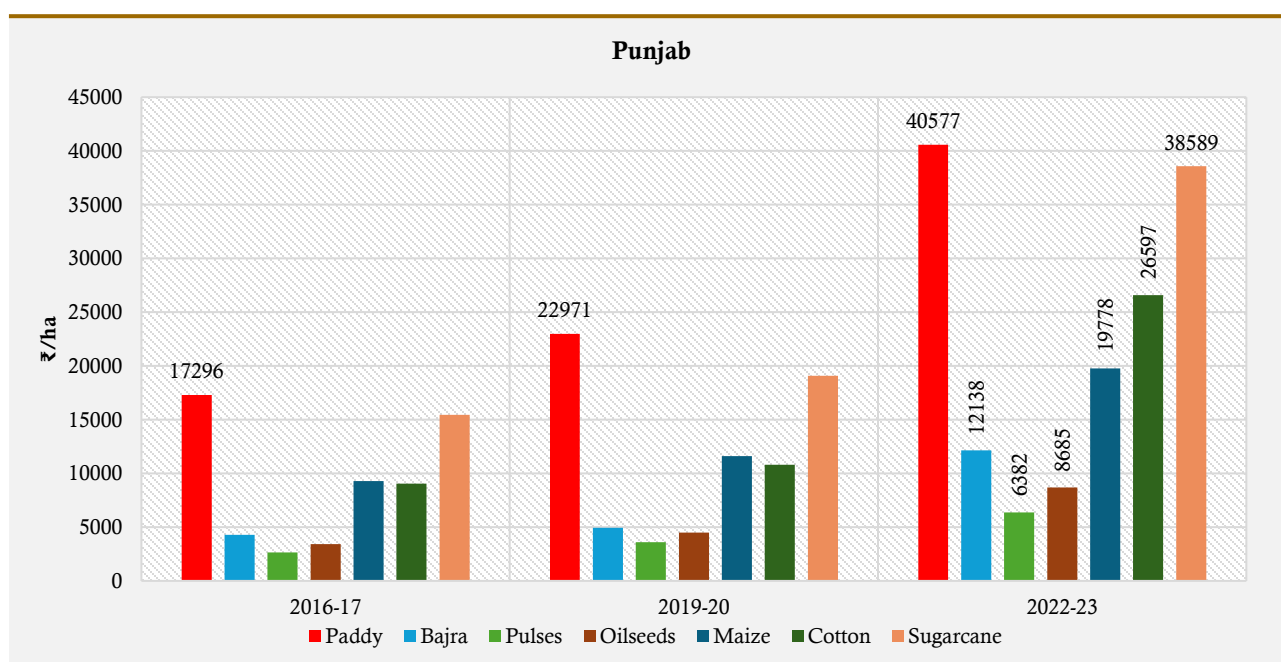
in Punjab and 63.6 per cent in Haryana (CGWB, 2025). As groundwater levels fall, tube wells are required to reach increasingly deeper aquifers. Between 2000 and 2022, groundwater levels declined by approximately 11.94 metres below ground level (mbgl) in Haryana—the steepest decline among Indian states—and by 10.89 mbgl in Punjab (Thangaraj and Gulati, 2024).

The emerging sustainability challenge in these states is driven by four interrelated structural factors: (i) the widespread cultivation of paddy during the *Kharif* (July–October) season, (ii) excessive reliance on groundwater-based irrigation, (iii) strong farmer dependence on assured procurement mechanisms, and (iv) the availability of free or highly subsidised electricity, which weakens incentives for resource-efficient cropping choices. Paddy is a highly water-intensive crop, typically requiring 20–25 irrigations, compared with about 4–5 irrigations for many alternative crops, and is widely regarded as the most inefficient user of water, with 60–83 per cent of total irrigation lost through deep percolation (ICAR-NRRI, 2021). However, the average farm applied irrigation water varies with the agro-ecology and soil conditions, and Punjab ranks first, requiring 208 cm of water (CACP, 2013-14), indicating the high irrigation demand despite being water-stressed. This heavy dependence on irrigation has placed severe pressure on groundwater resources, leading to a persistent decline in water tables over the past several decades. Paddy cultivation also contributes significantly to greenhouse gas (GHG) emissions. The anaerobic decomposition of organic matter in flooded paddy fields releases methane (CH₄), a gas with a global warming potential 27.2 times higher than carbon dioxide (CO₂) over a 100-year period and about 80.8 times higher over a 20-year timeframe. Additional emissions arise from nitrous oxide (N₂O)—which has a global warming potential 273 times that of CO₂—primarily due to the use of synthetic nitrogen fertilisers. CO₂ emissions from energy use, along with CH₄ and N₂O released during crop residue burning, further add to the emissions profile. Considering these sources together, Punjab records the highest per-hectare GHG emissions from paddy cultivation in India—about 5 tonnes of CO₂ equivalent (t CO₂ eq) per hectare compared with the national average of 3.1 t CO₂ eq per hectare—followed closely by Haryana at 4.7 t CO₂ eq per hectare (Singh and Gulati, 2025). Crop residue burning in these states also contributes substantially to local air pollution, with direct adverse effects on public health. The cultivation of HYVs of wheat and paddy has also led to heavy reliance on chemical inputs, including fertilisers and pesticides. Fertiliser application rates average about 250 kg per hectare in Punjab and 220 kg per hectare in Haryana in 2024-25 (FAI, 2026). Excessive use of fertilisers, particularly nitrogenous (N) ones in relation to phosphatic (P) and potassic (K) fertilisers, has significant environmental consequences: part of the applied nitrogen is lost as ammonia, nitrogen gas, or N₂O emissions, while another portion leaches into groundwater in the form of nitrates, leading to contamination of groundwater.

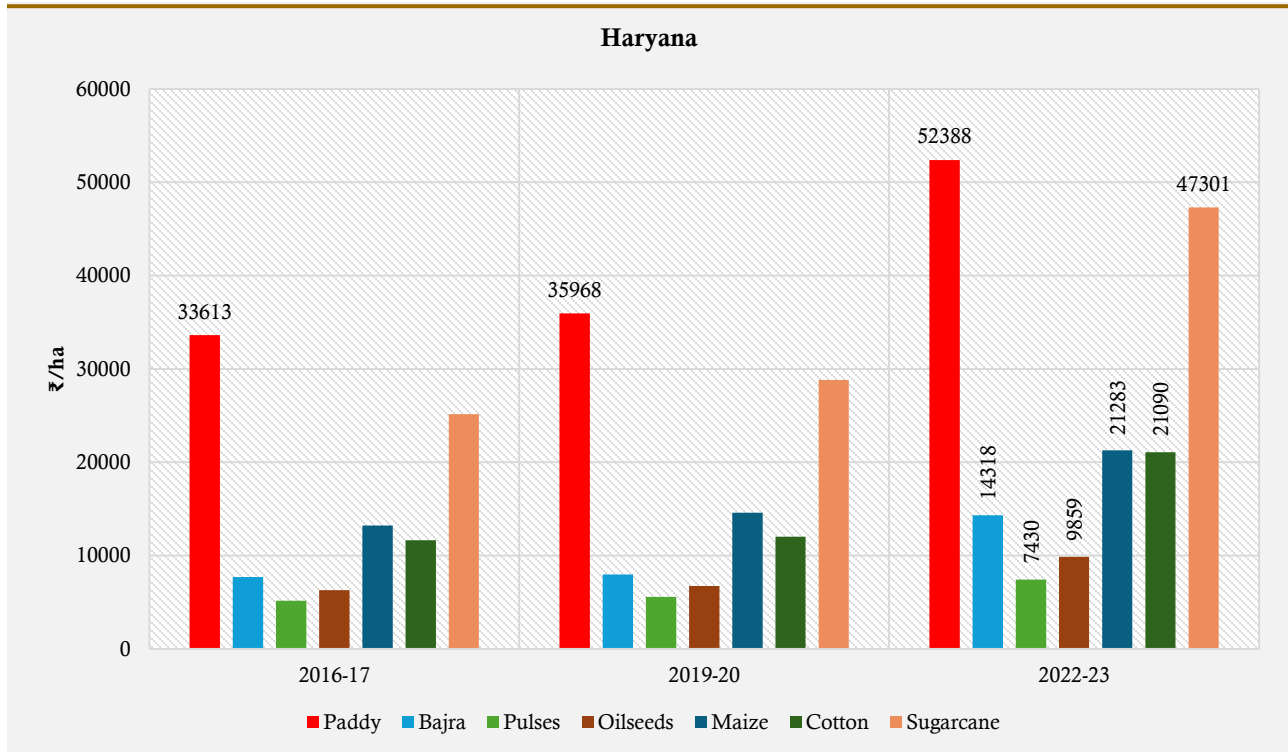
These developments illustrate the hidden environmental and social costs of agricultural growth in Punjab and Haryana and underscore the urgent need to transition toward more

sustainable cropping patterns and production practices. The degradation of soil health, groundwater resources, air quality, and human well-being is not only a regional concern but also a national one, given the critical role these states play in India's food supply. These environmental stresses also increasingly affect farm productivity, costs of cultivation, and ultimately farmers' incomes. The initial recommendations for altering Punjab's cropping pattern away from the prevalent paddy-wheat cycle emerged in the late 1980s by a committee led by economist S.S. Johl. Yet, farmers continue to grow this crop due to its high profitability, lower risk of nature, and its assured procurement from the government. In the year 1971-72, rice covered only 0.39 million hectares (mha) of cropped area in Punjab, a figure that has since expanded to 3.2 mha, thereby increasing its share in gross cropped area (GCA) from 7 per cent to 38 per cent in 2023-24. The distortion in cropping pattern is due to the incentive structure that encourages mono-cropping of paddy-wheat cycle. The subsidies, both from the Government of India (GoI) in the form of fertilisers and state governments in the form of power, irrigation and machinery, are skewed in favour of paddy cultivation. This is due to high consumption of fertilisers, irrigation water, and electricity for groundwater extraction during paddy cultivation. Our analysis indicates that during 2022–23, paddy received per hectare input subsidies at about ₹40,577 in Punjab and ₹52,388 in Haryana. By comparison, support for oilseeds remained much lower at ₹8,685 per hectare in Punjab and ₹9,859 per hectare in Haryana, while pulses received ₹6,382 per hectare in Punjab and ₹7,430 per hectare in Haryana. This situation analysis led us to explore possibilities of providing incentives to farmers by repurposing the existing subsidies that are currently being provided for paddy cultivation by the GoI and state governments

Total Incentives towards Paddy vis-à-vis Other Kharif Crops



Source: Estimated by authors using MoF, GoP, GoH, FAI, MoAFW (various years)



Source: Estimated by authors using MoF, GoP, GoH, FAI, MoAFW (various years)

Recommendations and Way Forward

- i. **‘Paddy-skewed incentives’ to ‘crop neutral incentives’ - Existing incentive of ₹17,500 per hectare for non-paddy farmers should be doubled by GoI**

Union Agriculture Minister, Shri. Shivraj Singh Chouhan announced an ambitious “-5, +10” formula to reduce the area under rice cultivation by 5 mha while increasing rice output from the remaining rice area by 10 million tonnes (MT), to free up area for the cultivation of pulses and oilseeds (PIB, 2025). Of the target 5 mha rice area reduction, at least 8-15 lakh hectares of non-basmati rice area needs to be targeted from Punjab and Haryana. It is because these states are experiencing severe environmental degradation, specifically the unsustainable depletion of groundwater and high GHG emissions caused by water-intensive paddy farming. The shift from paddy toward diversified farming is crucial for environmental sustainability. However, at present, the agricultural subsidies as well as the assured procurement are skewed towards paddy, which is one of the major reasons that drives paddy cultivation and its profitability. Other *Kharif* crops in Punjab and Haryana have widely documented challenges, e.g. pest attack in cotton, low yield in pulses and maize, lack of cold storage facilities for perishables, uncertain market, etc., that are getting compounded with the climate change impacts. The viability of other crops remains a major concern for the farmers. The farmers’ income and profitability need to be linked with crop diversification goals, which are not

aligned at present, though the GoI and states have announced the crop diversification schemes.

Since *Kharif* 2020-21, under the Promotion of Crop Diversification and Water Conservation Scheme, the Government of Haryana (GoH) has introduced an incentive of ₹7,000 per acre under '*Mera Pani Meri Viraasat*' (₹17,500 per hectare) to encourage farmers to transition from paddy to other crops. However, the rice area is on a consistent upward trajectory and has steadily increased from 1.28 mha in 2021–22 to 1.7 mha in 2025–26. During *Kharif* 2020 and *Kharif* 2021, approximately 25,600 hectares and 20,752 hectares were diversified to other alternate crops, and the GoH provided incentives of ₹45 crores and ₹36 crores, respectively (Economic Survey of Haryana, 2025). This indicates that paddy cultivation decisions are being driven more by structural incentives (such as assured procurement, MSP support, and irrigation access) rather than by a one-time crop diversification incentive. In 2025–26, GoH has increased the incentive to ₹8,000 per acre (₹20,000 per hectare). Building on this, the 2026–27 Budget Speech announced an additional ₹2,000 per acre, raising the total support to ₹10,000 per acre (₹25,000 per hectare) by the GoH (GoH, 2026). But since the profitability of paddy is much higher than the other alternative crops, the incentives for alternative crops need to be doubled up, with equal share coming from the GoI, as the GoI will be saving on fertiliser subsidy as well as the costs of carrying bulging stocks of rice with the Food Corporation of India (FCI). If the GoI also contributes to the scheme, the farmer will get ₹35,000 to ₹40,000 per hectare for switching from paddy. It should be made available at least for 5 years to those farmers who switch to alternative crops, as the savings on power subsidy for the state and fertiliser subsidy for the GoI are going to be for the long haul.

GoI announced the Crop Diversification Scheme in 2023-24 with ₹289.87 crore allocation for 2024-25 BE for Punjab. This Centrally Sponsored Scheme (CSS) scheme (60:40 funding by GoI and GoP) envisaged to cover up to five hectares for the beneficiary farmer to provide an incentive of ₹17,500 per hectare. In 2024–25, GoP initially allocated ₹500 crores for the scheme (Budget Estimate, (BE)). However, this was sharply reduced to ₹40 crores (Revised Estimate, (RE)). More strikingly, the actual expenditure stood at just ₹0.85 crore—barely 0.17 per cent of the original budget and about 2.1 per cent of the revised allocation (GoP, 2026). And if we go one step further, the Comptroller and Auditor General of India (CAG) finance report indicated the Audited Expenditure to be ₹0.20 crore. This may indicate delays in scheme rollout, administrative and procedural hurdles or lack of project readiness. Another possible reason could be that this incentive falls short of covering the financial gap and market risk that farmers face when switching to alternate crops.

A more robust incentive, ranging from ₹30,000 to ₹40,000 per hectare, is proposed for farmers in Punjab and Haryana who opt for non-paddy crops (Singh et al., 2024). This would not strain the budget of any government, as this shift would ultimately reduce electricity, water, and fertiliser usage along with a corresponding decline in subsidy expenditure. Overall, if we

shift 8-15 lakh hectares of non-basmati paddy area from Punjab and Haryana, it would lead to saving on power, irrigation, and other subsidies (e.g. paddy residue management) from state government budgets and saving on fertiliser subsidy from the GoI budget. This saved amount could be repurposed to farmers shifting from paddy to non-paddy crops. This ensures the shift of incentives from 'paddy-skewed incentive' to 'crop-neutral incentive'. With every hectare of paddy in Punjab, diversified to pulses and oilseeds, the move will not only make the country self-sufficient, but each hectare of diversified paddy field will save fertiliser subsidy of ₹15,263 per hectare (for pulses cultivation) and ₹13,479 per hectare (for oilseeds cultivation). GoP will save power subsidy of ₹18,932 per hectare (for pulses cultivation) and ₹18,414 per hectare (for oilseed cultivation). Similarly, every hectare of paddy in Haryana diversifying to pulses and oilseeds will save fertiliser subsidy of the GoI of ₹20,457 per hectare and ₹18,697 per hectare, respectively. While GoH will save ₹24,500 per hectare (for pulses cultivation) and ₹23,831 per hectare (for oilseeds cultivation) in power subsidy.

ii. Incentive of ₹35,000 per hectare in Punjab and Haryana for non-paddy farmers should be provided for at least five years

As per the crop diversification scheme guidelines, the farmers who diversify from paddy get an incentive of ₹17,500 per hectare only once, while paddy farmers reap benefits every year. Considering the skewed subsidy towards paddy every year, and if the farmer switches to other crops, then subsidy on power and fertilisers on account of paddy cultivation would be saved for the long haul. Thus, it is proposed that farmers should get a minimum of ₹35,000 per hectare for switching from paddy for at least five years till the vulnerabilities of new crops are reduced. During this period of five years, heavy expenditure on agriculture research and development (R&D) for raising the productivity of pulses and oilseeds be done by the GoI and the State Agriculture Universities (SAU), given that large quantities of pulses and edible oils are imported. Profitability of paddy in Punjab and Haryana is higher compared to other alternate crops due to assured procurement of paddy at MSP and skewed incentives towards paddy. For example, in 2022-23, the incentives gap of pulses in comparison with paddy was ₹34,195 per hectare in Punjab and ₹44,958 per hectare ha in Haryana. For oilseeds, the gap was ₹31,892 per hectare in Punjab and ₹42,528 per hectare in Haryana. Since these crops save fertiliser and power subsidies, the saved amount can be repurposed to farmers for shifting from paddy at least for five years.

iii. Ensuring that MSPs for pulses and oilseeds are effective

Farmers respond to the price signals provided by the MSPs and continue to grow predominantly crops which give them an assured price. Although GoI announces MSPs for 23 commodities and Farm Remunerative Price (FRP) for sugarcane, the procurement policy has been the most successful in reaching wheat and paddy farmers, and that too only in a few states. About 35 per cent of rice (51.8 MT) and 25.4 per cent of wheat production (29.9 MT)

during the *Kharif* Marketing Season (KMS) 2024–25 and *Rabi* Marketing Season (RMS) 2025–26 was procured by FCI at MSP (FCI, 2026). In 2022–2023 and 2023–2024, the average number of farmers who benefited from rice procurement was 11.5 million, whereas the average number of farmers who benefited from wheat procurement was 6.9 million. However, procurement of other crops such as oilseeds and pulses has been low. During 2023–24, 2.7 MT of oilseeds (6.8 per cent of the production) and 1.4 MT of pulses (5.8 per cent of the production) were procured under Price Support Scheme (PSS)/ Price Stabilisation Fund (PSF), and an average of 1.5 million farmers benefited from the purchase of pulses, while 1.14 million benefited from the purchase of oilseeds (NAFED, 2025).

Under the ‘Mission for *Aatmanirbharta* in Pulses’, aimed at achieving self-sufficiency by 2030–31, the GoI has identified 489 districts as focus areas for cluster-based interventions. Of these, 7 districts are in Punjab and 3 in Haryana. The targeted expansion in area under pulses is projected to reach 0.67 lakh hectares in Punjab (from 0.37 lakh hectares in 2024–25) and 0.84 lakh hectares in Haryana (from 0.74 lakh hectares in 2024–25) by 2030–31. However, the envisaged expansion in these states needs to be more ambitious to drive meaningful crop diversification. This requires strengthening price incentives, particularly through repurposing subsidies on paddy and giving them equally for pulses and oilseeds, thereby creating crop-neutral incentives, as also more effective implementation of MSP for pulses and oilseeds. At present, the procurement ecosystem remains heavily skewed in favour of rice: during TE 2023–24, approximately 92 per cent of rice produced in Punjab and 74 per cent in Haryana is procured by the FCI (FCI, 2026). This creates a strong policy bias that discourages farmers from shifting to alternative crops. In contrast, despite persistent domestic shortages of pulses and oilseeds, market prices for these commodities often fall below MSP due to weak procurement mechanisms and weakening incentives for diversification. It is therefore recommended that pulses and oilseeds be accorded higher policy priority through assured and decentralised procurement in Punjab and Haryana, and a better price support mechanism to ensure remunerative returns for farmers and promote sustainable crop diversification.

iv. Punjab and Haryana as export hubs for high-value horticulture crops

To promote diversification, Punjab should also target doubling the area under high-value fruit orchards (like plums, peaches, litchi, guava, etc.) and vegetables (potatoes, peas, chilli, bell peppers, seedless cucumbers, gherkins, etc.) that are suitable for Punjab. They will need to be linked to processors, organised retailers and exporters, well in advance, to take care of price risks which are generally higher in perishables than in cereals. The Food Parks supported by the GoP should be part of this linkage. Air freight subsidy for exports to Gulf countries, and major investments in cold storage and reefer vans, for exports through Amritsar, will go a long way to augment farmers’ incomes sustainably. However, this can only be extended by the GoI. Agricultural and Processed Food Products Export Development Authority (APEDA) should be involved in making some districts of Punjab as export hubs for high-

value agriculture targeting Middle East countries. An alternative would be to work with Middle East countries and their Sovereign Wealth Funds to invest in Punjab as a source of food security for Middle East countries.

Amongst Middle East countries, the United Arab Emirates, Saudi Arabia, Turkey and Iraq are the largest importers for edible fruits and nuts in TE 2024 with shares of 27 per cent, 18 per cent, 13 per cent and 11 per cent respectively. Citrus fruits (13 per cent) are the sizeable category, followed by dates, figs, pineapples, avocados, guavas, and mangoes (12 per cent) (ITC Trade Map, 2026).

v. Carbon credits for farmers

Carbon is a tradable good in carbon credit system where one carbon credit unit is equivalent to one tonne of carbon dioxide emissions. This system provides financial incentives to farmers by allowing them to sell the carbon credits generated through the reduction of GHG emissions in their farmlands. Paddy cultivation in Punjab and Haryana emits 5 tonnes CO₂ eq per hectare (Singh and Gulati, 2025), and by switching to alternate crops, the farmers can earn up to 4 carbon credits. Some private companies are trying to develop this carbon market on voluntary basis. But there is need for the Central Government and state governments to work out pricing of carbon, and the certification process through due diligence.

In conclusion, the shift from prevalent paddy cultivation in Punjab and Haryana to oilseeds and pulses requires gearing of policy making towards sustainable and profitable agriculture. One of such policy innovations is suggested in this report, where farmers shifting from paddy to pulses and oilseeds can be given roughly ₹35,000 per hectare for at least 5 years. Interestingly, there is hardly any additional expenditure involved in this 'repurposing' of subsidies. It will lead to commensurate saving of the state government's power, canal irrigation subsidy, and the GoI will save fertiliser subsidy, as farmers switch from paddy to these environmentally benign crops. Hence, this is just repurposing the same subsidy and making incentives crop-neutral. If this is done, then the carbon footprint of paddy can be reduced in this region, and water and soil can be saved.