

Agricultural Insurance

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<http://fmds.upou.edu.ph/index.php/academics/cep?id=344>



Learning Objectives

- To understand the idiosyncratic and covariate risks associated with agriculture
- To understand the risk management approaches to address the risks in agriculture production
- To evaluate the risk insurance as an effective risk management approach for the most vulnerable in agriculture

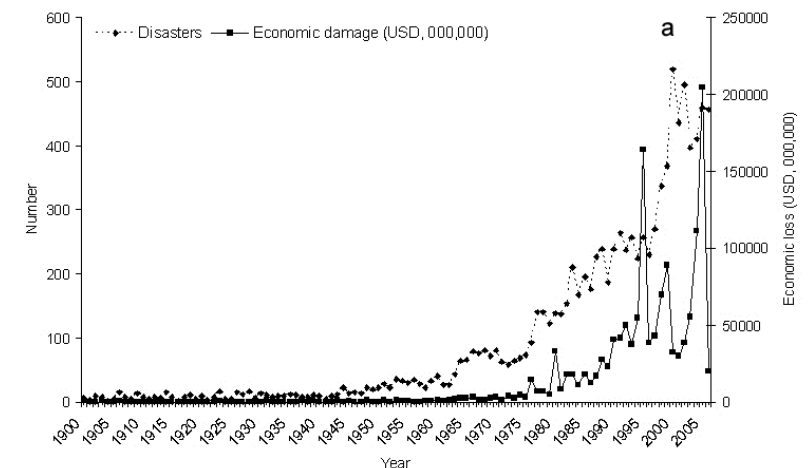


Outline

- Understanding risks in agriculture
- Risk management approaches for agriculture
- Insurance for risk reduction in agriculture
- Example of Japan
- Example of India
- How insurance can be made more effective?
- Conclusions and Way forward



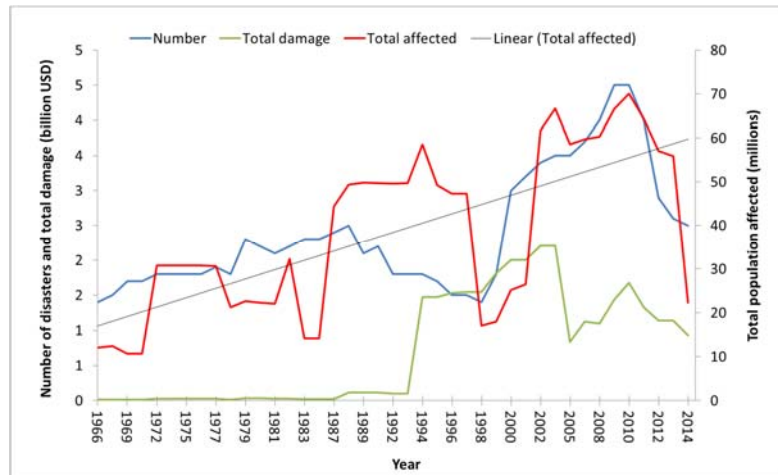
Understanding Disaster Trends



Global: Number of disasters and economic damage (Prabhakar et al., 2009)

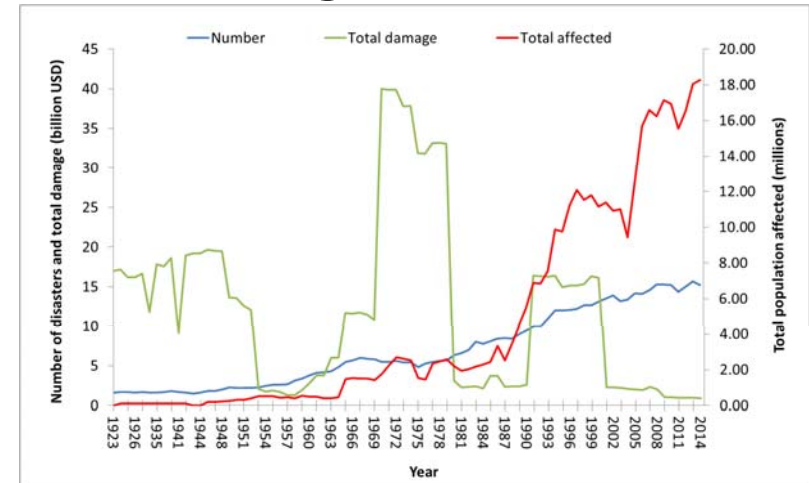


Understanding Disaster Trends



Asia: 10-year moving average of number of droughts and related losses (data from EM-DAT, 2015)

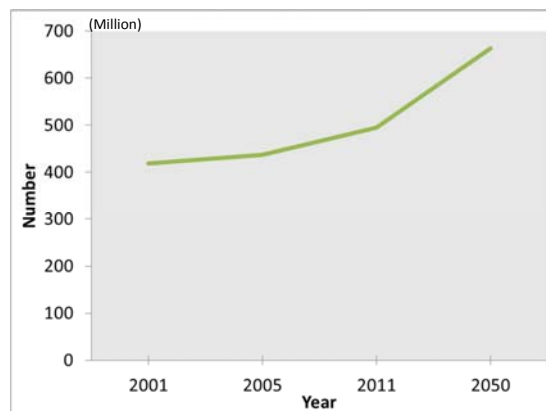
Understanding Disaster Trends



Asia: 10-year moving average of number of storms and related losses (data from EM-DAT, 2015)

Reasons behind increasing trends:

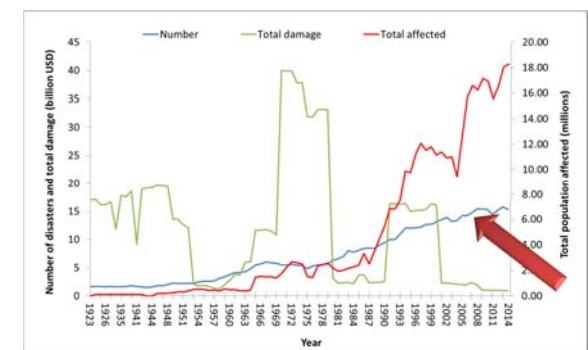
- Increasing population in vulnerable areas including in river flood plains



India: Population (million) in the flood plains of the Ganges basin (2050 figures are projections)

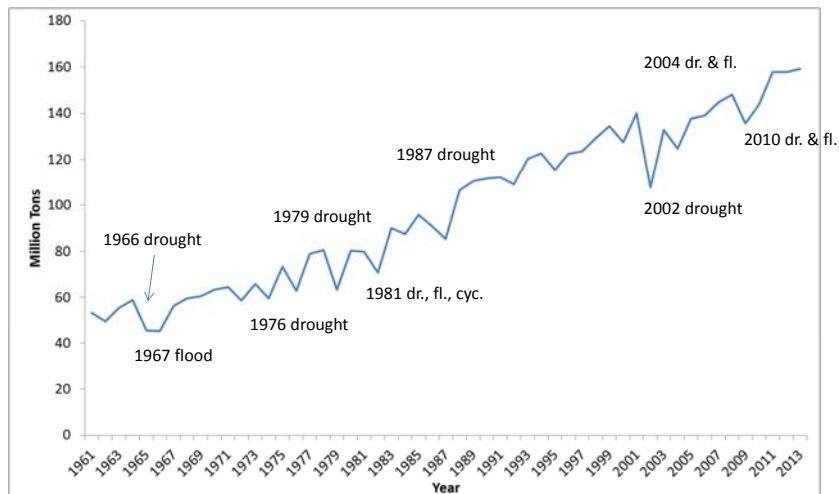
Reasons behind increasing trends:

- Increasing number of natural hazards (climate change?)
- Increased reporting of natural disasters
- A combination of all the above



Asia: Trend in the number of reported storms (EM-DAT, 2015)

Impact on Agriculture Production: India



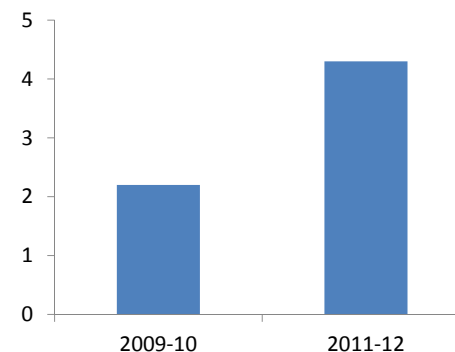
FAO-STAT, 2015



Impact on Farm Income

- Increase in farm loan defaults.
- Increased burden on government: farm loan waivers to the tune of 14.4 billion US\$ in 2008 by GOI, in comparison GOI spent only 694 crore on insurance in 2008.

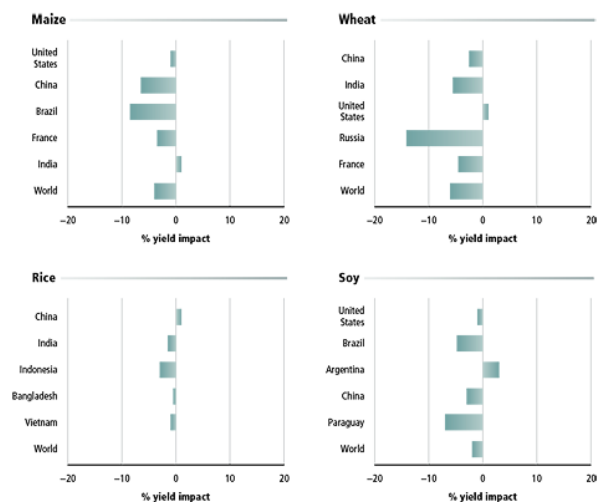
Agriculture NPAs in PSL, India



Source: RBI, 2014



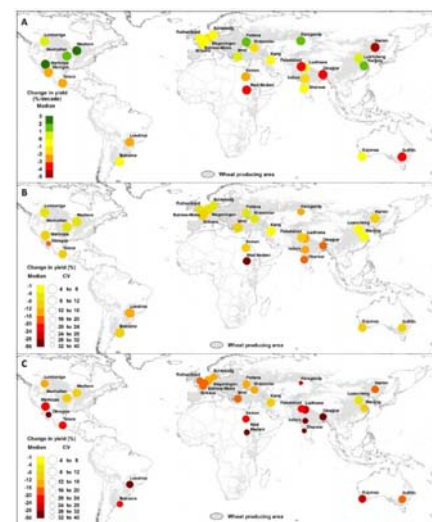
Estimated net impact of climate trends for 1980–2008



Source: Lobell et al., 2011



Global Yield Trends and Climate



“...warming is already slowing yield gains at a majority of wheat-growing locations. Global wheat production is estimated to fall by 6% for each °C of further temperature increase and become more variable over space and time”.

Source: Asseng et al., 2015



Shift towards Better Risk Management!

- There is a need for shift from ex-post relief oriented approaches to ex-ante risk mitigation and risk management approaches.



Understanding the Concept of Risk

- Risk is the combination of the probability of an event and its negative consequences (UNISDR, 2015)
 - In popular usage the emphasis is on chance or possibility
 - In technical usage, the emphasis is on the consequences or potential losses

Understanding the Risk

- Risk is the function of hazard, vulnerability, exposure and capacity.

$$R = f(H, V, E, C)$$

- Hazard is often cannot be controlled where as vulnerabilities and exposure can be reduced and capacities can be improved ultimately reducing the overall risk.

Types of Risks Faced by Farmers: Idiosyncratic Risks

- Shocks that are specific to individual farm contexts and vulnerabilities
- Can be mitigated by diversification of income sources
- Are easy to cover by insurance as they are not correlated with circumstances out of the control of the actors in question
- Risk of investing in such insurance is minimal for insurance companies

Covariate Risks

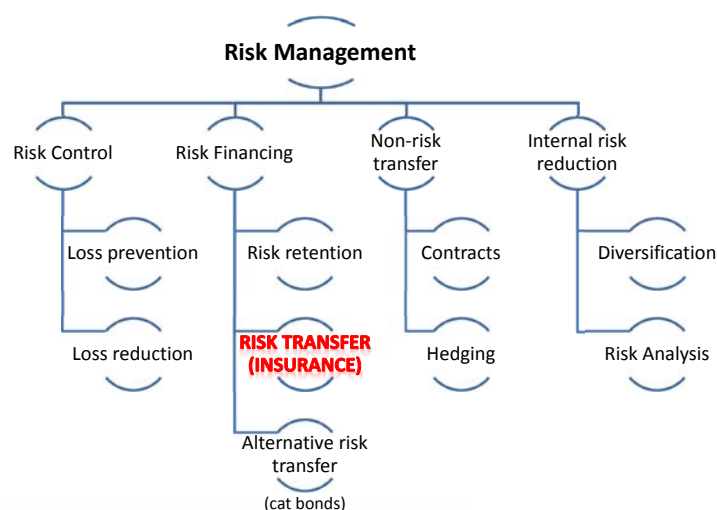
- Risks that have massive impact and are often out of the hands of the actors in question. E.g. constant natural disasters leading to erosion of mutual support systems in the society.
- Often covered by government safety nets.
- Difficult to insure and often associated with high insurance costs

Examples of Risks

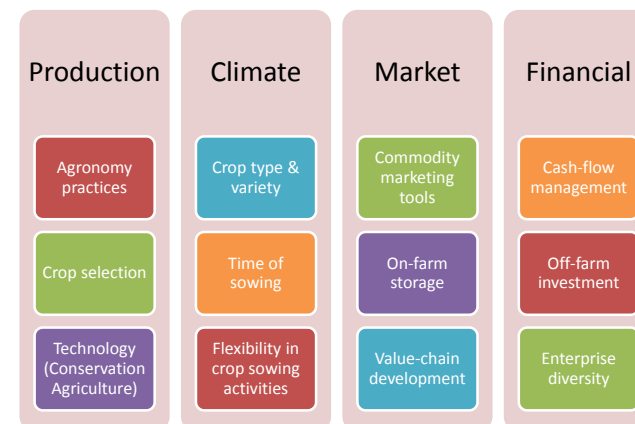
	Idiosyncratic risks	Covariate risks
Income risks	High cost of inputs	Droughts
	Reduction of profits	Floods
	Loss of employment	High temperature shocks
Asset risks	Theft	Low temperature shocks
	Death of animals	Forest fires
	Breakdown of equipment	Disease and pest outbreak
Health risks	Fire outbreak	Labor shortage
	Ill health	Market fluctuations

Source: Adepoju et al., 2013

Risk Management Techniques

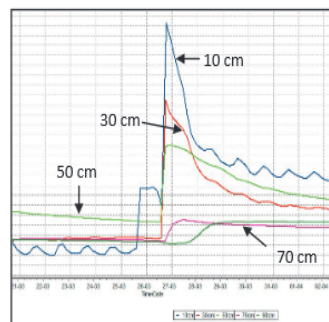


Risks and Management Strategies in Agriculture

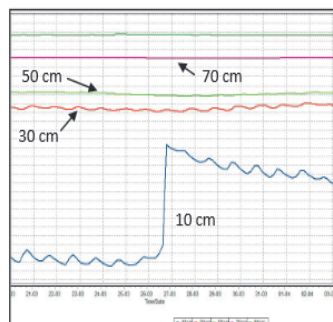


Source: IAfD, 2014

Strategies adopted by farmers to manage risks Improved decision making – moisture monitoring



Moisture probe readings from Paruna Site Sand after 30mm rain on March 27, penetrating to 90cm sensor depth.

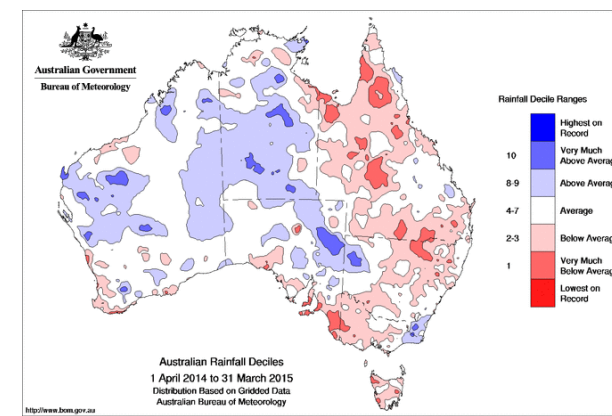


Moisture probe readings from Paruna Site Heavy Flat soil after 30mm rain on March 27, only impacting the 10cm moisture sensor, but not reaching the 30cm sensor.

Source: IAfD, 2014

Strategies Adopted by farmers to manage risks

Managing climate variability through improved decision making: rainfall deciles

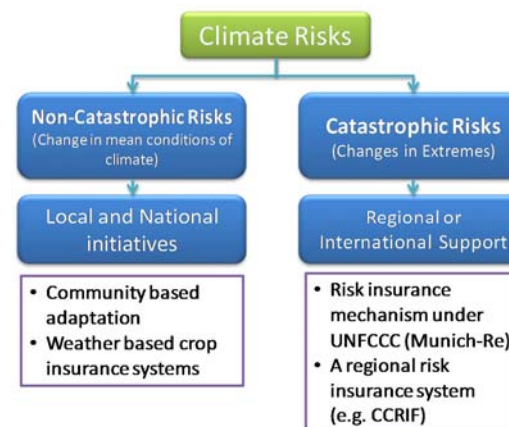


Source: Australian Government, 2015

Market Risks

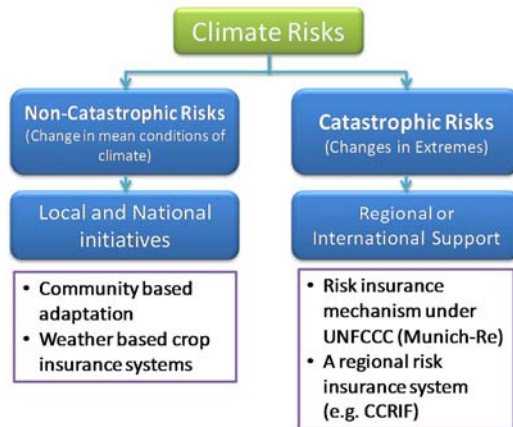
- On-farm storage of grain
- Preparing marketing plan (when, where and how to sell)
- Grain quality maintenance
- Forward contracting

A two-pronged approach for covariate and idiosyncratic shocks



1. Non-catastrophic risks: Risks from change of mean state of climate
 - a. Within the capacity of national systems
 - b. Local knowledge is useful E.g. Community based adaptation, weather based crop insurance schemes etc.

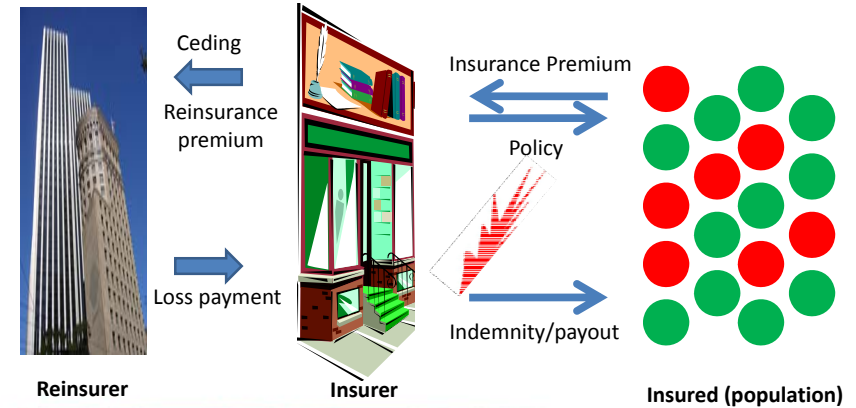
A two-pronged approach for covariate and idiosyncratic shocks



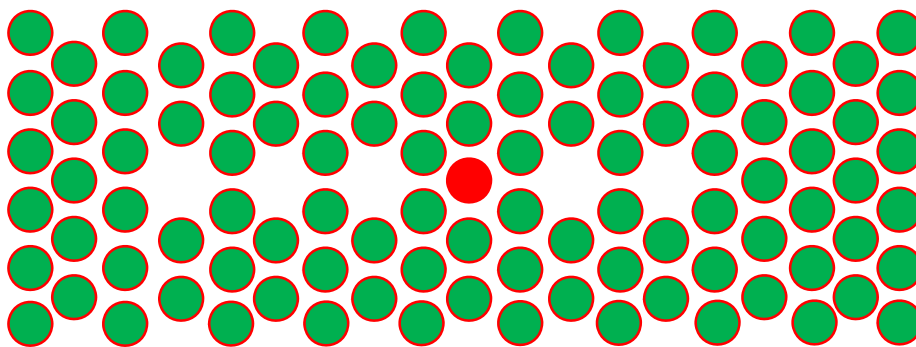
2. **Catastrophic risks: Risks from changes in extremes**
- Need external assistance in terms of finances and experiences
 - Local knowledge often fall short
 - e.g. Global and regional catastrophic risk insurance schemes, adaptation networks

What is Risk Insurance?

- Transfer the risk for a payment (premium) to somebody (insurer) who is better able to bear the risk or can in turn hedge the risks



Risk Spreading



Insured (population)

N=100
 Probability of occurrence of loss = 1%
 Insurance company has to collect premiums from all 100 people in order to pay the one person

7 Principles of Insurance

- Principle of utmost good faith
- Principle of insurable interest
- Principle of indemnity
- Principle of contribution
- Principle of subrogation
- Principle of loss minimization (else results in moral hazard)
- Principle of causa proxima (nearest cause)

Risk Insurance

- Emphasis on risk mitigation compared to response
- Provides a cost-effective way of coping financial impacts
- Covers the residual risks uncovered by the other risk reduction mechanisms.

Source: Arnold, 2008; Siamwalla and Valdes, 1986; Swiss Re, 2010

Risk Insurance

- Stabilizes rural incomes: reduce the adverse effects on income fluctuation and socio-economic development.
- Provides opportunities for public-private partnerships.
- Reduced burden on government resources for post-disaster relief and reconstruction.

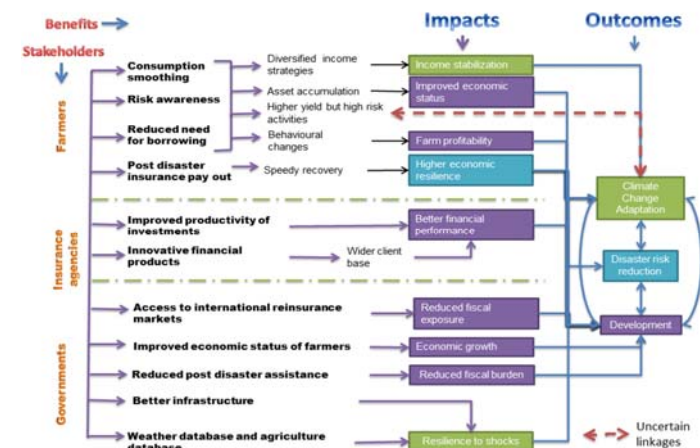
Source: Arnold, 2008; Siamwalla and Valdes, 1986; Swiss Re, 2010

Risk Insurance

- Helps communities and individuals to quickly renew and restore the livelihood activity.
- Depending on the way the insurance is designed, the insurance mechanism can address a wide variety of risks emanating from climatic and non-climatic sources.

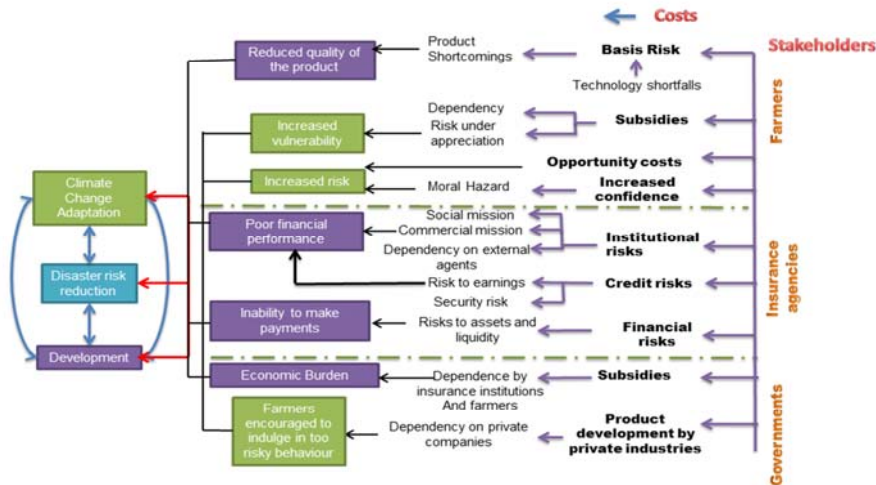
Source: Arnold, 2008; Siamwalla and Valdes, 1986; Swiss Re, 2010

Costs and benefits of insurance



Source: Solomon and Prabhakar, 2014

Costs and benefits of insurance



Source: Solomon and Prabhakar, 2014

Costs and benefits of insurance

The message: Insurance can have both costs and benefits and net benefit in terms of long-term recovery is not always assured at the overall system level depending on how the insurance is designed

Source: IGES, 2014

Types of Insurance in Agriculture

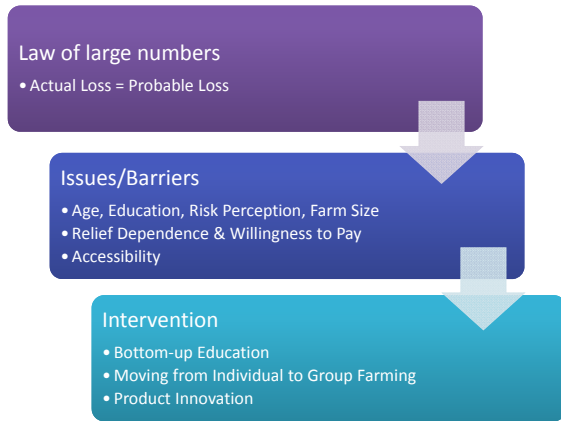
- Single peril insurance
- Multi-peril insurance
- Yield insurance
- Price insurance
- Revenue insurance
- Whole-farm insurance
- (net)Income insurance
- Index insurance
 - Area yield index
 - Area revenue index
 - Indirect index insurance (e.g. weather such as rainfall, temperature etc)

Characteristics of Insurable Risks



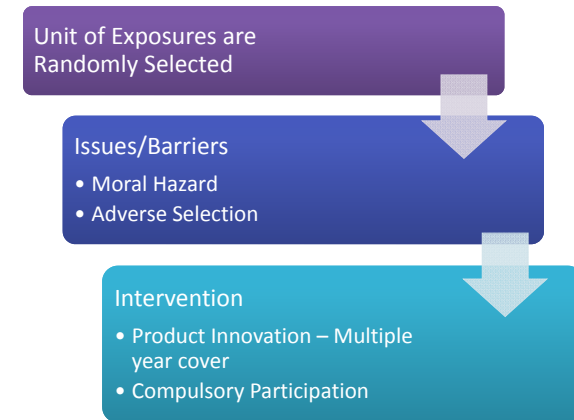
Source: Arpah, 2014

Large Number of Exposure Units



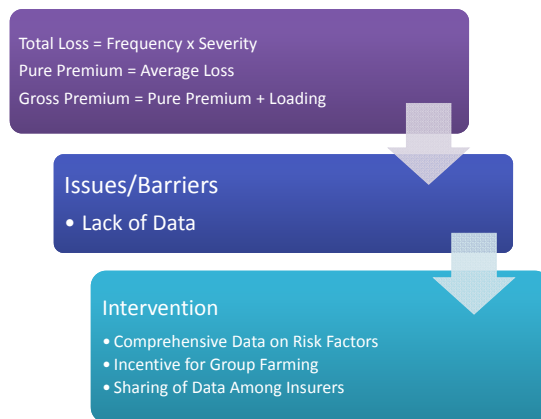
Source: Arpah, 2014

Loss Must Occur by Chance



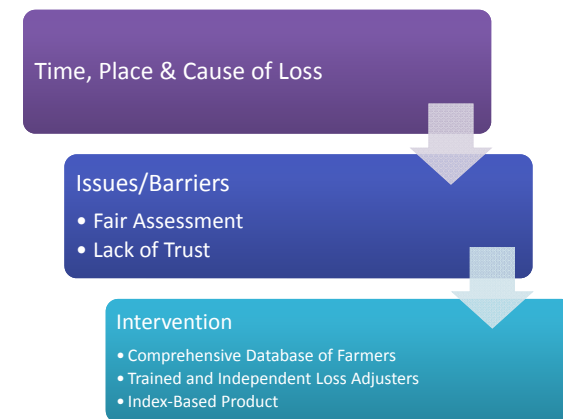
Source: Arpah, 2014

Loss Must Be Measurable



Source: Arpah, 2014

Loss Must Be Determinable



Source: Arpah, 2014

Loss Must NOT BE CATASTROPHIC

Loss exposure should be independent
Individual losses are not severe

Issues/Barriers

- Exposure to Climate Risk is Systemic Risk
- Losses are severe and farmers take time to recover

Intervention

- Promoting self-insurance at local level
- Spreading of Risk Across Countries/Regions

Source: Arpah, 2014

Premium Must Be Economically Feasible

Affordable to Consumers and Profitable to Insurers

Issues/Barriers

- Low Income Farmers and Highly Dependence on Agriculture
- High Risk Leading to High Premium

Intervention

- Promoting Off-Farm Income
- Innovative Premium Collection
- Product Design
- Risk Management Strategies
- Lower Administrative Cost

Source: Arpah, 2014

Risk Insurance and Post-Disaster Recovery

- Typical view of disaster recovery:
 - Infrastructure
 - Health
 - Education
 - Transportation
 - Livelihoods
 - Agriculture
 - Fisheries
 - Manufacturing
 - Social capital
 - Community building
- Insurance?
 - Though insurance is purchased before disaster, its actual role is in post disaster recovery.
 - Insurance can be effective when it is combined with reconstruction.
 - However, insurance has largely been missing from the portfolio of post-disaster recovery approaches.

Risk Insurance and Post-Disaster Recovery

- **What is limiting the potential of risk insurance in post-disaster recovery?**
- **How can Insurance be effective?**

What is Limiting Risk Insurance Role in Long-Term Recovery?

- Can promote emphasis on risk mitigation especially when insurance is made mandatory and there is proper insurance price signal given: **Insurance is largely subsidized in developing countries when present (especially in agriculture sector); In urban sector, insurance is either not mandatory or largely absent.**

What is Limiting Risk Insurance Role in Long-term Recovery?

- Covers the residual risks not covered by the other risk reduction mechanisms. **High basis risks could be a spoiler.**

What is Limiting Risk Insurance Role in Long-term Recovery?

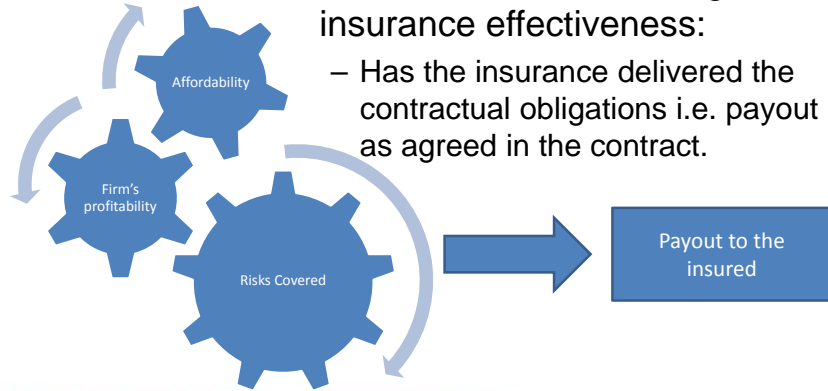
- Stabilizes rural incomes: reduce the adverse effects on income fluctuation and socio-economic development: **Delayed payments, insufficient coverage of hazards.**

What is Limiting Risk Insurance Role in Long-term Recovery?

- Reduced burden on government resources for post-disaster relief and reconstruction: **Subsidization.**
- Provides opportunities for public-private partnerships.

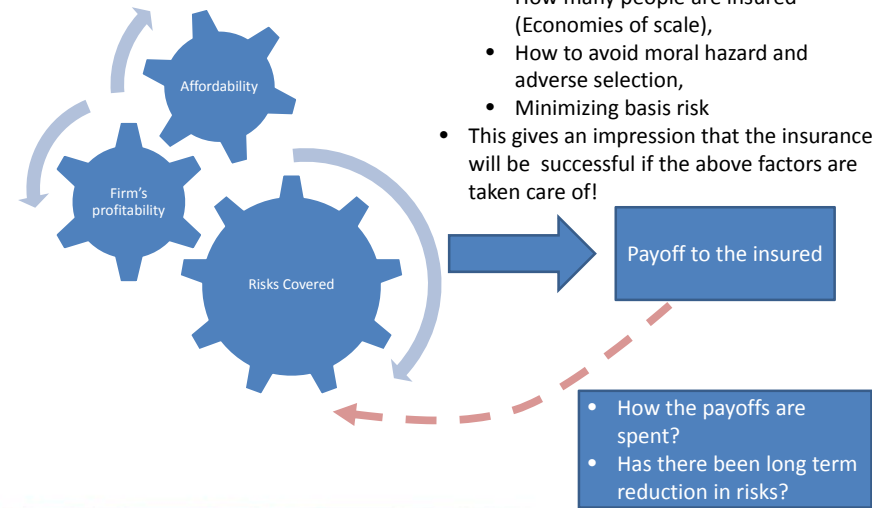
The Notion of Insurance Effectiveness vis-a-vis Recovery

- Traditional understanding of insurance effectiveness:
 - Has the insurance delivered the contractual obligations i.e. payout as agreed in the contract.



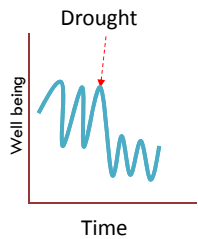
Is this sufficient?

- Most literature and experiences talks insurance effectiveness in terms of
 - How many people are insured (Economies of scale),
 - How to avoid moral hazard and adverse selection,
 - Minimizing basis risk
- This gives an impression that the insurance will be successful if the above factors are taken care of!

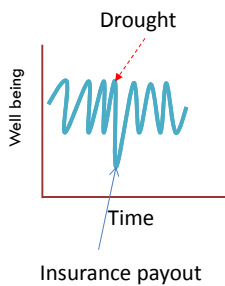


In other words...

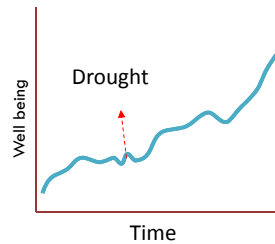
Vulnerable situation



Resilient situation



Adaptable situation



True?

- Will mere paying back of loss amount lead to CCA and DRR benefits?
 - Promoting high risk and profit seeking behavior (with implications for basis risk)
 - How the insurance pay offs are spent by farmers: in risk mitigation or business as usual crop management practices, resulting in no net risk reduction.

True?

- Will mere paying back of loss amount lead to CCA and DRR benefits?
 - Subsidized premiums in most developing country contexts: Doesn't really convey the price signal to farmers leading to no change in crop production practices and no net reduction in cost of risk.

True?

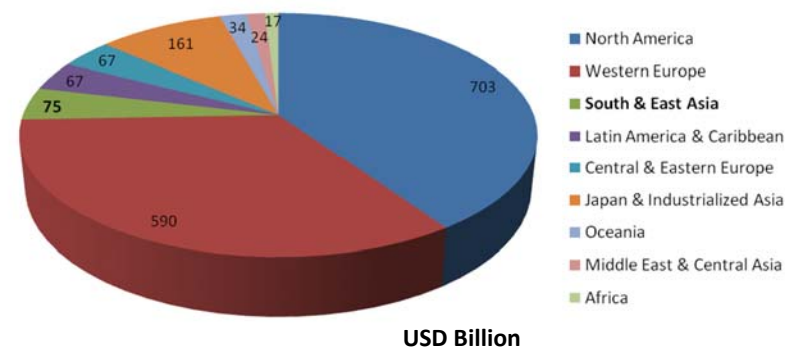
- Will mere paying back of loss amount lead to CCA and DRR benefits?
 - Most of these issues are often linked to not just how the insurance is designed but also what kind of support services (e.g. education on risk management) goes to the insurance buyers so that they make informed choices.

What About Evidence?

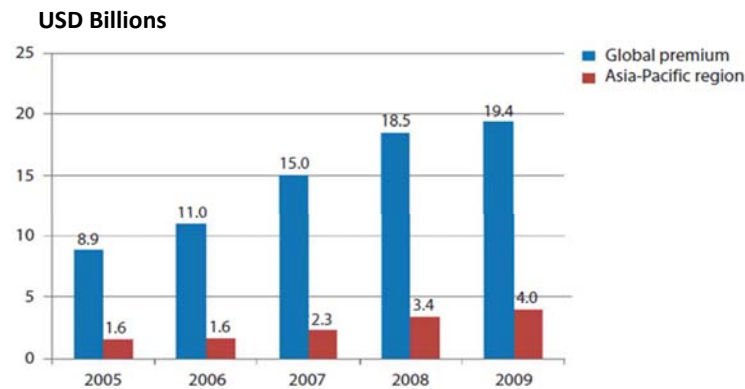
- Our literature review has suggested that there is no sufficient evidence on how insurance is proving effective on the ground. What kind of social and economic benefits insurance is offering leading to disaster risk reduction and climate change adaptation outcomes?

Is the insurance a go-to-tool for the most vulnerable?

Non-life Insurance Premiums



Is the insurance still a go-to-tool for the most vulnerable and poor?



Source: Global Premiums Iturrioz, 2010

Is the insurance still a go-to-tool for the most vulnerable and poor?

- High insurance costs
- High residual risks
 - Urban areas: Poorly developed risk mitigation options such as structural standards, land use/urban planning etc.
 - Rural/agriculture: Only 35-40% of Indian agriculture is irrigated.

Is the insurance still a go-to-tool for the most vulnerable and poor?

- Poorly developed re-insurance industry
- Poor availability of data to assess risks for designing risk insurance systems (e.g. weather data and data on crop loss)
- Willingness to pay: Cultural and perceptual issues with both people at risk and policy makers

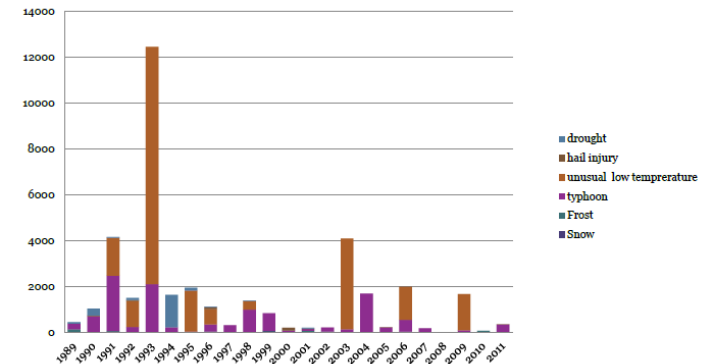
Is the insurance still a go-to-tool for the most vulnerable and poor?

Given these limitations, should we still be thinking insurance as a go-to-tool for the most vulnerable? What are the alternative financial risk management approaches can we think?

Crop Insurance In Japan

Crop damage by Natural Disasters in Japan (100 million Yen): Important perils

Crop damage by disaster, Ministry of Internal Affairs and Communications 2005, 2012



Types of Agriculture Insurance

- Rice, sugarcane*, wheat, and barley (Nation-wide program, *Okinawa)
- Livestock insurance (Nationwide)
- Fruit and fruit-tree insurance (Optional)
- Sericulture insurance (Optional)
- Greenhouse insurance (Optional)

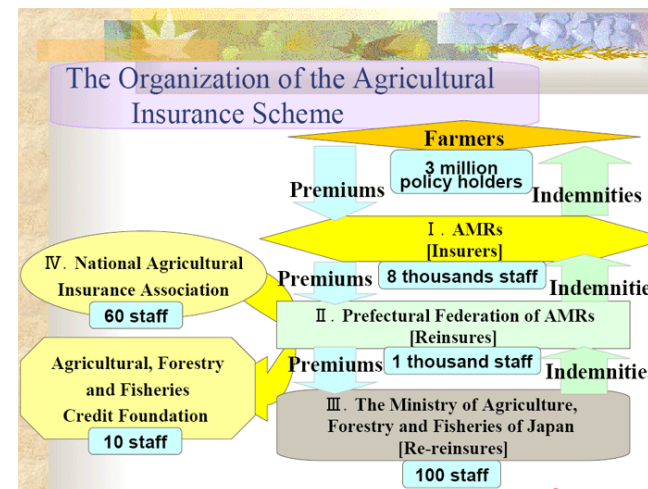
Institutional Arrangements: NOSAI

- NOSAI stands for *Nogyo Kosai Saido (Agriculture Mutual Aid System)*
- Established as a result of Agriculture Natural Disaster Compensation Law 1947: to stabilize the agriculture income from disasters leading to the growth of Japanese agriculture

Institutional Arrangements: NOSAI

- NOSAI is a mutual aid system operated by the Agriculture Mutual Relief associations (AMRs) in each prefecture and the collection of AMRs is called NOSAI.
- The pool of insurance money generated from insurance premiums is used to pay insurance to farmers upon disaster.
- Multi-peril insurance

Organizational Structure



Source: www.NOSAI.or.jp

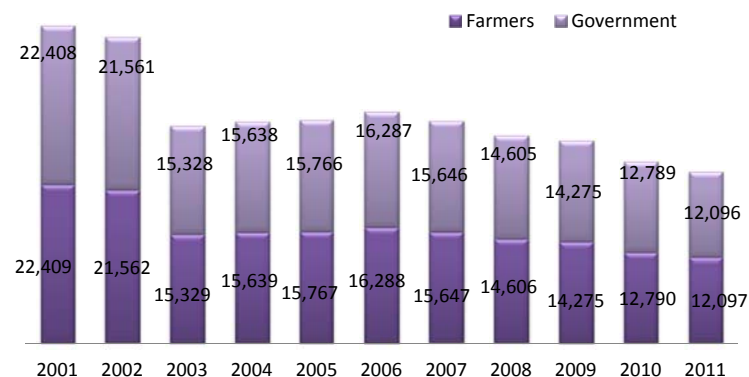
Paddy Insurance

- Started in 1947 according to Agricultural Natural Disaster Compensation Law
- Conditions:
 - Compulsory participation for all the farmers
 - Subsidized by 50%
 - Covers between planting-harvesting
 - Compensation: By loss assessment
 - Offered throughout the country
 - The insurable land should be 20-40acres paddy or 10-30 acres wheat

Sugarcane Insurance

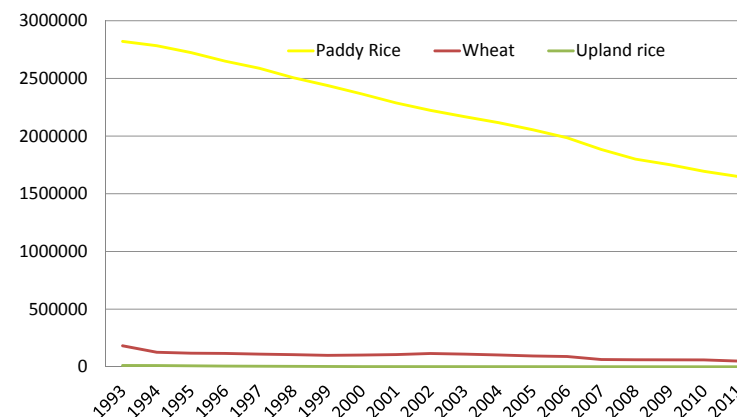
- Started in 1947 according to Agricultural Natural Disaster Compensation Law
- Conditions:
 - Voluntary participation for all the farmers
 - Subsidized by 55%
 - Covers between sprouting-harvesting
 - Compensation: By loss assessment
 - Offered in Kagoshima and Okinawa
 - The insurable land should be >5 acres in mainland and 10 acres in islands

Premiums for crop insurance (million yen)



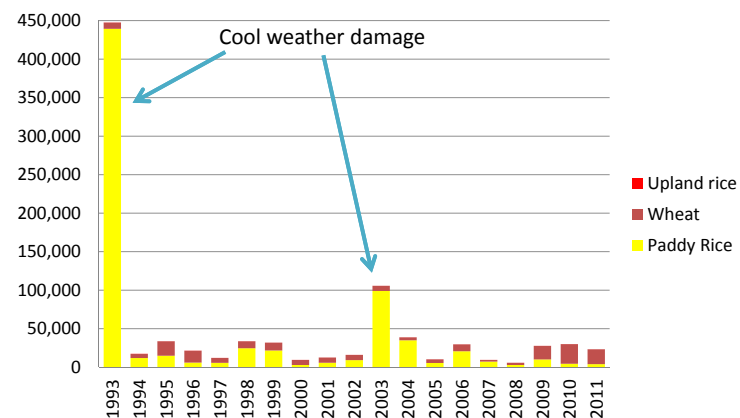
Source: NOSAI

Number of Farmers insured for Crop insurance



Source: NOSAI

Indemnities for crop insurance (Million Yen)



Source: NOSAI

Insurance Performance: Indemnity/producer premium ratio (I/P)

COUNTRY	PERIOD	I/P (producer loss ratio)
Brazil (Proagro)	75-81	4.29
Costa Rica	70-89	2.26
India (CCIS)	85-89	5.11
Japan	47-77	1.48
	85-89	0.99
Mexico (Anagsa)	80-89	3.18
Philippines (PCIC)	81-89	3.94
United States of America (FCIC)	80-89	1.87

Source: FAO, 2011

Farmers Opinion on Insurance

- 90% felt insurance is necessary for recovering from crop loss (highest among all the study countries) and the rest thought it is a good policy for the government to implement.
- 57% didn't find any loopholes in the system while 30% felt that the damage assessment was not up to their satisfaction.

Farmers Opinion on Insurance

- 57% received the compensation within 3 months of damage assessment while others received even sooner.
- Payment was timely for 83% and helped them to recover from the disaster. Majority felt that the damage assessment process was 'fair'.

Source: FAO, 2011

Farmers Opinion on Insurance

- 43% felt that they recovered 'mostly' from the disaster with the help of insurance while the rest felt either recovered fully (30%) or didn't recover at all (10%).
- On the subsidy issue, most farmers felt the current level of subsidy is sufficient while 37% felt that it should be increased to 70%. None favored the removal of subsidy.

Source: FAO, 2011

Sugarcane Insurance

- **Farmer 1:** Okinawa mainland, has <100 acres
Premiums: ¥9,000 × 7 years=¥63,000
Indemnities: ¥83,000 (last year)= **NET BENEFIT!**
- **Farmer 2:** Okinawa mainland, has area of 338a
Premiums: ¥70,000 × 10years=¥700,000
Indemnities: ¥1,470,000 (last year)= **NET BENEFIT!**
- **Farmer 3:** Irab island
Premiums for 24 years= ¥3,000,000
Indemnities: ¥5,000,000 (last year) = **NET BENEFIT!**

↑
What are the DRR and CCA benefits of this payoff?

Conclusions:

- Farmers have reported the net benefit from crop insurance in questionnaire surveys (paddy) and in terms of indemnities received (Sugarcane)
- Subsidy played a major role in farmers finding the insurance profitable/useful (the net positive indemnities was after 55% insurance)

Conclusions:

- Insurance helped in recovery from disaster according to 73% of respondents
- No major issues were reported in terms of moral hazard and hence both the insurance company and the farmers prefer indemnity based insurance (corroborated by the least I/P ratio)

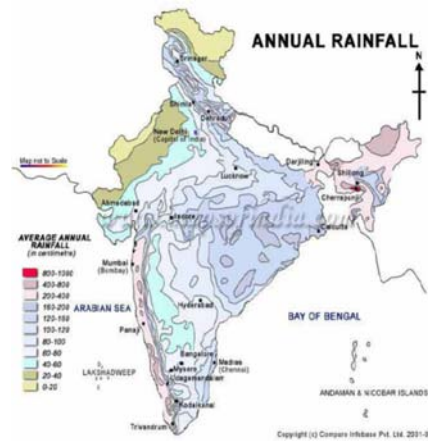
Conclusions:

- There is a considerable resistance from farmers for changing from indemnity based insurance to index based insurance (why fix that is not broken)

Crop Insurance in India

Rainfall Variability

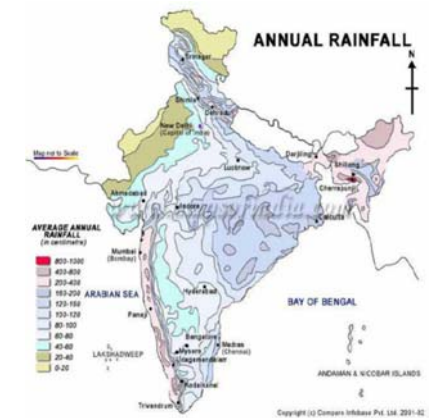
- Rainfall variability is dominant due to the presence of the Monsoon (seasonal winds blowing from the Indian Ocean and Arabian Sea in the southwest bringing heavy rainfall)
- Monsoons contribute 78% India's annual rainfall - undergoes wide inter annual variations



Source: Rao, 2014

Rainfall Variability

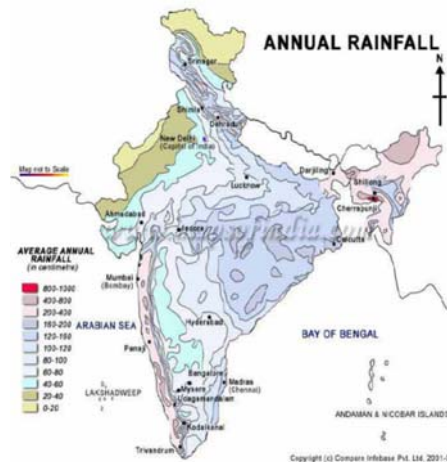
- Large variations in rainfall distribution (<10cm in western desert to >1000cm in northeast)
- Disparity in the rainfall distribution is so great – droughts and floods occur at different parts of the country at the same period and in the same place at different periods



Source: Rao, 2014

Rainfall Variability

- 1/3rd of the country is mostly under threat of drought
- 1/6th of the country prone to floods



Source: Rao, 2014

History of Crop Insurance in India

Early efforts

- Rainfall Insurance Scheme of 1920
- Various new schemes proposed during 1950s
- Crop Insurance Bill and Model scheme during 1960s
- Experimental schemes during 1970s

History of Crop Insurance in India

Area based schemes

- Pilot Crop Insurance Scheme (PCIS): 1979–84
- The Comprehensive Crop Insurance Scheme (CCIS): 1985–1999
- The Experimental Crop Insurance Scheme (ECIS): 1997–1998
- The Pilot Scheme on Seed Crop Insurance (PSSCI): 1999-2000
- The Pilot Project on Farm Income Insurance Scheme (FIIS): 2003-2004

History of Crop Insurance in India

Weather / Area Based Schemes

- Weather Based Crop Insurance Scheme (WBCIS): 2004 – 2014
- National Crop Insurance Program (NCIP): 2013 – 2014
- Modified National Agricultural Insurance Scheme (MNAIS): 2010 -2014

National Agricultural Insurance Scheme

- Initiated in 1979, it is improved over the years (1999) and made national program (1985)
- Yield guarantee scheme
- Compulsory for all borrowers and optional for non-borrowers
- Indemnity based insurance (the level of indemnity can be chosen by the insured)

Source: K.N. Rao, 2011. Presented at IGES-TERI Workshop on Future Climate Regime.

Major Issues ...

Major Issue	Explanation
Discrepancy in Area insured	The area insured for a particular crop being more than the crop area sown
Crop-cutting experiments (CCEs)	Delay in receiving crop-cutting data, and quality and reliability of such data
Weather data, particularly from private automatic weather stations (AWSs)	Lack of confidence in AWS data
Crop loan practices	Non-compliance with the provision of compulsory insurance for borrowed farmers, multiple loans on the same land, lack of seasonality discipline, etc.

Source: Rao, 2014

Major Issues ...

Major Issue	Explanation
Technical skill and capacity building of personnel associated with crop insurance schemes	Personnel with government agencies, banks and insurance agencies
Awareness of farmers regarding various features of the schemes	Farmers do not have information on the schemes and principles of insurance
Product design	Lack of innovation and poor correlation of product parameters with yield outcomes.
Crop insurance premium	Affordability for farmers; transparency in determining premium rate
Settlement of claims	Delay in settlement of claims; dissatisfaction with quantity of claims in case of WBCIS

Source: Rao, 2014



Recommendations

Major Issue	Recommendations
Discrepancy in Area insured	Use technology (GIS, GPS, GPRS etc.), instead of the area-correction factor
Crop-cutting experiments (CCEs)	Use of technology (Remote Sensing, Crop Simulation Models, GPRS enables photographs etc.,)
Weather data, particularly from private automatic weather stations (AWSs)	A system of accreditation, certification and quality monitoring of AWSs
Crop insurance premium	Inadequate yield data for smaller area units results in more loading, leading to higher premium. Determination of premium needs to be rationalized.
	Premium rates for irrigated crops should be different from that of non-irrigated crops so as to encourage participation of farmers with irrigated agriculture.



Recommendations

Major Issue	Recommendations
	Introduction of a no-claim bonus would encourage farmers to participate in the scheme.
	Presence of village level yield / weather data.
	Instead of bundling together several risks while calculating premium rates for a particular crop, the most critical risk could be identified and design the contract. Other risks can be included as additional benefits with incremental premium.
	A basic insurance product with a lower premium rate, but with a 'top-up' option for additional triggers or perils at incremental premiums could be introduced. This will give farmers more choice, and the basic product would be more affordable.



Recommendations

Major Issue	Recommendations
	An atlas of critical weather elements that trigger crop-yield losses in different crop-growth periods should be developed for different agro-climatic regions. Governments and industry could use this as a benchmark while deciding the premium.
Settlement of claims	A time limit of three months from the end of the crop season or date of crop harvest or submission of crop-cutting data may be incorporated. Delay in payment should attract penalty along with interest on payable amount.



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How Best Insurance Can Lead to Long-term CCA-DRR Benefits?

- When it was combined with post-disaster reconstruction
 - Combining fire and earthquake insurance with reconstruction of houses

How Best Insurance Can Lead to Long-term CCA-DRR Benefits?

- Mandatory requirement
 - Japan, mandatory fire and earthquake insurance with right insurance price signal has led to higher emphasis on risk mitigation leading to long-term reduction in risks

How Best Insurance Can Lead to Long-term CCA-DRR Benefits?

- Right price signal
 - Avoiding subsidies (e.g. agriculture) and instead spending on risk mitigation options

How Best Insurance Can Lead to Long-term CCA-DRR Benefits?

- Appropriate insurance and contract design
 - Multi-peril and location specific insurance approaches including weather index insurance
 - By reducing basis risks
 - Mandatory combination of risk mitigation and risk spreading instruments
 - Reducing basis risks, lessening disaster losses
 - Making female members of household the beneficiary of insurance payoff
 - Economic empowerment and share in risk management decisions
 - Innovative solutions such as linking savings with insurance
 - Effectively high liquidity situation of households that can be used for nutrition, health and education

Questions that are yet to be addressed

- With the above context, the following questions deserve in-depth examination:
 - Are insurance instruments designed keeping in long-term objectives in mind? What are long-term evidences we have?

Questions that are yet to be addressed

- Is there any evidence for farmers adopting more robust risk mitigation options to reduce premium prices?
- How do we know that insurance is resulting into disaster risk reduction and climate change adaptation outcomes?

Questions that are yet to be addressed

- What indicators and methodologies can we pick to assess insurance products for their CCA and DRR benefits?
- What insurance design elements and monitoring and evaluation procedures can ensure such benefits for various stakeholders engaged in insurance?

Questions that are yet to be addressed

–Does the slow pace of progress in up scaling insurance in developing countries hint for alternative risk management options? If so, what they would be?

Conclusion

Asia pacific region is highly vulnerable to climatic hazards. We have seen that farmers and governments are prone to financial burden. While there are several risk management options, we have seen that risk insurance is slowly gaining importance in the Asia pacific region for the benefits we discussed. For the insurance to be effective, it is important that the insurance premium prices are kept affordable while still being profitable for insurance companies. However, there is a need to move from traditional indemnity insurance approaches to index based approaches to avoid moral hazard, adverse selection and other costs. In terms of long term risk reduction, insurance in itself may not lead to long-term risk reduction if the risk price signal is not conveyed to the farmers and if the insurance is not mandatorily combined with risk mitigation options such as best management practices.

Thank you!

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