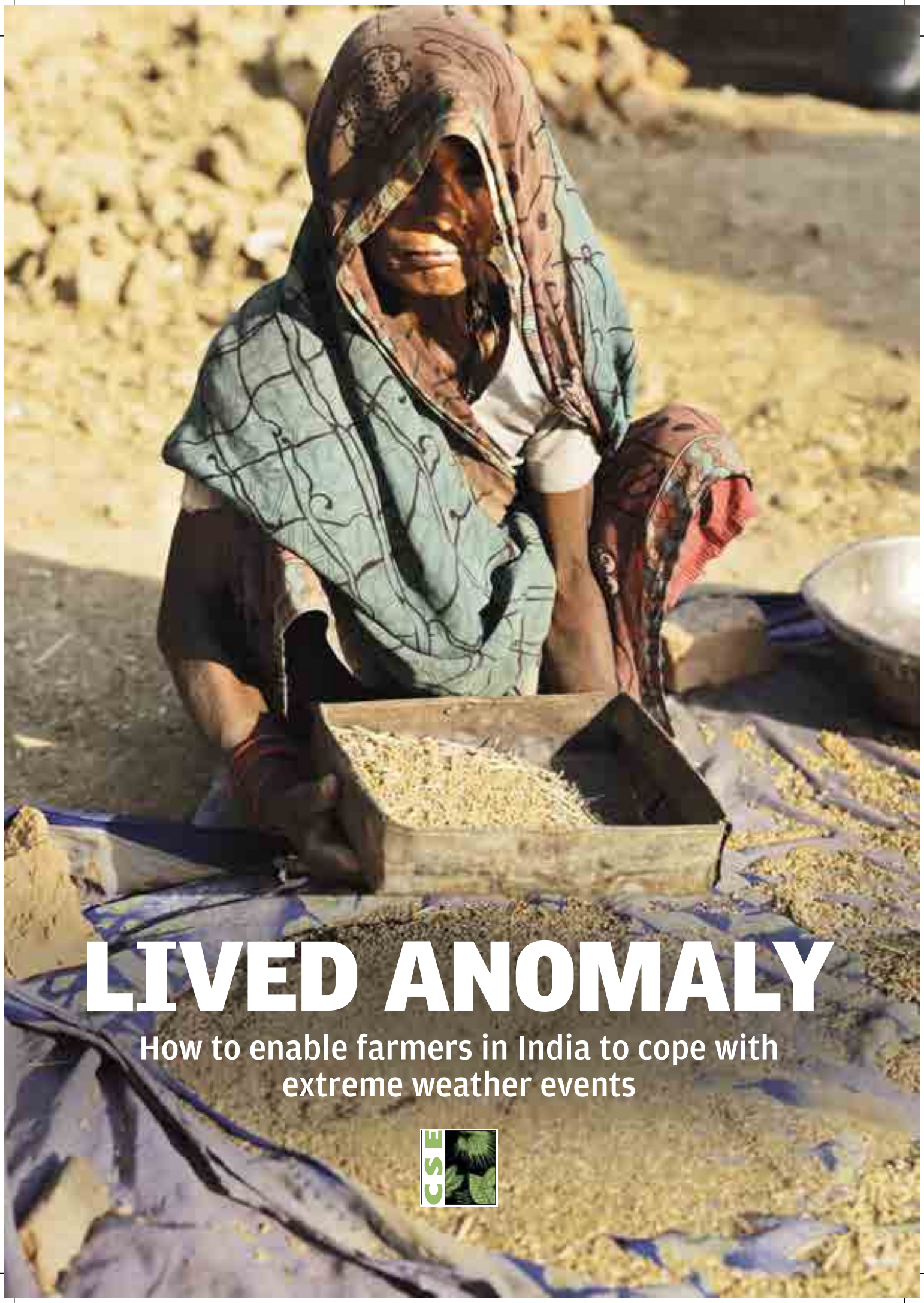

LIVED ANOMALY

How to enable farmers in India to cope with extreme weather events

CSE

Lived Anomaly

HOW TO ENABLE FARMERS IN INDIA COPE WITH EXTREME WEATHER EVENTS

A Centre for Science and Environment assessment report

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Cover caption: A woman in Kacchipurva village in Banda district, Bundelkhand, sieves wheat grain to separate it from dust. The region is among the worst affected by extreme weather.

We are grateful to DanChurchAid for its support to the programme on climate change adaptation.

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We would also like to thank *Down To Earth* for its contribution to this report.

Maps in this report are indicative and not to scale.

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Preface

Lived Anomaly is about what is happening to farmers in India because of extreme weather events, largely as told by farmers themselves. Its basis is the winter–spring of 2015 and the telling aftermath. The report is also a peek into the future—what we should expect as our planet continues to heat up due to the incessant increase in greenhouse gas emissions.

Usually, farmers expect rain February onwards, and tolerate even the odd hailstorm or two. The rain is well spread out in time, a light drizzle or a moderate downpour. It is very good for the rabi crops farmers have sown (the rabi season is one of two major agricultural seasons in India, and stretches from December/January to April. The other season is kharif, between April and October). The weather in the rabi season of 2015 was immensely irregular, as described in Chapter 1.

What propelled the Centre for Science and Environment (CSE) to put this report together—in a way, forced our hand—wasn't merely the degree of irregularity in 2015. It was also that 2015 was the third year in a row when the rabi season was thrown out of kilter in large parts of India by deviant weather.

In 2013, five states were impacted and 0.35 million hectares (ha) of standing crops affected. In 2014, six states were affected and 5.5 million ha of crops, just a month away from being harvested, were damaged. In 2015, no less than 15 states were hit and 18.23 million ha of crops were damaged. The 15 states account for approximately 75 per cent of India's population and about 70 per cent of its geographical area, and produce approximately 81 per cent of its foodgrains.

Such intensely growing anomaly could simply not be left unrecorded. We began to collate information, in real time—

tracking parliamentary debates and picking and gauging the data being put out by the government. We also started tracking the increasingly disturbing reportage in the regional-language media—stories of real-time destruction, real-time death by dismay and indebtedness.

During this period we surveyed impacts on the ground. CSE's study area was Mathura, Shamli, Muzaffarnagar and Agra districts in Uttar Pradesh (UP)—some of the worst-affected districts in the worst-affected state. The team met farmers, local leaders and panchayat-level, block-level and district-level officials (the patwari, the kanoongo, the tehsildar, the Deputy Director-Agriculture, ADM (Finance), the District Magistrate and so on).

The team saw the destruction with their own eyes, from destroyed crops to devastated farmer families. It returned with much material and at least one telling insight: there was a huge difference between what was being said by the government and what was actually happening at the ground level. The team also witnessed the failure of all safety nets—the delivery of relief, inadequacies of crop insurance and the utter helplessness of farmers in India.

This was the second impetus for *Lived Anomaly*. We were forced to look beyond the event per se. So there is an analysis of the chaotic and politicized 'relief' scenario (see Chapter 2: *What 'relief' means*). Then, a close look at the sheer inadequacies of the safety net for farmers in India—the state of agricultural insurance in India (see Chapter 3: *Beyond 'relief'*) and the lack of institutional credit that worsens farmers' woes (see Chapter 4: *A burden made worse*). The material for these chapters is based on what the team learnt on the ground; CSE thanks the many officials, farmer union representatives and, especially, farmers that freely interacted with the team. Further research showed that what the team learnt was fairly representative of the situation countrywide.

The situation countrywide is grim. For a long time, the phrase 'agrarian crisis' has been used to describe the plight of the farmer in India. The 2006 Swaminathan Committee Report pointed it out. Recent reports point out that more than half of agricultural

households are in debt and that institutional credit is still a dream for a large majority of small and marginal farmers.

CSE knows what 'agrarian crisis' means. For the past three decades we have documented it. But we are forced to ask: is it possible that India now faces an agrarian crisis like never before? Given the way the rabi season has progressed—rather, regressed—in the last three years and that large parts of India have experienced a fourth consecutive drought during the kharif season, is it possible that Indian agriculture, now, faces a point of destructive inflection? Is this because of the regularly irregular weather due to climate change? This, then, is the third propellant for *Lived Anomaly*.

There is a fourth. Now, more than ever, farmers in India need safety nets to overcome the vulnerabilities induced by frequent weather anomalies. There are ways to bring respite (see Chapter 5: *A learning*), but much more needs to be done. We can only suggest some, but our hope is that this report will act as an agent provocateur for much more research and far better recommendations. Our key suggestions are:

1. Use technology for accurate and speedy crop-damage assessment. This is key to the delivery of relief and farmer-friendly crop insurance schemes;

2. Undertake wholesale reform in the way relief is estimated and delivered. Currently, relief amounts given to the majority of the farmers are not even sufficient for the next sowing season. Relief, currently, is more political tokenism than a safety net against extreme weather events.

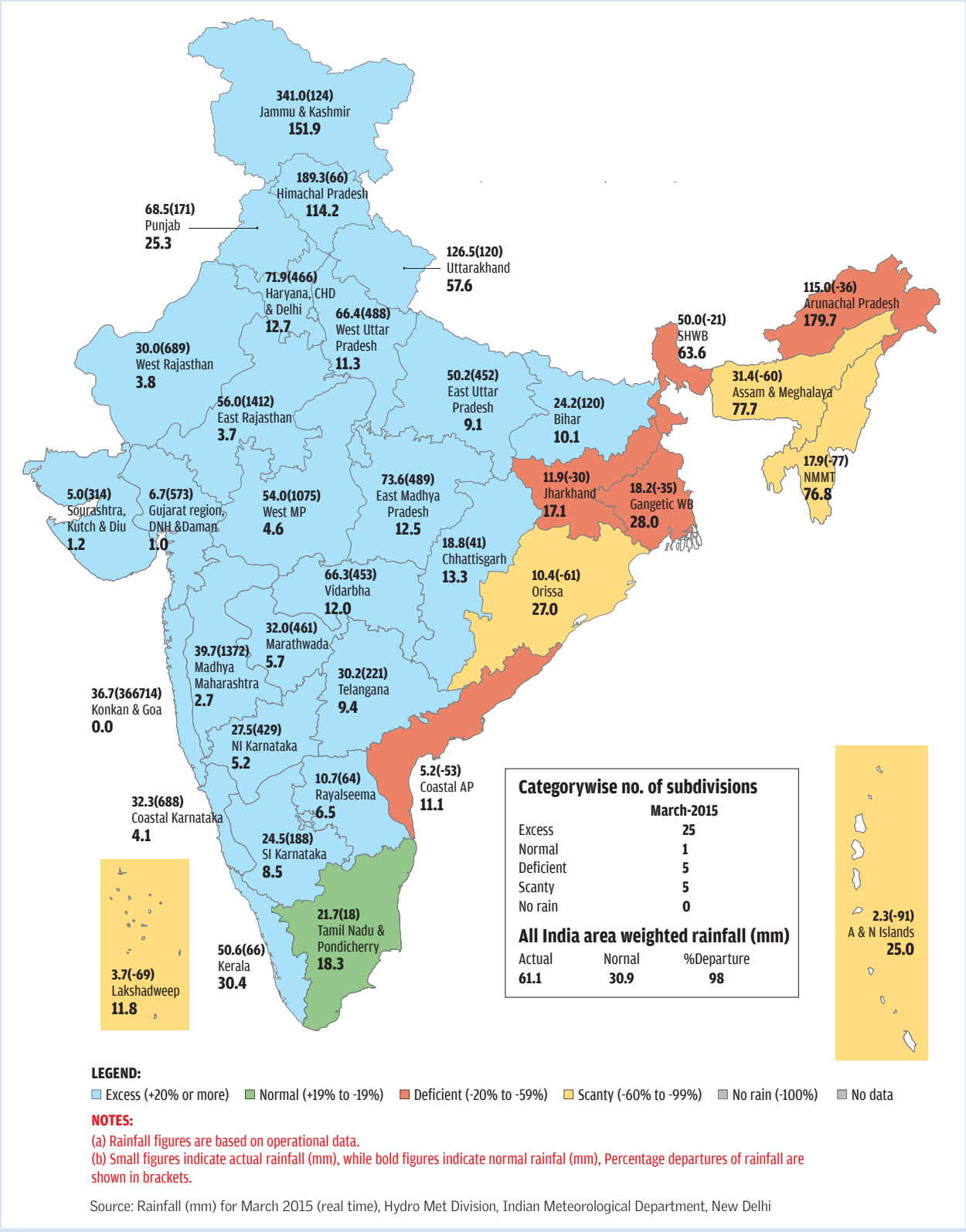
3. Make crop insurance an attractive and a feasible compensation mechanism for farmers. Presently, agricultural insurance schemes cater to very few farmers in a few states and there, too, largely function as insurance for crop loans taken by farmers from banks.

India faces a tremendous challenge that it can no more afford to ignore. We have to answer all the questions farmers have posed, and keep posing, with utmost sincerity. All efforts have to be made to make sure that we, as a nation, do not fail the farmer. We should not be under the illusion that only farmers will pay the price in the event of a natural calamity. Eventually, we all will be forced to pay the price, directly or indirectly. For if the farmer fails, this country fails.

Chandra Bhushan

Wettest March in 48 years

The first few days of March brought heavy rainfall with major parts of the country seeing many times more rain than historically recorded. East Rajasthan saw an increase of 1,412 per cent over normal rainfall, central Maharashtra saw an increase of 1,372 per cent and western MP an increase of 1,075 per cent



NOTES:

(a) Rainfall figures are based on operational data.

(b) Small figures indicate actual rainfall (mm), while bold figures indicate normal rainfal (mm), Percentage departures of rainfall are shown in brackets.

Source: Rainfall (mm) for March 2015 (real time), Hydro Met Division, Indian Meteorological Department, New Delhi

1. Fell February and Mad March

How 15 states in India reeled under awry weather

The first week of March 2015. Even as farmers all over India were preparing to harvest their rabi (winter) crops, such as wheat, pulses, potato, sugar cane, maize, groundnut and mustard and horticultural crops, such as grapes, papaya, mango, banana, onion and other vegetables, the weather turned rogue.

'It has been raining woes for farmers since Saturday night [28 February 2015]', began a 3 March 2015 article in the *Times of India*, 'as a rare confluence of weather systems drenched large parts of the country, flattening standing crops at many places and damaging vegetable fields'. Already by Monday, 2 March, news had begun to pour in from all over the country, from state after state, of standing crops utterly destroyed. The sense was clear that a disaster of national proportions was under way: alarmed Lok Sabha parliamentarians discussed what needed to be done on Monday itself. In the reportage available in the regional media of this anomalous weekend, one theme stands out as unprecedented: farmers, unable to fathom what they were witnessing in their fields, unable to accept what had happened to their almost-harvestable crops, dying of shock.

This 'rare confluence of weather systems' cleared, only to return, again and again. With not only severe rain, but equally severe hailstorms and thunderstorms. We now know that during the wretched winter and spring of 2015, unseasonal rain fell from early February itself. We know that the nation-wide average rainfall, 1–18 March, was 49.2 mm, 197 per cent above normal—this was the real havoc-wreaker. We know that average rainfall for the whole of March was 61.1 mm, nearly double the normal, making March 2015 the wettest in 48 years (see Map 1: *Wettest March in 48 years*). And India was rain-and-hail lashed. Across 15 states, lashed five times over: 28 February–2 March, 7 and 8 March, 14–16 March, 30 March and the first week of April.[1]

The nation-wide average rainfall in 1–18 March was 49.2 mm, 197 per cent above normal. The average rainfall for the whole of March was 61.1 mm, nearly double the normal, making March 2015 the wettest in 48 years

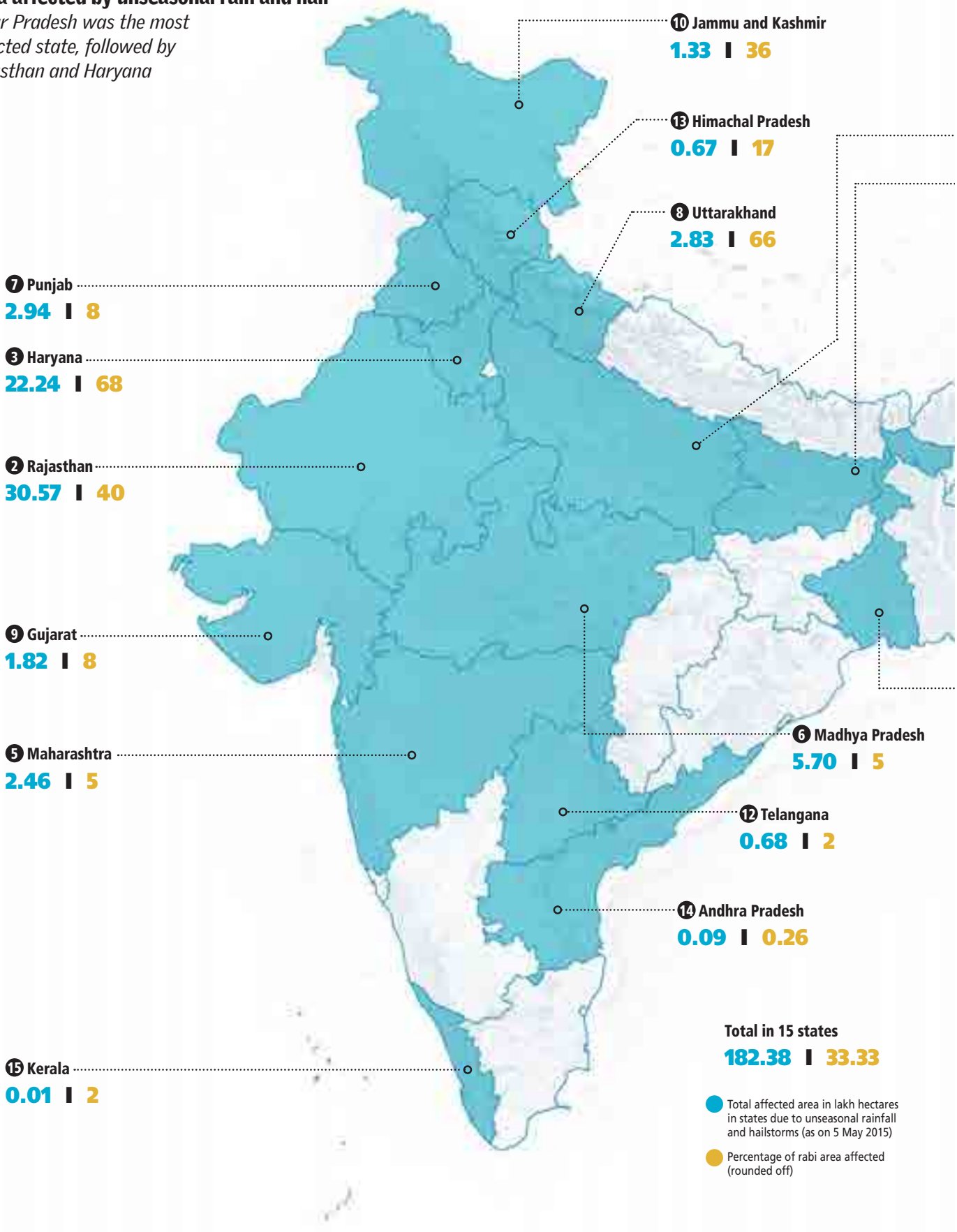
The damage

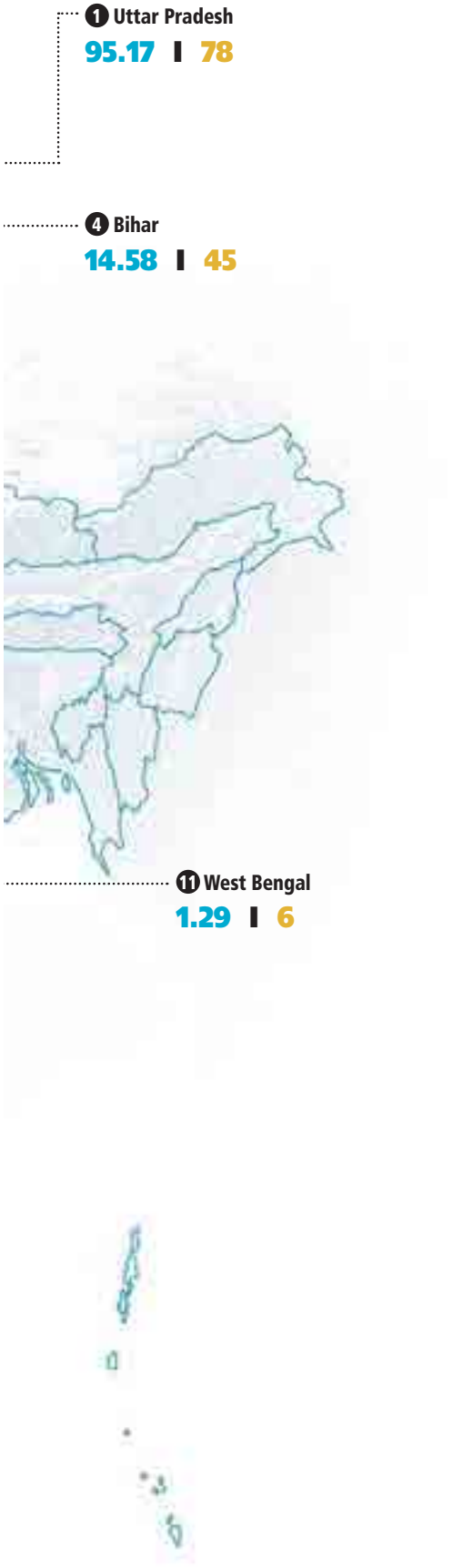
The Union Ministry of Agriculture estimates regarding the extent of damage vary. A 28 April 2015 press release said crops on 189.81 lakh hectares (ha) were damaged. Then, in response to a Rajya Sabha question on 'compensation for loss of crops due to variance in weather pattern', the quantum of crop damage was revised to 182.38 lakh ha, as on 5 May 2015.[2]

There is no quibbling, however, about the depth of loss to farmers. Close to 80 per cent of the total area under rabi crops in Uttar Pradesh—almost the entire state: 73 of 75 districts—got impacted. Haryana and Uttarakhand suffered over almost 70 per cent of rabi crop area. Overall, Uttar Pradesh came out worst, followed by Rajasthan, Haryana and Bihar. In all, roughly 33 per cent of the rabi crop area in 15 states was harmed (see Table 1: *Area affected by unseasonal rain or hail) (see also Map 2: Area affected by unseasonal rain or hail*).

Area affected by unseasonal rain and hail

Uttar Pradesh was the most affected state, followed by Rajasthan and Haryana





Impact of unseasonal rains and hailstorms Feb–Apr 2015

1 Uttar Pradesh: 73 of 75 districts (except Bijnor and Balrampur) were declared as affected by unseasonal rain and hailstorm. Crops on 95.17 lakh hectares (ha) were affected in these districts. Crops on 65.86 per cent of the affected area, i.e. 58.92 lakh ha, were damaged 33 per cent or more. 44 out of the 73 affected districts, i.e. 60.27 per cent, experienced 50 per cent or more damage (as on 14 April 2015).

Main crops damaged were wheat (72.35 lakh ha); pulses (12.93 ha); horticulture, including vegetables and fruits (3.43 lakh ha) and oilseeds, including mustard, safflower and castor (3.03 lakh ha). About 30 per cent of mango flowers were also destroyed.

2 Rajasthan: Rajasthan's agriculture ministry confirmed that unseasonal hailstorms and rain led to crop losses in 45 per cent of the state's farmland in 2015. 30.57 lakh ha area were affected in total according to initial 'girdawari report', more than 2.31 crore people were affected in 21,083 villages accross the state.

- Over 1,532 villages suffered 75–100 per cent crop damage.
- 6,200 villages suffered 50–74 per cent damage.
- 13,324 villages lost less than 50 per cent of their produce.

As per the 'girdawari' (record of crops cultivated by farmers) report, Kota district was the worst hit, with damages worth Rs 1,310 crores, followed by Bhilwara, where the total loss estimated was Rs 1,152 crores. Ajmer, Bundi, Chittorgarh, Jhalawar, Barmer, Jodhpur, Tonk and Rajsamand were the most-affected districts.

Around 41 people, 98 milking animals and 2,089 small herds of sheep/goat lost their lives. The main crops damaged were wheat (8.918 lakh ha); oilseeds, including mustard, safflower and castor (5.884 lakh ha) and pulses (3.152 lakh ha).

3 Haryana: 22.24 lakh ha crop area were affected, including wheat crop spread over 19.5 lakh. However, farmers with 18.47 lakh ha, comprising 96 per cent of the affected acreage, will not be compensated as the extent of damage in the area is 0–25 per cent, which is below the eligibility limit to get the compensation.

About 2.13 lakh ha of mustard crop was damaged of which damage was over 75 per cent on 49,550 ha.

The districts of Mewat, Karnal, Kaithal and Yamunanagar reported up to 25 per cent damage on 18.47 lakh ha of wheat and on 1.44 lakh ha of mustard crop. Rewari, Gurgaon, Palwal, Mahendragarh and Bhiwani districts reported 26–50 per cent damage, i.e. 48,693 ha wheat and 8,555 ha mustard crop. Parts of Mewat, Jhajjar, Rewari, Mahendragarh, Yamunanagar, Palwal districts also reported crop damage of 51 to 75 per cent, i.e. 49,570 ha for wheat and 10,735 ha mustard crop. Parts of Bhiwani, Mahendragarh and Jind had severe losses of over 75 per cent, with damage to more than 1,000 ha of wheat and 49,550 ha of mustard crop.

The worst affected crops in the state were wheat (19.5 lakh ha), oilseeds, including mustard, safflower and castor (2.136 lakh ha) and horticulture, including vegetables and fruits (0.589 lakh ha).

4 Bihar: Thunderstorms hit six flood-prone districts of the Kosi region in Bihar on 22 April 2015, leaving over 42 people dead and damaging crops in over 1,200 ha. Districts affected were Purnea, Madhepura, Dharbhanga, Araria, Bhagalpur and Katihar. Crop damage due to the cold wave, unseasonal rains and hailstorm in the state in February–March 2015 was estimated to be on about 14.58 lakh ha.

5 Maharashtra: Maharashtra had crop damages on nearly 20 lakh ha, with 33 per cent or more crop damage on an estimated 9.89 lakh ha. Later estimates, however, revised the damage to crops in the state to be on 2.46 lakh ha.

Wheat (0.628 lakh ha), rabi, sorghum, chickpea, onion, mango, grapes (which suffered fruit cracking) and citrus were the major crops damaged. About 30,000 villages in 28 districts experienced losses, the worst affected being Hingoli, Beed, Aurangabad, Parbhani, Akola, Amaravati, Yavatmal, Sholapur, Pune, Nasik, Jailgaon, Satara, Sangli, Kolhapur and Ahmednagar.

6 Madhya Pradesh: 43 out of the 48 districts were affected by unseasonal heavy rains that claimed over 70 lives. An estimated 9 lakh ha of crop, later revised to 5.70 lakh ha, of mainly wheat (2.4 lakh ha), pulses (2.0 lakh ha) and horticulture were ruined. Affected districts include Indore, Ujjain, Dewas, Dhar, Jabhua, Mandsaur, Nemach, Rewa, Sidhi, Satna and Shahdhol.

Table 1: Area affected by unseasonal rain or hail

Fifteen states were impacted significantly by unseasonal rain or hail. Some states were affected to the extent of 68–78 per cent

State	Area affected (in lakh hectares) as on 5 May 2015	Average of last three years (2011–12, 2012–13 and 2013–14) of rabi area sown (in lakh hectares)	Percentage of rabi area affected (rounded off)
Uttar Pradesh	95.17	122.04	78
Rajasthan	30.57	76.46	40
Haryana	22.24	32.59	68
Bihar	14.58	32.23	45
Maharashtra	2.46	51.53	5
Madhya Pradesh	5.70	104.20	5
Punjab	2.94	35.97	8
Uttarakhand	2.83	4.27	66
Gujarat	1.82	22.18	8
Jammu and Kashmir	1.33	3.66	36
West Bengal	1.29	23.16	6
Himachal Pradesh	0.67	4.03	17
Andhra Pradesh (including Telangana)	0.77	34.39	2
Kerala	0.01	0.48	2
Total in 15 states	**182.38**	**547.19**	**33.33**

Sources: Indiastat;
http://www.indiastat.com/table/agriculture/2/areaundercrops19502014/448934/825053/data.aspx
Rajya Sabha starred question no. 144 answered on 8 May 2015

In February–April 2015, standing crops on 182.38 lakh ha, or 29.61 per cent of the entire rabi sown area, were affected; 67 per cent of this was wheat crop

According to data put out by the Directorate of Economics and Statistics, Union Ministry of Agriculture, as on 13 February 2015, the total cropped area of the rabi season was 615.74 lahk ha. Of this, wheat was sown over 306.35 lakh ha; coarse cereals over 57.74 lakh ha, gram over 85.91 lakh ha, pulses over 145.92 lakh ha and oilseeds were sown over 80.92 lakh ha.[3, 4]

February to April, standing crops over 182.38 lakh ha, or 29.61 per cent, were mowed down. Wheat, coarse cereals such as barley, pulses, oilseeds and many other crops received a battering. For instance, 122.6 lakh ha of 306.35 lakh ha on which wheat was sown was affected (see Table 2: *Crop-wise area affected*).

Impact: foodgrain production

To gauge the effect of the maladjusted winter–spring of 2015 on foodgrain production, it is most useful to turn to data released by the Agricultural Statistics Division, Department of Agriculture and Cooperation, Government of India (ASD). This public institution periodically releases 'advance estimates' of how much foodgrain a season (kharif or rabi) is likely to yield, and then, as the season ends, provides the production picture.

On 18 February 2015, the ASD released its second estimate, in advance, of how the foodgrain scenario for the 2015 rabi season looked: total production was pegged at 1,332.8 lakh tonnes. By 13 May 2015, the estimate had reduced, by 67.6 lakh tonnes, to 1,265.2 lakh tonnes.[5] The reduction was based on information the ASD had up to the last week of March. Unseasonal rain/hail had obviously caused the ASD to rethink the picture.

Now the complete picture is out. Estimates released on 17 August 2015

Table 2: Crop-wise area affected

Wheat was the worst-affected crop, followed by pulses and oilseeds

Crop	Area affected (in lakh hectares)	Percentage of total area affected
Wheat	122.60	67.22
Coarse cereals (barley/jowar/maize)	2.41	1.32
Pulses	20.22	11.09
Oilseeds (mustard/safflower/castor)	11.39	6.24
Horticulture (vegetable/fruits)	6.96	3.82
Cumin	2.07	1.13
Isabgol (psyllium)	1.78	0.98
Coriander	1.86	1.02
Other crops	13.10	7.18
Total area	**182.38**	**100**

Source: Directorate of Economics and Statistics, Ministry of Agriculture

show that in the 2014–15 rabi season, total actual foodgrain production was 1,263.8 lakh tonnes. It is still 69 lakh tonnes, or 5.18 per cent, less than what the ASD had originally expected (in the second advanced estimate), and still lower that what ASD re-estimated in May. Note, also, that the August estimation includes summer crop sown in April–May, after the worst was over. Indeed, the final picture of the rabi season shows an increase in production of such crops as jowar, maize, moong and some coarse cereals, possibly due to the third (summer) crop.

But there is heavy loss. To major foodgrain crops such as wheat, gram, barley and other rabi pulses. And to oilseeds. The fall in production of major foodgrain crops is about 86.3 lakh tonnes, or 6.47 per cent less than originally expected. As per CSE estimates, this translates to a loss of Rs 15,777 crore (1 crore = 10 million) worth of foodgrains. A fall in production of 14.1 lakh (1 lakh = 1,00,000) tonnes oilseeds, 14.8 per cent of expected production, means an additional loss of Rs 4,676 crore. As per CSE estimates, the total

In the 2014–15 rabi season, foodgrain production was 1,263.8 lakh tonnes—5.2 per cent, less than what was originally expected

Hailstones on the streets of Mathura district in Uttar Pradesh. Some people died in the hailstorm and hundreds were injured

Table 3: Estimated damage to foodgrains largely attributed to rain or hail

Production of wheat, barley, gram and other rabi pulses fell by 8.63 million tonnes (6.47 per cent), worth about Rs 15,777 crore. Production of oilseed (rapeseed and mustard, groundnut and sunflower) fell by 1.41 million tonnes (14.8 per cent), worth Rs 4,676 crore

Rabi crop	Second estimate in Feb. 2015 (in million tonnes)	Fourth estimate in August 2015 (million tonnes)	Crop loss due to unseasonal rain and hail (drop in production between second and fourth estimates)	Crop MSP (Rs/quintal)	Economical value of loss incurred* (in Rs crore)
FOOD GRAINS					
Wheat	95.76	88.94	6.82	1,450	9,889
Barley	1.77	1.60	0.1679	1,150	193
Gram	8.28	7.17	1.1101	3,175	3,525
Other rabi pulses	3.67	3.14	0.53	4,094	2,170
Total foodgrains losses which can largely be attributed to rain and hail					**15,777**
OILSEEDS					
Rapeseed and mustard	7.363	6.309	1.054	3,100	3,267
Groundnut	1.822	1.482	0.34	4,000	1,360
Sunflower	0.322	0.309	0.013	3,750	49
Total loss in oilseeds which can largely be attributed to rain and hail					**4,676**
Total losses in foodgrains and oilseeds (in Rs crore) which can largely be attributed to rain and hail					**20,453**

Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Government of India

The fall in production of major foodgrain crops was about 86.3 lakh tonnes, this translated to a loss of Rs 15,777 crore worth of foodgrains. A fall in production of oilseeds by 14.1 lakh tonnes meant an additional loss of Rs 4,676 crore. The total economic loss was about Rs 20,453 crore

economic loss unseasonal rains caused are about Rs 20,453 crore (see Table 3: *Estimated damage to crops largely attributed to rain and hail*). It should be noted that, in addition to the crops the ASD provides information on, thousands of acres of orchards of banana, mango, watermelons, papaya were damaged in various parts of the country—these economic losses are not included in the ASD's final estimate (see box: *Wasted orchards and gardens*).

Wheat is the worst damaged. As per CSE estimates, wheat loss is an estimated 68.2 lakh tonnes, worth an estimated Rs 9,889 crore (at the rate of a minimum support price of Rs 1,450 per quintal, one of the biggest year-on-year falls in wheat production since 1950. Similar losses were also seen in 2000–01 and 2002–03 (about 67 and 70 lakh tonnes respectively). The decline in production means that India may have to import about 10 lakh tonnes of wheat in 2015–16, the highest in the last eight years. Pulses and oilseeds, too, are badly damaged (see Table 4: *Crop losses as percentage of sown area*).

The uncertainty of knowledge

What are we make of the winter–spring of 2015? Should we call it an 'extreme weather event', usually defined in statistical terms as an event that far exceeds the 'normal'? Or, as scientist M. Rajeevan has suggested in 'Overview of extreme weather events: what is predicted for South Asia', should we call it a 'high impact weather event', defined as weather that can result in significant impacts on safety, property and/or socioeconomic activity?

Scientists have been studying this phenomenon for quite a while now—for 2015 isn't the first time—in recent years. India has experienced winter–spring

WASTED ORCHARDS AND VEGETABLE FIELDS

A snapshot. For full details please see Annexure 3

As on 5 May 2015, the Government of India estimated that 6.958 lakh hectares (ha) of horticultural area (where vegetables and fruits are grown) was affected in the country; 3.43 lakh ha of such area was affected in Uttar Pradesh, followed by Maharashtra (1.281 lakh ha), Haryana (0.589 lakh ha) and other states. For details please see Annexure 3.

Uttar Pradesh: Reportedly, 30 per cent of flowering on mango trees was damaged in different parts of Uttar Pradesh. The Saharanpur region of Uttar Pradesh suffered 70 per cent of mango crop losses.[1] Mango growers were not eligible for relief.[2]

Maharashtra: Fruit crops were adversely affected in parts of Maharashtra. North Maharashtra and the Marathwada region were seriously impacted. Grapes and mango were the worst affected, with exports reducing by 50 per cent from the previous year.[3] Farmers in Jalna and Aurangabad areas of Maharashtra said 90 per cent of the region's popular kesar mango crop, ready to be harvested within a fortnight, was destroyed.[4]

Jammu and Kashmir: Continuous rainfall, gusty winds and hailstorm in south Kashmir's Shopian and some parts of Pulwama district caused huge damage to the crops, including apple, pears, cherries, almonds and peaches.[5]

Karnataka: Banana orchards in the Yadiki mandal, watermelon and papaya orchards in Gooty, Kanaganapalli, Chennekothapalli (CK Palli) and Ramagiri mandals of Karnataka were destroyed.[6]

Table 4: Crop losses as a percentage of sown area

40 per cent of area sown with wheat and 14 per cent of the area under pulses and oilseeds was affected by rain and hail

Crop sown	Area sown (country-wide, in lakh hectares)	Area affected (country-wide, in lakh hectares as on 5 May 2015, based on Lok Sabha question)	Area affected (in per cent)
Wheat	306.35	122.596	40
Coarse cereals (barley/jowar/maize)	56.89	2.413	4
Pulses	142.92	20.222	14
Oilseeds (mustard/safflower/castor)	80.14	11.388	14
Horticulture (vegetable/fruits) and other crops (cumin, isabgol, coriander, other crops)	NA	25.763	–
Total crops	–	**182.38**	–

Source: http://pib.nic.in/newssite/PrintRelease.aspx?relid=115223
Rajya Sabha unstarred question no. 1406, answered on 8 May 2015, 'Damage to crops due to heavy rains, hailstorm and frost'

gone awry. But there is no scientific consensus on the unseasonal rain and hail of 2015, only theories.

The primary culprit seems to be a weather system called the western disturbances. But there are other culprits, too. The warming of the Tibetan Plateau is one such. An anomalous polar jet stream (which is like a river of wind that emanates from the poles and flows through the northern hemisphere between the two lowest levels of the atmosphere, the troposphere and the stratosphere, creating and/or affecting weather systems) is yet another. In the scientific community, the debate is on, as it should be: science does not deal in

VINEET KUMAR / CSE

Farmer Kedar Singh's brother, son and daughters. Kedar Singh succumbed to a heart attack after his harvested crop was destroyed in fields where he had left it after he was unable to find space in a cold storage in Agra.

CASE STUDY Chronicles of deaths avoidable

Kedar Singh Tomar, Village Dignair, Block Barauli, Agra district

Thirty-five-year-old farmer Kedar Singh was part of a family of five that included two daughters, a son and his wife. He had taken 2 bigha (approximately 0.32 ha) of land on rent for farming potatoes at the rate of Rs 20,000 per bigha (approximately 0.16 ha). The input cost for potato was Rs 45,000–50,000 per bigha. He had taken a loan of approximately Rs 2 lakh from moneylenders at an interest rate of 60 per cent.

This season was very good for potato and Kedar Singh had been happy. However, because of the bumper potato crop in the Agra region, all 235 of Agra's cold storages were full. Kedar Singh had waited in a queue outside a cold storage for three days, along with his vehicle in which he would transport the crop, but he couldn't find space for his potatoes. He took the crop back to his village to leave it in open fields. The unexpected hailstorm and rain destroyed all the potato. Overcome with anxiety about how he would repay the moneylenders and pay the rent for his land, he succumbed to a heart attack.

An analysis of this case underlined that:

1. Not being a landowner makes it very difficult to establish creditworthiness and get loans from banks.
2. Since current crop insurance schemes are linked to loans from banks, Kedar Singh probably didn't have any insurance cover either.
3. As per UP state norms, government relief is only for landowners, not for people leasing land. This means that Kedar Singh was not entitled to any government relief package.

OTHER DAMAGES

Fodder crisis

The quality of hay deteriorated because of rain and there were instances of animals falling ill after feeding on the fodder. K. Nath Rai, Deputy Director, Agriculture Department, Agra, expects a significant fodder crisis for animals in UP as hay has been destroyed on a large scale and farmers will find it difficult to find good-quality fodder for their cattle.

Birds and cattle

Hundreds of thousands of birds, especially peacocks, were found dead in fields after the hailstorms and hundreds of cattle were seriously injured. The hailstones were so heavy and fell with such velocity that they broke cemented roofs in several villages. Some hailstones weighed as much as 1–2 kg. A few older people said that they had never seen such large hailstones before.

VINEET KUMAR / CSE

While availability of fodder was affected by unseasonal rain and hail, villagers say that cattle also fell sick after eating the available hay (top); birds and animals killed in a hailstorm near Mathura. Thousands of birds and animals died in Uttar Pradesh alone (below); the largest-ever hailstones collected after a hailstorm, as claimed by farmers. They say that hail that year pierced holes in cement roofs.

THE IDES OF MARCH

Climate change or just an isolated natural/regional phenomenon? On 2015, the jury is still out

There is no unanimity among scientists on the reasons behind the events of winter–spring 2015 in India. They offer a number of explanations.

Easterly wave: According to the Indian Meteorological Department (IMD), severe rain this year was the result of the confluence of a weather system called the western disturbances and easterly waves from the Bay of Bengal. Easterly waves, or easterlies, blow year-long from east to west. The two winds converge throughout the year, but results vary. They generally bring rain only to the northern part of the country. But, this year, states in central and south India also received rain, says B.P. Yadav, head of IMD's National Weather Forecasting Centre. Western parts of Madhya Pradesh, for instance, received over 1,075 per cent more than the usual rainfall during March 2015, while the rainfall in central Maharashtra was 1,372 per cent above normal, says IMD data. Yadav says the change in rainfall pattern is part of natural weather variation.

Pacific Decadal Oscillation: Jason Nicholls, senior meteorologist and manager of international forecasting at AccuWeather Inc., a global leader in weather information services, offers a more complicated reason. He says a phenomenon called Pacific Decadal Oscillation (PDO) contributed to the severity of this year's rainfall. PDO is the name given to long-term fluctuations in the surface temperature of the Pacific Ocean. In areas above 20° north off the western coast of North America, cooling is observed during the negative phase of PDO while warming is observed during the positive phase. This shift from one phase to another happens every 10 years or in multiples of 10 years and is yet to be understood properly. PDO influences the placement and intensity of ridges (high-pressure areas) and troughs (low-pressure areas) over the northern hemisphere.

Nicholls says that the wet winter seen this year and in 2013–14 was caused by the impact of a 'very strong positive PDO'. The warm waters in the west coast of North America led to a strong ridge over the Gulf of Alaska and western Canada. Another ridge prevailed over the central Atlantic Ocean which allowed storm systems to move through Europe into southeast Europe and the Middle East. A weakness between a couple of such ridges allowed storm systems to move into Afghanistan, Pakistan and northern India over the past couple of winters/springs, he explains.

Jet streams: Akshay Deoras, an independent weather expert based in Maharashtra, says that widely used weather models, such as the Global Forecast System, are consistently showing the movement of new upper air troughs into India. Such troughs in the jet streams (narrow bands of strong winds flowing in the upper troposphere) could be affecting the western disturbances which, the IMD says, are present in the lower and middle troposphere.

certainties, and the more the research undertaken, the better the collaboration among experts, the quicker and better we'll know (see Box: *The Ides of March*).

One thing is certain, though. Here is a phenomenon that has occurred for the third year in a row, in increasing intensity vis-a-vis its spatial spread, and vis-a-vis the extent and quantum of damage to the rabi crop (see Map 3: *When freak becomes the norm*).

The certainty of death

This, too, is certain. The weather of winter–spring 2015 has taken lives. Hundreds of farmers have died in Uttar Pradesh, Rajasthan, Madhya Pradesh, Haryana, Maharashtra and other affected states, either from shock or suicide after bad weather.

Uttar Pradesh's main Hindi newspapers *Dainik Jagran* and *Amar Ujala* carried reports of 30–50 farmer deaths every day for days after crop damage began March 2015 onwards. There is no accurate figure of deaths attributed to

One such trough started forming in the upper troposphere over Iran, Afghanistan and Pakistan on 26 February and intensified and moved towards north-western parts of India on 28 February. This led to the formation of a low-pressure region in the lower troposphere over northwest India, causing an incursion of moisture from Arabian Sea, and produced heavy rains. The rainfall on 14–16 March was also caused by a similar upper air weather set-up. This shows how problematic the combination of western disturbances and upper air troughs can be for India, says Deoras.

But all these explanations are based on climatic phenomena that have always existed. What is making their impact increasingly severe now? A few studies say that global warming holds the clues.

Heating of the Tibetan plateau: A study by the Indian Institute of Tropical Meteorology (IITM), Pune, has directly linked western disturbances to global warming. In a paper published in *Climate Dynamics* in February 2015, the researchers say global warming is impacting air currents and causing freak weather events. Pronounced warming over the Tibetan plateau in recent decades has increased the instability of the Westerlies and this has increased the variability of the western disturbances.

According to the study, the western Himalayan region has seen a significant rise in surface temperatures since the 1950s. Observations from the area show a significant increase in precipitation in recent decades. The researchers looked at a variety of climate data to understand the increasing frequency of heavy precipitation. They say temperatures have risen in the middle- and upper-tropospheric levels over the subtropics (the area between the Tropic of Cancer and the Tropic of Capricorn) and the middle latitudes. 'Our study suggests that human-induced climate change is the reason for the increased variability of western disturbances,' says R. Krishnan, one of the researchers. 'The findings are based on direct observations and we are now using climate models to confirm if the impact is human-induced,' says Krishnan.

Arctic warming: Another study which blames global warming is by Jennifer Francis of Rutgers University, New Jersey, and S.J. Vavrus of University of Wisconsin-Madison, both in the US. The study, published in the January 2015 issue of *Environment Research Letters*, suggests that heating up of the Arctic has weakened the jet streams in the northern hemisphere. The west to east flow of jet streams in the northern hemisphere is maintained by the 'gradient of heat' between the cool Arctic and warmer areas near the equator. But the Arctic has been warming since the past 20 years due to which the jet streams have become weaker. Rather than circling in a relatively straight path, jet streams now meander. This is making the South colder and the North warmer. Francis says western disturbances could definitely be affected by these jet streams.[1]

[1]For more details, see Varshney, Vibha and Niyogi, Dipanwita 2015, 'Raining Troubles' in *Down To Earth*, Vol. 22, No. 23, 1–5 March, Society for Environmental Communications, New Delhi.

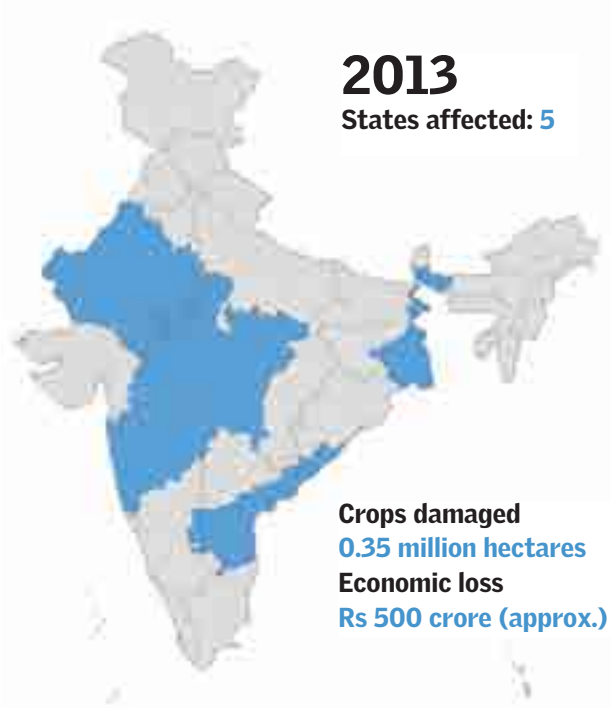
crop failure. However, 1,153 farmers were reportedly killed in UP alone.[6] Maharashtra has officially registered 601 farmer deaths during February–April 2015. Officially, the UP government has put the figure at 89 farmer deaths attributed to unseasonal rain and hailstorms; Rs 6.21 crore was disbursed to the families of deceased farmers.

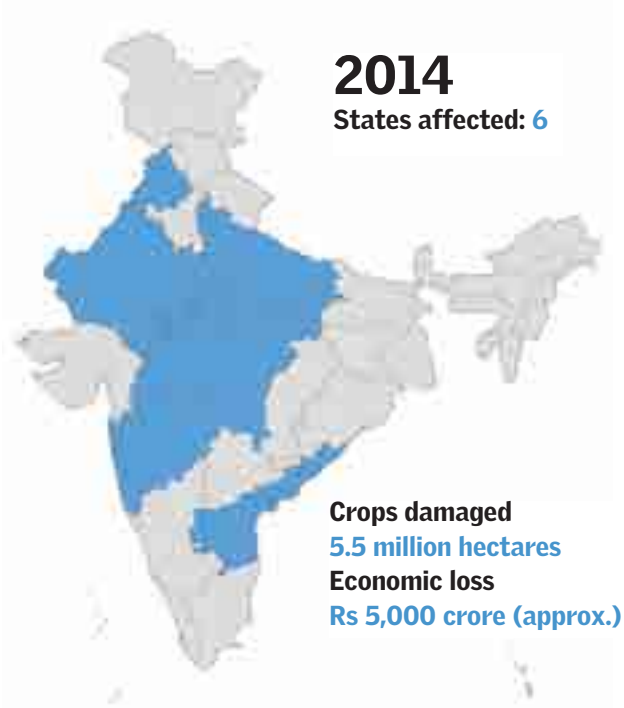
Months later, there is no complete information on the total number of farmer deaths the untimely rain and hailstorms triggered. A comprehensive study is needed to gauge the actual number of deaths that can be linked to distress caused by this phenomenon.

It is unlikely there ever will be such a study. Even the Union Minister for Agriculture raised a question on the accuracy of the data related to farmer deaths state governments submitted after their survey of the damage. And state governments downplay farmer deaths.[7, 8, 9] For, in the aftermath of a tragedy such as this one, an agrarian crisis such as occurred this year, the focus shifts elsewhere. The game changes. Read on.

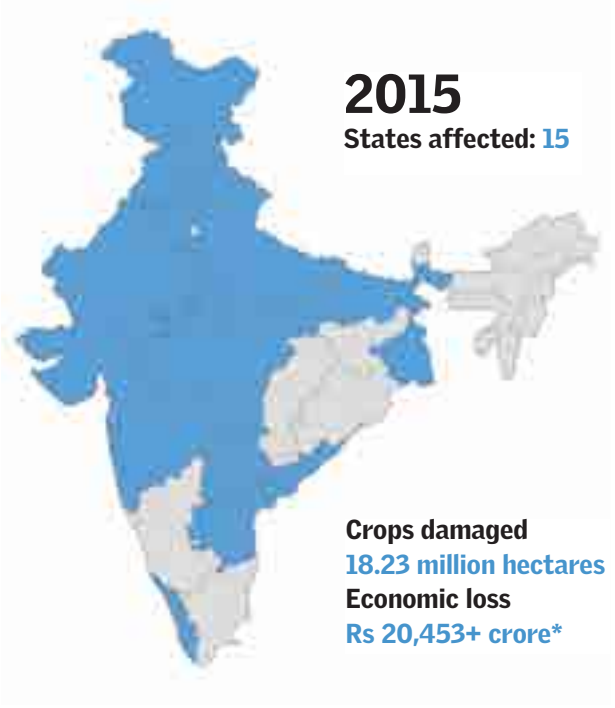
When freak becomes the norm

When hailstorms and unseasonal rains destroyed large swathes of rabi crops in 2013, they were thought to be freak weather events. But they hit again in 2014 and then in 2015, each time with more intensity and causing more damage





2015 was the third year in a row that the rabi season in India faced weather anomaly. In 2013, five states were impacted and 0.35 million hectares of standing crops destroyed. In 2014, six states were affected and 5.5 million hectares of crops were destroyed. In 2015, no less than 15 states were hit and 18.23 million hectares of crops were damaged



* Hundreds of acres of orchards of banana, mango, watermelon, papaya etc. were also damaged and are not included in this estimate; .
http://www.thehindu.com/news/national/andhra-pradesh/rain-hailstorm-cause-misery-to-farmers/article7100081.ece
Sources: Based on state government estimates

2. What 'relief' means

A stop-gap measure. Farmers need compensation for what they lose

After disaster has struck, a new game appears. Always after. It is always called a game-changer, is invariably announced with fanfare, stands in for limitless political mileage but represents the limit of true political empathy towards those disaster affects in India. Especially farmers, post-crop loss. This form of empathy is called 'relief'. Let us, therefore, first try and understand what this word means, in general, in India.

When disaster strikes, a many-geared administrative machinery rumbles to life. State governments are primarily responsible for rescue, relief and rehabilitation. Money for the three Rs is disbursed through two funds: the State Disaster Relief Fund (SDRF) and the National Disaster Relief Fund (NDRF). In the SDRF, the Centre puts in 75 per cent and a state government contributes 25 per cent. Actual funds a state gets are based on what the

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Storm-ravaged wheat in Bundelkhand in Madhya Pradesh. Madhya Pradesh was one of the 15 states affected by unseasonal rain and hail

Table 1: Average cost of wheat cultivation and 'relief'

Relief varies from 28 to 67 per cent of input costs for wheat. Compensation, however, is for up to 2 ha, with remaining losses uncompensated

State	Wheat cost (in Rs) per hectare (2012–13)	Maximum relief amount given, i.e. in 100% crop loss scenario (in Rs)	Relief given as a percentage of total cost incurred (rounded off)
Haryana	53,710.8	29,670	55
Madhya Pradesh	37,119.9	25,000	67
Punjab	49,070.4	19,760	40
Rajasthan	46,569.1	13,500	28
Uttar Pradesh	43,698.4	18,000	41

*Wheat yield per hectare in quintals (2014–15 India Stat data). MSP Rs 1,450 per quintal

Sources: 'Price policy for rabi crops, the marketing season 2015–16', Commission for Agricultural Costs and Prices, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi, July 2014

Finance Commission recommends (14th Finance Commission for the current period of 2015–20); it determines the annual size of the fund and how much the Union government and the states ought to chip in with. NDRF kicks in when the level of the disaster is really high-impact: the Central government lends logistic and financial support, when required, through the fund. When a natural disaster damages crops, the National Disaster Management Act comes into play: here exist the rules and regulations to how to provide 'relief' to affected farmers.

There is no process to the 'relief' process. Relief provisions are designed to only provide money that covers the input costs for the next cropping season. In this way, 'relief' is viewed as just an 'input subsidy'

Perhaps such a rumbler is needed. But on the ground, 'relief' amounts to a temporary measure that is a mere fraction of the actual loss a farmer incurs.

Consider, for starters, the package different states handed out to wheat farmers this year (wheat farmers were the worst-affected by the anomalous winter–spring of 2015). Assuming crop loss of 100 per cent, the maximum relief wheat farmers got ranged from 28 per cent of all the cost they had incurred in Rajasthan to 67 per cent of such costs in Madhya Pradesh. Moreover, the money they got had a ceiling: they were paid 'relief' for loss over only up to 2 ha (see Table 1: *Average cost of wheat cultivation and 'relief'*).

Now, what if a 10-ha farmer lost all his crops? He, too, got paid for 2 ha. The rest wasn't the government's concern, state or Centre. Moreover, different states had different rules for farmers who cultivated land on lease (they weren't owners): Haryana and Rajasthan made some provision, but in Uttar Pradesh such farmers got nothing; they were out of the 'relief' loop.

In general, then, the first question related to 'relief' is: what exactly is it? Is it a full 'compensation' package? No. Normatively, relief is just a momentary bulwark, and most dissatisfactory, too. Officials prefer to wash their hands off the 'relief' question—perhaps the process of disbursing money is too distressing for them. But what they say is instructive.

They say farmers should ensure full 'compensation' for their losses through insurance schemes. They say farmers should not depend on 'relief' provisions: these are meant only to tide over the immediate term. Indeed, 'relief' provisions are so designed to only provide money that covers the input costs for the next cropping season. In this way, 'relief' is viewed as just an 'input subsidy'.

In addition, the 'relief' a state government gives as a percentage of the total cost the farmer has incurred also varies drastically from state to state. The actual amount provided appears to be more of a 'political handout' decision

than one based honestly on input cost calculations. Indeed, if post-disaster 2015 is taken as a rule of thumb, there seems no logical basis by which 'relief' is provided: Uttar Pradesh paid up a maximum of Rs 18,000 per ha, Rajasthan paid Rs 13,500 per ha and the Delhi government coughed up a whopping Rs 50,000 per ha as 'relief'. What is the logic? The question becomes more pertinent if one looks at the 'sops' state governments have also provided this year: more time to pay loans (but you have to pay) and electricity bills (the oldest 'sop' in India).

There is no rationale to the 'relief' provided: Uttar Pradesh paid up a maximum of Rs 18,000 per ha, Rajasthan paid Rs 13,500 per ha and the Delhi government gave Rs 50,000 per ha as 'relief'

2015: What the government did

Once the winter–spring 2015 anomaly took on the form of a national disaster, the Centre quickly sprang into action and created an ameliorative package for affected farmers. Following Prime Minister Narendra Modi's announcement, several relief provisions were amended on the kinder side. This is made clear by a Union Ministry of Agriculture press release dated 10 April 2015:[1]

- Farmers were now eligible for an relief/input subsidy if 33 per cent or more of their crop was damaged. Earlier, they got relief only if the crop damage was 50 per cent or more;

CALCULATING 'RELIEF'

The case of Uttar Pradesh

Let us look at how Uttar Pradesh calculated 'relief'. The details in the table below are based on UP government estimates of 1 May 2015. So they differ slightly from the updated estimate of 15 May 2015 that the UP government came out with. Even so, they provide a good understanding of the break-up of relief calculations.

As per revised estimates, 58.92 lakh ha were damaged more than 33 per cent and the state government submitted a demand of Rs 7,543.14 crore to the Centre. As on 15 May 2015, the state government approved the release of Rs 1,954 crore.[1]

Table: Uttar Pradesh government relief

Estimated total damage to crops, houses and animals was to the tune of Rs 7,500 crore

Item	Amount
Total sown area in 72 affected districts	126.30 lakh ha
Total crop area affected	89.01 lakh ha
Of total affected area, area where crop loss was over 33 per cent	58.60 lakh ha
Loss to crops (relief being asked) of famers having up to 2 hectares land	Rs 6,22,823.04 lakh
Loss to crops (relief being asked) of farmers having more than 2 hectares land	Rs 1,26,847.31 lakh
Estimate value of damage to houses as per Central government norms	Rs 21.49 lakh
Human lives lost	93
Ex-gratia payments to families of deceased person (Rs 4 lakh per deceased)	Rs 372.00 lakh
Animal loss (milch animals—buffalo, cow, camel, yak etc. @ Rs 30,000 and sheep, goat, pig @ Rs 3,000; drought animals—camel, horse, bullock etc. @ Rs 25,000 and calf, donkey, pony, mule @ Rs 16,000)	Rs 25.65 lakh
Demand for livestock sector	Rs 3,057.62 lakh
Estimated total damage to crops, houses, animal loss ex-gratia payment	Rs 7,500.89 crore

Source: State government of Uttar Pradesh

Note: Calculations are based on 1 May 2015 estimates

- In the case of agricultural, horticultural and annual plantation crops, the input subsidy was hiked from Rs 4,500 per ha to Rs 6,800 per ha in rain-fed areas and restricted to areas sown in this season;
- The quantum of input subsidy for perennial crops, i.e. crops standing for more than a year, mostly tree crops, was hiked from Rs 12,000 to Rs 18,000 per ha;
- Assistance money for land and other losses due to silting of agricultural land was increased from Rs 8,100 per ha to Rs 12,200 per ha. This was also applicable to the removal of debris on agricultural land in hilly areas and restoration or repair of fish farms;
- In the case of loss of a substantial portion of land due to landslide, avalanche and change in the course of rivers, the existing level of financial assistance was hiked from Rs 25,000 per ha to Rs 37,500 per ha for small and marginal farmers;
- To replace milch animals (many animals had died), assistance was increased from Rs 16,400 to Rs 30,000: such assistance was applicable to buffaloes, cows, camels as well as yaks;
- To replace dead sheep or goats, financial assistance was raised from Rs 1,650 to Rs 3,000; and
- To replace draught animals (camel, horse, bullock and so on), assistance was hiked from Rs 15,000 to Rs 25,000.

States also swung into action. A 24 April 2015 press release of the Union Ministry of Agriculture[2] requested state governments to take immediate steps and address calamity by using SDRF funds. States were advised to submit a memorandum 'as per extant procedure/norms', for additional financial assistance from the NDRF. State governments were required to utilize their contingency funds if the SDRF got exhausted.

Some states—Uttar Pradesh, Rajasthan, Haryana, Punjab, Madhya Pradesh and Maharashtra, all badly affected—did use their discretionary powers to increase their quantum of compensation (see Table 2: *What the worst-affected states wanted*).

Taken together, the response of the Centre and the states, stumbling to get their act together, further shows the extent of what actually happened (for administrations do not take decisions until they have all the information): dead milch animals, dead draught animals, devastated plantations, lost agricultural land. Taken together, to what extent was this 'official' response to weather-based calamity mere political damage control? Could it be that the limit of political empathy, especially vis-à-vis a distressed farmer, was breached?

In the system that exists today to measure crop loss and to calculate relief, the village patwari is the most critical cog. The information patwaris provide becomes the basis for loss estimation and relief provided across the country. But the patwari reports losses by 'eye estimation'

What CSE did

The Centre for Science and Environment (CSE) decided to go to Uttar Pradesh (UP)—the worst-affected state in the winter–spring of 2015—and find out exactly how 'relief' happens.

The first thing CSE did was try and understand the process of relief assessment. We interviewed officials at the state and district levels (the District Magistrate [DM], Additional District Magistrate [ADM], Secretary of Finance and Secretaries of various departments, mid-level officials, such as tehsildars, and junior functionaries like the patwari/lekhpal—patwaris are called lekhpal in UP). Indeed, we aver that what we found in UP is fairly typical of what happens country-wide.

Table 2: State-wise relief

A farmer in one state will get a different relief amount from a farmer in another state for the same extent of specific-crop loss for reasons that are merely, and clearly, political

State	Relief asked by state	Relief sanctioned by Centre	Relief calculation for individual farmers	Other subsidies, if any
Uttar Pradesh	Memorandum for Rs 7,543.14 crore submitted to the Central government	Rs 2801.59 crore sanctioned by Central government. As on 15 May 2015, the state government approved relief of Rs 1,954.55 crore for districts. Rs 1,524.73 crore has been distributed to 34,11,417 affected farmers	Categorization: i. Rs 9,000 per ha for rain-fed land; ii. Rs 18,000 per ha of irrigated land; iii. Marginal and small farmers, i.e. farmers owning land up to 1.999 ha, will get up to Rs 35,982 per ha; iv. Minimum relief fixed at Rs 1,500	
Rajasthan	The state had asked for monetary relief of Rs 8,251 crore from the Centre of which Rs 5,840 crore would be for crop loss, Rs 150 crore for water supply and waiving power bills Rs 316 crore and irrigation cess	Rs 1447.73 crore was approved by Central government. Rs 700 crore disbursed as on 12 May 2015	Categorization: i. Rain-fed area and restricted to sown area—Rs 6,800 per ha; ii. Irrigated area—Rs 13,500 per hectare; irrigated land using diesel pump Rs 18,000 per ha. This is subject to a cap of 2 ha per farmer	Small and marginal farmers—crops damaged up to 50 per cent or more exempt from paying electricity bill for four months. Relief also announced for farmers who have taken land on rent for farming
Haryana	Rs 1,135.91 crore from NDRF	Centre has asked the government of Haryana to utilize the exisiting funds of SDRF of Rs 1,791.06 crore	Categorization as on 9 April 2015: i. Crop damage of 76 per cent and above—wheat: Rs 29,670 per ha; mustard: Rs 24,700 per ha; ii. 51–75 per cent crop damage—wheat: Rs 23,465 per ha; mustard: Rs 18,525 per ha iii. Crop damage of 25–50 per cent —wheat: Rs 17,290 per ha; mustard: Rs 13,585 per ha	
Punjab	Rs 717 crore		Nearly 98 per cent of the land is irrigated in Punjab, so relief is paid for irrigated area as per categorization: i. Relief compensation for crop damage of 76–100 per cent: Rs 19,760 per ha; ii. Crop damage of 33–75 per cent: Rs 13,338 per ha iii. Crop damage of 25–33 per cent: Rs 4,940 per ha	
Maharashtra	Rs 1,427 crore	Rs 844 crore sanctioned as: i. Subsidies for small and marginal farmers—Rs 630 crore; ii. Bigger agricultural tracts—Rs 214 crore	Categorization: i. Compensation for non-irrigated land—Rs 6,800 up to 2 ha; ii. Irrigated land—Rs 13,500 up to 2 ha; iii. Compensation for horticulture (all-year) crops—Rs 18,000 for up to 2 ha	

Source: Compiled from state government notifications and news reports

Relief assessment, we now understand, is the responsibility of the Revenue Department of each state/district/tehsil. And this is how, we found, it happened in UP this year, after all the rain and hail:

- Eye estimation is the foundation of relief assessment. It is a simple process: a patwari casts a glance over the agricultural field, and quickly assesses the crop damage, using only his eyes. It is an assessment without any specific measurements. It is a strange beginning: At the gram nyay panchayat level, the patwari is the only one responsible for reporting crop damage to higher authorities. (One gram nyay panchayat comprises six or seven gram panchayats in UP—similar divisions are followed by revenue departments in other states). He is the fulcrum. And he just uses his eyes.
- The patwari then prepares a report based on the girdawari (land record of crops farmers cultivate). The Deputy Director, Agriculture (Mathura), claimed the patwari is accompanied by a technical person from the state Department of Agriculture when assessing crop damage. This is not a widespread practice. The report is submitted to the tehsildar who compiles the data for his tehsil. It is sent to the ADM (Finance) for the district.
- Personnel of the Departments of Agriculture and Revenue then meet to arrive at the final figure. The Department of Agriculture puts in its inputs, but it is the Department of Revenue that takes a final call on the actual damage to be shown. The Department of Revenue then sends its decided final report to the state government headquarters.
- The state revenue department prepares a report to be submitted to the Union Ministry of Agriculture.
- Based on the report submitted, the Union government sends a Central team to the state to verify the assessment the state revenue department has made.
- The Central team submits its report to the Union Ministry of Agriculture, which takes up the matter with the Union Ministry of Finance and the Union Ministry of Disaster Management to make funds available to the state government.[3]
- The relief amount is disbursed to farmers in the form of cheques, based on the calculation of the percentage of crop damaged.

Disbursement of relief to farmers is a very tiresome process, adding to farmer distress. Payments are chronically delayed

Relief estimation is cumbersome

Relief estimation could also be a very tiresome process, adding to farmer distress. CSE consultations with farmer groups, district officials and other stakeholders highlighted several problems in the current system of 'relief' estimation in UP, which we think typifies what happens nation-wide:

1. At farmer level, an archaic way to estimate crop damage

In the system that exists today to measure crop loss, and to calculate 'relief', the village patwari becomes the most critical cog. Information patwaris provide becomes the basis for loss estimation and 'relief' provided across the country.

The patwari reports losses using an 'eye estimation' that is submitted to the tehsildar and aggregated at the district, state and national levels. But, as news reports related to agrarian distress often point out, patwaris are often not able to visit every field. Damage reports are then based on oral conversation with villagers, making the process arbitrary and open to malpractice and corruption. Dharmendra Malik, UP state spokesperson of the Bhartiya Kisan Union

GEETIKA SINGH / CSE

A farmer in Mathura—one of the worst-affected districts of Uttar Pradesh—shows grains of his wheat crop affected by rain and hail. The yield was very low and the grains small in size. A substantial part of the grain had rotted

(BKU), says that the Uttar Pradesh government still imposes rules from the British era—such as the UP Revenue Act 1942 (Shashnadesh sankhya 4400/22-das-B-(6)-39, dated 24 December 1942)—to provide 'relief' to affected farmers. The UP Revenue Act 1942, meant to waive off taxes collected from farmers in the event of a natural calamity, uses area as the unit for calculating damage and 'relief', not the farmer; the rule mentions that the farmer will not be a unit. Crop loss estimation is done on the basis of area, and the 'relief' amount for a particular plot area gets further divided among the farmers whose fields fall within that designated plot's boundaries. Various farmers might have different levels of crop losses; also, different crops might be present within that particular plot boundary: the matter of 'relief' can get quite complex at times.

2. Too few patwaris

There are too few patwaris in each tehsil to deal with the amount of work required to accurately estimate crop loss. Rohtas Singh of BKU, Mathura, says that even if a patwari wants to carry out the survey honestly, it is practically impossible for him to visit each farmer's field to assess damage to crops. During the colonial era, when the patwari was the only official to visit a village, the goverment was dependent solely on him. Now, however, other government representatives in villages, such as the village secretary, rojgar sevak and kisan sahayak, can be called upon but are not.

GEETIKA SINGH / CSE

Farmer Shyam Singh Chahar shows damaged wheat grain

CASE STUDY No information about relief provision

Shyam Singh Chahar—Village Rohta Bagh, Block Barauli Aheer, District Agra

Chahar has about 2.22 ha on which he grows bajra and wheat. The unseasonal rains and hailstorm in March and April damaged about 50 per cent of his wheat crop. Normally, he would have had a yield of about 120 quintals of wheat, but this time he suffered a loss of crop of about 60 quintals, worth Rs 78,000 (assuming 1 quintal is worth Rs 1,300) and an additional Rs 29,964 due to loss of crop residue and hay, resulting in a total loss of over Rs 1,07,964.

These cost calculations do not include rent paid for leased land, rental value of owned land (net of land revenue), imputed value of family labour and managerial functions performed by the farmer.

Relief/compensation

Chahar is an exceptional case. He had not taken any loans, a family tradition he says he is trying hard to maintain. But that has also meant that his Kisan Credit Card (KCC) account is not used and that he is not enrolled for any crop insurance scheme.

Chahar also clarified that he is not sure of the process/criteria implemented to provide relief as he had not thus far received any relief (see *Annexure 2* for detailed cost calculations and details of the loss Chahar suffered).

3. Delay in 'relief' payment

Actual payment to farmers is chronically delayed, due to bureaucratic procedures. According to a news report of 12 May 2015,[4] two months after hailstorms caused widespread crop damage in Rajasthan, affected farmers were still waiting for 'relief' from the government. Villagers were not even able to repair their houses.

Hoshiyari Devi, 67, and her husband Balaram, 71, of village Gandawas in Bhiwani district, Haryana, sowed millets, guar, green gram and Turkish gram in November 2014. The crops looked promising till a devastating hailstorm struck their village on 16 March 2015. 'The crops were flattened by the hailstorm on wet land. Hardly any grain could be recovered,' said Devi. She is not expecting compensation soon. 'Compensation for crop that was lost in August 2014 arrived in February 2015,' she added.

4. Corruption at the patwari level

Amol Singh of village Piparhari in Bundelkhand had sown wheat on 10 bighas of land (about 1.6 ha) and gram on 2 bighas (about 0.32 ha). He received a cheque worth Rs 4,875, the maximum compensation for gram crop. He ought to have received Rs 9,750, given that his major crop was wheat. 'The patwari asked for a bribe. Since I refused, he showed gram as my major crop in the records,' says Singh. He is planning to return the amount, in protest, to the Collector. He has an outstanding debt of Rs 1.5 lakh.

Corruption in relief is pervasive across states

Corruption is pervasive across states. Local media has reported on how the system was abused to take advantage of 'relief' disbursed. In some villages in Shamli and Muzaffarnagar districts, UP, where wheat losses were not significant—less than 33 per cent for a specific farmer, and so not within the eligibility limit for 'relief' in UP—relief was, nevertheless, availed of. It was done by either bribing the patwari or pressurizing him via so-called 'influential local people', meaning political leaders and gram pradhans. There are cases, in Budhana tehsil of Shamli district, UP, where landowners who used their field to make bricks got compensation for wheat loss. There were also reports of instances where famers who had mango orchards received compensation for wheat crop loss.

5. Inadequate technical capacity of patwaris to make estimations leads to delays and frequently revised estimates

'Patwaris are involved with over 26 other government department works and are not equipped technically to carry out an accurate assessment of crop damage. A technical person from the state Department of Agriculture should accompany him, but this is not done in practice. There is great delay in the disbursement of relief to farmers. So far, only approximately 35 per cent of the farmers in UP have received relief from the state government,' says Rohtas Singh.

6. Insufficient money, particularly when there is no other substantial mechanism for compensation

Typically, farmers receive about Rs 18,000 per ha as 'relief'—for a maximum of 2 ha. If a farmer has 10 ha, he would still get a maximum of Rs 36,000, insufficient to cover even a part of his input costs. Farmers suffer losses to the order of Rs 50,000 per hectare.[5]

'Relief' is exclusionary. Some get it. Some don't. Who receives 'relief' depends on what can only be called 'political kindness', in truth a very unsubtle form of votebank politics that begins at the village level and extends upwards via a fixed political heirarchy

Even at the state level, there is a huge gap between the actual 'losses' and the amount sanctioned as 'relief'. In UP, for instance, a CSE estimate shows that the difference between the amount sought as relief by the UP government, and actual losses due to the unseasonal rain and hail, could be as much as Rs 10,300 crore.[6]

7. No transparency

In our field visits and interviews, farming communities frequently raised the demand that crop-damage assessment by patwaris be made transparent. They said patwaris should make available to the villagers all information related to crop damage, preferably in a gram sabha/panchayat, so that farmers know how much crop loss is shown for whom and they can ascertain whether the patwari has made a correct assessment.

8. 'Relief' is exclusionary

Some get it. Some don't. Who receives 'relief' depends on what can only be called 'political kindness', in truth a very unsubtle form of votebank politics that begins at the village level and extends upwards via a fixed political heirarchy.

This is the most important reason 'relief'—as it is delivered today—cannot be accepted as a viable response to weather-related calamities, of the kind that visited farmers in the winter–spring of 2015. For, the selective dispensation of 'relief' transforms a hard-working farmer into a mere client of the political patron, at the local level and at the level of the state. 'Relief', in other words, becomes yet another form of the 'patron–client' relationship that so bedevils Indian democracy. It becomes a reincarnation of a feudal mode of operation, where the local (or state-level) politician, interested only in controlling his fief, reduces a human being—a distressed farmer—to a mere vote.

3. Beyond 'relief'

The state of agricultural insurance in India

Since 'relief' is inadequate, what is the alternative? Extreme weather events are here to stay; they are not going to go away. So it is imperative to look beyond 'relief' to a more secure, trustworthy, deliverable safety net for farmers in India. Does agricultural insurance, as it exists in India today, fit the bill?

As of now, agricultural insurance is the only form of substantial compensation farmers in India have access to. Or, do they?

As it stands today, agricultural insurance schemes cover losses resulting from extreme weather events, including unseasonal or heavy rain and hailstorms. Ideally, insured-crop losses and damage incurred due to extreme weather events will be paid for and farmers may have a degree of financial respite. However, this is far from the grim reality.

Insurance: the scenario

Agricultural insurance is the only form of substantial compensation farmers in India have access to. But the reach is limited

The Government of India does consider crop insurance as a mechanism to mitigate loss and cope with risks from weather vagaries. Until 1985, crop insurance schemes were thought up, and implemented, only on an experimental, pilot basis. The Comprehensive Crop Insurance Scheme (CCIS) was the first nation-wide insurance scheme, implemented from kharif 1985 to kharif 1999. In 1999, CCIS was replaced by the National Agricultural Insurance Scheme (NAIS). NAIS was conceptualized to address the operational problems that arose in implementing CCIS.

The objective of NAIS is the same as that of the previous scheme (CCIS): to protect farmers against losses suffered in a time of crop failure due to a natural calamity. The Agriculture Insurance Company of India Limited (AICL) is responsible for implementing NAIS. AICL is under the administrative control of the Union Ministry of Finance and is the largest insurance provider to the agricultural sector in India.

In addition to NAIS, there are two other schemes: the Modified National Agricultural Insurance Scheme (MNAIS), a modification of the NAIS that is area-based, and the Weather-Based Crop Insurance Scheme (WBCIS), which is based on weather data, with rainfall and temperature being the primary parameters. These schemes, too, are AICL-driven.

Further, along the lines of MNAIS and WBCIS, a separate—pilot—Coconut Palm Insurance Scheme (CPIS) has been designed to cover losses for coconut palm farmers in the coastal states of the country.[1] The Central government also announced it would introduce what it called the Farm Income Insurance Scheme in the kharif season of 2015. But NAIS, MNAIS and WBCIS are the three predominant crop insurance schemes being implemented in most states (see *Annexure 5 for the list of agricultural insurance schemes in the country and their comparison*).

NAIS, MNAIS and WBCIS are AICL-based, government-run. But several private insurance companies, too, have been allowed to operate MNAIS and

WBCIS. These are:

1. ICICI Lombard General Insurance Company Ltd
2. IFFCO-Tokio General Insurance Company Ltd
3. Cholamadalam MS General Insurance Company Ltd
4. HDFC-ERGO General Insurance Company Ltd
5. Tata AIG General Insurance Company Ltd
6. Future Generali India Insurance Company Ltd
7. Reliance General Insurance Company Ltd
8. Universal Sompo General Insurance Company Ltd
9. SBI General Insurance Company Ltd
10. Bajaj Allianz General Insurance Company Ltd

Three predominant crop insurance schemes exist in India today. All three are government-run. But private companies have also been included in the picture

Insurance: the risk question

NAIS, MNAIS and WBCIS provide multi-peril risk cover (see Table 1: *NAIS, MNAIS and WBCIS risk-cover*).

The NAIS covers risk for crop-yield losses from the time of sowing to the time the crop is harvested.

WBCIS, variously, is not a yield guarantee insurance scheme: it is India's first weather-based insurance scheme. WBCIS provides payout against incidents of adverse rainfall (deficit as well as excess) during the kharif season, and adverse incidents in weather—frost, heat, relative humidity and unseasonal rainfall—during the rabi season.

In the case of MNAIS, insurance cover is extended for 'prevented sowing'—meaning, sowing that could not be carried out due to extreme weather events—and for planting risks and post-harvest losses due to cyclonic rain. In the latter case (cyclonic rain) cover is available up to 14 days from the date of harvest. The payout is usually carried out as an 'on-account payment': an immediate

Table 1: NAIS, MNAIS and WBCIS risk-cover

Risks covered under the National Agricultural Insurance Scheme (NAIS), Modified National Agricultural Insurance Scheme (MNAIS) and Weather-Based Crop Insurance Scheme (WBCIS) include hailstorm, cyclones, landslides, floods and drought

NAIS	MNAIS	WBCIS
Practically all risks are covered		Parametric weather-related risks such as rainfall, frost, heat (temperature), humidity are covered. These risks appear to account for majority of crop losses
Natural fires and lightning, storms, hailstorms, cyclones, typhoons, tempests, hurricanes, tornados, floods, inundation and landslide (hailstorm and landslides are claimed based on losses at the individual-farmer level)	Natural fires and lightning, storms, hailstorms, cyclones, typhoons, tempests, hurricanes, tornados, floods, inundation and landslide (hailstorm and landslides are claimed based on losses at the individual farmer level)	
Drought, dry spell	Drought, dry spell	
Pest/disease etc.	Pest/disease etc.	

Source: Agriculture Insurance Company Limited, available on: http://www.aicofindia.com/

payment of 25 per cent when crop losses incurred are over 50 per cent, with the remaining 75 per cent paid out only after the process of damage assessment is completed, after what is called in the scheme 'the Crop Cutting Experiment', an estimate of crop yield, at the end of a sowing-harvesting cycle.

But what happens when there is a hailstorm, landslide, cyclone or flood? These insurance schemes consider such events 'localized phenomena' (NAIS/MNAIS) or 'localized calamities' (WBCIS). The NAIS design considers all of the above; MNAIS has provision for hailstorms and landslides; the WBCIS design incorporates hailstorms and cloudbursts. But, in the case of such events, all three insurance schemes follow a similar procedure: insurance claims have to be applied for and will be settled on an individual basis. The insured farmer, whatever the scheme, has to intimate information about the crop loss he has incurred within 48 hours of its actually occurring to the local revenue/agriculture department. Based on such information received, a team is sent for assessment and only then does the farmer become eligible for an insurance payout.

Insurance: the process

State governments intending to participate in a crop insurance scheme communicate their willingness—and, crucially, their acceptance to abide by the provisions of the insurance scheme—to the Department of Agriculture and Cooperation (DAC). If a state wishes to take up an insurance scheme, it must mention the areas it intends to promote the scheme in, and the crops for which the scheme is intended.

All farmers, including sharecroppers and tenant farmers—subject to the condition they have papers to prove, or possess certification, that they are farming as tenants or sharecroppers—growing the state-notified crops in the state-notified area submitted to the DAC, are eligible for coverage. In case a farmer has availed a loan via the Kisan Credit Card (KCC) scheme, he mandatorily qualifies for crop insurance coverage.

State governments notify concerned agencies/departments and institutions a month before sowing begins. This notification is about what crops have been selected for that particular season as well as the areas (these are called 'reference unit areas') in the districts the state has chosen for a particular insurance scheme. In this way, states and districts implement NAIS, MNAIS and WBCIS, as decided, as chosen and as rolled out.

If a state decides to roll out MNAIS and WBCIS during a season—whatever the area, the district, or the crop—private insurance companies can also have a go. They can bid to operate in that area, for that crop. The bidding process has specific guidelines and prerequisites: the selection of the insurance companies is based on the following criteria:

- experience;
- relevance of insurance product;
- premium rate;
- existence of infrastructure; and
- quality of services (coverage of farmers and area, payout in terms of quantum and timely settlement, willingness to do publicity and awareness campaigns).

On this basis, a state government is supposed to select only those insurance companies that provide the 'best premium value'.

The insured farmer, whatever the scheme, has to relay information about the crop loss he has incurred within 48 hours of its actually occurring to the local revenue/agriculture department. That is a very tough task

The crop insurance process is monopolistic: the farmer paying premium for crop insurance offered by a company does not have any say in the insurance scheme or the company he might like to get his crop insured with

The evaluation process for the bids is conducted by the state government via an institution, the State Level Coordinating Committee on Crop Insurance (SLCCCI), in the presence of the participating insurance companies. The allocation of notified crops or the areas to an insurance company is based on the lowest weighted average, or the lowest possible premium rate quoted (for threshold yield is the same for all insurance companies).[2]

In practice, however, a state government does not always follow the weighted average premium rate. The bid is given to any of the companies based on that state government's discretion. In fact, sometimes, a state government combines bidding for both the kharif and rabi seasons. This is a strange practice, for it is quite impossible for a company to place an estimate of threshold yield for the rabi season at the time of notification, usually the pre-kharif season.

Insurance: what the process reveals

The manner in which state governments, perhaps not at the behest of the Centre, roll out agricultural insurance schemes raises some questions.

- **Question 1: Does the process smack of market monopoly?**

The guidelines are very clear: in the agricultural insurance process, a state government must maintain 'stability and continuity'. This means it must allow a particular insurance company, once it wins the bid for or is allocated an area and crops, to implement its schemes for a minimum of three years. For example, a district allocated to a company for khairf 2014 will continue to operate there for kharif 2015 and kharif 2016; this holds for the rabi seasons,

VINEET KUMAR / CSE

Government officials survey wheat crop devastated by rain and hail.

too. Further, the guidelines allow the insurance company to renegotiate terms, if relevant.

Here, it is important to note that the farmer paying the premium for crop insurance offered by a company does not have any say in the insurance scheme or the company he might like to get his crop insured with. He has no choice, for he is farming in a 'reference unit area' that is state-designated, planting crops that are state-designated, and can only opt for the state-designated scheme/company.

In such a scenario, the insurance company the state has opted for has a monopoly. It faces no competition. Seen in a different light, it has simply no incentive to improve upon the product design or familiarize itself with the customer, the farmer.

- **Question 2: What is the linkage between the company and the farmer?**

None. In the crop insurance structure as it now exists, there is no direct linkage between the insurance company and the farmer. A company operating in the notified region receives the premium amount from the bank(s) where the farmer has availed the loan.

In the existing crop insurance mechanism, there is no direct linkage between the insurance company and the farmer

This is a serious disconnect in the customer–provider relationship. CSE has confirmation, via interviews, where farmers clearly stated that they were not aware of the insurance company where the deducted premium amount was deposited. In fact, farmers were unaware of the insurance scheme applicable in their 'reference unit area'.

- **Question 3: Could it be that crop insurance is actually bank-loan protection?**

Yes. Agricultural insurance schemes in India mostly function as a crop-loan protection measure. All the three schemes—NAIS, MNAIS, and WBCIS —are linked to the Kisan Credit Card loan. Whichever one the farmer gets to non-optionally opt for, that scheme is mandatory for a farmer growing an insurable crop and availing a seasonal agricultural operations (SAO) loan from financial institutions, through the Kisan Credit Card scheme. Loanee farmers are *compulsorily* covered under the insurance scheme applicable for that particular 'reference unit area'.

The insurance premium is deducted as additional cost to the loan taken and works as collateral security to the sanctioned credit. The insurance premium deducted safeguards the loan provider (the bank) rather than the loanee (the farmer). In case there is a claim benefit after damage, banks directly take the insurance compensation amount and show a deduction from total credit on paper.

According to guidelines of Kisan Credit Card loans, insurance premium rating and claim settlement are crop- and season-specific. A bank, at the time of withdrawal of credit by the farmer, is required to ensure the purpose—the crop , the acreage on which it will be sown and the season—for which credit is withdrawn. Banks are required to maintain season-wise and crop-wise limits (there are separate limits for different crops).

The non-borrowing/non-loanee farmer can also avail of his area's insurance scheme if he is cultivating the area-fixed crop insured for a particular season. However, non-loanee farmers comprise a very minuscule percentage.

Table 2: Number of farmers insured for rabi 2013–14

Scheme	Number of farmers insured (in millions)
National Agricultural Insurance Scheme (NAIS)	3.9
Modified NAIS	2.99
Weather-Based Crop Insurance Scheme (WBCIS)	5.3
Total insured farmers	12.26

Table 3: Number of insured farmers for kharif 2014

Scheme	Number of farmers insured (in millions)
National Agricultural Insurance Scheme (NAIS)	9.55
Modified NAIS	5.86
Weather-Based Crop Insurance Scheme (WBCIS)	8.13
Total insured farmers	**23.56**

Source: Rajya Sabha question no. 2583 (answered on 20 May 2015)

81 per cent of Indian farmers are oblivious to the practice of crop insurance. Out of an estimated total of 9.02 crore agricultural households, only about 4.8 per cent had insurance for wheat and paddy and about 8.9 per cent for gram during the two agricultural seasons between July 2012 and June 2013

Insurance: its reach

The 70th round of the National Sample Survey Organisation[3] reveals that a very small segment of agricultural households insured their crops against possible crop loss. Among the reasons for not insuring crops, lack of awareness was the most prominent one. According to the survey, out of an estimated total of 9.02 crore agricultural households, only about 4.8 per cent had insurance for wheat and paddy and about 8.9 per cent for gram, during the two agricultural seasons between July 2012 and June 2013.

Data from a Rajya Sabha question of 20 March 2015 throws further light on the matter of the actual reach of crop insurance. As per question no. 2583, answered on 20 May 2015, only 10.31 per cent of all farmers in the country were insured for the rabi season of 2013–14, assuming India has about 11.90 crore cultivators[4] in the country (see Table 2: *Number of insured farmers for rabi 2013-14*). However, for the kharif season of 2014, 235.6 lakh farmers were insured, or 19.81 per cent of all cultivators (see Table 3: *Number of insured farmers for kharif 2014*). The Rajya Sabha document also reveals that approximately 12 per cent of the net sown area was insured for the rabi season of 2013–14 and approximately 24 per cent for the kharif season of 2014.[5]

In sum, then, roughly 20 per cent of all farmers in India have access to insurance.

Insurance: at ground-level

CSE field visits in UP and interviews with farmers, local administration and state-level officials have given us several insights on the situation on the ground. Most concerns are characteristic of the sector and applicable to other parts of the country as well. They include:

1. Lack of awareness of insurance schemes and processes

Asked about insurance, farmers and representatives of farmer unions said they were unaware of or unclear about the processes of availing insurance and the facilities provided through these schemes. Most farmers interviewed could not tell which insurance scheme was applicable to their area and for which crop premium had been deducted.

Table 4: Season-wise agricultural insurance in UP

Under 50 per cent of insured farmers actually benefited from the coverage

Season	Number of farmers insured (in lakhs)	Number of payouts (in lakhs)	Total payouts (in Rs crore)	Premium amount (in Rs crore)
Kharif 2013	10.26	4 .6	175	109.23
Rabi 2013–14	7.54	3.4	234.91	98.7
Kharif 2014	7.36	3.29	155.43	213.55
Rabi 2014–15	7.99	0.11*	3.4*	181.08

Source: Based on interviews with various stakeholders

Only 10.31 per cent of all farmers in the country were insured for the rabi season of 2013–14, assuming India has about 11.90 crore cultivators

2. Access to insurance

One of the most notable issues, underlined by all stakeholders consulted, was the lack of reach of crop insurance. While the national average (itself fairly low) is about 20 per cent, in UP, we found, the reach was a paltry 3.5 per cent. Out of 2.33 crore farmers in UP, only 8 lakh were insured (see Table 4: *Season-wise agricultural insurance in UP*).

3. Discretionary power of banks

Not all farmers who have Kisan Credit Cards (KCC) have availed insurance, although this is mandatory as per KCC norms. Higher KCC loans result in increasing the farmer's risk and liability and lack of insurance means no compensation in times of distress. Banks, too, it should be noted, are under pressure to meet their KCC targets, and hence waive off premium components at their own discretion.

4. Premium adds to burden of small and marginal farmers

The premium to be paid for crop insurance is considered an additional burden and farmers often request for premium not to be deducted from the loan. In the case of small and marginal farmers, especially, the premium amount becomes a serious deterrent to taking up crop insurance.

The premium charged under WBCIS and MNAIS are at the actuarial value. Even if the government provides subsidy slabs, the premium amount is still high for farmers. Many respondents felt that rather than spending huge amounts of money in times of disaster, the government could pay a much higher part of the premium for small and marginal farmers and ensure they received compensation in times of distress.

5. Clauses difficult to comply with

Clauses mentioned in the terms and conditions of crop-insurance schemes, such as farmers necessarily reporting crop damage within 48 hours of the event, are impractical and very difficult, if not impossible, for the farmer to comply with. It can result in the farmer receiving no compensation, despite possessing a viable insurance policy.

6. Not enough personnel to deal with large volumes of claims

Not enough staff to facilitate speedy payouts and claim settlements was reported as a major reason for delays in verifying losses and settling claims. UP, for instance, reported crop damage of 33 per cent or more in 72 out of the 75 districts due to unseasonal rain, but only about 11,000 claims were settled by

CASE STUDY No information about insurance

Goma Devi, Block Chatta, Mathura district, Uttar Pradesh

Fifty-five-year-old Goma Devi lost over 80 per cent of her standing wheat crop to the unseasonal rain and hail that fell in Uttar Pradesh in March–April 2015. Asked about crop insurance, she said, 'The bank doesn't tell us anything about insurance. I had also paid Rs 5,000 as a bribe to get a loan. I am thinking about how I will get the next loan to cultivate my 4 acres (approx. 1.6 hectares) of land.'

CASE STUDY Bank not forwarding insurance premium to company

Arjun Khushwaha—Village Majgaon Kala, Chhattarpur district, Madhya Pradesh

Arjun Khushwaha was at the receiving end of a bank's policy of deducting the premium amount from the farmer but not forwarding it to the insurance company.

Talking about land owned jointly by his father Channu Khushwaha and his uncle, he said, 'We have taken loans with Kisan Credit Card (KCC) every year since 2002 and the bank deducts Rs 2,000 per year as premium. But we've never got any compensation under the insurance scheme.' He added, 'Last year, we took a loan of Rs 2.37 lakh for the rabi crop and were allowed to withdraw Rs 1.98 lakh.' The bank officer said that insurance was compulsory on the loan. Since the land was in the joint names of his father and uncle, they were charged a premium of Rs 15,000 each. After damage to their crop this year, when Arjun and his father approached the bank to claim insurance, the bank manager, State Bank of India, Satai Branch, Chhattarpur district, said that he 'had forgotten to deduct the premium amount from the KCC account, so the crop was uninsured'.

We were told of several similar incidences during our field visits, highlighting the laxity in the implementation practices of insurance schemes. Cases of banks not forwarding premium paid by farmers to insurance companies need to be investigated to verify if they are simply instances of banks' carelessness or cases of corruption. It is possible that insurance premium deducted by banks from farmers and not submitted to insurance companies have been misused by bank officials over the past few years, as claimed by Shyam Singh Chahar of Bharatiya Kisan Union (Agra district).

April 2015. This, despite insurance norms according to which village panchayats with 50 per cent or more damage are eligible for 25 per cent 'on-account payment' immediately.

Insufficient staff exist, as stakeholders pointed out, not only in insurance companies but also in government agencies, including the Department of Revenue, solely responsible for generating data on average crop yields for a season (approximately six months) and for issuing advisories and contingency plans.

7. Waiting six months to a year for final settlements

Once an 'on-account payment' is made (25 per cent), the remaining payout as well as payout for those with less than 50 per cent crop loss is provided only after regular Crop Cutting Experiments have been conducted by the concerned department. This takes up the entire agricultural season, after which data is processed, losses analysed and the payout process begun. This means

CASE STUDY Crop damage and lack of clarity on insurance coverage

Rohtas Singh, Village Garhi Mangli, Block Baldeo, Tehseel Mahavan, District Mathura, UP

Rohtas Singh has about 1 ha of land on which he grew wheat. Normally, he would have had a yield of about 45 quintals, but in 2014–15 he lost about 20 quintals to unseasonal rain and hail. His loss was to the tune of about Rs 34,500 of which Rs 27,000 was loss from the wheat crop and over Rs 7,500 in damages to hay and unusable crop residue. This cost calculation does not include rent paid for leased-in land, rental value of owned land (net of land revenue) and imputed value of family labour and managerial functions performed by farmer.

ROHTAS SINGH

Farmer Rohtas Singh has never been able to repay his loans fully from his agricultural income

Using his Kisan Credit Card, Rohtas Singh had taken a crop loan of Rs 1,40,000 from Syndicate Bank in July 2014. He has been continuously in debt to the bank for about the last 11 years. Since he has never been able to repay his loan fully, he is forced every year to borrow money from relatives or moneylenders at 2 per cent interest or more (for a short duration like two to three days) so that he can pay his outstanding loan money to the bank and become eligible to apply for fresh loans as otherwise the bank interest rate increases with time. This cycle of loans continues forever.

Among the many people interviewed, Jagpal Singh, chairperson of Nagar Panchayat, Block Chhata in Mathura, said that he could bet that farmers of this area would never be able to repay their loans. He said that farmers could never be loan-free as farming was a loss-making proposition; farmers would be in a debt trap forever.

Relief/compensation

While Rohtas Singh is aware that an insurance premium amount is deducted from his crop loan automatically by the bank, he does not know about details such as his insurance coverage and amount of payout he is eligible for under current circumstances. Repeated visits to his bank have only resulted in him being told that compensation will be given only after detailed assessments and 'orders from above'. The lack of clarity has left Singh frustrated. He says he still does not know where to go or what to do to speed up the process.

With regard to relief from the state, Singh was not sure what amount he is eligible for and said that he has not yet received any relief (*see Annexure 3 for detailed calculations related to Singh's input costs and losses suffered*).

It takes six months to a year or more for full settlement of insurance payment. This means farmers do not receive compensation when they need it most

timescales of six months to a year or more for full settlement. It also means that farmers do not receive compensation when they need it most.

8. Delays in loan repayment leading to loss of insurance

In times of distress due to losses from extreme weather events, farmers may default on loan repayment, making their insurance policies inactive. In 2014–15, several farmers suffered significant losses to their crops due to drought in the kharif season 2014 and hail and rain in the rabi season of 2014–15. They defaulted on payments and are now getting no compensation from insurance.

9. Poor product design

There is no incentive to improve the insurance product, for the business of procuring 'customers' is bidding-oriented. Insurance companies aim to bid for the bigger states and more districts within these states. Once companies win a bid, they monopolise the business in a region. The insurance company that wins the bid becomes the sole insurance company for a district and offers only the insurance scheme mandated by the state government. There is no market competition, in contrast to general insurance products where different companies offer challenging incentives. Crop insurance products offered remain unchanged year after year, without improvisation and innovation or scope of betterment. Under such circumstances, farmers have no choice but to opt for a specific insurance scheme or insurance company already determined by the state government.

GEETIKA SINGH / CSE

Only 19 per cent of the farmers in the country have ever availed of crop insurance. Most farmers are not aware of the existence of crop insurance schemes or uninterested or unable to afford insurance premiums

10. Insurance payout not at individual level

Related to 'product design' is the issue of insurance being provided at the level of what is termed the 'homogenous insurance unit', or insurance provided at the village panchayat/block/mandal level (IU), and not the individual farmer level. If all the farmers in a village suffer loss, or say 60 per cent, the entire IU will be eligible for insurance. On the other hand, if an individual farmer suffers loss while other farmers do not, he will not be eligible for insurance. Most farmers argue that if the insurance is bought at the individual level, the payout should be disbursed in the same way.

11. Lack of confidence in receiving payouts

Another reason farmers are wary of paying insurance premiums to banks is, to a great extent, rooted in past experiences when they did not receive the insurance payout because of administrative issues, including incomplete or absent paperwork or identification, ineligibility due to changed circumstances or guidelines not followed.

There were issues on the farmers' side as well. Many were unwilling to take up insurance policies and requested banks not to deduct premiums from their accounts. Better awareness campaigns and enforcement of KCC rules to ensure all KCC accounts are linked to insurance are sure to result in much higher insurance coverage among farmers.

The lacunae we observed during field trips and interviews are also reflected at the national level in studies and reports of committees constituted to study the effectiveness of agricultural insurance in India. While the reports make numerous recommendations to improving crop insurance schemes in India, a lot needs to actually happen at the operational level.

In times of distress, say due to losses from extreme weather events, farmers may default on loan repayment. This makes their insurance policies inactive

THE CROP INSURANCE PROCESS

Illustrative examples to show how crop insurance works

For any insurance scheme to function, two variables are crucial to determine claim settlements:

i. Sum insured: The maximum amount paid out in the event of a claim. It is linked to the cost of cultivation on the basis of which banks, or the state/district-level technical committees (the State/district Coordinating Committee on Crop Insurance) fix a scale of indemnity.

ii. Premium: Amount based on which the insured, in this case the farmer, can avail the payout in case of a calamity. The process of premium calculation is different for NAIS, MNAIS and WBCIS—the schemes that comprise the crop insurance apparatus in India—and strongly contributes to preference of one over another.

To understand the process of how a typical agriculture/crop insurance scheme works, we first take the example of NAIS.

NAIS: What is the sum insured?

Since this insurance scheme is credit-linked for a loanee farmer, the sum insured will be at least equal to the amount of crop loan availed for a notified crop. This sum insured is a compulsory coverage. The loanee farmer can also insure his crop for a higher sum—up to the threshold value, equivalent to guaranteed yield—called normal coverage, that can go up to 150 per cent of the value of average yield. But in the case of additional coverage, the farmer is supposed to pay a premium at the actuarial rate.

What is the premium a farmer pays?

A normal, or flat, premium rate, much less than the actuarial value, is paid. While actuarial rate is an estimate of the expected value of future loss, future loss is usually predicted on the basis of historical loss-experience and a consideration of the risk involved. Accurate actuarial rates help protect insurance companies against the risk of severe underwriting losses that can lead to insolvency.

Premium for small and marginalized farmers is subsidised to the extent of 10 per cent, shared on a 50:50 basis by the state and Central governments.

Within the NAIS, different crops have different premium rates:

- Kharif crop—flat premium rate = 3.5 per cent of sum insured for all oilseed, crops and bajra
- Kharif crop—flat premium rate = 2.5 per cent for other food grains, including pulses
- Rabi crop—flat premium rate = 1.5 per cent of sum insured for wheat
- Rabi crop—flat premium rate = 2.0 per cent for other food grains, including pulses and oilseeds

Taking an hypothetical example

Suppose the state threshold yield = 1,930 kg/ha	Let us take the state average yield = 2,412 kg/ha
Let us take value of threshold yield = Rs 14,200/ha	And value of 150 per cent of actual yield = Rs 26,600/ha
Normal (flat) premium rate = 2.5 per cent	Actuarial premium rate = 3.55 per cent
Scenario 1: In the case of compulsory coverage Suppose, loan amount = Rs 12,000 Full premium @ 2.5% = Rs 300 Subsidy @10% of full premium = Rs 30 Net premium = Rs 270	**Scenario 2 :** In the case of optional coverage up to 150 per cent of value average Suppose, loan amount = Rs 12,000 Full premium from Rs 14,200 to 26,600 = 12,400 @ 3.55% = Rs 440.2 Subsidy @ 10% of full premium = Rs 44.02 Net premium = Rs 396.18

For annual and horticultural crops, actuarial premium is charged.

This is an hypothetical example to understand how claims get processed. Let us take the example of paddy during the kharif season.
Suppose actuarial premium rate = 3.55 per cent.

How do claims get processed?

In the case of 'area approach', the farmer need not intimate the bank or Agriculture Insurance Company (AIC). Crop losses, if any, or reduction in yield as compared to gauranteed yield is reflected in the crop estimation survey (during Crop Cutting Experiment),

and the shortfall in yield, should be paid as claim through the bank.

In case of individual losses, incidents of hailstorm, flood, landslide and cyclones, farmers need to intimate the local revenue department/bank and/or insurance company of the crop loss within 48 hours. (The claim process for WBCIS operates on weather-based parameters.)

MNAIS: What is the sum insured?

Since MNAIS is a credit-linked insurance scheme for the loanee farmer, the sum insured would be at least equal to the amount of crop loan availed for the notified crop. This amount insured is a compulsory coverage and can extend up to the value of the threshold yield of the insured crop.

What is the premium a farmer pays?

For MNAIS, calculation of premium is done on actuarial basis. This means the higher the risk, the greater the premium the farmer pays. This is quite a contrast to the flat premium rate NAIS provides. This means that, in MNAIS, premium rates farmers pay are relatively higher than in the NAIS scheme, for food crops and oilseeds.

Within MNAIS, premium amount is not fixed and can be at anything from 1 per cent to 25 per cent depending on the historical trend of crop yield over the past seven years. The actuarial value for premium calculation also varies from one crop to another and one region to another.

Before the start of each crop season, the insurance companies bidding for the scheme for that notified region work out the actuarial premium as well as a net premium rate. The premium payable by the farmer is the premium rate after subsidy. Premium subsidy by the government ranges upto 75 per cent depending on the premium slabs.

Therefore, the premium rate is: i. different for different crops; ii. varying from one district to another; and iii. different premium rates for the rabi and kharif seasons.

Please refer to the premium slab to better understand the following example:

This illustrative example explains how the premium slab is used to calculate premium under the MNAIS scheme. The premium is calculated and charged on actuarial basis.

Example 1: Taking the fifth slab, i.e. for premium greater than 15 per cent, subsidy to the farmer is 75 per cent subject to minimum net premium of 6 per cent

Suppose the sum insured = Rs 100

Premium to be charged at 16 per cent of sum insured = 16

According to this slab, the farmer would receive a subsidy of 75 per cent (refer to the slab as given above).

As per the slab in the premium, the farmer will have to pay a net premium of only Rs 12 (75 per cent of 16). The subsidy amount shall be shared by Union and state government at 50:50 ratio.

Example 2: Taking the third slab, i.e. for premium between 5 and 10 per cent, subsidy to the farmer is 50 per cent subject to minimum net premium of 3 per cent

Suppose sum insured = Rs 100

Premium to be charged at 8 per cent of sum insured = 8

Then farmer would receive a subsidy of 50 per cent (refer to the slab as given) as per the slab in the premium and the farmer will pay a net premium of only Rs 4 (50 per cent of 8). The subsidy amount shall be shared by Union and state governments at a 50:50 ratio.

S no.	Premium slab	Subsidy to farmer
1	up to 2 per cent	Nil
2	>2–5 per cent	40 per cent subject to minimum net premium of 2 per cent
3	>5–10 per cent	50 per cent subject to minimum net premium of 3 per cent
4	>10–15 per cent	60 per cent subject to minimum net premium of 5 per cent
5	>15 per cent	75 per cent subject to minimum net premium of 6 per cent

How do claims get processed?

The claims are to be fully borne by the implementing insurance company. The government acts as a reinsurer of last resort in case the claim ratio exceeds 500.

In case of widespread calamities, claims are

settled on an area-approach basis. The state government conducts the requisite number of crop cutting experiments (CCEs), i.e. at least four per village/village panchayat, to estimate the actual yield and submit data for the notified crop. The insured crop recording lower actual yield when compared to guaranteed yield will be eligible for claim for that notified area.

Thereafter, insurance companies in consultation with the concerned state/UT government decide on crops/areas eligible for 'on-account' payment based on agro-met data/satellite imagery/acreage damaged, or any other proxy indicator. 'On-account' payment is assessed at the insurance unit level (e.g. village level). It is implemented with the prerequisite that the estimated crop losses are more than 50 per cent (as compared to normal/average yield). The maximum amount payable under 'on-account payment' is 25 per cent of the likely claims. The remaining 75 per cent claim amount is made after the CCE at the end of season.

WBCIS: What is the sum insured?

Sum insured is broadly the cost of inputs expected to be incurred by the insured in raising the crop. In case of WBCIS, it is pre-declared per unit area (hectare) by the AICL (Agriculture Insurance Company Ltd) at the beginning of every crop season (based on consultation with experts in the state government). The sum insured may be different for different crops in different RUAs (reference unit areas). Sum insured is further distributed under key weather parameters used in the insurance scheme.

How is the premium paid by the farmers?

Premium rates depend on the 'expected loss', which depends on the pattern of weather parameters of the historical period of about 25–100 years in the context of ideal weather requirements of a crop. Premium rates could vary for each reference unit area for each crop.

In practice, premium rates are capped for the cultivator; the premium rate of the cap is shared by the state and Central government on a 50:50 basis.

There are different slabs for different crops as given below:

FOOD CROPS AND OIL SEEDS	
Crops	**Premium paid by insured cultivator**
Wheat	1.5 per cent or actuarial rate, whichever is less
Other crops (other cereals, millets, pulses, oilseeds)	2 per cent or actuarial rate, whichever is less
ANNUAL COMMERCIAL/HORTICULTURAL CROPS	
Premium slab	Subsidy/premium
Up to 2 per cent	No subsidy
>2 to 5 per cent	25 per cent, subject to minimum net premium of 2 per cent payable by farmer
> 5 to 8 per cent	40 per cent, subject to minimum net premium of 3.75 percent payable by farmer
>8 per cent	50 per cent, subject to minimum net premium of 4.8 per cent payable by farmer

How do claims get processed?

The WBCIS follows the 'area approach', i.e. taking a reference unit area, e.g. block/village, for the purposes of compensation. All cultivators who have insured that particular notified crop in that notified unit area will be considered as equal during assessment of the claims. Each reference unit area is linked to a weather station on the basis of which current weather data is inferred and claims are processed. In case of adverse weather incidence, the insured would be entitled to payout subject to the 'weather triggers' defined within the payout structure as per the scheme.

4. A burden made worse

Lack of institutional credit intensifies farmer woes

Imagine that you wake up one morning, go to your field—it is raining heavily, unnaturally heavily; for a while, the rain also changed to hail—and find four months of hard work wilting in mud, turned to a miasmic pulp. Imagine you survive that shock, and then wonder what to do. Imagine you are one of the rare cultivators that is insured; moreover, even rarer, you know the rules. You apply for 'relief'. Then, all you can do is wait. And tackle the headaches that come your way. You are strong, but there is one headache that refuses to go away: how are you going to sow your crop next season?

Access to institutional credit is a crucial factor in the impact that anomalous events, such as what happened in the winter–spring of 2015, have on a farmer in India. The farmer lives the anomaly: when the flow of income from crop cultivation gets irregular and inadequate, or disturbed—as it did February–April this year—farmers cannot repay their debts. Increasing indebtedness means an existence compounded by anxiety; it heavily dents a farmer's productivity. Hefty loans and lack of access to institutional credit that, in turn, mean a heavy dependence on local moneylenders who charge very high rates of interest, invariably contribute to a rising number in farmer suicides, especially post-disaster.

As of now, this picture will not admit even a brushstroke of change. The state of institutional credit in India today is, in one word, grim.

Access to institutional credit is a crucial factor in the impact that anomalous events, such as what happened in the winter–spring of 2015, have on a farmer in India. But the state of institutional credit in India today is grim

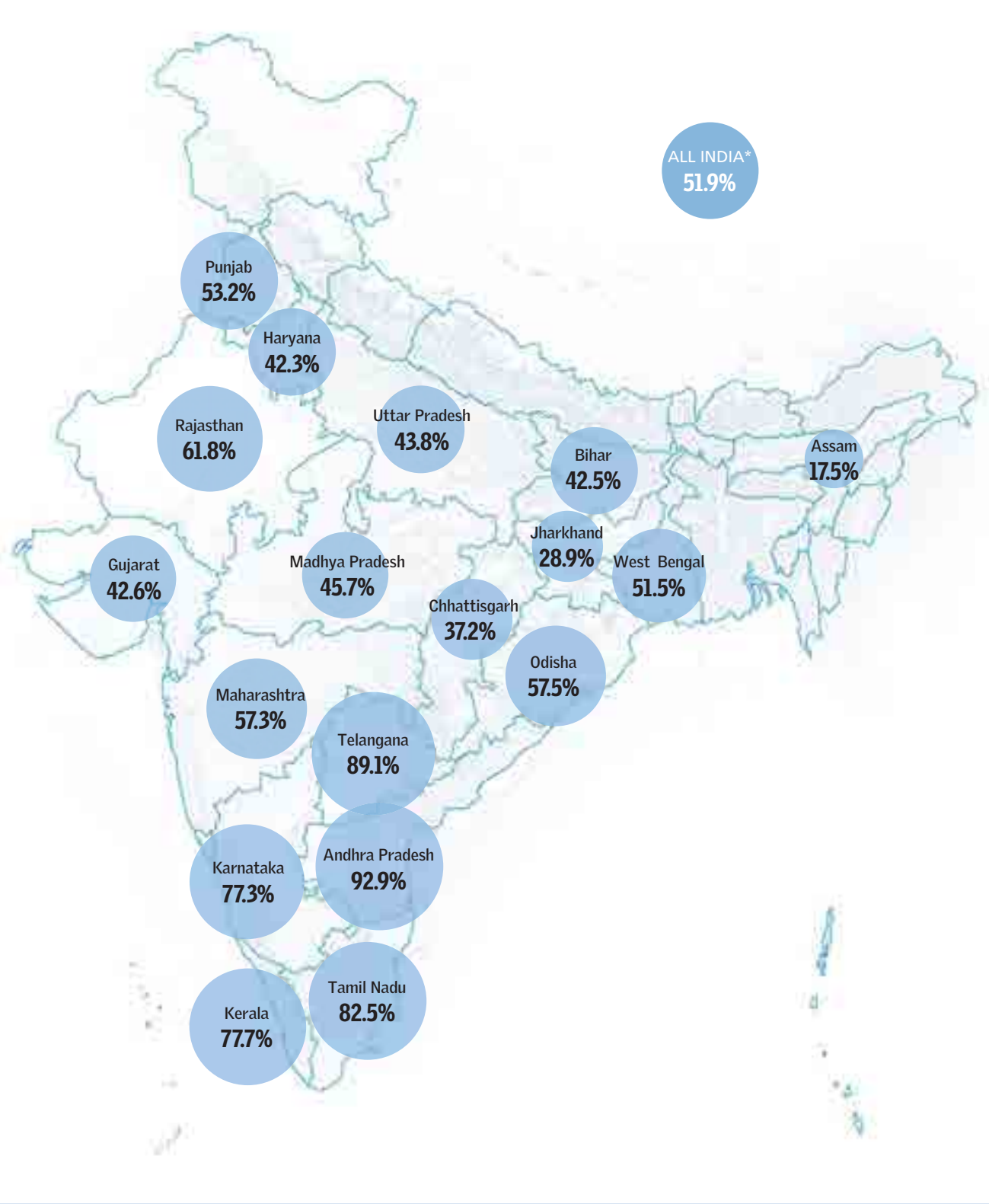
Institutional credit: a grim scenario

In 2014, the National Sample Survey Organisation (NSSO), arguably India's foremost research-based public entity on matters of national concern, did a countrywide survey of agricultural households in India. The 'Situation Assessment Survey of Agricultural Households in India', as their report is called, is based on information from 35,000 households. NSSO estimated about 52 per cent of agricultural households in the country were in debt (see Map 1: *Proportion of indebted agricultural households in country*). The average amount of outstanding loan per agricultural household, NSSO found, was approximately Rs 47,000.

Let's get into details of what the NSSO found. Andhra Pradesh has the highest share of indebted agricultural households in the country (92.9 per cent), followed by Telangana (89.1 per cent) and Tamil Nadu (82.5 per cent). Assam (17.5 per cent), Jharkhand (28.9 percent) and Chhattisgarh (37.2 per cent) are the major states with a lower share of indebted agricultural households. The average amount of outstanding loan is the highest for Kerala (Rs 2,13,600), followed by Andhra Pradesh (Rs 1,23,400) and Punjab (Rs 1,19,500). Assam (Rs 3,400), Jharkhand (Rs 5,700) and Chhattisgarh (Rs 10,200) have the lowest average outstanding loan.

Proportion of indebted agricultural households in country

52 per cent of India's agricultural households are in debt. Indebtedness in some states touches 93 per cent



*Based on information from all states and Union Territories, including those not shown in this map

Source: 70th round: National Sample Survey (Report titled 'Situation Assessment Survey of Agricultural Households' January–December 2013)

At an all-India level, about 60 per cent of the outstanding loans have been taken from institutional sources, that include government (2.1 per cent), co-operative societies (14.8 per cent) and banks (42.9 per cent). Among the non-institutional sources, agricultural/professional moneylenders (25.8 per cent) have the major share in terms of outstanding loans.

Andhra Pradesh has the highest share of indebted agricultural households in the country. The average amount of outstanding loan is the highest for Kerala

Institutional credit: who hogs it?

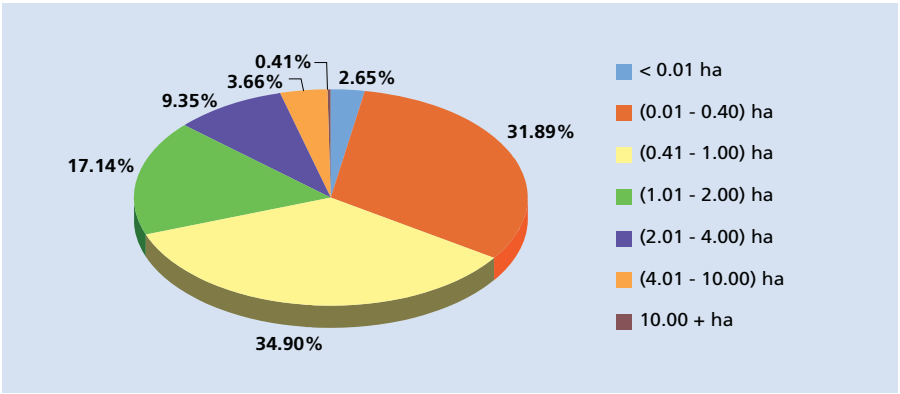
Large farmers and agri-based companies. A budgetary provision of Rs 5,75,000 crore for farm credit was made in 2012–13. A year earlier, 2011–12, Rs 4,75,000 crore was provided. In the 2015–16 budget, a provision of approximately Rs 8.5 lakh crore has been made for farm credit. According to the Reserve Bank of India, farm loans increased by 755 per cent between 2000 and 2010. But where does all this money go? These are substantial amounts. Where are they disbursed?

Not to small and marginal farmers. These farmers are the foundation of agriculture in India. In 2013, rural India had an estimated total of 9.02 crore agricultural households. Small and marginal farmers comprised about 57.8 per cent of the total estimated rural households of the country during the same period. Over two thirds of India's farming population was made up of small and marginal farmers. One third of rural households had farms smaller than 0.4 hectares. Uttar Pradesh, with an estimated 1.805 crore agricultural households, accounted for about 20 per cent of agricultural households in the country (see Graph 1: *Size of landholdings and estimated number of agricultural households in India*).

Institutional credit, however, manages to avoid such farmers. A news report in the Hindi daily *Dainik Jagran*, dated 24 October 2012,[1] brought to light this startling reality. According to this report, a confidential document available with the Ministry of Finance categorically states that despite the increase in farm credit by over 2.5 times in the last five years, less than 6 per cent of the total institutional credit is made available to small and marginal farmers.

Further, in 2007, of the total credit of Rs 2,29,400 crore advanced by banks, the share of small farmers was a mere 3.77 per cent. That is, 96.23 per cent of the farm credit disbursed in 2007 was cornered by big farmers or agribusiness companies. In 2011–12, while total farm credit swelled to Rs

Graph 1: Size of landholdings and estimated number of agricultural households in India



Source: NSSO 2014

5,09,000 crore (against a target of Rs 4,75,000 crore), small and marginal farmers got only 5.71 per cent.

The backbone of the agricultural economy in India keeps getting broken, and broken. And the government is not interested in lending support.

Institutional credit: ground reality

1. Tedious paperwork

Getting a bank loan is one of the most difficult tasks for a farmer. Eligibility for a loan requires a no-dues certificate from institutions like Bhoomi Vikas Bank and a registered lawyer referred by bank officials. Farmers are generally not able to get a no-dues certificate without paying bribes.

2. Corruption and discretionary powers of officials

Farmers interviewed in villages in Agra and Mathura districts of Uttar Pradesh said that they pay a standard 10 per cent commission of the loan amount as bribe to bank officials to get a loan. Banks decide on the eligibility of a farmer to get a loan and often find small and marginal farmers ineligible, for they consider them to be high-risk creditors who may not be able to repay. Those with some political influence in the area can have the documentation for the loan done more easily.

In 2011–12, of the total farm credit of Rs 5,09,000 crore, small and marginal farmers got only 5.71 per cent. The majority was hogged by institutions and big farmers

3. Insufficient loan amounts

Bank loans with land as guarantee are insufficient, particularly in cases where landholdings are small. Banks decide how much a farmer can get as loan after considering his income and properties, along with the land he owns. Farmers with large landholdings get large loans. Small farmers, and those who take land on lease, often end up with less than 70–75 per cent of the required loan amount.

4. Easy access to private moneylenders

It is very difficult for farmers, especially the majority of farmers that are small or marginal, to get loans from banks. Such farmers, invariably small and marginal, are forced to take loans from local moneylenders—in UP, called aadhtiyas—at very high rates of interest that vary from 24 per cent to 120 per cent. An interest rate of 60 per cent is very common in most parts of Uttar Pradesh—it is referred as 'Rs 5 per saikda' (an interest of Rs 5 per Rs 100 of principal every month). Since loans from moneylenders are immediately and easily available, without formalities, farmers are pushed to take these to deal with unforeseen emergencies like unseasonal rainfall and hailstorms.

Institutional credit: awareness and financial counselling needed

Interviews during field trips to UP showed that while the Kisan Credit Card (KCC) scheme brought about much-needed access to institutional credit at reasonable interest rates, there were also cases where poor administration of the scheme created more harm than benefit. Where this was so, KCC loans were provided too liberally, exceeding the farmer's paying capacity.

To make matters worse, such loans were tied to purchase of farm equipment from a specific dealer, referred by bank officials, who made

VIKAS CHAUDHARY / CSE

Most farmers are not sure if they will benefit from insurance and are unwilling or unable to pay the high insurance premiums required. They are offered crop insurance schemes that are not attractive and the premiums are a burden on them. There is also no choice between schemes as only one scheme is on offer in a district

equipment available at a price higher than the market value. The opinion that emerged, from conversations, was that there existed a nexus between banks, insurance companies and equipment manufacturers. This was repeatedly expressed in discussions and interviews.

Another concern that came to light during discussions with stakeholders (individual farmers, farmers' unions and government officials) was the interest rate on KCC loans. For the initial year, the interest rate on KCC loans is low, 4–7 per cent generally, but it then rachets up as high as 14 per cent for loans above Rs 3 lakh.[2] Further, even in cases where low rates of interest are applicable, delayed or defaulted payments have meant that loans have gotten compounded in subsequent years, leading to high rates of interest being applied.

In many cases, fresh KCC loans with higher limits are issued to clear out previous dues. This solution offers temporary relief, but pushes farmers deeper into debt.

It is apparent that just providing loans is not the answer to the problems small farmers in India face. The need to educate them about various schemes, ways to reduce the amount of interest they end up paying on a loan, managing their debts, and so on, are equally important.

Reserve Bank of India governor Raghuram Rajan said, in an interview, that the lack of formal financing was one of the factors contributing to farmer suicides. He said, 'it is lack of formal financing rather than the excessive burden of informal financing which is the problem. So can we move formal financing

For the initial year, the interest rate on Kisan Credit Card loans is low, 4–7 per cent generally. But it then ratchets up to as high as 14 per cent for loans above Rs 3 lakh

VINEET KUMAR / CSE

Farmers says that the state of institutional credit is grim

to every area of the country? The need of the hour is to expand formal institutions to every corner of country. In the last few days, we have seen the tragic picture of farmer suicides . . . (these) are complicated matters. There is no easy explanation to why somebody takes (the) ultimate step'.[3]

That is true. There is no easy explanantion. But, perhaps, there might be a simpler explanation. Pure debt, and no institutional help. How difficult is that to understand?

5. A learning

We can build safety nets for Indian farmers by adopting good practices

There is a huge difference between a 'lesson' and a 'learning'. When hailstorms and unseasonal rains destroyed large swathes of the rabi crop in India in 2013, they were thought to be freak weather events. But they struck again in 2014, and then in 2015, each time with more intensity and causing more damage and livelihood loss. Farmers were simply pushed to the brink, closer and closer. Many fell over, 2013–15. That is a 'lesson'.

Disturbing, but not enough. The point is we need to move on to 'learning': from the terrain of a 'problem' Indian farmers are experiencing, but still do not fathom—perhaps we, too, do not—towards resolution. And from the anomalous winter–spring of 2015, there is only one 'learning': the need for the farmer in India to get respite.

Why respite is required

An underlying factor that pushes Indian farmers to the brink is the very poor economics of Indian agriculture, that barely covers the cost of cultivation, particularly for small and marginal famers (see Case Study: *Wheat farming bleak in western Uttar Pradesh*).

Almost 70 per cent of farmers in India are engaged in a loss-making business under normal circumstances, even without a natural calamity befalling them

A recent study,[1] that uses data from various reports of the Commission for Agricultural Costs and Prices on crops—paddy, wheat, gram, groundnut, sugar cane, cotton—in various states between 1975–76 and 2006–07, shows that farmers have either made very little profit or suffered huge losses when cultivating most of these crops. The situation is no different today. The recent National Sample Survey Organisation (NSSO) data on income, consumption and savings of agricultural households brings out the precarious situation of Indian farmers.

At an all-India level, the average monthly income of an agricultural household during the agricultural year July 2012–June 2013, the NSSO estimated, was Rs 6,426. During this period, net receipts from farm business (cultivation and farming of animals) accounted for 60 per cent of the average monthly income and another 32 per cent was income from wages/salaries (see Graph 1: *Distribution of average monthly income*). The average monthly consumption expenditure per agricultural household was Rs 6,223. On an average, therefore, an agricultural household in India is hand-to-mouth. But averages do not reflect the actual status of a large majority of farmers.

Almost 70 per cent of farmers in India—farmers with leass than 1 hectare of landholding—are engaged in loss-making businesses under normal circumstances (see Table 1: *Monthly income, expenditure and savings of agricultural households*). Only farmers with big landholdings make some profit.

Poor profit margins mean that the slightest variability in input factors, climate conditions or market prices at the time of harvest can push farmers

CASE STUDY Wheat farming bleak in western Uttar Pradesh

Dharmendra Malik—Bhartiya Kisan Union, Muzaffarnagar, UP

COURTESY OF DHARMENDRA MALIK

Farmer unions protest against skyrocketing input costs for crops and the consequent lack of profitability in the agricultural sector—an ongoing concern for farmers

Based on rough estimates provided by Dharmendra Malik, conservative figures for sowing wheat on 1 hectare in western Uttar Pradesh are as follows:

Minimum expenses for sowing wheat

Minimum cost for wheat in 1 hectare (it can increase in other areas)	Cost (in Rs)
Preparing the field and tilling for sowing	7,800
DAP fertilizer (130 kg)	2,730
Urea (260 kg)	1,625
Zinc (26 kg)	1,300
Irrigation five times (diesel and electricity)	6,500
Labour cost for crop cutting	6,825
Thrashing of wheat crop	5,850
Minimum labour of farmer	6,000
Transpotation to Mandi	3,000
Gobar manure	5,000
Major cost incurred by farmer for wheat crop (without land rent)	**46,580**
Major cost incurred by farmer for wheat crop (with land rent of Rs 31,250 for six months)	**77,830**

Income from cultivating wheat

Average production in 1 ha wheat crop	Quantity (in quintals)	Value (in Rs)
Wheat	32	46,400 (@ current year MSP Rs 1,450 per quintal)
Hay	50	15,000
Total value of wheat and hay		**61,400**

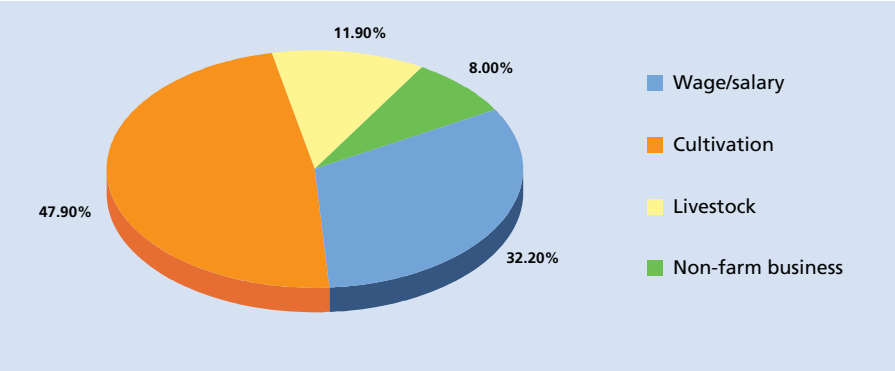
Farmer's profit (if land rent is not taken into consideration) = 61,400 – 46,580 = Rs 14,820 if he is able to sell his crop at the government-declared Minimum Support Price (MSP). Most often, however, this is not the case with farmers in the state. Local prices are generally lower. In UP, for example, the selling price in the market could be 10–15 per cent below MSP, unless there is a major market shortage.

Farmer's profit (if land rent is taken into consideration) = 61,400 – 77,830 = Rs -16,430, or a loss of Rs 16,430.

This estimate takes into consideration only the main components of cost borne by the farmer at the prevailing market rate for wheat crop. There are many other incidental expenses that farmers have to bear, such as additional cost of transportation for fertilizer or grain and farm-machine repairs, investment in farms that have not been taken into account here. If we consider the value of additional family labour and managerial functions performed by the farmer, even without land rent, farming becomes a loss-making business for the individual farmer. Small and marginal farmers especially do not make any profits.

Graph 1: Distribution of average monthly income

60 per cent of average monthly income per agricultural household comes from cultivation and livestock



Source: NSSO

Table 1: Monthly income, consumption and savings of agricultural households (July 2012–June 2013)

Almost 70 per cent of Indian farmers incur losses

Size class of land possessed (hectares)	Percentage of agricultural households in the country	Total income, including wage/ salary, cultivation, farming of animals and non-farm business (in Rs)	Total consumption expenditure (in Rs)	Net investment in productive assets (in Rs)	Net saving/ deficit (in Rs)
0.01–0.40	31.89	4,152	5,401	251	-1500
0.41–1.00	34.90	5,247	6,020	540	-1313
1.01–2.00	17.14	7,348	6,457	422	469
2.01–4.00	9.35	10,730	7,786	746	2,198
4.01–10.00	3.66	19,637	10,104	1,975	7,558
10.00 +	0.41	41,388	14,447	6,987	19,954
All sizes	100 %	6,426	6,223	513	-310

Source: NSSO

deep into debt. The generally poor economics of the sector, indebtedness, crop failures, non-remunerative prices for crops and poor returns over cost of cultivation have led to over two lakh farmer suicides in India between 1990-91 and 2009-10. The proportion is alarmingly high in Maharashtra, Andhra Pradesh and Karnataka.[2] Under such circumstances, even the slightest fluctuation, leave alone extreme weather events, can cause serious dents in the farming community.

What safeguards are required

The current fundamentals of agriculture are too weak to provide respite to farmers. From making farming remunerative and improving productivity to promoting climate resilient agriculture, the list of things to do is long and hard. This report is not aimed at addressing all the issues that ail the agricuture sector of the country. Our aim is focussed: how to effectively provide relief and compensation to farmers in case of extreme weather events.

The previous four chapters have set the stage. The issues we intend to address are:

Remote sensing, to assess crop damage and so hasten the compensation process, is a viable way to provide respite. The technology is still evolving in India. There are challenges to overcome

VINEET KUMAR / CSE

Harassed farmers are pushed to take credit from private moneylenders at very high interest rates as corruption and tedious paperwork make access to institutional credit very difficult

Best practices exist on the terrain of crop insurance across the world. Most are corporatized. Can India afford that? Does India want to go that way? It is not clear

- How do we accurately and speedily assess crop damage? This is key to the delivery of relief and farmer-friendly crop insurance schemes;
- How do we make relief provided by the state meaningful? Relief, currently, is more political tokenism than a safety net, especially against extreme weather events; and
- Can we design a crop insurance scheme that is affordable and can effectively act as the primary compensation mechanism for losses incurred due to extreme weather events?

There is no one scheme/mechanism/technology for all the above three issues. What we have is a catalogue for some good and some emerging practices that we can learn from and adapt to our situation.

Transparent, accurate and quick crop loss estimation

Many countries are practising/experimenting with remote sensing technology and satellite data, used on their own or in combination with field-level data and models, to measure crop yields/crop loss at the farmer-field level. We in India are still at a pilot stage in rolling out such technologies.

Currently, there are various national-level applications in India that use remote-sensing for macro-level crop acreage and production estimates, cropping system analysis, management of waterbodies that provide water for agriculture, drought assessment and monitoring, horticultural development, precision farming, soil resource mapping and watershed development (see Box: *Crop forecasting: the Indian scenario*).

But there are several challenges in doing accurate and speedy crop damage assessment at the farmer level and disbursing relief/insurance payouts, such as lack of digitization of land records and the need to position constellations of

CROP FORECASTING: THE INDIAN SCENARIO

India has been using remote sensing technology for crop forecasting since the late 1980s. Initiated under a Department of Agriculture and Cooperation (DAC) project called CAPE—Crop Acreage and Production Estimation—at the Space Application Centre of the Indian Space Research Organisations (ISRO), the use of remote sensing data for pre-harvest crop production forecast is now being operationalized in India under a national-level programme called Forecasting Agricultural Output using Space, Agrometeorology and Land-based Observations (FASAL).

Funded by the Union Ministry of Agriculture, FASAL, in operation since August 2006, envisages multiple production forecasts of major crops at the district, state and national levels. It is a multi-institutional programme. FASAL involves ISRO centres (Space Applications Centre, Ahmedabad and National Remote Sensing Centre, Hyderabad); the India Meteorological Department; the Agriculture Insurance Company; the Institute of Economic Growth; State Remote Sensing Centres; State Agriculture Departments and the Mahalanobis National Crop Forecast Centre (MNCFC), Ministry of Agriculture.FASAL issues multiple forecasts at the national and state levels for five crops—rice (kharif and rabi), jute, rapeseed, mustard and two rabi crops: potato and wheat. State- and district-level forecasts for cotton, sugar cane and rabi sorghum have also been generated 2013–14 onwards. MNCFC has been providing crop forecasts from the kharif season of 2012.

Another project is the National Agricultural Drought Assessment and Monitoring System (NADAMS), developed by the National Remote Sensing Centre. Here, remote-sensing data is taken from multiple sources and integrated with ground and meteorological information for district/sub-district level drought. NADAMS provides forecasts on a near real-time basis on prevalence, severity level and persistence of agricultural drought at the state, district and sub-district levels. It is currently being used to assess the prevailing situation in 14 states—Andhra Pradesh, Telangana, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and Uttar Pradesh. Among these, drought assessment for Andhra Pradesh, Karnataka, Haryana and Maharashtra are being carried out at the sub-district level.[1]

Remote-sensing data for agriculture and crop-related assessment is currently received from a limited number of satellites. The satellite Resourcesat-2 is a follow-up on Resourcesat-1 (launched 17 October 2003) with enhanced capabilities.[2] It provides continuity of remote-sensing data and has improved spectral and spatial coverage.[3] Another satellite is Radar Satellite-1 (RISAT–1);[4] it enables the imaging of surface features during the day and the night, under all weather conditions.

satellites to make available timely yield images.[3]

The good news is that the government has rolled out some programmes to use satellite and remote sensing data for crop loss estimation on a pilot basis.

Remote sensing: the challenges of down-scaling

According to S.S. Ray, Director, Mahalanobis National Crop Forecast Centre, Department of Agriculture and Cooperation, India:

- It is currently not possible to get data at the farmer-field level, and getting high resolution real-time data is not feasible for a wider area. The few satellites currently in use provide limited information and cannot focus on all areas at one time. A constellation of satellites is needed for data assessment.
- It is difficult to translate the satellite data and information received into the exact field affected. To do this, the current software needs to be updated with the khasra map so that it tallies with the farmer landholding area (this

VIKAS CHOUDHARY / CSE

The widow and son of a cotton farmer in Beed in the Marathwada region of Maharashtra. The farmer committed suicide after three years of consecutive drought and unseasonal rain destroyed his crop

Digitization of khasra maps is required to enable the use of remote sensing for crop loss estimation at the farmer level

is being done in some states). Currently, the khasra map, which is with the patwari at the lowest unit level of the revenue department, in some places is on a piece of cloth and mapped out at the time of the British era. This map should be digitized for a more accurate idea of the landholding size at the farmer level.

- Changes in the crop are not easily visible through remote sensing when crops mature. Hence, the satellite imagery is not always accurate and has to be substantiated with ground-truthing.
- Most disasters are hydro-meteorological calamities. During such events it is often not possible to procure optical data because of the cloud cover. Radar data is still used at the research level.
- Remote-sensing data using satellite images cannot completely access yield loss that will, then, determinerelief/insurance payout. The existing resolution used has limitations,for sensors cannot focus on whole areas and cover damage or yield on an everyday basis. It might still be possible to do so at district level, but not at the individual farmer level. Further, there are no records of historical trends of weather indicators (such as rainfall and temperature variations) for each taluka.This data gap makes more difficult the task of assessment based on trend analysis.
- There is a need to combine technologies such as ground location sampling, aerial images, satellite data and weather data (for instance, rainfall grid data).

Assessing crop damage: emerging global practices

In the 2000s, researchers at the University of Nebraska, USA, studied the suitability of airborne multispectral imagery, a form of remote-sensing technology used to detect the energy which radiates from the object or area being observed. This energy is recorded as a electrical signal which is converted to a digital value, then used to assess the effect of artificially induced hail damage in corn and soybean using Landsat TM image to assess true hailstorm

effects on croplands. They considered a 30 m resolution of broadband imagery as adequate for preliminary post-storm hail damage assessment and a 5 m resolution imagery as adequate to confirm hail damage. Based on the assessment,researchers were confident that remote sensing could assess hail damage faster and more accurately than traditional field-based verification.[4]

Earlier, MERIS (Medium Resolution Imaging Spectrometer) data, of a coarser resolution,was being used to assess hail, and MERIS could not reliably estimate the area of crop damage, a finding that is typically based on imagery acquired a few days before and after a hailstorm and field-based damage assessments of the Agriculture Financial Service Cooperation in Alberta, Canada.[5]

Similar reservations on the limitation of this technology were expressed by researchers A. Apan et al of the University of Southern Queensland, Australia.[6] They argued that although remote sensing had the potential to delineate capture image of areas of reduced biomass (remote sensing works on biomass estimation), it remained difficult to attribute such losses to hail damage, for other confounding factors could also have caused biomass reduction. Research suggests that remote sensing can, at best, be deployed in a supportive and cost-saving role, targeting areas for further field verification.

The US has started using remote sensing in crop damage assessment

Crop classification derived from remote sensing was used, for example, by the United States Department of Agriculture's Risk Management Agency (RMA)to verify whether farmers had planted the crop for which losses were claimed. This US crop insurance programme, with insurance policies covering a liability of US $55 billion in 2007, is sold by 16 private insurance companies. The system is, like any insurance system, not free of fraud. However, data-mining techniques are used to detect anomalies in claims and suspect cases, for example, to verify whether farmers had planted the crop for which losses were claimed.

There is ample scope to use remote sensing in crop damage assessment. However, satellites with relatively long (>20 days) revisit times that carry optical sensors whose imaging capability is affected by clouds (e.g. Landsat) are not very suitable if assessment is required within a few days after an extreme event.

Several new satellite missions significantly reduce revisit times while mapping the earth at a very high spatial resolution (approximately 1 m). The German Rapid Eye AG, for example,has developed a series of five satellites that can cover any area on Earth once a day and aims for more timely delivery to service the crop insurance industry, among others.[7] Competitors, such as Digital Globe (WorldView-2 satellite with 8 spectral bands) and SPOT IMAGE (Pleiades satellite) offer the same revisit frequency. Similarly, SarMap is developing applications of radar imagery, unaffected by cloud cover and acquired at a spatial resolution of approximately 20 m as an input in a crop damage insurance system.[8]

A common problem these new missions face, however, relates to the fact that imagery is usually acquired only through tasking after a certain temporal gap (put simply, the satellite takes time to return to the same position while orbiting) and not regularly, as by Landsat and other 10-30m resolution sensors that provide high resolution imaging information. Hence, suitable imagery depicting the situation before the extreme weather event may not be available. In this respect, the increase of public-domain high resolution optical and radar

MAHARASHTRA TO USE SATELLITE IMAGERY

As per news reports in May 2015, the government of Maharashtra will use satellite imagery to assess crop damage for insurance payouts. The scheme will be piloted in 500 villages of the state and extended to other areas in phases.[1]

The existing practice across India is that banks pay crop insurance based on the assessment by revenue department officials on crop damage for an administrative unit, i.e. an insurance unit that comprises a village panchayat, block, mandal, cluster etc. Under this process, farmers do not get paid to the extent of damage to their crop, as most often the patwari gives a rough and inaccurate estimation. For example, if the report submitted to the revenue department for an area, i.e. administrative unit, says that crop damage is to the extent of 50 per cent, every farmer will be paid insurance on the assumption that he has lost 50 per cent of his crop even if he has lost 75 per cent.

Satellite mapping will enable accurate data on crop yield and the use of satellite imagery would show the extent of damage on individual farms, enabling relief and insurance payouts to be disbursed in a transparent and timely manner.

imagery with short revisit times, such as by the European Sentinel-1 mission, is highly useful, for it monitorsEarth's surface continuously. The first Sentinel-1 satellite was launched in April 2014 and Sentinel-2 will be launched towards the end of 2015.

Make state-based 'relief' meaningful

The 'relief' system currently followed in India to deal with crop losses in the event of extreme weather has serious gaps. After discussing with farmers and experts, we have the following suggestions:

- ***The relief amount should cover crop loss as well as input cost for next season:*** For small and marginal farmers, the relief amount should be enough to cover their crop losses as well as provide them enough money for the next season sowing. Presently, 'relief' money is not even sufficient to take care of all input costs for the next season.
- ***Sharecroppers and farmers taking land on lease/rent should also be protected:*** A significant proportion of farmers in India take land on lease for farming. But in the event of any losses due to extreme weather events, various states, even now, have no provision to provide relief to such farmers, for most relief is distributed based on an archaic British practice founded on the khasra map.

  There should be provision for lease farmers in all the states, as farmers do not have lease papers on their names. Some states like Haryana have some provision for lease farmers, but it should be implemented in its true spirit. States like Uttar Pradesh and Bihar, which do not have any provision for a share-cropper to claim relief, should also come up with this provision as soon as possible.
- ***Crop losses less than the arbitrarily-decided minimum threshold should also be covered:*** Relief should be provided to all affected farmers, even if the losses are less than 33 per cent. Currently, farmers are eligible to get relief only if they lose more than 33 per cent of their crop (central government guideline). However, this year, a significant proportion of the affected farmers in Haryana suffered losses to their

crops less than 25 per cent (state government eligibility limit) and were not eligible for any relief.

- ***Relief estimation by state governments and the Centre should be publicly reconciled:*** Currently, there is a huge gap in the estimates of relief state government make and at the Centre. There is a huge difference in the money the Centre allocates, for relief, and what a state government demands. For example, the memorandum submitted by the Uttar Pradesh government for relief to the Centre was Rs 7,543 crore; the Centre, however, approved only Rs 2,801 crore. What does this indicate? Either the state government's relief estimation is inflated or the Centre has underestimated the losses. Thus, there should be a public reconciliation of relief estimation. Otherwise, either deserving farmers will be overlooked or a large amount of money is sure to be siphoned off. Such trust deficit most harms the farmer.
- ***Minimize political interference in relief estimation and delivery:*** There is a lot of political bickering, and grand-standing, over relief. The Centre's support to states depends on the political equation between a state government and the Centre, regional political equations and vote bank politics. At the state level, vote bank politics dominates. For instance, the Delhi government allocated Rs 50,000 per ha as relief, while the Rajasthan government gave just Rs 13,500 per ha and Uttar Pradesh declared about Rs 18,000 per ha. If relief is to be a genuine safety net in a time of unnatural distress, such untoward political influences must be minised. A relief commission might be a good idea?
- ***A state government should be judicious in declaring an extreme weather event:*** Only consider the drought that affected India in 2015. Out of the 18 states impacted, only four declared they were drought affected. Odisha, Chhattisgarh, Madhya Pradesh and Andhra Pradesh declared a drought. Even though other states like Haryana (38 per cent rainfall-deficient), Uttar Pradesh (46 per cent deficient), Bihar (28 per cent deficient), Rajasthan (12 per cent deficient) and Telangana (20 per cent deficient) are still facing a drought-like situation, as of November 2015.
- ***The first rule of relief:*** it should be delivered on time. It should not go on forever.

Make crop insurance affordable and feasible for farmers

Several problems in India's agricultural insurance sector have been highlighted in Chapter 3: lack of awareness, high premium amounts, delays in settlement process, poor product design, insurance payouts not at individual farmer levels, and so on.

But CSE is also keen to understand the good practices from different parts of the world. While national circumstances and the challenges of adopting some of these practices could vary substantially from one region to another, an understanding of these schemes hold learnings.

A review of literature on agricultural insurance schemes in various parts of the world highlights key points critical to the success of such schemes. These are:

A good insurance product is one that is flexible, has fast payouts through rapid assessment, has direct linkage between farmers and the insurance entity and follows a transparent process

Good product design with competition and flexibility in implementing schemes

- ***Product design for single peril:*** In the US, crop-hail policies are provided to farmers by private insurance companies. Farmers in the US purchase crop-hail coverage because hail is a unique extreme weather event that can totally destroy a significant part of a planted field while leaving the rest undamaged. In parts of the US where hail is frequent, farmers often purchase a crop-hail policy to protect high-yielding crops. Unlike multi-peril crop insurance schemes in USA, a crop-hail insurance policy can be purchased any time during the growing season.[9]

  In the Indian context, however, crop insurance is available for notified crops at the beginning of the season and cannot be applied for after the cut-off date. For example, the cut-off date for the kharif season is 31 July and for rabi it is 31 December. Whether farmers choose single-peril or multi-peril insurance, the availability of the option provides the opportunity to choose risk protection from a single type of a frequently occurring extreme weather event in an area. For example, Bihar is frequently affected by flood—farmers here can opt for single-peril coverage and offset some of the farming risk through insurance. They can keep the premium lower than if they were to insure against other damages as well. Among countries which offer crop-hail insurance within the EU, Germany and the UK continue to provide this insurance at 100 per cent risk cover.

The US is the only country offering Crop Revenue Insurance, which is insurance payout based on yield measurement and crop prices

- ***Multi-peril and revenue-based product:*** In the US, multi-peril crop insurance (MPCI) policies are a part of the Federal Crop Insurance Program that is overseen by the United States Department of Agriculture's Risk Management Agency. Within MCPI, policies have to be purchased before planting and cover loss of crop yields from all types of natural causes, including drought, excessive moisture, freeze and disease. Over a period of time, newer coverage options combining yield protection and price protection have been introduced to guard farmers against potential loss in revenue, whether due to low yields or changes in market price. The US is the only country offering Crop Revenue Insurance (CRI), which is insurance payout based on yield measurement and crop prices. CRI policies provide risk coverage to the policyholder from decline in yield and drop in crop prices. The guaranteed yield is determined based on past production and the guaranteed price can either be a future market price for the crop for the month of harvest, or a strike price of a base price option.[10]
- ***Flexibility of different types of insurance products available for different crops:*** Spain, for instance, provides various insurance products catering to risk coverage of different types, including,

1. 'Combined' insurance that covers for all risks for all vegetables, fruits;
2. Yield-based crop insurance according to geographic area (province, municipality etc.) which provides risk coverage specifically for winter cereals, proteins, grapes and Lanzarote onion;
3. Yield-based insurance for an individual farmer which is specifically available for olives, wine grapes, almonds, sugar beet and some fruits;
4. Insurance products where a fixed cost is applicable for associations and cooperatives, covering fruits, citrus and grapes.[11]

In the first three insurance products, hail and fire are covered at 100 per cent while other risks are covered within the range of 65 to 100 per cent, depending on the peril.

Effective public–private partnerships and substantial government subsidies

- ***Effective public–private partnerships:*** For multi-peril crop insurance schemes in USA, the Federal Crop Insurance Program follows a public-private partnership model. The RMA—which determines the rate to be charged at which crops can be insured in various parts of the country—has authorised 19 private companies to sell insurance. Private insurance companies sell insurance to farmers who request for it and undertake the larger portion of the risk. Farmers benefit from private-sector efficiency, which speeds payments when it is most necessary; taxpayers benefit from reduced overhead operational and administrative costs from the sharing of underwriting gains and losses between the government and private companies.
- ***Substantial subsidies not just in the premiums paid, but also in underwriting any losses and reimbursing insurance companies for operating and administrative costs:*** In the context of USA, the federal government provides premium subsidies to reduce costs for farmers. In addition, it provides reimbursement to private insurance companies to offset operating and administrative costs that would otherwise be covered under the premium paid by farmers. The government and private insurance companies share the underwriting gains and losses of the programme. In good years, the government collects a portion of the underwriting gains and in bad years the private sector absorbs a share of the losses, reducing taxpayer exposure. To use an example, 2001-2010 were good years when the government saw an underwriting gain of US $4 billion. But the gains were counterbalanced by losses incurred in 2011, 2012 and 2013.[12]

  A similar scenario prevails in the EU where subsidies are offered on the premium rate. For example, in some countries in less-developed areas, young farmers, women farmers, associations or cooperatives can also apply for higher subsidies. The systems are well developed in countries where public support is given to agricultural insurance. This kind of support for insurance premium encourages farmers to take an active role in risk management and participate in insurance. Examples where subsidies are offered are Italy, which gives a subsidy of 67 per cent on total premium and 64 per cent for multi-peril products, and Spain, which gives 49 per cent, including subsidies at the regional level.

  In India, depending on the premium slab for different schemes, the premium subsidies offered comprise a wide range, i.e. from no subsidy (at premium slab of 2 per cent) to anything from 25 per cent to 75 per cent (for a premium slab of more than 2 per cent). In Europe, reinsurance is undertaken by private companies in most countries to ensure the viability of insurance schemes. In Italy, Portugal and Spain, however, insurance is partially managed by the government or public companies.[13]

The US provides substantial subsidy in the premium paid by farmers

Fast payouts through rapid assessments and the use of technology, such as remote sensing, AWS and mobile banking services

Agriculture and Climate Risk Enterprise (ACRE) is the largest index insurance programme in the developing world in which farmers pay a market premium.

It is also the largest in sub-Saharan Africa. It is also said to be the first agricultural insurance programme, worldwide,that has reached smallholders using mobile technologies through partnering with regional initiatives called M-PESA mobile banking.

Initiated in 2009 by the Syngenta Foundation for Sustainable Agriculture, Kilimo Salama (Kiswahili for Safe Agriculture), ACRE functions on a three-pillar approach.

The first pillar is that the product range is based on several data sources, including automatic weather stations and remote-sensing technologies.

The second is ACRE's role as an intermediary between insurance companies, reinsurers and distribution channels/aggregators (including microfinance institutions, agribusiness and agricultural input suppliers).

The third is the link to the mobile money market, through the M-PESA scheme in East Africa. M-PESA allows for quick enrolment and payment of claims without a physical visit by farmers. The programme predominantly covers Kenya and Rwanda and has gradually begun working in Tanzania. ACRE provides insurance for crops such as maize, beans, wheat, sorghum, coffee and potato.

Africa is leading the innovations in developing insurance products for small and marginal farmers

ACRE offered a range of insurance products to farmers. In the first stage, insurance was linked to agricultural credit from Microfinance Institutions (MFIs). The credit was designed for those farmers who wanted to grow maize using improved inputs; therefore the credit covered seed or mineral fertiliser worth at least US $100. In 2013, 182,092 farmers purchased this package, inclusive of agronomic training MFI field agents provided. In the second stage, ACRE offered contract seed grower insurance for large-scale producers (i.e. greater than 20 acres) as well, at an average value of US $650 per acre. During this phase, the seed company paid the premiums at the start of the season, which was then repaid by the farmers at harvest when delivering their seeds to the company. In 2013, 650 producers covered 11,814 acres with this package.

In the third stage, dairy livestock insurance was offered in partnership with a dairy cooperative (for farmers who owned cattle) and lending institutions (for farmers who wanted to purchase cattle). These partners (dairy cooperative or lending institutions) paid the premium up-front, then deducted the amount from the payment to the farmers for milk deliveries, or combined it with loan repayment. Livestock insurance also covered animal care packages and vaccines.

From 2013 and 2014 onwards, insurance premium was incorporated into the price of a seed bag. Each bag contained a scratch card with a code that could be texted to ACRE during the planting period to start coverage against drought. Each farm was then monitored using satellite imagery for 21 days. If the calamity index was triggered due to an adverse weather event, farmers were automatically paid via M-PESA for a new bag of seeds so that they could replant the crop.

One of the major reasons behind the rapid up-scaling of the ACRE project is the wide range of partners involved. Partners include banks and MFIs, mobile network operators, seed companies, government agencies (ministries of agriculture and national meteorological services), research institutions, insurance and reinsurance companies—UAPin Kenya, Societé Rwandaise d'Assurance in Rwanda, SwissRe, Africa Re and global donors (Global Index Insurance Fund, GIIF).

Direct linkages of farmers with the insurance companies

In USA, crop insurance is sold, administered and delivered by the private sector.[14] The companies employ agents who explain the insurance packages available, based on which the farmer selects the insurance package. Based on the farmer's choice, the agent collects the premium and sells the insurance policies. If an extreme weather event occurs, the farmer intimates the agent. The agent intimates the company and loss adjusters visit the farm, evaluate and assess the extent of loss, after which the claim is paid. A similar model is followed by ACRE in East Africa, where the agricultural credit and insurance providers are microfinance institutions (MFIs) and the farmers are directly contacted by MFI field agents.

In the Indian context, as was highlighted in Chapter 4, most farmers could not tell which insurance scheme was applicable to their area and for which crop the premium was deducted. Insurance is linked to agricultural loans provided by banks, which then forward the insurance premiums to the concerned insurance company in India.

A direct linkage of farmers with insurance companies can avoid the confusion which arises when the banks play the role of intermediary. This is also reflected on the consequent lack of awareness among the policyholders about insurance companies and schemes.

In sum, then, it is possible to provide respite to the farmer in India, especially small and marginal farmers. Examples exist in different parts of the world of ways in which a farmer's investment and hard work is protected, and profit augmented. The vagaries of the weather are neither eternal nor mythic. We live in a time of a warming Earth. We live in a time of weather system anomaly. In India, nobody experiences, or lives, such anomaly as closely as the farmer. At CSE, we feel, the time has come to offer him a respite.

Examples exist in different parts of the world of ways in which a farmer's investment and hard work is protected, and profit augmented. India needs to learn from them

Annexures

Annexure 1: Agra farmer case study

Shyam Singh Chahar—Village Rohta Bagh, Block Barauli Aheer, District Agra, Uttar Pradesh

From the farmer's diary:

Data given below is based on the information provided by the farmers. Conservative figures have been used for the purpose of cost calculation.

Agriculture field: 2.22 hectares, duration: July 2014–April 2015

Rs 16,000: Tillage (Rs 200 per bigha, soil is tilled a total of eight times)

Rs 16,000: Irrigation (total 160 hours irrigation required for a full year, Rs 100 per hour is charged from farmer)

Rs 7,250: Wheat seeds (5 quintal seed used, Rs 1,450 per quintal is charged, since farmer has his own seed. However, market rate for good-quality seed is approximately Rs 2,000 per quintal, which has not been used here)

Rs 11,200: DAP (10 packets of DAP, Rs 1,120 per packet, each DAP packet is 50 kg)

Rs 3,120: Urea (10 packets urea, Rs 320 per packet, each urea packet is 50 kg)

Rs 200: Transportation charges of urea and DAP from market to home

Rs 13,000: Cutting of wheat crop by labourer

Rs 7,000: Rent charged by tractor and machine for harvesting

Rs 2,000: Labourer used for harvesting crop on machine

Rs 90,000: Labour cost of farmer (@Rs 300 for 300 days as it is for two full agricultural seasons)

Rs 500: Transportation charges for carrying wheat grain from the field to home

Rs 5,000: Spent on bajra cultivation

Rs 1,500: Bajra seed

Rs 5,000: Charges for bajra harvest by tractor and machine

Total cost incurred = Rs 1,75,520

Total wheat production = 60 quintal (almost 50 per cent crop damaged by unseasonal rains, otherwise the average production would have been 120 quintal)

Total husk production = 66 quintal, ((almost 50 per cent crop damaged by unseasonal rains, otherwise the average hay production would have been 132 quintal)

Rs 78,000: Wheat sold at the rate of Rs 1,300 per quintal, farmer sold the wheat from his field itself so he did not require to pay the transportation cost to mandi.

Rs 30,000: Husk sold

Bajra production = 25 quintal

Rs 25,000: From bajra production (Rs 1,000 per quintal)

Rs 5,000: From selling bajra residue/husk

Total income from wheat and bajra = 78,000 + 30,000 + 25000 + 5000 = Rs 1,38,000

Total loss = 1,38,000 – 1,75,520= - Rs 37,520

Loss from unseasonal rainfall and hailstorm:

Wheat loss = 60 quintal x Rs 1300 = Rs 78,000

Hay loss = 66 quintal x Rs 454 = Rs 29,964

i.e. Total loss = Rs 1,07,964

Annexure 2: Mathura farmer case study

From the farmer's diary:

Data given below is based on the information provided by the farmers. Conservative figures have been used for the purpose of cost calculation.

Farmer: Rohtas Singh, Village: Garhi mangli, Barauli, Block Baldeo, Tehseel Mahavan, Mathura, Uttar Pradesh
wheat input cost and return
Cost calculations are given for growing wheat on 1 hectare (small farmer). Rohtas Singh reported a loss of Rs 24,865. This case study does not include land rent.
Rs 12,750: Multiple tillage (farmers in Baldeo block have to undertake various tillage to make the soil sowable from July to November)
Rs 3,500: Levelling of the field
Rs 1,875: Irrigation before sowing, rent paid for water
Rs 750: Labourer hired for irrigation
Rs 4,000: Wheat seed, purchase of about 160 kg seed required for 1 hectare (this farmer has used WH 711 seed variety)
Rs 300: Transportation charges for bring seeds from Block Baldeo to the farmer's village
Rs 5,200: Rs 1,300 per DAP packet, four DAP packets have to be purchased for 1 hectares
Rs 300: Transportation charges for DAP
Rs 1,000: Sowing machine on rent
Rs 1,400: 200 kg of urea (4 packets of urea, 1 packet contains 50 kg urea and cost Rs 350 each)
Rs 600: Labour charges to spray urea into the field
Rs 800: Pesticide used for weeds
Rs 800: Labour charges for weed spray, Rs 30 is being charged for spray of 15 litres tank
Rs 7,500: Irrigation done four times, Rs 1,875 charged per irrigation
Rs 2,400: Labour charges for irrigation; on an average Rs 2,400 charged, even though Rs 750 x 4 comes to Rs 3,000. This charge may fluctuate depending on the number of days spent on irrigation varying with the availability of electricity.
Rs 16,250: Small farmers depend on labourers to harvest their crops as they don't use machines
Rs 1,875: To collect the crop from field for machine, Rs 150 per bigha is the standard collection charges taken by labourer (1 hectare = 12.5 bigha in Mathura)
Rs 2,400: Rent of tractor and machine used for harvesting. Normally, Rs 600 is charged per hour and it takes on an average four hours to harvest the crop of 1 ha.
Rs 2,240: 8 labourers required for cutting. They charge Rs 70 per hour, it takes approximately 4 hours, Rs 70 x 4 hours x 8 labourers equals to Rs 2,240.
Rs 500: Labourer charges for transportation of wheat from field to home
Rs 300: Transportation of wheat grain to home
Rs 1,000: Transportation of wheat grain to mandi/private businessperson in Mathura district
Rs 250: Labour charges for transportation of wheat to mandi

Total cost incurred by adding above given components = Rs 67,990
Total wheat production = 25 quintal (wheat production under normal circumstance could have been 40–45 quintal per hectare, as observed in previous years)
Total wheat sold = Rs 33,750 (Rs 1,350 per quintal so for 25 quintal wheat = Rs 33,750)
Total hay production = 25 quintal
Total hay sold = 9,735 (375 x 25= 9,735, Rs 375 per quintal hay, other farmers purchase it. Hay production under normal condition, i.e. without unseasonal rain would have been 45 quintals. Hay price received was also Rs 25–30 less per quintal because of the impact of rain on hay quality.)

So total income of farmer = income from wheat and hay = Rs 43,125
Total loss = 43,125 – 67,990 = Rs -24,865

Crop loss due to unseasonal rain and hailstorm: 20 quintal wheat i.e.
20 quintal x Rs 1350 = Rs 27,000
20 quintal hay i.e. 20 quintal x Rs 375 = Rs 7,500
i.e. total loss due to unseasonal rainfall and hailstorm = Rs 34,500, that is this year the farmer made a loss of Rs 34,500 in his farming because of rainfall and hailstorms.

Annexure 3: State-wise, crop-wise area affected by hailstorms and unseasonal rain in the country in February, March and April 2015 (area in lakh hectares)

States/crops (area in lakh hectares)	Wheat	Coarse cereals (barley/ jowar/ maize)	Pulses	Oilseeds (mustard/ safflower/ castor)	Horticulture (vegetable/ fruits)	Cumin	Isabgol	Coriander	Other crops	Total area (as on 5 May 2015)
Gujarat	1.201	0.028	0.144	0.000	0.024	0.212	0.009	0.089	0.117	1.82
Madhya Pradesh	2.400	0.000	2.000	0.000	0.500	0.000	0.100	0.700	0.000	5.70
Maharashtra	0.628	0.157	0.282	0.000	1.281	0.000	0.000	0.000	0.114	2.46
Rajasthan	8.918	0.518	3.152	5.884	0.055	1.856	1.671	1.065	7.449	30.57
Haryana	19.478	0.029	0.006	2.136	0.589	0.000	0.000	0.000	0.000	22.24
Punjab	2.560	0.020	0.010	0.010	0.100	0.000	0.000	0.000	0.240	2.94
Uttar Pradesh	72.350	0.000	12.930	3.030	3.430	0.000	0.000	0.000	3.430	95.17
Uttarakhand	1.879	0.000	0.608	0.046	0.300	0.000	0.000	0.000	0.000	2.83
Himachal Pradesh	0.558	0.030	0.020	0.005	0.060	0.000	0.000	0.000	0.000	0.67
Bihar	11.386	1.396	1.002	0.000	0.319	0.000	0.000	0.000	0.477	14.58
J&K	1.000	0.000	0.020	0.090	0.100	0.000	0.000	0.000	0.121	1.33
Telangana	0.000	0.208	0.002	0.094	0.000	0.000	0.000	0.000	0.375	0.68
Andhra Pradesh	0.000	0.003	0.001	0.005	0.000	0.000	0.000	0.000	0.080	0.09
Kerala	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.004	0.01
West Bengal	0.237	0.025	0.043	0.088	0.199	0.000	0.000	0.000	0.694	1.29
Total	**122.596**	**2.413**	**20.222**	**11.388**	**6.958**	**2.068**	**1.780**	**1.855**	**13.102**	**182.38**

Annexure 4: Statement referred to in part (c) of Rajya Sabha Unstarred Question No. 1406 due for 08.05.2015 regarding damage to crops due to heavy rains, hailstorm and frost. Allocation of SDRF Approved by the Government during 2015-16 to 2019-20

State	Central	Central Contribution						State contribution						Total allocation					
	contribution	2015-16	2016-17	2017-18	2018-19	2019-20	Total	2015-16	2016-17	2017-18	2018-19	2019-20	Total	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Andhra Pradesh	0.75	330.00	346.50	363.75	381.75	400.50	1822.50	110.00	115.50	121.25	127.25	133.50	607.50	440.00	462.00	485.00	509.00	534.00	2430.00
Arunachal Pradesh	0.9	46.80	48.60	51.30	54.00	56.70	257.40	5.20	5.40	5.70	6.00	6.30	28.60	52.00	54.00	57.00	60.00	63.00	286.00
Assam	0.9	414.00	434.70	456.30	478.80	503.10	2286.90	46.00	48.30	50.70	53.20	55.90	254.10	460.00	483.00	507.00	532.00	559.00	2541.00
Bihar	0.75	351.75	369.00	387.75	407.25	427.50	1943.25	117.25	123.00	129.25	135.75	142.50	647.75	469.00	492.00	517.00	543.00	570.00	2591.00
Chhattisgarh	0.75	180.75	189.75	198.75	208.50	219.00	996.75	60.25	63.25	66.25	69.50	73.00	332.25	241.00	253.00	265.00	278.00	292.00	1329.00
Goa	0.75	3.00	3.00	3.00	3.00	3.00	15.00	1.00	1.00	1.00	1.00	1.00	5.00	4.00	4.00	4.00	4.00	4.00	20.00
Gujarat	0.75	528.75	555.00	582.75	612.00	642.00	2920.50	176.25	185.00	194.25	204.00	214.00	973.50	705.00	740.00	777.00	816.00	856.00	3894.00
Haryana	0.75	231.00	242.25	254.25	267.00	280.50	1275.00	77.00	80.75	84.75	89.00	93.50	425.00	308.00	323.00	339.00	356.00	374.00	1700.00
Himachal Pradesh	0.9	212.40	223.20	234.00	245.70	258.30	1173.60	23.60	24.80	26.00	27.30	28.70	130.40	236.00	248.00	260.00	273.00	287.00	1304.00
Jammu and Kashmir	0.9	229.50	241.20	252.90	265.50	279.00	1268.10	25.50	26.80	28.10	29.50	31.00	140.90	255.00	268.00	281.00	295.00	310.00	1409.00
Jharkhand	0.75	273.00	286.50	300.75	315.75	331.50	1507.50	91.00	95.50	100.25	105.25	110.50	502.50	364.00	382.00	401.00	421.00	442.00	2010.00
Karnataka	0.75	207.00	217.50	228.75	240.00	252.00	1145.25	69.00	72.50	76.25	80.00	84.00	381.75	276.00	290.00	305.00	320.00	336.00	1527.00
Kerala	0.75	138.75	145.50	153.00	160.50	168.75	766.50	46.25	48.50	51.00	53.50	56.25	255.50	185.00	194.00	204.00	214.00	225.00	1022.00
Madhya Pradesh	0.75	657.75	690.75	725.25	762.00	799.50	3635.25	219.25	230.25	241.75	254.00	266.50	1211.75	877.00	921.00	967.00	1016.00	1066.00	4847.00
Maharastra	0.75	1112.25	1167.75	1226.25	1287.75	1352.25	6146.25	370.75	389.25	408.75	429.25	450.75	2048.75	1483.00	1557.00	1635.00	1717.00	1803.00	8195.00
Manipur	0.9	17.10	18.00	18.90	19.80	20.70	94.50	1.90	2.00	2.10	2.20	2.30	10.50	19.00	20.00	21.00	22.00	23.00	105.00
Meghalaya	0.9	21.60	22.50	24.30	25.20	26.10	119.70	2.40	2.50	2.70	2.80	2.90	13.30	24.00	25.00	27.00	28.00	29.00	133.00
Mizoram	0.9	15.30	16.20	17.10	18.00	18.00	84.60	1.70	1.80	1.90	2.00	2.00	9.40	17.00	18.00	19.00	20.00	20.00	94.00
Nagaland	0.9	9.00	9.00	9.90	9.90	10.80	48.60	1.00	1.00	1.10	1.10	1.20	5.40	10.00	10.00	11.00	11.00	12.00	54.00
Odisha	0.75	560.25	588.75	618.00	648.75	681.75	3097.50	186.75	196.25	206.00	216.25	227.25	1032.50	747.00	785.00	824.00	865.00	909.00	4130.00
Punjab	0.75	292.50	306.75	322.50	338.25	355.50	1615.50	97.50	102.25	107.50	112.75	118.50	538.50	390.00	409.00	430.00	451.00	474.00	2154.00
Rajasthan	0.75	827.25	868.50	912.00	957.75	1005.00	4570.50	275.75	289.50	304.00	319.25	335.00	1523.50	1103.00	1158.00	1216.00	1277.00	1340.00	6094.00
Sikkim	0.9	27.90	29.70	30.60	32.40	34.20	154.80	3.10	3.30	3.40	3.60	3.80	17.20	31.00	33.00	34.00	36.00	38.00	172.00
Tamilnadu	0.75	509.25	534.75	561.00	589.50	618.75	2813.25	169.75	178.25	187.00	196.50	206.25	937.75	679.00	713.00	748.00	786.00	825.00	3751.00
Telangana	0.75	205.50	216.00	226.50	238.50	249.75	1136.25	68.50	72.00	75.50	79.50	83.25	378.75	274.00	288.00	302.00	318.00	333.00	1515.00
Tripura	0.9	27.90	29.70	30.60	32.40	34.20	154.80	3.10	3.30	3.40	3.60	3.80	17.20	31.00	33.00	34.00	36.00	38.00	172.00
Uttar Pradesh	0.75	506.25	531.75	558.00	585.75	615.00	2796.75	168.75	177.25	186.00	195.25	205.00	932.25	675.00	709.00	744.00	781.00	820.00	3729.00
Uttarakhand	0.9	189.00	198.00	207.90	218.70	229.50	1043.10	21.00	22.00	23.10	24.30	25.50	115.90	210.00	220.00	231.00	243.00	255.00	1159.00
West Bengal	0.75	387.00	406.50	426.75	448.50	471.00	2139.75	129.00	135.50	142.25	149.50	157.00	713.25	516.00	542.00	569.00	598.00	628.00	2853.00
Total		8512.50	8937.30	9382.80	9852.90	10343.85	47029.35	2568.50	2696.70	2831.20	2973.10	3121.15	14190.65	11081.00	11634.00	12214.00	12826.00	13465.00	61220.00

Annexure 5: Government-initiated agricultural insurance schemes in India

The table details the three prominent crop insurance schemes in India—National Agricultural Insurance Scheme (NAIS), modified National Agriculture Insurance Scheme (MNAIS) and Weather-Based Crop Insurance Scheme (WBCIS)

Government scheme	National Agricultural Insurance Scheme (NAIS)	Modified National Agricultural Insurance Scheme (MNAIS)	Weather-Based Crop Insurance Scheme (WBCIS)
Formative year	NAIS flagship crop insurance scheme—introduced in rabi season 1999–2000	Started on a pilot basis in 50 districts of the country since 2010–11 rabi. Now merged under the National Crop Insurance Programme (NCIP) with other Pilot insurance schemes of Weather-Based Crop Insurance Scheme (WBCIS) and Coconut Palm Insurance Scheme (CPIS). Improvements have been introduced in MNAIS. It has been fully implemented throughout India from rabi 2013–14	Piloted in the country in kharif 2003. Some states where weather insurance has been piloted are Andhra Pradesh, Chhattisgarh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab and Rajasthan.
Previous scheme	Improvement in scope and content on Comprehensive Crop Insurance Scheme (CCIS)—1985.	A modified and improved version of the National Agricultural Insurance Scheme	First weather based insurance scheme in India
Responsible authority	Ministry of Agriculture and Cooperation (GoI)	Ministry of Agriculture and Cooperation (GoI)	Ministry of Agriculture and Cooperation (GoI)
Insurance approach	Indexed approach known as area yield-based approach, taken forward from CCIS. Losses covered, from sowing to harvesting operates on an 'area yield' basis for widespread calamities.	Following on the lines of NAIS, modified NAIS retains the area- based yield approach. But MNAIS is a hybrid scheme, also draws upon elements of weather index approach as well. Technically, the Scheme operates on basis of 'Area Approach' i.e., Defined Areas for each notified crop for widespread calamities and insurance unit is Village/Village Panchayat for major crops and for other crops.	Weather-based crop insurance uses weather parameters as 'proxy' for crop yields in compensating the cultivators for crop losses
How does it work?	Area-yield-based approachin which the index used is crop yield of a defined area called an Insurance Unit (IU), i.e. an administrative unit in India such as block, hobli, mandal, patwari, halka	As compared to NAIS, MNAIS has a smaller scale of Insurance Unit. Crop Cutting Experiments (CCE) conducted to assess crop yield estimates are lowered from the block level to the village level to reduce basis risk (i.e. the mismatch between the actual individual crop yield losses and insurance indemnity)	Weather-based crop insurance is based on how weather conditions affect crop production even when a cultivator has taken care to ensure good harvest. Historical correlation between crop yield and weather parameters help in developing weather thresholds (triggers) beyond which if crop starts getting affected adversely, the farmer is eligible for claim settlement.
	Actual yield of the insured crop measured by Crop Cutting Experiments in the Insurance Unit that is compared to historical yield of the past five years.	'Actual Yield' (AY) per hectare of insured crop for IU is calculated on the basis of requisite number of CCEs in insured season while Threshold Yield (TY) for a crop for in a notified IU is based on a moving average of the past seven years (excluding calamity years). If the yield falls short of the specified TY, all insured farmers growing theat crop are entitled to payouts	Claim payout structures are developed to compensate cultivators, using the weather triggers, to the extent of losses they have suffered
How do we calculate claims?	If actual yield of insured crop is less than value of historical/ threshold yield (based on moving average of five years), all farmers in IU are eligible for same rate of indemnity payout.	In adverse seasonal conditions in crop season- insurance companies in consultation with State Government/UT based on agro meteorological data/ satellite imagery or any other proxy	Insured cultivators become eligible for payout if the 'actual weather' data recorded at a 'Reference Weather Station' (RWS) during the specified time period shows deviation (Adverse Weather Incidence) as compared to the specified 'Trigger

Contd . . .

Annexure 5: (. . . contd)

Government scheme	National Agricultural Insurance Scheme (NAIS)	Modified National Agricultural Insurance Scheme (MNAIS)	Weather-Based Crop Insurance Scheme (WBCIS)
		indicator decide about crops/ areas for which account payment is made, up to 25 per cent of likely claims	Weather'. In such cases, the specified 'crop' in that particular Reference Unit Area shall be deemed to have suffered the same level of Adverse Weather Incidence and consequently the same proportion of loss of crop yield, therefore becoming eligible for same proportion of payouts.
Coverage area	Across all states and in Union Territories on optional basis	MNAIS is applicable in select districts of selected states from rabi 2013–14 onward under the National Crop Insurance Programme (NCIP)	WBCIS is applicable in select districts of selected states
Farmer profile	Scheme is compulsory for farmers availing crop production loans (borrowing farmers) and voluntary for others (non-borrowing farmers).	Scheme is compulsory for farmers availing crop production loans (borrowing farmers) and voluntary for others (non-borrowing farmers).	Scheme is compulsory for farmers availing crop production loans (borrowing farmers) and voluntary for others (non-borrowing farmers)
	All farmers, including sharecroppers and tenant farmers, growing the notified crops in the notified areas are eligible for coverage	All farmers, including sharecroppers and tenant farmers, growing the notified crops in the notified areas are eligible for coverage	All farmers, including sharecroppers and tenant farmers, growing the notified crops in the notified areas are eligible for coverage
Insurance for non--loanee farmers at the time of sowing	Can avail insurance mostly after the crop is sown (within 30 days from sowing or cut-off date, whichever is earlier). Small/marginal farmers are provided subsidized premium.	Can avail insurance before sowing/ planting (should there be a change of crop, same to be intimated within 30 days from cut–off date, along with sowing certificate.	Can avail weather insurance before the sowing/planting
Government liabilities and risk sharing	Most of the risk is borne by the Central and state governments; the government bears 70 or 80 per cent while farmers bear 20 or 30 per cent.	MNAIS operates on actuarial premium rates. The premium subsidy provided by the government ranges from 0 to 75 per cent depending on the premium slab. The premium subsidy is shared by the Centre and state governments on a 50:50 basis. Claim liability is borne by the insurance company.	WBCIS operates on actuarial premium rates. The premium subsidy provided by the government ranges from 0 to 75 per cent depending on the premium slab. The premium subsidy is shared by the Centre and state governments on a 50:50 basis. Claim liability is borne by the insurance company.
Crops covered	At commencement of each season, preferably before end-February for kharif and before end-August for rabi season and issuance of notification for season. State/UT governments ensure issuance and circulation to all concerned agencies, departments and institutions that have been assigned roles in administering the scheme within seven days. Crops covered include food crops (cereals, millets and pulses) and oilseeds (groundnut, soybean, sunflower and mustard, safflower, niger etc.).	At commencement of each season, preferably before end-February for kharif and before end-August for rabi season and issuance of notification for season. State/UT governments ensure its issuance and circulation to all concerned agencies, departments and institutions that have been assigned role in administering the scheme within seven days. Crops covered include food crops (cereals, millets and pulses) and oilseeds (groundnut, soybean, sunflower and mustard, safflower, niger etc.).	At commencement of each season, preferably before end-February for kharif and before end-August for rabi season, and issuance of notification for season. State/UT government ensure its issuance and circulation to all concerned agencies, departments and institutions. Crops covered include wheat, other crops (other cereals, millets, pulses, oilseeds) and important crops in the states the scheme is being implemented.
	Annual commercial/ horticultural crops—sugar cane, cotton, potato, onion,	Annual commercial /horticultural crops—sugar cane, cotton, potato, onion, chilly, turmeric, tapioca, coriander, cumin,	Weather-Based Crop Insurance Scheme (WBCIS) pilot during rabi 2007 season is available in specified locations and for

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Annexure 5: . . . (contd)

Government scheme	National Agricultural Insurance Scheme (NAIS)	Modified National Agricultural Insurance Scheme (MNAIS)	Weather-Based Crop Insurance Scheme (WBCIS)
	chilly, turmeric, tapioca, coriander, cumin, fennel, fenugreek, annual banana, annual pineapple etc.	fennel, fenugreek, annual banana, annual pineapple etc.	specified crops in the states of Bihar, Chhattisgarh, Haryana, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh
Premium rates	Premium rates during i. Kharif (June–October) are 3.5 per cent for oilseeds and pearl millet and 2.5 per cent for cereals, millets and pulses; ii. in rabi season (November–March), premium rates are 1.5 per cent for wheat and 2 per cent for other food crops and oilseeds. The rates for annual commercial/ horticultural crops are actuarial	Before start of each crop season, insurance companies will work out actuarial premium as well as net premium rates (premium rates actually payable by farmers after premium subsidy) for each notified crop through standard actuarial methodology in conformity with provisions of IRDA.	Premium rates depend on the 'expected loss', which in turn depends on patterns of weather parameters of historical period of about 25–100 years in requirements of a crop. In other words, the premium in the context of ideal weather rate could vary with each Reference Unit Area and with each crop. However, the premium rates are capped for the cultivator; and the premium (rates) beyond the cap are shared by the Central and concerned state government on 50:50 basis. There is a set premium slab for different categories of crop
Advantages	Mitigates moral hazards and adverse selection	i. Subsidy determination in advance enables upfront government and farmer contributions toward premiums, passing residual risks to insurers (market approach) and facilitates fast claim settlements; ii. Combining weather-indexed insurance (allows quick payments and enables interim payments within a crop season) with area yield insurance (allows payouts with closer correlation to yield losses) makes best use of both indices; iii. Improving underwriting terms and the conditions of crop insurance policy, such as purchase deadlines and additional benefits, makes product more sustainable	i. Trigger events like adverse weather (rainfall, temperature, relative humidity etc.) can be independently verified and measured; ii. It allows for speedy settlement of claims, say within 45 days from the end of the insurance period; iii. Insured is not required to submit claim form or other documents as proof of loss. The claim payout is automatically calculated on the basis of weather data collected from the Reference Weather Station at the tehsil/block level
Shortcomings	i. Heavily subsidized CAP in premium as premium paid by farmers is a small fraction of actuarial premium; ii. Financial strain on public funds and administrative difficulties for implementing agencies; iii. Regional problems and disparities in terms of farmers covered, premium collected and claims settled; iv. Lack of endorsement and of interest from farmers	Crop Cutting Experiment (CCEs): Critical to estimating actual yield of a unit area determining indemnity. Among other shortcomings in MNAIS is that the insurance unit (IU) is taken as a smaller area unit, i.e. at the village panchayat level, which can pose a problem. Due to the smaller IU taken, there is an increase in number of CCEs to be conducted which in turn can become a time consuming and tedious. Major issues with CCE include: i. Managing/administering CCEs is a challenge because of high number and large area for conducting CCEs; ii. Short time available to complete the task of CCEs; iii. Challenge in ensuring data collected is reliable, possibility of inadequate care in following prescribed procedures; iv. Local pressure to underestimate yield so that those insured can become eligible for crop insurance claims; v. CCE data is not available on a real-time basis, delay in consolidation of data and delayed settlement of claims.	i. Weather data: Lack of confidence in AWS data, certification, accreditation and quality control of AWSs, particularly from private automated weather stations (AWS); ii. Limited number of weather stations in India. Therefore there is a likely difference in rainfall and weather conditions between the weather station and the farmer's field. With weather stations located at a radii of more than 10 km, there are bound to be differences in weather, particularly in rainfall between the location of weather stations and the farmer's field. Result may lead to undeserved payouts or vice versa.

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Box: Result of relief calculation: Uttar Pradesh

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11. Page 104, Chapter 6: Technical aspects of agricultural insurance; http://ec.europa.eu/agriculture/analysis/external/insurance/technical_en.pdf
12. http://www.cropinsuranceinamerica.org/about-crop-insurance/just-the-facts/page/4/#.Vay17aSqqko
13. http://ec.europa.eu/agriculture/analysis/external/insurance/technical_en.pdf
14. http://www.cropinsuranceinamerica.org/about-crop-insurance/just-the-facts/page/3/#.Va85ZqSqqko

Box: Crop forecasting: The Indian scenario

1. http://www.fao.org/fileadmin/templates/rap/files/Project/Expert_Meeting__ 17Feb2014_/P2-3_Remote_Sensing_for_Crop_Monitoring.pdf
2. Resourcesat-2 comprises three cameras mounted on a single platform with a high-resolution sensor LISS-IV (Linear Imaging Self Scanning Sensor-IV), medium resolution LISS-III (Linear Imaging Self Scanning Sensor –III) and a coarse resolution AWiFS (Advanced Wide Field Sensor).
3. http://bhuvan.nrsc.gov.in/bhuvan/PDF/Resourcesat-2_Handbook.pdf
4. Radar Satellite-1 is a state-of-the-art microwave remote sensing satellite carries a Synthetic Aperture Radar (SAR)

Box: Maharashtra to use satellite imagery

1. http://www.livemint.com/Politics/zQaZGChmifEwpnDzuXxNaI/Maharashtra-to-scan-satellite-images-to-assess-crop-damage-f.html; http://indianexpress.com/article/cities/mumbai/kharif-review-satellite-images-to-assess-crop-yield-for-insurance/his

This report is an assessment of the impact of the unseasonal rainfall and hailstorms in February–April 2015 on agriculture in India. It investigates the effectiveness of response measures—existing relief and compensation mechanisms in the country for farmers affected by such extreme weather events. The report highlights the need for urgent reforms in the agrarian sector, given the expected increase in the frequency of extreme weather events, and cites instances of advancements in crop damage assessment and crop insurance schemes that are more attractive to farmers.

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