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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
ADBL	Agricultural Development Bank Limited
AICI	Agricultural Insurance Company of India
BGA	Island Banana Export Association
BGC	Island Banana Export Company
BSE	Bovine Spongiform Encephalitis
CBS	Central Bureau of Statistics
CECI	Centre for International Studies and Cooperation
CLDP	Community Livestock Development Program
CMF	Centre for Microfinance
CoV	Coefficient of Variation
CRAM	Crop Risk Assessment Model
CSD	Centre for Self-Help Development
CWII	Crop Weather Index Insurance
DAH	Directorate of Animal Health
DECRS	Development Economics Vice Presidency Research Support
DHM	Department of Hydrology and Meteorology
DICGC	Deposit Insurance and Credit Guarantee Corporation
DoA	Department of Agriculture
DoLS	Department of Livestock Services
DSCP	Deprived Sector Credit Program
FMD	Foot and Mouth Disease
GCMNB	Global Capital Market Non Banking Financial Institutions Division
GFDRR	Global Facility for Disaster Reduction and Recovery
GoN	Government of Nepal
HH	Households
IRB	Brazilian Reinsurance Institute
IU	Insured Unit
LDCs	Least Developed Countries
MDG	Millennium Development Goals
MFI	Microfinance Institution
MOAC	Ministry of Agriculture and Cooperatives
MOF	Ministry of Finance

MPCI	Multiple Peril Crop Insurance
NAIS	National Agricultural Insurance Scheme
NAITSU	Nepal Agricultural Insurance Technical Support Unit
NBL	Nepal Bank Limited
NGO	Non-Governmental Organization
NPR	Nepalese Rupee
NRB	Nepal Rastra Bank
OCA	On Call Assessors
OIE	Office Internationale des Epizooties
PML	Probable Maximum Loss
PPR	Pestes de Petits Ruminants
PSCP	Priority Sector Credit Program
RBB	Rastriya Banijya Bank
RBS	Rastriya Beema Sansthan
RMDC	Rural Microfinance Development Center
RRDB	Regional Rural Development Bank
RSRF	Rural Self-Reliance Fund
SACCOS	Savings and Credit Co-operatives
SACNP	World Bank Office in Kathmandu, Nepal
SASFP	South Asia, Finance and Private Sector Development Unit
SFCL	Small Farmer Cooperatives Ltd
SHG	Self-Help Group
SIF	Self Insurance Fund
SKBB	Sana Kisan Bikas Bank Ltd (Small Farmer Development Bank)
SVD	Swine Vesicular Disease
VDC	Village Development Committee
VO	Village Organization
WINCROP	Windward Islands Crop Insurance Limited

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EXECUTIVE SUMMARY

CONTEXT

1. Key policy and strategy documents including the latest Budget Speech for the Fiscal Year 2008-09 emphasize the major role that agriculture can play in poverty reduction in Nepal. The stagnation in the agricultural sector has become the major factor of underdevelopment and poverty. The main goal of rapid economic growth and poverty alleviation cannot be achieved until agricultural productivity is increased and excess manpower from agriculture is shifted to other sectors of the economy through creation of gainful employment opportunities.
2. Agricultural production can increase if the vagaries of nature and the risks associated with it can be better managed. One third of agriculture land is under irrigation and therefore the majority of the Nepali farmers are exposed to adverse weather events. Given the scarcity of affordable and suitable risk management tools, when exposed to adverse shocks, low income households may be forced to reduce food consumption, take their children out of school, and sell productive assets, which then jeopardize their economic and human development prospects.
3. The study on Access to Financial Services in Nepal conducted by the World Bank in 2007 identified the need for innovative financial products to assist farmers in the management of agricultural (livestock and crop) production and thus contribute to increasing agricultural productivity. Insurance can facilitate access to agricultural credit at better terms as it increases the creditworthiness of farmers and other agents of the agricultural sector. To the extent that farm-level risk management instruments contribute to the overall financial stability of the agribusiness sector, indirect benefits in terms of credit availability may be realized at other levels of the agribusiness marketing chain. Financial instability at the farm-level arising from yield or price shocks may lead to instabilities at other levels of the processing and marketing chain. In this way, instruments that contribute to stability at the farm level may ease credit constraints for agents at other levels of the agribusiness complex.
4. In this context, the Ministry of Finance (MOF), the Insurance Board, and the Ministry of Agriculture and Cooperatives (MOAC) asked the World Bank to conduct a feasibility study on agricultural insurance in Nepal, with a particular focus on small and marginal farmers, and provide recommendations for its future development. This work aims to provide an overall framework for the development of sustainable market-based agricultural insurance for small and marginal farmers in Nepal. It relies on the following components:
 - *Review of agricultural insurance in Nepal.* While the formal insurance sector does not offer agricultural insurance products, some entities are involved in providing insurance protection, which is usually linked directly to their credit operations.
 - *Agricultural risk assessment.* A formal crop and livestock risk assessment is performed. It is intended to assist policy makers and insurance practitioners in the planning, design and rating of crop and livestock insurance. This assessment is essential in developing technically and financially sound agricultural insurance products.
 - *Agricultural product development.* An analysis of suitable agricultural insurance products is conducted, for both crops and livestock. It identifies products that could be developed and piloted in a second phase.

- *Operational issues for agricultural insurance.* Operational challenges for the development of agricultural insurance are discussed, including underwriting, distribution, and loss assessment.
 - *Institutional challenges.* The emergence of a sustainable market-based agricultural insurance program entails support from the government in creating an economic and legal environment that attracts private insurers and provides farmers with the incentives to engage in risk-financing strategies. It includes, among others, the development of risk market infrastructure, such as efficient data collection and management systems, appropriate regulatory and legal framework, effective information and education programs, and the development of local technical expertise.
5. ***This report draws heavily on international experience.*** International experience on agricultural insurance is vast, as agricultural insurance is currently being implemented in more than 100 countries around the world. This study benefits from this international experience (for example, the Indian area-yield and weather index crop insurance schemes, a Mexican agricultural mutual insurance program, and a Mongolian livestock mortality index insurance program) which is tailored to the local economic and social characteristics of Nepal.

CHALLENGES FOR THE DEVELOPMENT OF AGRICULTURAL INSURANCE IN NEPAL

6. Nepal faces a series of key institutional, technical, operational and financial challenges in developing crop and livestock insurance products and services which are suited to the needs of the country's small and marginal farmers, and in scaling-up the demand for and supply of crop and livestock insurance.

Institutional challenges

7. ***Farmers lack awareness of and access to agricultural insurance.*** There is a very low level of awareness and knowledge about agricultural insurance on the part of Nepalese crop and livestock producers. The level of current supply of suitable agricultural insurance products and demand for insurance is low. In the case of livestock, after 20 years of livestock-credit guarantee insurance programs, current uptake amounts to less than 15,000 head of cattle or buffalo each year or less than 0.2 percent of the national herd.
8. ***Lack of legal and regulatory framework for agricultural insurance.*** In the absence of specific agricultural insurance legislation, there is a lack of clarity over the legal status of the guarantee protection cum insurance products which are being implemented by a range of public-sector organizations, the cooperatives, NGOs, and MFIs.
9. ***Current insurance legislation does not recognize the informal crop and livestock insurance programs implemented through the cooperatives and MFIs.*** Current insurance legislation and regulation does not recognize, and thus does not supervise, the insurance products and services offered by the cooperatives and MFIs to Nepali small and marginal farmers. This in turn acts as a major barrier to collaboration between cooperatives/MFIs and private commercial insurers in their efforts to identify ways of:
- (a) Strengthening and standardizing agricultural insurance product design and rating so that these conform to the technical and legal requirements of the insurance industry;
 - (b) Developing an integrated risk financing strategy for crops and livestock whereby the cooperatives might operate as the primary insurer, the insurance companies might provide excess of loss insurance (reinsurance) and government might also participate as a catastrophe reinsurer; and
 - (c) Collaborating in the marketing of agricultural insurance products, thereby reducing the costs to both parties and other operational areas (underwriting, premium collection, loss assessment and claims settlement).

Financial challenges

10. **Private insurance companies have limited financial capacity** and are reluctant to take a lead in investing in agricultural insurance which is considered to be a high risk class of insurance. Commercial insurers are also concerned about their ability to access international agricultural reinsurance capacity.
11. **Cooperative Agricultural Insurers have limited financial capacity and none of their programs are currently reinsured.** The cooperative and MFI insurers usually have very limited financial reserves and none of the agricultural credit-guarantee or insurance programs reviewed are protected by reinsurance. The lack of access to formal risk transfer and reinsurance mechanisms leaves the individual cooperative or MFI insurers very exposed to catastrophe losses (e.g. epidemic diseases, drought, flood and wind). Should a major insured loss occur, they would be unable to pay all due claims in full. International experience shows that in many countries, crop and livestock insurance has been initiated by farmer cooperative or mutual insurers. Many of these programs have, however, failed because of their inability to put in place a proper catastrophe reinsurance program.

Technical challenges

12. **Lack of exposure to international agricultural insurance technology.** The private insurance companies have had little or no exposure to international practice in agricultural insurance and they lack knowledge and awareness in the design, rating and implementation of agricultural insurance. The cooperatives and MFIs also have very limited experience with agricultural insurance.
13. **Limited range of crop and livestock insurance products.** The range of crop and livestock insurance products currently available through the cooperative and microfinance sectors are very restricted and need to be strengthened and brought into line with international standards. There is also a need to develop new crop and livestock insurance products which are tailored to the needs of Nepali farmers in each of the main agro-climatic regions.
14. **Data and information** are critical to the design and rating of any crop and livestock insurance program in Nepal. Availability of quality, long term time series data on crop production and yield is a challenge faced in developing adapted crop insurance products. Data on crop production and yields are available at a district level for Nepal and are useful for regional crop risk assessment, although the data may underestimate actual yield variability. Time series crop production loss data by cause of loss are not available. Nepal has a high density of weather stations and more than 30 years of daily weather data which can be used in the design of weather index products. For livestock the regional mortality statistics are of limited use for the design and rating of livestock insurance policies.

Operational challenges

15. **Private insurers lack rural branch networks.** The commercial insurance companies have regional branch offices in the major cities, but few have retail sales outlets in individual districts and villages. Currently therefore the private commercial insurers do not have a rural distribution network through which to market crop and livestock insurance products and services to Nepal's predominantly small farmers. Conversely, the cooperatives and MFIs are working directly with small producers in most Village Development Committees (VDCs) in Nepal and there is a well established rural credit network through which insurance products and services could also be distributed and administered.
16. **High administrative costs of agricultural insurance for small farmers.** The very small size of farms of less than one hectare and small average herd size of 2 to 3 animals means that the costs of insurance delivery and underwriting and claims administration are potentially prohibitively high. Any concept of individual farmer sales needs careful consideration and there is a need to identify group sales e.g. linked to input supply or to seasonal production loans.

OPTIONS FOR CONSIDERATION

Developing an enabling agricultural insurance framework for Nepal

17. **No “one-size-fits-all”!** Any agricultural insurance programs in Nepal are likely to be location specific and will need to reflect the local risk exposures (flood and/or drought are key exposures in the Terai, while hail and landslide are of greater concern in the hills), and take into account infrastructural constraints and the presence of local service organizations.
18. **Each type of Nepali farmer needs tailor-made agricultural insurance solutions.** Subsistence farmers: traditional crop or livestock insurance will not benefit these farmers; semi-commercial farmers: the cooperatives and MFIs are already assisting with livestock insurance and new pilots for crop insurance and these initiatives should be built-upon; commercial farmers: insurance through the cooperatives/microfinance institutions, and possibly private sector insurance for the biggest farmers should be initiated.
19. **The role of the private commercial insurance sector may be limited in the short term.** In the short term the commercial insurance industry lacks the underwriting capability and rural infrastructure to implement and administer small-holder agricultural insurance cost-effectively and it is therefore unlikely to get directly involved in individual farmer crop or livestock insurance, although there could be exceptions either under a carefully designed pilot weather index insurance coverage or tailored insurance coverage for larger commercial livestock operations.
20. **Mutual agricultural insurance is likely to offer potential for development in Nepal.** The current livestock and crop insurance initiatives through the cooperatives and/or MFIs appear to offer considerable potential for replication and scaling-up in Nepal. They should be promoted and strengthened by creating some form of pooled excess of loss reinsurance. Ways of establishing a linkage between the cooperative and MFI insurance sectors and the private commercial insurers need to be explored, but unless insurance legislation is amended the insurance products and services offered by the cooperatives/MFIs will not be legally recognized. Mutual insurance should be properly regulated and meet adequate solvency requirements.
21. **The role of the government, with the assistance of the donor community, is essential for the development of agricultural insurance in Nepal.** It should focus on stimulating crop and livestock insurance through the cooperative and rural banking/microfinance sectors. The Government of Nepal (GoN) could facilitate a review of existing insurance legislation with a view to bringing cooperative and MFI insurance practices and regulations into line with those of the private commercial insurance sector and to legitimize insurance through these organizations.
22. **There is a need for technical assistance in the design and implementation of agricultural insurance products.** Technical assistance is required to enable Nepalese insurers to develop agricultural risk assessment methodology; develop rate-making methodology; develop crop and livestock products; develop loss adjustment procedures; train underwriters and sales agents; train field assessors and loss adjusters; and to educate farmers and livestock producers on the role and functions and benefits of risk transfer/insurance. The GoN, with the help of donors, could support the creation of a Technical Support Unit, to provide technical assistance to the insurance companies.
23. **The Government should also strengthen the risk market infrastructure,** such as the agricultural and weather data collection and management systems, or the legal and regulatory framework to allow for index-based insurance.

24. **The Government could act as a reinsurer of last resort against agricultural catastrophic losses.** The Government could play an important role in providing catastrophe reinsurance if local insurers and/or international reinsurers are unwilling to provide excess of loss reinsurance protection for the cooperative/microfinance agricultural crop and livestock insurance initiatives.
25. **The Government could provide targeted premium subsidies.** Insurance premiums subsidies targeted to small and marginal farmers and/or specific crop/livestock could be offered by the GoN as part of a social program. Targeted premium subsidies may help small and marginal farmers to access agricultural insurance. Such a public subsidy program should be carefully devised (with a clear exit strategy) to provide the adequate financial incentives and its costing should be carefully analyzed to avoid unsustainable public costs.

Developing agricultural insurance pilots

26. Table 1 provides a summary of the main internationally available crop insurance products and the World Bank's assessment of their suitability for smallholder agricultural conditions in Nepal in the start-up phase of new market-based pilot crop insurance programs.
27. **There may be possibilities to pilot test an area-yield index program**, where: (i) payouts are based on an aggregated crop yield index, (ii) there are areas of homogeneous rain-fed or irrigated cropping and (iii) farmers use similar varieties and crop husbandry and technology levels. This may apply especially to paddy rice grown in flood and/or drought prone areas of the Terai. However, the biggest issue facing the design of an area-yield index pilot program for Nepal relates to the method of establishing average yields for the insured crop.
28. **Weather based crop insurance, where payouts are based on parametric indices such as cumulative rainfall levels, could offer potential for introduction into Nepal** under a carefully designed pilot program for one or two selected crops grown under rain-fed conditions and where coverage would initially be provided for excess rainfall or rainfall deficit (drought) and possibly for low temperatures (frost). Potential Pilot Programs for weather index insurance in Nepal might include: excess rainfall, rainfall deficit for rain-fed paddy rice grown in the Terai; or low temperature (frost) and relative humidity for potatoes grown in the hill region.

Table 1. Potential Crop Insurance Products for Nepal

Type of Crop Insurance Product	Basis of Insurance and Indemnity	Suitable for Nepal in start-up phase?
<i>Traditional Individual Farmer Insurance</i>		
Single peril Hail	% Damage	YES
Named Peril (e.g. Hail + Fire + Frost)	% Damage	YES
Multiple Peril Crop Insurance (MPCI) (incl. Drought)	Loss of Yield	NO
Revenue Insurance	Loss of Yield and Price	NO
<i>New Crop Index Insurance</i>		
Aggregate Yield Shortfall Insurance	Loss of Aggregate Yield	NO
Area-Yield Index Insurance (e.g. NAIS, India)	Area-Yield Index	YES
<i>Crop Weather Index Insurance</i>		
Micro-Weather Index Insurance (individual farmers)	Weather Index (e.g., rainfall)	YES
Meso-Weather Index Insurance (financial institutions)	Weather Index (e.g., rainfall)	YES
Macro-Weather Index Insurance (governments)	Weather Index (e.g., rainfall)	NO

29. **Livestock insurance programs.** None of the livestock credit-guarantee cum insurance programs in Nepal is currently reinsured and they are therefore very exposed to catastrophe losses, particularly epidemic diseases of livestock. The following strengthening of the existing livestock policies could be considered:

- There is a need to introduce a simplified and standard Livestock Accident and Mortality Policy for cattle and buffalos, which specifically excludes all Class A and B contagious diseases;
- The standard livestock policy should clearly state the range of insured perils. The insured perils should include natural perils such as fire, flood, landslide, and accidental injury or death;
- A technical review of the premium rates should be conducted;
- If the community-based livestock insurance programs are to attract pooled reinsurance protection in the future, it will be necessary to introduce a standard policy wording(s) across all cooperatives and MFIs, to agree on standard rates and discounts and uniform risk acceptance, loss notification and loss assessment procedures.
- While most small farmers with less than 5 head of cattle or buffalo will probably continue to purchase individual animal insurance, options for larger livestock owners should be considered including herd cover with explicit deductibles.
- There is also a need to consider ways of scaling-up coverage. Currently about 15,000 head of cattle and buffalo are insured each year under the government and community livestock insurance programs, which represents only about 0.1 percent of the national herd.

MOVING AHEAD

30. **Agricultural insurance should be promoted as part of the overall disaster risk management framework in Nepal.** Agricultural insurance for small and marginal farmers is not sustainable as a stand-alone program. It should complement other agricultural risk management activities aimed at reducing the vulnerability of small and marginal farmers to natural disasters.
31. **The development of agricultural insurance will require addressing major institutional and technical/operational challenges.** Close collaboration is needed between the Government of Nepal, and particularly the Insurance Board, the domestic insurance industry, the farmer cooperatives the microfinance and banking sectors, with support from the line ministries (MoAC, MoF) and the NGOs.
32. **Promoting the role of private commercial insurers.** The 1992 Insurance Act permits Private Commercial Insurers to appoint agricultural cooperatives and MFIs to act as agents on their behalf. Wherever possible the private sector should be encouraged to develop agricultural crop and livestock insurance products and to channel these through the cooperatives and MFIs to Nepal's predominantly poor and marginal farmers.
33. **Enabling the legal and regulatory environment for the development of agricultural insurance.** Mutual livestock insurance has operated for several years outside the Insurance Law; this is not sustainable nor desirable as this program grows. The insurance legal and regulatory framework in Nepal could be revised to allow for the development of agricultural mutual cooperative insurance. Likewise, it could be revised to allow for the development of index-based insurance. The revision of the legal and regulatory framework should not be a pre-condition for the development of pilot agricultural insurance programs, as long as these pilots can be properly supervised, as shown in the Mongolia livestock insurance pilot. However, any nationwide expansion of the program would need suitable amendments to the insurance legal and regulatory framework.

34. **Strengthening existing crop and livestock mutual insurance programs.** Additional technical assistance could be provided to the on-going small-scale mutual crop and livestock insurance programs to strengthen their technical features (e.g., policy terms and conditions and rates) and their financial features (e.g., reinsurance).
35. **Design and implementation of new agricultural insurance pilots.** Agricultural insurance programs could be piloted to ascertain the viability of agricultural insurance in Nepal and to serve as a demonstration effect. These pilot programs could be linked to an existing agricultural development program (e.g., improved seed varieties, fertilizers, crop credit). A technical support unit, supported by the Government of Nepal and the donor community, could assist in the design, rating and implementation of a pilot program. An awareness and education campaign could complement the pilot program to ensure that small and marginal farmers understand the proposed pilot insurance products. Potential agricultural insurance pilots are:
1. Pilot Programs for Named Peril Policies: e.g., Citrus, vegetables–Hill Regions–hail and frost;
 2. Pilot Programs for Area-Yield Index: e.g., Paddy Rice–drought/flood prone areas of Terai;
 3. Pilot Programs for Weather Index: e.g., Rain-fed Paddy–Terai–excess rainfall , rainfall deficit.
36. **Creation of the Nepal Agricultural Insurance Technical Support Unit.** A specialized technical support unit, the Nepal Agricultural Insurance Technical Support Unit (NAITSU), should be established to assist stakeholders in the development of agricultural insurance in Nepal. NAITSU would be responsible for the key functions of (i) data and information collection and management; (ii) insurance demand assessment; (iii) product design and rating; (iv) the design of operating systems and procedures, most notably underwriting and claims control and loss assessment procedures; (v) training for insurance companies, MFIs, farmer cooperatives and farmer groups; (vi) awareness campaigns. NAITSU would report to a Steering Committee with representatives of the public and private stakeholders

CHAPTER 1

INTRODUCTION

- 1.1. The Nepalese economy is primarily agriculture based. Most of the rural population are smallholders. With a per capita GDP of US\$470 and with 31 percent of the 28 million population of Nepal living below the poverty line, poverty still remains a major development problem.¹ The GDP in the agricultural sector is even lower at less than US\$140 per agricultural worker. Nepal ranks 143 out of 177 in the UN Human Development Index (2007).² The Government is committed to attaining the Millennium Development Goals (MDGs) as they apply to Nepal and is aiming to cut absolute poverty to 21 percent by 2015. Poverty is much more severe in rural areas (35 percent) compared to the urban areas (10 percent) and is particularly severe in the Mountain zone. About 80 percent of the rural population aged 15 and above is engaged in agriculture.
- 1.2. Key policy and strategy documents relating to the sector including the latest Budget Speech for the Fiscal Year 2008-09 emphasize the major role that agriculture can play in poverty reduction in the country. It is reported in the budget speech that stagnation in the agricultural sector has become the major factor of under-development and poverty. The budget speech document further states that the main goal of rapid economic growth and poverty alleviation can never be achieved until agricultural productivity is increased and excess manpower from agriculture is shifted to other sectors of the economy through creation of gainful employment opportunities³.
- 1.3. The Nepali agricultural sector is based on the production of basic staple grains. About 82 percent of cropped area is planted with cereal crops, but basic staple grains contribute only about 30 percent of agricultural GDP, while export crops contribute about 50 percent. Since the share of high-value crops in total cultivated area is still small, the desired process of agricultural diversification is hardly noticeable at the aggregate level. Therefore, the rural areas suffer from slow growth, rising poverty and food insecurity, and subsistence level of agriculture. Trade often occurs in local markets that are subject to gluts and price crashes. Storage and transportation facilities are poorly developed. Quality and value enhancement through grading and processing is rare. In the absence of adequate marketing channels and opportunities, the incentive and financial capacity to invest in improved farm and water management or modern inputs is limited. Furthermore, the principal challenge the sector faces in this era of globalization is market-orientation, trade promotion, and increased investment in the agricultural sector to secure broad-based growth in rural incomes.
- 1.4. Increase in agricultural production can only be maintained and the diversification can only succeed if the vagaries of nature and the risks associated with it can be managed. One third of agriculture land is under irrigation and therefore the majority of the farmers are exposed to the climatic uncertainties associated with rain-fed agriculture. Given the scarcity of affordable and suitable risk management tools, when exposed to adverse shocks low income households may be forced to reduce food consumption, take their children out of school, and sell productive assets, which then jeopardize their economic and human development prospects.

¹ Central Bureau of Statistics: 2007/8. Other measures suggest that GDP/capita may be lower and the poverty rate higher.

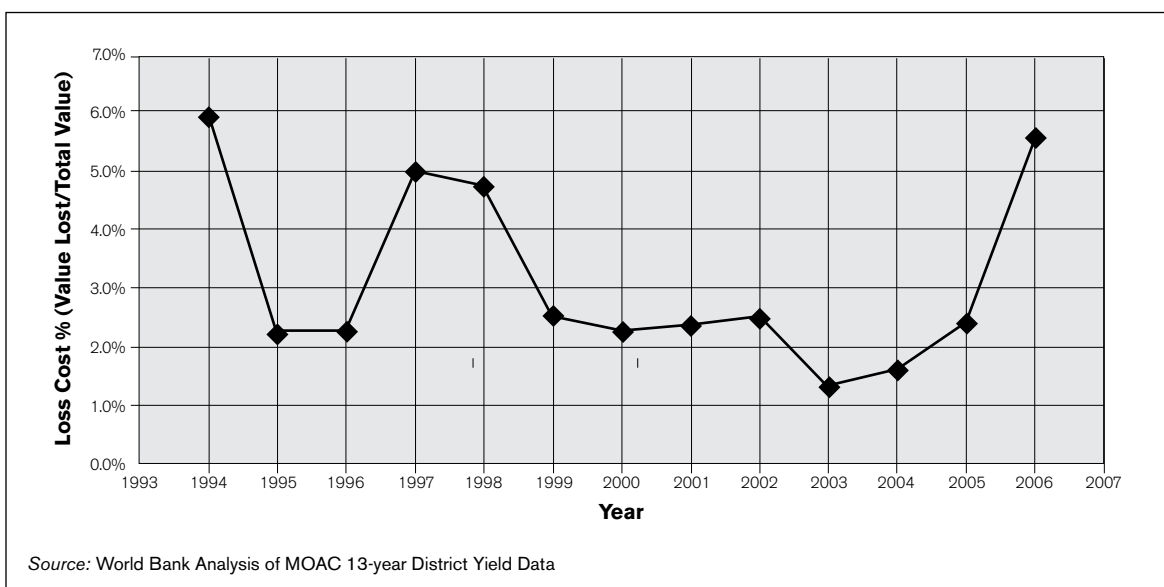
² UNDP: Human Development Report 2007.

³ Ministry of Finance: 2008 Budget Speech for Fiscal Year 2008/09, Government of Nepal.

- 1.5. Since the late 1950s, the Government of Nepal (GoN) has been concerned with increasing access to financial services for low income households and small businesses. To this end, GoN has pursued a number of interventionist policies: it has (i) mandated private and public banks to lend a certain percentage of their loan portfolio to low income households and small businesses (the so-called deprived and priority sector lending); banks can fulfill the target by lending directly to these sectors, or by lending through an intermediary, typically the microfinance sector; (ii) introduced a branch opening policy to encourage network expansion outside of the Kathmandu valley; (iii) created special institutions to cater to the underserved (e.g., Cooperatives, Postal bank, Regional Rural Development Banks (RRDBs), Small Farmer Development Bank (SFDB), Rural Self-Reliance Fund (RSRF), and Rural Microfinance Development Center (RMDC)); and (iv) has introduced two new categories of financial institutions with lower capital requirements, thus increasing sharply the number of institutions, in the hope that more institutions would increase access to financial services.
- 1.6. Microfinance institutions, including cooperatives, play a key role in the delivery of financial services to low income households, and yet many microfinance clients still prefer to save and borrow from the informal sector. According to the World Bank's (2007) Access to Finance Study in Nepal, only 26 percent of the population holds a deposit account. The banks dominate in the urban areas, while the financial NGOs and Cooperatives come second and are the preferred service providers for the low income households. They also serve the rural areas. However, the cooperatives reach more remote and rural areas than the financial NGOs. According to the data from the Centre for Microfinance, the outreach for all these players is about 1.2 million clients, but the total number of the potential customer base is 8.7 million, which represents a 14 percent market penetration rate. The limited ability of the microfinance sector to cater adequately to low income households is reflected in narrow outreach, sluggish growth, high liquidity, and low profitability. Several factors explain the current disappointing state of the microfinance sector in Nepal. These include: a complicated geo-political environment; weak technical capacity in key areas (e.g., accounting and auditing, strategic planning, financial analysis, and human resource management); lack of commercial orientation; high operational expenses in the hills/mountain areas, etc.; and slow professionalization of the microfinance sector as it is still considered by many as a charitable activity.
- 1.7. The mandate of the Agricultural Development Bank Limited, ADBL, created in 1968, is to extend credit to cooperatives, individuals, and enterprises engaged in agriculture. In addition to its agriculture and commercial banking divisions, the ADBL established the Small Farmers Development Program to provide credit to small groups of farmers on a group guarantee basis. Nepal introduced the Cooperative Act in 1992. The program started being reorganized into the Small Farmers Cooperatives Limited, SFCLs, a federation of autonomous cooperatives. In 2001 the Small Farmers Development Bank was established to provide wholesale funds to these cooperatives. By July 2004 there were 161 such cooperatives, with 90,000 members and about US\$4.0 million in deposits and US\$18.3 million in outstanding loans. A 2003 review of the ADBL's financial performance revealed serious concerns about its financial health. Non performing loans were alarmingly high, reaching 40 percent in the Small Farmers Development Program. Accordingly, it was recommended that the program's transformation into independent cooperatives be accelerated (World Bank 2007).
- 1.8. The Department of Cooperatives, within the Ministry of Agriculture and Cooperatives, MOAC, works as a regulatory authority and it is also actively involved in promoting and developing cooperatives. The department is involved in research and study on cooperatives; formulation of laws and policies; provision of capacity building to cooperatives through the Cooperative Training Centre; institutionalization, monitoring, and evaluation of cooperatives, and representation functions at the national and international levels. The department provides the oversight for both the multipurpose cooperatives and the Savings and Credit Cooperatives, SACCOs that provide financial services to the rural poor. The network of these institutions, as will be shown later in the report, could provide a platform to promote agricultural insurance in Nepal.

- 1.9. The Savings and Credit Cooperatives (SACCOS) are a special form of cooperative in which members of a particular group or organization agree to save their money together and to make loans to each other at reasonable rates of interest. Some SACCOS provide loans on group guarantee while others provide loans on individual basis. The number of members can range from 25 to 9,000 or more but tend to average about 200.⁴ Of the 10,000 cooperatives in Nepal, approximately 3,500 are SACCOS.⁵ Both the Rural Microfinance Development Centre (RMDC) and the Rural Self Reliance Fund (RSRF) provide capital to SACCOS. SACCOS are found spread across most regions of Nepal and make up a significant number of the microfinance practitioners in Nepal⁶. The majority of the SACCOS generate funds through internal savings mobilization or retained earnings.
- 1.10. Small Farmer Cooperatives Ltd (SFCLs) is a special form of SACCO. They are federations of small-farmer groups organized under the Small Farmers Development Program of the ADBL of Nepal, with technical assistance from the German Agency for Technical Cooperation (GTZ). Like other SACCOS, the SFCLs can access wholesale funds from RMDC and RSRF, but they are also able to obtain financing from Sana Kisan Bikas Bank, SKBB, the Small Farmer Development Bank, an apex institution in which many of the SFCLs are shareholders.
- 1.11. The recent budget statement has indicated that the Government of Nepal (GoN) is looking up to the cooperative movement to bring the disadvantaged groups together so that they can obtain the needed services. The Statement from the Minister of Finance to the local Donors Meeting in September 2008 emphasized the need to develop the cooperatives based on voluntary initiation of local people to mobilize local resources and skills and be responsive to local needs, so that they can participate in the country's economic development.
- 1.12. With a vast majority of farmers growing rain-fed crops and therefore being vulnerable to the vagaries of the monsoon rains, agricultural risk management products become particularly important for Nepal. The annual average nationwide crop yield losses vary significantly from year to year, as shown in Figure 1.1. In addition, this national aggregation masks a large heterogeneity among crops, where annual average losses for crops like barley, oil-seed and potato can exceed 6 percent of the total value.

Figure 1.1. Nepal: annual average crop losses, in percentage of total value



⁴ World Bank. 2007. "Access to Financial Services in Nepal." Washington, D.C.

⁵ Interview with Mr. Tanka Mani Sharma, Registrar, Department of Co-operatives, Ministry of Agriculture and Cooperatives. June 2008.

⁶ World Bank. 2008. "Mapping of Microfinance Sector in Nepal". Washington, D.C.

- 1.13. The study on Access to Financial Services in Nepal conducted by the World Bank in 2007 identified the need for innovative financial products to assist farmers in the management of the agricultural (livestock and crop) production variability and thus contribute to increasing agricultural production. Insurance can facilitate access to agricultural credit at better terms as it increases the creditworthiness of farmers and other agents of the agricultural sector. To the extent that farm-level risk management instruments contribute to the overall financial stability of the agribusiness sector, indirect benefits in terms of credit availability may be realized at other levels of the agribusiness marketing chain. Financial instability at the farm level arising from yield or price shocks may lead to instabilities at other levels of the processing and marketing chain. In this way, instruments that contribute to stability at the farm level may ease credit constraints for agents at other levels of the agribusiness complex.
- 1.14. In this context, the Ministry of Finance (MoF), the Insurance Board, and the Ministry of Agriculture and Cooperatives, MOAC, requested the World Bank to conduct a feasibility study on agricultural insurance in Nepal and provide recommendations for its future development. This work aims to provide an overall framework for the development of sustainable market-based agricultural insurance in Nepal. It relies on the following components:
- *Review of agricultural insurance in Nepal.* While the formal insurance sector does not offer agricultural insurance products, some entities are involved in providing insurance protection, usually linked directly to public or private credit and microfinance operations.
 - *Agricultural risk assessment.* A formal crop and livestock risk assessment is performed. It is intended to assist policy makers and insurance practitioners in the planning and design and rating of crop and livestock insurance. This assessment is instrumental in developing viable agricultural insurance products.
 - *Agricultural product development.* An analysis of suitable agricultural insurance products is conducted, for both crops and livestock. It identifies products that could be developed and piloted in a second phase.
 - *Operational issues for agricultural insurance.* Operational challenges for the development of agricultural insurance are discussed, including underwriting, distribution, and loss assessment.
 - *Institutional challenges.* The emergence of a sustainable market-based agricultural insurance program entails support from the government in creating an economic and legal environment that attract private insurers to this new business and provide farmers with the incentives to engage in risk-financing strategies. It includes, among others, the development of risk market infrastructure, such as efficient data collection and management systems, appropriate regulatory and legal framework, effective information and education programs, and the development of local technical expertise.
- 1.15. This report should be ideally complemented with a comprehensive demand assessment for agriculture insurance. A formal demand assessment for agricultural insurance could be conducted during the development of agricultural insurance pilots. An appropriate monitoring and evaluation study in the context of a pilot agricultural insurance program would also allow for a formal assessment of the demand for agricultural insurance from small and marginal farmers in Nepal.
- 1.16. The report consists of seven chapters, starting with this introduction. Chapter 2 provides a review of agricultural insurance in Nepal. Chapter 3 presents a detailed risk assessment of the main crops and livestock in Nepal. Chapter 4 identifies the suitable crop and livestock insurance products that could be developed and piloted in a second phase. Chapter 5 discusses the operational challenges in the design and implementation of an agricultural insurance program. Chapter 6 focuses on the institutional challenges in the development of an agricultural insurance program, and discusses public-private partnerships in agricultural insurance. Chapter 7 presents conclusions and recommendations. The report ends with seven technical annexes, provided for reference purposes.

CHAPTER 2

REVIEW OF AGRICULTURAL INSURANCE IN NEPAL

- 2.1 This chapter provides a review of the agricultural risk transfer and insurance mechanisms currently available to crop and livestock producers in Nepal including (a) public-sector natural disaster relief and credit protection programs, (b) formal commercial insurance products and services provided through the private insurance companies and finally (c) the non-regulated insurance products and services available through the microfinance and cooperative sectors. The issues and challenges for crop insurance are identified at the end of this Chapter and these themes are then dealt with in detail in subsequent chapters of the report.

GOVERNMENT DISASTER RELIEF PROGRAMS

Agricultural disaster relief programs

- 2.2. Because of its location in an active seismic zone of the Himalayas and its mountainous topography, Nepal is prone to a wide range of naturally occurring disasters including earthquake, landslide, avalanche, flood from rivers and glacial lakes and also drought, windstorm, hail and—in the case of livestock—epidemic diseases.
- 2.3. Following the major landslide and flood disasters of July 1993 in which 1,537 people lost their lives and a further 85,451 households were affected, the GoN established a National Action Plan for Disaster Management. The Ministry of Home Affairs is responsible for overall coordination of policy, planning and implementation of disaster management in conjunction with the various sector ministries, including the Ministry of Agriculture and Cooperatives, MOAC, which operates a disaster relief program⁷ for natural perils in agriculture which carries an annual budget of NRs 10 million.
- 2.4. The MOAC provides compensation for farmers whose crops are affected by natural perils including landslide, flood and river erosion, drought and hail. Compensation is provided to livestock producers in the event of major calamities resulting in the death of their animals.
- 2.5. The MOAC disaster relief programs are implemented through the Departments of Agriculture and Livestock and their respective district-level offices in Nepal's 75 Districts. In each district a District Natural Calamities Rehabilitation Committee is responsible for assessing the damages resulting from a major event, identifying schedules of the affected farmers and submitting requests for disaster compensation to the District Agriculture or Livestock offices.
- 2.6. In the case of crop losses the compensation is usually paid in the form of free seeds and inputs for the new cropping season. Compensation is also provided to repair damaged irrigation infrastructure. In the case of livestock, compensation is usually paid in kind in the form of vaccines or medication for livestock, or occasionally replacement animals such as poultry and goats, and for fish farmers, new fingerlings are provided to replace the lost stock.

⁷ The MOAC has established a Natural Calamities Relief Unit under the Business Promotion and Statistical Division.

- 2.7. Table 2.1 provides a summary of the financial support provided by MOAC under the Natural Disaster Relief program between 1997/98 and 2006/07. The highest compensation was paid out to farmers located in the Terai for early season drought losses in paddy in the 2005-06 season amounting to NRs 44.2 million (US\$0.63 million).

Table 2.1. Financial support from the Ministry of Agriculture and Cooperatives provided to the districts affected by natural calamities

Year	Types of Natural Calamities	Supported Sector	Amount in NRs (Million)	Support District
2006/07	Hail	Agriculture	5.00	Kathmandu, Bhaktapur, Tanahu, Lamjung, Kaski, Myagdi, Gulmi, Doti, Darchula, Okhaldhunga, Salyan, Rolpa, Puthan, Bhojpur, Arghakhachi, Syang
	Flood	Agriculture	2.80	Banke, Bardiya, Dhanusa, Mahotari, Siraha, Saptari, Sarlahi, Rautahat, Rupandehi, Sunsari, Bara, Kailali, Parsa, Udyapur, Baglung, Myagdi
	Flood	Livestock	2.20	Banke, Bardiya, Dhanusa, Mahotari, Sunsari, Saptari, Siraha, Sarlahi, Rautahat, Bara, Parsa, Rupandehi, Baglung, Bajura
2005/06	Drought	Agriculture & Livestock	44.20	All Terai Districts of Eastern and Central Development Regions
2004/05	Drought/ snow in mountains	Agriculture	2.01	22 Districts
			4.058	34 Districts
2002/03	Flood	Agriculture & Livestock	15.92	28 Districts
1997/98	Flood	Agriculture	14.00	Affected districts across country

Source: MOAC, Natural Calamities Relief Unit 2007.

- 2.8. If, in future, market-based crop and livestock insurance is scaled up in Nepal, the roles and linkages between the crop and livestock insurance programs and government disaster relief should be reviewed and clarified in order to avoid overlap between the 2 programs. Experience shows that where governments intervene with free disaster relief for climatic or natural perils, this can act as a major disincentive to farmers to purchase crop or livestock insurance, especially where premiums are high. Some countries, such as Spain and France, only provide disaster relief for crops and perils which are not included and insured under the national agricultural insurance program. Other countries e.g., the USA only provide natural disaster relief if the farmer has first purchased minimum catastrophe crop insurance protection under the Federal Crop Insurance program.

Poultry, avian influenza government compensation scheme

- 2.9. In Nepal, Class A epidemic diseases (which are highly contagious) in cattle, buffalo, horses, sheep, goats, pigs and poultry are not controlled through compulsory slaughter either of the affected animals or the unaffected animals in the herd/flock. Rather, vaccination is used wherever possible to control disease outbreaks. This is in contrast to several European countries where class A epidemic diseases are immediately communicable and often carry a compulsory government slaughter order for affected and unaffected animals in the herd and also any animals in the containment area, and the state usually provides financial compensation to the livestock owners for the compulsory slaughter of their animals.

- 2.10. In Nepal there is one exception, namely avian influenza, which carries a compulsory slaughter order. In response to concerns over outbreaks of avian flu in neighboring China and India, in 2005, the GoN approved a National Avian Influenza Pandemic Preparedness and Response Plan and project, which has been implemented with World Bank financial assistance since 2007.⁸ The avian influenza control program is implemented by the Directorate of Animal Health, Department of Livestock Services (DoLS). A key component is a compensation fund which is designed to indemnify poultry owners for the compulsory destruction of birds, eggs and poultry feed during avian flu containment and control programs. The World Bank reported proposed compensation at a flat market-based rate of NRs 100 per bird irrespective of age or breed and NRs 500 for parent stock. It is understood that Nepal has not incurred any avian influenza outbreaks in the past 2 years.
- 2.11. There are major issues for both governments and insurance companies to consider in providing compensation protection for epidemic diseases in livestock. Many insurers and reinsurers are not willing to insure epidemic diseases because of the systemic nature of epidemic diseases in livestock and potential for losses to accumulate over large regions with very high associated claims costs. Similarly there is a question whether governments and society can afford to bear the potentially huge costs of compensating livestock producers in the event of catastrophe disease losses in their animals. The issue of livestock epidemic disease coverage is discussed further in Chapter 4.

NON-LIFE INSURANCE SECTOR

Regulated insurance market

- 2.12. **Insurance regulator.** The Nepalese Insurance Market is regulated by the Insurance Board (Beema Samiti), Ministry of Finance. The Insurance Board is constituted under the Insurance Act of 1992 to systematize, regularize, develop and regulate the Nepalese life and non-life insurance markets. The Insurance Board is responsible for authorizing new insurance companies and for granting them operating licenses, approving new insurance products and policies and tariffs and for regulating the activities of the legally recognized entities including Insurance Companies, Insurance Agents, Surveyors (Loss adjusters) and Brokers, under the provisions of the Insurance Act, 1992. The Insurance Board is funded partly by government, partly by the registration fees paid by the insurance entities and finally by a service charge equivalent to 1 percent of the gross premium income of all insurance companies.
- 2.13. **Insurance legislation** is set out in the Insurance Act of 1992 and the Insurance Regulation 2049 (1993).⁹ The Insurance Act contains a series of legal and financial requirements for Insurance Companies to operate in the domestic Nepali market including:
- *The insurance company must be registered* with and licensed by the Insurance Board in order to legally transact life or non-life insurance business. The Insurance Board issues an annually renewable certificate to the insurance company which specifies the categories of insurance business which the company is licensed to underwrite.
 - *The minimum capital requirements* to form an insurance company are NRs 100 million (US\$1.43 million) for Non-life companies and NRs 250 million (US\$3.57 million) for Life companies.
 - *The solvency margins and minimum reserves* which an insurer must maintain. In the case of non-life insurance, they are not less than 50 percent of net non-life insurance premiums. The reserves must be deposited in a reserve fund and a separate fund must be maintained for each class of insurance business;

⁸ WB Dec. 2006: Report No. 36719. Technical Annex, Avian Influenza Control Project

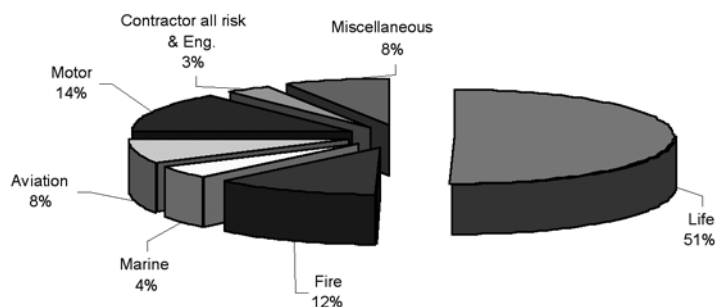
⁹ Both documents may be downloaded from The Insurance Board's website at <http://www.bsib.org.np/beemasamiti.html>

- *The investment norms* which each Company must comply with. For life insurers, a minimum of 75 percent of the company's funds must be held in compulsory investments including government securities and treasury bills and fixed-term commercial and development bank deposits; for non-life insurers the corresponding figure is 65 percent of the total investment. The remaining (25 percent maximum for life companies: 35 percent for non-life companies) optional investments may be held in housing schemes, financial companies and shares in public limited companies.

2.14. **Authorized categories of insurance.** The 1993 Insurance Regulations define the permitted Categories of Insurance Business including Life, Non-Life and Reinsurance business. Authorized categories of Non-Life Insurance include fire, motor vehicle, marine, engineering and Contractor's risk insurance, aviation insurance and miscellaneous insurance. Agricultural (crop, livestock, aquaculture or forestry) Insurance is not specifically identified as an authorized category of insurance and currently this class of business therefore falls under "Miscellaneous Insurance."¹⁰ According to the Insurance Board, agricultural crop, livestock and poultry insurance are approved classes of insurance business in Nepal. The special case of index-based insurance will possibly have to be considered by the Insurance Board, which has not yet advised whether index-based insurance is permitted under the Insurance Act 1992 and Insurance Regulations 1993, or whether new legislation is required. There may also be a case for specific Agricultural Insurance Legislation (Law) to be drawn up for Nepal.

2.15 **Non-life insurance market.** In 2008, there were 22 registered insurance companies in Nepal with 3 more (Life) companies in the process of being approved by the Insurance Board. Of the 22 registered companies, 5 companies are private commercial Life Insurers, 16 are private commercial Non-Life companies and 1 company is a composite life and non-life fully state owned company, Rastriya, Beema Sansthan, RBS. In 2007/08 the total market premium volume had increased to about NRs 5 billion for life insurance and NRs 3 billion for non-life business, or a total of about NRs 8 billion (US\$114 million), representing about 2 percent of the non-agricultural sector GDP, with an average premium of less than US\$2.3 per capita, with a 51 percent to 49 percent split between life and non life business: motor vehicle was the most important class of non-life business with 14 percent share of total premium, followed by fire and aviation (Figure 2.1).¹¹

Figure 2.1. Nepal 2004/05 Insurance Market Premium



Source: Nepal Insurance Board, 2008.

2.16. **Insurance pools.** Nepal has experience with insurance pools. Following 9/11/2001, the non-life insurers with assistance from the Insurance Board formed a terrorism insurance pool which is supported by the entire market. Insurance pools have been adopted in several countries to underwrite national agricultural insurance programs and this is an option for GoN and the insurance industry to consider in future. (See Chapter 6 for further details).

¹⁰ See Chapter 2 Insurance Regulations, 2049 (1993).

¹¹ As a comparison, the insurance penetration rate is US\$3.5 per capita in India and US\$0.9 per capita in Bangladesh.

- 2.17. **Reinsurance market.** There is no state reinsurance company in Nepal and all reinsurance is placed with foreign international reinsurers. The main reinsurer is the General Insurance Corporation of India, GIC which acts as the lead treaty reinsurer for about 75 percent of all Nepalese insurance companies.¹² Motor vehicle insurance is typically reinsured on an Excess of Loss basis, but other classes are reinsured on a Proportional Facultative or Quota Share Treaty basis with retentions on the order of 5 percent to 10 percent maximum. Most insurance companies do not have the capital and reserves to retain significant levels of risk.
- 2.18. In 2007, RBS signaled its intention to launch non-life reinsurance both for the domestic and international markets within the next 2 years.¹³

Non-regulated insurance market

- 2.19. In Nepal some entities are involved in providing insurance protection, usually linked directly to public or private credit and microfinance. These entities are not, however, registered with, or licensed by the Insurance Board to operate as Insurance Companies and they do not comply with the licensing, minimum capital and solvency requirements of the 1992 Insurance Act. As such their operations, products and services are deemed to be credit-guarantee protection and not commercial insurance.
- 2.20. **Credit Guarantee (Insurance) Protection.** In 1974, GoN established the Deposit Insurance and Credit Guarantee Corporation, DICGC with the joint investment of three development banks, NRB, RBB and NBL. The DICGC was formed to provide credit-guarantee insurance and to provide compensation equivalent to 75 percent of the value of defaulted loan repayments. The DICGC was seen as a way of securitizing commercial bank lending to small-scale agriculture, cottage industry and service sectors under the 1974 Priority Sector Credit Program (PSCP) and the Deprived Sector Credit Program (DSCP) of 1991. Under these poverty alleviation/credit programs, it was mandatory for commercial banks to provide 12 percent of loan requirements of the PSCP and 3 percent of the loans for the DSCP. The DICGC is not licensed with or approved by the Insurance Board and its credit guarantee activities are therefore not deemed to be insurance. The DICGC has been associated for 20 years with a livestock-credit (insurance) guarantee program (See below for further details).
- 2.21. **Cooperative Insurance.** Nepal has an extensive network of 9,720 cooperatives with about 1.3 million registered members of which 3,392 are Savings and Credit Cooperatives (SACCOS) and 2,532 are Multi-purpose Cooperatives. Of the cooperatives, 3,056 are directly involved in agriculture including: 1,564 dairy farmer cooperatives, 1218 agricultural cooperatives, 213 small farmer cooperatives, 65 coffee cooperatives, and finally 22 tea cooperatives.¹⁴ A central activity of the cooperatives is to provide financial services to their members, including micro-savings, loans and in some cases micro-insurance including livestock insurance and most recently small scale crop insurance. The activities of the cooperatives are regulated by the Cooperative Act. The insurance activities of the Cooperatives are not, however, regulated by or approved by the Insurance Board and their activities are therefore not deemed to be insurance. Annex 1 provides further details on the cooperatives while the next section reviews the agricultural insurance initiatives currently being implemented by various cooperatives.
- 2.22. **Microinsurance.** In addition to the savings and credit cooperatives, there are more than 10,000 Microfinance Institutions, MFIs, in Nepal which are involved in providing a broad range of financial services to their members including micro-savings, loans and in some cases micro-insurance usually linked to credit. Examples include life, health, household contents insurance and livestock insurance (this program is reviewed below). Currently these micro-insurance programs are not regulated or approved by the Insurance Board and are therefore not formally

¹² Given the political instability over the past decade, most of the European international reinsurers withdrew from the Nepalese market. Currently, international reinsurers are providing support on large projects which involve aid donors (WB, GTZ, KfW, etc.).

¹³ Himalayan Times, April 5, 2007.

¹⁴ Figures provided by Department of Cooperatives, MOAC, May 2008.

recognized as insurance. According to the Centre for Microfinance (CMF), however, in 2008 the Insurance Board formed a working committee with CMF to study ways of legalizing micro-health and micro-life insurance products issued by the MFIs.

- 2.23. Project-based insurance.** Under the Asian Development Bank-financed Community Livestock Development Project (CLDP) 2005 to 2010, special financial provision is being made to develop microfinance and insurance services to men and women farmers in 22 districts of the three western regions of Nepal. A central feature of the CLDP is a livestock mortality insurance scheme which has been implemented for nearly a decade through the communities and through the Milk Cooperatives. Features of this innovative program are reviewed in the next section.

AGRICULTURAL INSURANCE PROGRAMS

Private commercial sector involvement in agricultural insurance

- 2.24. To date in Nepal, there has been no involvement by the private commercial insurance sector in crop and livestock insurance, although two companies have received requests for poultry insurance from large-scale commercial producers.¹⁵
- 2.25. The main reasons why Nepalese private commercial insurers have not got involved in crop or livestock insurance to date, include: (a) the lack of awareness on the part of insurers of crop and livestock insurance products and operating systems and procedures; (b) the lack of accurate time-series animal mortality data and crop production loss or damage data on which basis to establish technical premium rates; (c) the fact that no insurer has a rural sales distribution and administration network outside the major towns and cities; (d) the prohibitively high administration costs of dealing with very small individual farmers, in particular the costs associated with pre-inspections and adjusting crop or livestock losses on an individual farmer basis; and (e) non-availability of agricultural reinsurance protection.
- 2.26. In the absence of any involvement by the private commercial insurance sector in small-scale farmer agricultural insurance, in Nepal the Government, the Cooperatives and MFIs have taken a lead in providing a range of livestock protection (insurance) and most recently crop protection (insurance) insurance products and services which are reviewed below.

Non-regulated livestock insurance

- 2.27. Livestock insurance has been implemented in Nepal since 1987. There are currently at least four different models of livestock insurance, all with linkages to credit or microfinance for the purchase of livestock. Key features of these programs are presented below and full details are presented in Annex 2.

Deposit Insurance and Credit Guarantee Corporation, DICGC

- 2.28. The earliest livestock insurance (credit-guarantee) program was developed by the Nepal Rastra Bank (Central Bank of Nepal) in conjunction with the DICGC in 1987 and was specifically designed to protect commercial bank lending to small farmers to purchase cattle, buffalo or small ruminants (i.e., livestock credit insurance). The coverage provides comprehensive mortality and loss of working use protection for livestock.
- 2.29. The DICGC product conforms to standard livestock insurance norms in terms of its requirements that each animal is subject to a pre-inspection by a veterinarian to certify its clean bill of health prior to attachment of risk and the

¹⁵ Both Allianz Insurance Company and Premier Insurance Company have been interested in underwriting large facultative poultry enterprises.

animal must be ear tagged for identification purposes and the insured is issued with a full contract (policy wording). Furthermore the program sets out the norms which must be followed in the event of a loss including loss notification reporting procedures and the requirement for a veterinary inspection to certify the cause of loss.

- 2.30. The DICGC's 20 year results 1987/88 to 2006/07 show that over this period the company has insured a total of nearly 220,000 animals (mainly cattle and buffalo), although insurance uptake has declined from a peak of about 22,500 animals per year in the mid 1990s to less than 6,000 in recent years (Annex 3). Over the past 5 years, average premium rates have been fixed at 6 percent of which the livestock producer pays half (premium rate of 3 percent) and government through the MOAC subsidizes the other half (3 percent premium rate). The sum insured (guarantee amount) has been linked to lending and currently averages about NRs 15,000 per animal, which compares with a market value for a pedigree¹⁶ dairy cow of up to NRs 50,000 and NRs 20,000 for a local breed of dairy cow. Buffalo are typically valued at between NRs 10,000 and NRs 25,000 per animal. In the case of loss of use, the maximum indemnity is 40 percent of the sum insured per animal; for mortality claims, the farmer is indemnified at 80 percent of the sum insured value.
- 2.31. Over the past 20 years the claims record has been very stable with a long term average loss cost of 38 percent and peak loss ratio of 76 percent in the first year of operation of the program with an average loss cost of 3 percent (Annex 2). However, on account of the DICGC's extremely high administration and overhead costs averaging 57 percent of total premium, the program has operated at an average 96 percent Combined Ratio¹⁷ (break-even) over the past 20 years. Over the past 10 years during which the volume of insured livestock business has fallen considerably, the program has operated at an average loss ratio of 44 percent, but on account of the extremely high average administrative costs of 88 percent of premium, the program has operated at a financial loss in all years with an average combined ratio of 129 percent. The program has not been reinsured at any stage over the past 20 years.
- 2.32. Key issues for DICGC include:
- a. The livestock credit guarantee policy offers All Risk Mortality coverage.¹⁸ It is questionable whether it is technically sound to underwrite disease, including epidemic diseases, under this livestock insurance policy.
 - b. Under the former PSCP, commercial banks insisted on their investment loans to livestock producers being protected by the GICGC livestock guarantee (insurance) policy against mortality of the animal and/or default by the loanee. Since 2002 GoN has committed to phasing out the PSCP and now that commercial banks are no longer required to lend part of their loan portfolio to small farmers and livestock producers, the demand for the DICGC's credit-guarantee protection has declined considerably. There is therefore considerable uncertainty over the future of the DICGC program. CECI (2008) however argues that "even after the phasing out of PSL loan scheme if the GICGC were to continue offering compensation for the default of the rural lending of commercial banks it will encourage the commercial banks to expand the rural branch network and wholesale lending to MFIs on lending to targeted poor people."¹⁹
 - c. The DICGC does not have any regional or district-level branches or field-level veterinary inspection staff with which to collect premium from the assured, or to conduct livestock pre-inspections and to adjust claims. It therefore has to rely totally on the banks to conduct these vital insurance functions. The current administrative costs of the livestock insurance program are excessively high and the program is operating at a financial loss.

¹⁶ Popular improved breeds include Jersey and Friesian.

¹⁷ The Combined Ratio is calculated as the paid claims plus administration and operating expenses divided by the paid premium. A combined ratio of > 1 implies the program is operating at a financial loss.

¹⁸ The DICGC wording is reviewed in Annex 2.

¹⁹ Centre for International Studies and Cooperation (CECI) 2008, Micro-financing towards Empowerment of Disadvantaged Groups in Nepal: Innovations and Practices, prepared by Micro Finance Department Nepal Rastra Bank, March 2008.

- d. The DICGC program has never been reinsured and in the event of a major livestock epidemic disease, the program would be very exposed to catastrophic loss.
- e. The DICGC livestock protection product is criticized in certain sectors as being a credit guarantee product and not a livestock insurance product because (a) it only provides protection for the amount of credit and does not cover the full market value of the animal; and (b) coverage is automatically terminated when the loan has been repaid normally after 2 to 3 years. To counter this criticism it is noted that in the absence of alternative livestock insurance products, the program has been successful for 20 years in enabling small livestock producers to access institutional livestock credit and to then protect these loans in the event of the death of the animal.

Small Farmer Cooperative Limited, SFCL, livestock insurance

- 2.33. The origins of the SFCLs date back to the mid-1970s when the ADBL established a Small Farmers' Development Project. At its peak this project extended credit to over 200,000 small farmers in 450 sub-project offices in over 600 villages in Nepal. The small farmer credit program was, however, extremely costly for ADBL to administer and beginning in 1988, in conjunction with GTZ, a process was begun to transform the best performing sub-project offices into Small Farmer Cooperatives (SFCLs) and to transfer responsibility to the cooperatives for providing savings and loans to their members and to manage wholesale credit disbursements from ADBL to their members. After capacity enhancement of small farmers, hand-over to the SFCLs began in 1993.
- 2.34. In 2001, GoN/ADBL formed the Sana Kisan Bikas Bank Ltd, SKBB (Small Farmers Development Bank) to provide wholesale credit, consultancy services and non-financial services to the SFCLs. Today there are a total of 228 (219 functioning) SFCLs in 40 districts of Nepal. According to SKBB the loan recovery record of the SFCLs exceeds 90 percent compared to about 75 percent for the ADBL.
- 2.35. Approximately 200 of the SFCLs have formed their own livestock insurance committees and provide individual animal mortality coverage and loss of use of the animal to their members. This program is very similar to the DICGC program in that it was also started in 1987, livestock insurance is linked to livestock loans through the cooperative and the program attracts 50 percent premium subsidy support from government. The SFCLs currently charge a flat premium rate of 10 percent for livestock insurance of which the farmer pays 5 percent and government subsidizes 5 percent (59 percent of the total cost) to the SFCL. In the event of a claim, the owner bears a 20 percent coinsurance and the loss is compensated at 80 percent of the sum insured value. The programs appear to be highly managed by the SFCL Livestock Insurance Sub-Committees which receive basic training from the Department of Livestock in animal health and simple veterinary procedures.²⁰ These committees then inspect any new animal prior to granting livestock insurance and they ensure that vaccination programs are maintained during the coverage period. Members who insure their animals are provided with free tagging and free livestock veterinary inspections and vaccinations.
- 2.36. The consolidated results of the SCFL livestock insurance program show that over the period 1987/88 to 2005/06 the SFCLs insured a total of 62,000 head of animals with total sum insured of NRs 745 million or an average sum insured of about NRs 12,000 per animal and with paid premium of NRs 74.5 million (average premium rate is 10 percent). An average of 3,263 animals was insured each year by the SFCLs during this period. The results show very low animal mortality losses, with paid compensation of only NRs 8.6 million over the 19 years and corresponding 11.61 percent loss ratio and long term average loss cost of only 0.9 percent. This loss cost rate can be interpreted as a claim rate of about one animal in a hundred insured animals and is very much lower than the national average mortality rate of about 3 percent²¹ in cattle and buffalo in Nepal. (See Annex 2).

²⁰ These comments are based on the World Bank's review of 2 SFCLs providing livestock insurance, one in Pokhara, the other in Baranagar.

²¹ Average mortality rate quoted by Department of Livestock at stakeholder technical meetings in July 2008.

- 2.37. The SFCL average loss cost rate of 0.9 percent compares very favorably with the DICGC long term loss cost of 3 percent. The SFCLs much lower claims ratio can only be explained by the high degree of control exerted by the cooperative livestock committees over their livestock insurance programs. It is also noticeable that the SFCLs average operating and administrative costs are only 3.5 percent of livestock premium which is very much lower than the operating costs of the DICGC program or 57 percent of premium. This evidence suggests that in the future there is merit in investigating further the potential to scale-up cost-effective (low administrative cost) crop and livestock insurance through the 3,056 agricultural cooperatives.
- 2.38. Key issues for the SFCLs appear to center on:
- a. The technical soundness of providing all risk mortality coverage in livestock which leaves the cooperatives very exposed to potential catastrophe losses due to epidemic diseases. There are very few international livestock insurance which provide all risk coverage and it is recommended that a technical review be conducted into the benefits of introducing (i) a standard accident and mortality policy for large classes of animal (cattle and buffalo); and then (ii) a separate epidemic disease coverage which would only be offered in special cases.
 - b. The relatively low level of uptake of livestock insurance by SFCL members for an average of 5,792 insured cattle and buffalo per year over the past 10 years. Many SFCL members are reluctant to purchase livestock insurance on the cattle or buffalo which they have purchased on credit through their cooperative. The low demand is partly due to economic factors namely that farmers cannot afford the high premiums charged by the cooperatives, and partly due to lack of awareness of how insurance works. There is also a tendency for livestock producers to purchase insurance for one year only in order to access livestock credit through the SFCL and then to cancel cover at the year 2 renewal.
 - c. The cooperatives visited by the World Bank team provide mechanisms for rebating premium to farmers in the event the policy is claims free. In Biratnagar for example the SFCL rebates 20 percent of premium in year 1; if the owner insures for 2 years, the no claims rebate of premium rises to 40 percent, and after 3 years the program will rebate 60 percent of premium. This practice may make livestock insurance more popular with members, but it prevents the SFCLs from generating surpluses to add to their claims reserves to pay for large livestock mortality events.
 - d. The single most important issue for the SFCL livestock insurance program is the lack of any form of catastrophe excess of loss protection which leaves the individual cooperatives financially exposed in the event of major losses which exceed the premiums collected from their livestock owner members.
 - e. There is a need to consider mechanisms for pooling the excess risk of the individual SFCL Livestock Insurance programs under a single reinsurance program. One option would be for the Cooperative Department to establish a cooperative reinsurance program, but this organization lacks insurance expertise and does not have the capital reserves to assume such a liability. Alternatively the SFCLs could approach the private commercial insurance and reinsurance sector to reinsure their livestock program. Currently the SFCL livestock insurance program is not legally authorized by the Insurance Board and therefore it cannot be insured or reinsured by the commercial insurance companies.

Community Livestock Development Program, CLDP

- 2.39. The third type of livestock insurance program in Nepal is being implemented under the Community Livestock Development Program, CLDP, which is funded by the Asian Development Bank (ADB) and which is implemented by the Department of Livestock DoLS with technical support from FAO.
- 2.40. Under the CLDP there are 2 different models of livestock insurance program: (a) Community Managed Insur-

ance Scheme which is provided for dairy animals and also for goats; and (b) Milk Cooperative managed insurance scheme. The livestock insurance policy provides similar All Risks Mortality and loss of use coverage as the other existing programs and is closely linked to livestock credit. Key features of the program are summarized in Box 2.1. The CLDP program is operating in the 22 districts of western, mid-western and far western Nepal and livestock insurance programs are operating in about 50 percent of these districts with approximately 200 community managed schemes and dairy cooperative schemes insuring about 5,000 animals, that is less than 1 percent of the national herd of dairy cows²². The underwriting results for selected Dairy cooperatives are presented in Annex 2.

Box 2.1. CDLP Livestock Insurance Scheme

Community managed insurance scheme

Requirements;

- Minimum number of households: 100
- Minimum number of animals insured: in the case of cattle: 50, in the case of goats: 150
- Establishment of insurance fund;
 - Farmers contribution: NRs 50,000 (dairy animals) and NRs 25,000 (goats)
 - CLDP support: NRs 50,000 (dairy animals) and NRs 25,000 (goats)
- From second year onwards, the annual premium rates are set at: 3 percent for large animals, 5 percent for goats.
- In case of the death of the animal up to 80 per cent indemnity is provided to the farmer according to the recommendation of insurance subcommittee.
- This type of insurance scheme is operated by forming a separate insurance committee under the main committee of the community.
- The insurance fund established at the beginning is mobilized as loans within the community members and income is earned from the interest charged.
- This scheme is limited within the community.

Milk Cooperative Managed Insurance Scheme

- Requirements are similar to community managed scheme.
- This scheme is open to any interested member of the cooperative rearing dairy animals.
- Dairy cooperatives have relatively better capacity and are better organized in comparison to a simple community.
- Dairy cooperatives have a district level organization and the primary level cooperatives are linked with the district union of cooperatives. So, the insurance program is institutionalized up to the district level through the dairy cooperatives. Example, Baglung model.

Source: T.N.Pandey 2008, FAO Consulting Services for the CLDP

2.41. Box 2.2 summarizes the key strengths and challenges of the CLDP livestock insurance program. In common with the SFCL cooperative program the CLDP program represents a mutual livestock insurance program managed by the community for its members, and group cohesion ensures that the insured animals are closely monitored and managed and that mortality rates and insurance claims rates are minimized. The issues and challenges are similar to those experienced by the other livestock insurance programs in that the programs are not reinsured and in the event of an epidemic disease outbreak the premium and reserves would not be adequate to cover

²² Estimates provided by T.N.Pandey 2008, FAO Consulting Services for the CLDP.

the claim amount, resulting in a need to pro rata down each claim payment to those insured's who have incurred losses. Furthermore, the CLDP livestock insurance program is not legally recognized under existing insurance legislation. The major difference between the CLDP and the previous livestock insurance programs is that it does not receive premium subsidy support from central government.

Box 2.2. Strengths and Challenges faced by CLDP livestock Insurance Program

Strengths	Challenges
<ul style="list-style-type: none"> ▪ Mortality rate is decreased; risk is lowered ▪ Fund is generated within the community ▪ Easy and fast to claim and get indemnity ▪ Effective monitoring of the insured animals ▪ Timely treatment and vaccination of insured animals ▪ The community feels ownership of the animals ▪ Increases mutual understanding and cooperation between the farmers and the cooperative/community 	<ul style="list-style-type: none"> ▪ In case of epidemic outbreak, the community/cooperative could not cover indemnity claims of insured animals ▪ No legal recognition of community/cooperative managed livestock insurance scheme.

Source: T.N.Pandey 2008, FAO Consulting Services for the CLDP

Centre for Self-Help Development, CSD

2.42. The fourth type of livestock insurance (protection) program is provided by the Centre for Self-Help Development, an NGO which provides microfinance linked to livestock insurance and which works with women's groups. The CSD program does not attract any form of government premium subsidy support or external reinsurance protection. The Livestock insurance program is very small, generating less than NRs 100,000 in premiums yearly over the past 5 years, and in each year the program has operated at a financial loss (loss ratio > 100 percent). In addition, the CSD is providing an integrated life insurance, household contents insurance and maternity health care insurance program which has proved very popular with the women's groups and which has performed very well and currently has been able to accumulate significant reserves (See Annex 3.). The key challenges for the CSD livestock program include:

- a. Measures to increase profitability and to increase sales volumes and spread of risk, need to be identified;
- b. The livestock protection program has no form of catastrophe reinsurance protection and some form of excess of loss coverage needs to be considered.

Non-regulated crop insurance

2.43. Traditionally there has been no crop insurance in Nepal because this has been perceived as too difficult to design and implement by both the formal insurance sector and the non-regulated MFI/Cooperative sectors. There are, however, two pilot crop insurance programs which have been implemented on a pilot basis in selected districts of Nawalparasi District and Chitwan District, Central Region, since 2007. These two pilot crop insurance programs have been initiated by local farmers with technical and financial assistance from the local Department of Agriculture and MoAC.

2.44. In September 2005, strong winds destroyed a very high proportion of 400 ha of bananas owned by several hundreds of small farmers in Kawaswoti VDC located in Nawalparasi District, Western Terai, with losses valued

at about NRs 29 million (US\$414,000). To protect against future catastrophic windstorm damage the banana growers sought assistance from the Department of Agriculture to design their own windstorm insurance program. In an initial phase the DoA assisted the VDC members to form a new Agriculture Insurance Multipurpose Cooperative which was registered with the Department of Cooperatives in June 2006. The insurance program was inaugurated by the Minister of Agriculture on May 22, 2007. Key features of the pilot banana windstorm insurance program are summarized in Box 2.3. and further details are presented in Annex 2.

- 2.45. Similarly, in response to severe hail damage to their vegetables in 2006, members of the Janodya Multipurpose Cooperative Ramnagar VDC, Nawalparasi District requested assistance from the local District Agricultural development office to design a vegetable insurance product and also to design coverage for their main cereal crops (paddy and maize). This program was inaugurated in 2007 to provide comprehensive hail, drought, flood, landslide and wind coverage for their vegetables and cereal crops. Key features of this program are also summarized in Box 2.3 and further information is presented in Annex 2.
- 2.46. In the absence of any lead from the commercial insurance sector it is commendable that the local cooperatives and local Department of Agriculture officers have taken the initiative to develop crop insurance programs to insure against key local climatic exposures in their cash crops and food crops. On the basis of this review a number of key issues and challenges are identified:
- a. There are opportunities to strengthen the technical design and basis of insurance and indemnity on these pilot crop insurance products. There is extensive international experience with windstorm insurance in bananas and this experience could usefully be applied to the design of the Nepalese banana insurance policy. In particular there is a need to introduce a conventional, percentage damage deductible on the banana policy. In the case of paddy and maize there is again major international experience with the provision of either single-peril hail insurance under a damage-based indemnity policy or a multi-peril yield shortfall policy. Vegetables represent a complex class of crops to insure against the comprehensive list of multiple perils which are apparently insured under the Janodya pilot program. The basis of insurance and indemnity for the vegetable policy and range of insured perils should be reviewed and where applicable rationalized. For all the crop insurance programs a review of loss assessment systems and procedures should also be conducted drawing on international lessons and experience.
 - b. If these pilot crop insurance products are brought into line with international standards it may become easier to register these products/policies with the Insurance Board thereby opening up opportunities for the cooperatives and commercial insurance sector to collaborate in the future.
 - c. Currently, after 2 years of implementation, the uptake rates on both the banana insurance and vegetable and cereal pilot crop insurance programs remain very low and the programs have yet to achieve any critical mass or spread of risk which is a prerequisite for any form of crop insurance. In part this may be a problem of growers' lack of awareness of the benefits of the crop insurance products, but also this may be a reflection of the extremely high premium rates levied by the cooperatives and which range from 13 percent for bananas to 15 percent for vegetables. Ways of scaling-up the pilot crop insurance programs need to be identified.
 - d. In the absence of any form of reinsurance protection, the cooperative crop insurers are very exposed to major windstorm loss in bananas which could easily exceed the premiums raised by the members, and similar comments apply to the drought or flood exposure in the vegetable and cereal programs. There is a challenge to design and implement an appropriate excess of loss reinsurance cover for these crop programs either through the cooperative movement or the commercial insurance sector. This in turn will require amendment to the current insurance legislation.

Box 2.3. Pilot Cooperative Mutual Crop Insurance Programs for Bananas and Vegetables**Scope**

- District Agriculture Office initiated as a pilot program in 2007 in response to farmers' demand for crop insurance
- Covers bananas grown in Kawaswoti and Shiva Mandir DVCs and vegetables, paddy and maize grown in Ramnagar, Nawalparasi District

Features

- Damage-based indemnity Policy
- Insured perils:
 - Bananas: windstorm, flood, landslide and hail
 - Paddy/Maize: hail, drought
 - Vegetables: hail, drought, frost and diseases
- Bananas: Premium NRs 2 per banana plant for compensation of NRs 15 per plant (13.33% premium rate)
- Vegetables: Premium NRs 100 per 0.033 ha (katha); Compensation NRS 1500/katha (15.0% premium rate)
- Paddy/maize: Premium NRs 50 per katha, compensation NRs 750 (15% premium rate)

Role of Government

- Product development through Department of Agriculture
- Capacity development and training of farmers and on-going technical support
- Provided financial grants to capitalize Cooperative credit and savings fund and crop insurance fund
- No premium subsidy support to date

Outcomes

- The Farmer members are to be commended for forming mutual insurance cooperatives with DOA assistance
- A technical review and strengthening of the crop policies is suggested (e.g., introduction of deductibles)
- Uptake is very slow to date under both crop insurance programs which are now in year 2 of implementation
- If the cooperative model of crop insurance is to be successful, need to consider ways of scaling-up.

Source: MOAC, 2008.

- 2.47. The above examples demonstrate that in the absence of any private commercial crop insurance products or services, small farmers belonging to the rural cooperatives have in recent years sought technical assistance from the Department of Agriculture and NGOs to form their own mutual crop insurance schemes. If such strong demand from farmers for crop insurance exists for other crops in other parts of Nepal, the Cooperatives are likely to play a central role in promoting the formation of crop insurance committees and in the design, rating and implementation of "mutual crop insurance programs."

CHALLENGES FOR AGRICULTURAL INSURANCE IN NEPAL

- 2.48. On the basis of this review it appears that Nepal faces a series of key institutional, technical, operational and financial challenges in (a) developing crop and livestock insurance products and services which are suited to the needs of Nepal's small and marginal farmers; and (b) in scaling-up the demand for and supply of crop and livestock insurance.

Institutional challenges

- 2.49. **Farmers lack awareness of and access to agricultural insurance.** There is a very low level of awareness and knowledge on the part of Nepalese crop and livestock producers of the role of agricultural insurance. The previous section has shown that there is a very low level of current supply of suitable agricultural insurance products and demand for insurance is low. In the case of livestock, after 20 years of livestock-credit insurance, current uptake amounts to less than 15,000 head of cattle or buffalo each year or less than 0.2 percent of the national herd.
- 2.50. **Lack of a national framework for agricultural insurance.** Currently, in Nepal, there is no overall policy framework for agricultural insurance and a lack of definition of the potential role of government in promoting and supporting agricultural insurance through the private insurance sector. To date, therefore, the commercial insurance companies have not been willing to take a lead in investing in the design and implementation of pilot crop or livestock insurance products and programs. In the absence of any lead by the private commercial insurers, the only agricultural insurance initiatives to date in Nepal are through the public-sector DICGC, the Cooperatives and MFIs, but most of these initiatives are at a local as opposed to a national level and penetration rates are currently low. There is a major challenge to define an appropriate agricultural insurance strategy for Nepal relying on strong public-private partnerships which includes both the private commercial insurers and the cooperatives and MFIs and other rural service organizations.
- 2.51. **Government Objectives for Agricultural Insurance and Target Beneficiaries.** GoN's objectives for agriculture under the 10th plan centre on poverty alleviation and increased commercialization of agriculture through the adoption of improved technology and provision of credit and other financial services. The objectives for agricultural insurance are not stated, however.. It will be necessary to differentiate between the different types of farmer (subsistence, semi-commercial, and commercial) and the suitability of crop insurance products for each group. Agricultural insurance is not suited to meeting the mainly social requirements of subsistence farmers, and governments should use alternative policy instruments to assist this group of farmers. Agricultural insurance for semi-commercial and commercial farmers should only be provided on a strictly commercial economic basis.
- 2.52. **There is no legal and regulatory framework for agricultural insurance.** In the absence of specific agricultural insurance legislation, there is a lack of clarity over the legal status of the guarantee protection cum insurance products which are being implemented by a range of public-sector organizations and the Cooperatives and NGOs/MFIs.
- 2.53. **Current Insurance Legislation does not recognize the Informal Crop and Livestock insurance programs implemented through the Cooperatives and MFIs.** Current legislation does not permit cooperatives and MFIs to act as insurance companies and does not recognize the products and services they are offering to small Nepali farmers. This in turn acts as a major barrier to collaboration between cooperatives/MFIs and private commercial insurers in order to identify ways of:
- a. Strengthening and standardizing agricultural insurance product design and rating so that these conform to the technical and legal requirements of the insurance industry;
 - b. Developing an integrated risk financing strategy for crops and livestock whereby the cooperatives might operate as the primary insurer, the insurance companies might provide excess of loss insurance (reinsurance) and government might also participate as a catastrophe reinsurer;
 - c. Collaborating in the marketing of agricultural insurance products, thereby reducing the costs to both parties, and other operational areas (underwriting, premium collection, loss assessment and claims settlement).

- 2.54. **The Insurance Board has, however, confirmed that the Cooperatives and MFIs are permitted to act as Insurance Agents** and they could therefore distribute agricultural insurance products (policies) on behalf of the registered commercial insurance companies under what is termed a Partner-Agent Model. This operational model for distributing agricultural insurance to small and marginal farmers is reviewed further in Chapter 6.
- 2.55. **Lack of exposure to international agricultural insurance technology.** Currently in Nepal the private insurance companies have had little or no exposure to international practice in agricultural insurance and they lack knowledge and awareness of the design, rating and implementation of agricultural insurance. The cooperatives and MFIs also have very limited experience with agricultural insurance.
- 2.56. **Limited range of crop and livestock insurance products.** The range of crop and livestock insurance products currently available through the cooperative and microfinance sectors are very restricted and need to be strengthened and brought into line with international standards. There is also a need to develop new crop and livestock insurance products which are tailored to the needs of Nepali farmers in each of the main agro-climatic regions.
- 2.57. **Data and information** are critical to the design and rating of any crop and livestock insurance program in Nepal. Availability of quality, long term time series data on crop production and yield is a challenge faced in developing adapted crop insurance products. Data on crop production and yields are available at a district-level for Nepal and are useful for regional crop risk assessment. Time series crop production loss data by cause of loss are not available. Nepal has a high density of weather stations and more than 30 years of daily weather data which can be used in the design of weather index products. For livestock the regional mortality statistics are of limited use for the design and rating of livestock insurance policies.

Financial challenges

- 2.58. **Private commercial insurance companies** have limited financial capacity and are reluctant to take a lead in investing in agricultural insurance which is considered to be a high risk class of insurance. Commercial insurers are also concerned about their ability to access international agricultural reinsurance capacity.
- 2.59. **Cooperative Agricultural Insurers have limited financial capacity and none of their programs are currently reinsured.** The cooperative and MFI insurers usually have very limited financial reserves and none of the agricultural insurance programs reviewed are protected by reinsurance. The lack of access to formal risk transfer and reinsurance mechanisms leaves the individual cooperative insurers very exposed to catastrophe losses (e.g. epidemic diseases, drought, flood, wind). In situations where claims exceed paid premiums and accumulated claims reserves and/or paid-up capital, the cooperatives would have to pro rata down the compensation payments to each insured and this is likely to prove very unpopular with the insured members. International experience shows that in many countries, crop and livestock insurance has been initiated by farmer cooperative or mutual insurers. Many of these programs have failed, however, because of their failure to put in place a catastrophe reinsurance program.

Operational challenges

- 2.60. **Private commercial insurers lack rural branch networks.** The commercial insurance companies have regional branch offices in the major cities, but few have retail sales outlets in individual districts and villages. Currently therefore, the private commercial insurers do not have a rural distribution network through which to market crop and livestock insurance products and services to Nepal's predominantly small farmers. Conversely, the Cooperatives and MFIs are working directly with small producers in most VDCs in Nepal and there is a well

established rural credit network through which insurance products and services could also be distributed and administered.

- 2.61. **High administrative costs of agricultural insurance for small farmers.** The very small size of farms of less than 1 ha and small average herd size of 2 to 3 animals means that the costs of insurance delivery, underwriting and claims administration are potentially prohibitively high. Any concept of individual farmer sales needs careful consideration and there is a need to identify group sales e.g., linked to input supply or seasonal production loans.
- 2.62. The above challenges are addressed in the subsequent sections of this report.

CHAPTER 3

AGRICULTURAL RISK ASSESSMENT IN NEPAL

- 3.1. To date, in Nepal, there has been no formal risk assessment for crop insurance purposes of the key climatic, biological and natural perils and their impact on crop production, yields and farm incomes. Similarly there has been no assessment of normal and catastrophe livestock mortality rates and their implications for the design of livestock insurance programs.
- 3.2. The key objectives of agricultural risk assessment include:
- Risk identification and quantification of the key natural, climatic and biological perils affecting crop and livestock production in the selected country and regions, and to classify these according to their frequency and severity into:
 - Independent risks: e.g., fire and hail which result in localized crop losses;
 - Intermediate risks: e.g., excess rain, frost;
 - Highly correlated (systemic) risks: drought and flood in crops, epidemic diseases in livestock which have a potential to impact over wide geographical area causing catastrophe losses.
 - Risk Mapping to define homogeneous crop risk zones;
 - Risk Modeling to quantify the catastrophe exposure to target sectors, crops, livestock and insured portfolios;
 - To use the outputs of the risk assessment to define a risk financing strategy including insurance and reinsurance structuring for the planned crop and livestock insurance portfolio.
- 3.3. This chapter starts with a brief review of data availability in Nepal for risk assessment purposes. This is followed by an overview of crop production systems in Nepal, the main crops and production and yields and climatic constraints to production, including an analysis of rainfall data and the relationship to national and departmental crop production and yields. The main part of this section deals with a Crop Risk Assessment Model, CRAM, which has been developed by the World Bank for Nepal using time-series district-level production and yield data and the main insurance-related applications of the model including the estimation of values of risk, expected claims costs and probable maximum losses and indicative pure rates and premium rates. Finally this chapter presents a review of livestock production systems and available livestock mortality data.
- 3.4. The risk assessment presented in this chapter is intended to aid policy makers and planners in Nepal to identify the key crops and exposures, and to identify key crops and areas which are exposed to loss and which might be selected for future pilot crop insurance programs. Similarly, conclusions have been drawn wherever possible regarding livestock insurance.

DATA AVAILABILITY FOR CROP AND LIVESTOCK AND WEATHER RISK ASSESSMENT

- 3.5. This section provides a summary for Nepal of the key sources of data and statistics on crop production, yields and crop loss or damage, weather parameters and animal mortality rates, which have been used under the risk assessment exercise. Further details of the methods of data collection and reporting in Nepal and issues relating to the accuracy of data are addressed in Annex 3.
- 3.6. **Data for crop risk assessment.** There are two types of data commonly used in the assessment of risk in crop production:
- a. Crop damage or production loss data by cause of loss** which are usually recorded in terms of the affected area (hectares) and an estimate of the average percentage damage in the damaged area, or an estimate of the value of production losses in the damaged area. Damage data are especially useful for the design and rating of named-peril damage-based policies. Under this study it has only been possible to collect limited crop damage statistics for key perils including flood, river erosion and hail, landslide and snowfall for 2 years only, 2003/04 and 2006/07.
 - b. Crop production and yield data.** The analysis of variance in time-series production and yield data forms the basis of any loss of crop yield insurance program. In most developing countries governments record annual cultivated areas for main crops and production and yields. Nepal has a well established system of recording crop production and yields and a minimum of 13 years published district-level crop production and yield data for the 5 main cereal crops and 4 cash crops.²³ These data have been used to develop the CRAM portfolio risk assessment model and to establish expected yields and illustrative premium rates for an **area-yield index insurance program** which GoN might consider for pilot testing in future.
- 3.7. **Data for weather risk assessment.** Crop risk assessment aims to combine an analysis of crop damage or production and yield variation with time-series climatic data. This is most suited to named-peril policies, for example coverage against spring frost or excess rain at harvest where time-series minimum daily temperature and daily rainfall can be correlated with crop production and yields for causal relationships, and where the time-series climatic data can be used to establish the frequency of occurrence and severity of frost events for rating purposes.
- 3.8. Nepal has a lengthy history of weather data recording through the Department of Hydrology and Meteorology (DHM), and a relatively dense network of about 280 meteorological rainfall recording stations providing daily rainfall data for 30 years or more. The relatively high density of weather stations in Nepal coupled with what appears to be good quality 30-40 year time series daily data, suggests that there is potential to develop and rate a series of pilot crop-weather index insurance programs for perils including **excess rainfall, rainfall deficit (drought)** and in the hill region, possibly **low temperature/frost**.
- 3.9. Under this feasibility study rainfall and temperature data have been accessed for 9 representative stations and these data have been analyzed to explore causal relationships between annual and seasonal rainfall and average district yields for the main crops. The weather risk analysis has also been conducted with a view to making a preliminary assessment of the suitability of developing non-traditional crop weather index insurance products for specific perils (e.g., excess rainfall or rainfall deficit-drought) and specific crops in Nepal. The results of this analysis are summarized in this Chapter and full details are presented in Annex 4.

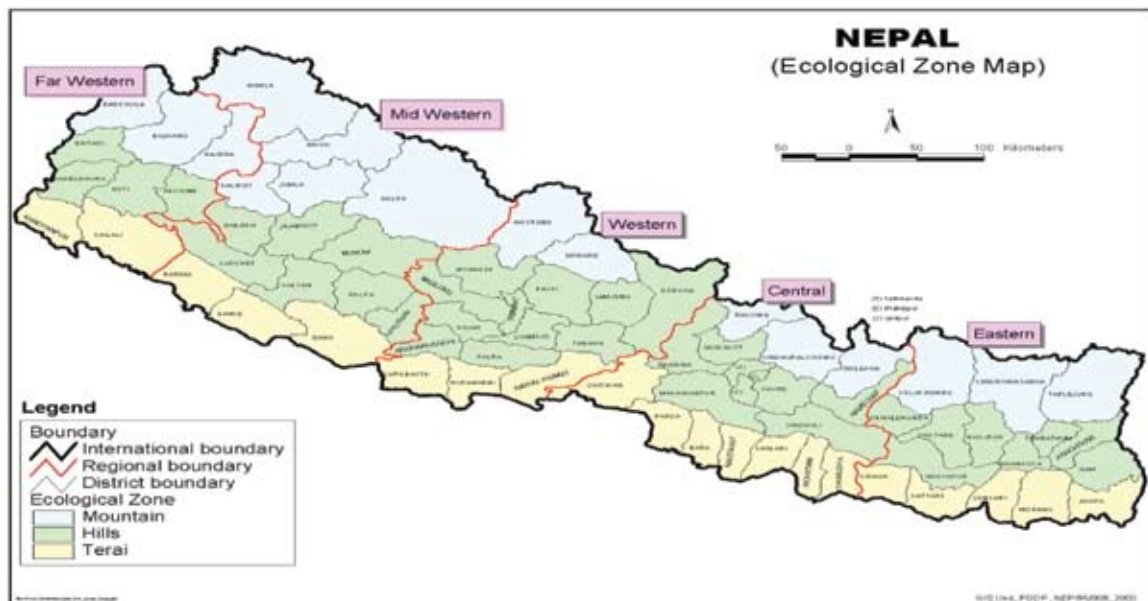
²³ In Nepal two organizations are involved in the recording of crop production and yields, 1) the Central Bureau of Statistics, CBS, and 2) The Ministry of Agriculture and Cooperatives (MOAC). The MOAC through its regional and district offices also records crop damage data.

- 3.10. **Data for livestock risk assessment.** The Directorate of Animal Health (DAH), of the Department of Livestock Services (DoLS), maintains annual statistics on disease outbreaks and mortality levels for all classes of livestock and this data is also available at a district level for the 4 years 2003-4 to 2006-07. The final section of this Chapter reviews the usefulness of these data for livestock risk assessment and insurance purposes.

AGRICULTURAL CROP PRODUCTION IN NEPAL

- 3.11. Nepal is divided into three ecological zones, which are highly influenced by topography: (1) the **Terai**, in the south, a low lying plain less than 50 Km wide, bordering India; (2) the central or mid- **Hills** including the highly populated valleys of Kathmandu and Pokhara; and (3) the high hills or **Mountains** of the Himalayas and Annapurnas bordering China. The country is then divided into 5 Development Regions and 75 Administrative Districts (See Map in Figure 3.1.).

Figure 3.1. Ecological Zone Map of Nepal



Source: Department of Hydrology and Meteorology.

Influence of altitude on climate

- 3.12. The altitude in the southern Terai is as low as 50 meters, rising in the north of Nepal to the highest mountain in the world, Mount Everest at 8,848 meters. The climate is highly influenced by topography and altitude: in the southern Terai **tropical and sub-tropical** conditions predominate; in the Hills at altitudes from 1,200 meters to 2,400 meters a **cool temperate** climate applies; and in the High Hills three climatic zones are identified, **cool zone** between 2,400 to 3,600 meters, **sub-arctic** conditions from 3,600 meters to 4,400 meters and above 4,400 meters **arctic** climatic conditions with permanent ice and snow.
- 3.13. In Nepal, altitude also affects annual rainfall patterns. Up to about 3,000 meters of altitude, annual total rainfall increases as the altitude increases; thereafter, annual rainfall decreases with increasing altitude and latitude. In addition to this latitudinal differentiation in rainfall, two other patterns are identified. First, given the northwestward movement of the moisture-laden summer monsoon (June to September), the amount of annual rainfall generally decreases from east to west. Second, the horizontal extension of hill and mountain ranges creates a

often in excess of 100 mm/day can lead to severe flooding (especially in the Terai) and landslides and mud slides (Hills and Mountains).

- 3.17. Average rainfall is very low between November and March and winter cropping is highly dependent on irrigation. In the winter season wheat, barley, and vegetables predominate. Snow-melt is a critical source of irrigation for winter season crops.
- 3.18. **Crop cultivation is also influenced by altitude and temperature.** An analysis of minimum and maximum temperatures is presented in Annex 4 for selected stations. In winter the mountain regions experience very low temperatures and frost is a risk exposure in winter crops. For example at Jumla weather station, the mean minimum daily temperatures in November is -1.6 C and February -3.0 C and January is the coldest month with a mean minimum daily temperature of -5.1 C. Conversely most of the hill region is free of frosts throughout the year. A sample analysis has been conducted for minimum temperatures for 3 stations in the Hills. At Lumle, Kaski District, there have only been 2 years in the past 30 years (1976 to 2006) when minimum daily temperatures in January and February have been less than zero degrees Celsius. Sindhuli is an important citrus growing area. Frost can be a problem in citrus with loss of fruit at zero centigrade and below and loss of the trees at temperatures below -3 C. However, over the past 30 years, at Sindhuli meteorological station there have been no frost days and minimum absolute temperatures in winter have been 1 C or above. Finally at Dhankuta, an important vegetable and cardamom growing area, there have been no recorded frost days in the past 30 years with an absolute minimum daily temperature of 1.8 C in December and minimum average daily temperature for January of 7.1 C. This analysis should be extended to other weather stations in the hill regions.
- 3.19. These findings suggest that any frost weather index crop insurance products that may be developed in future should concentrate on selected cash crops grown in the mountain regions and possibly in frost prone areas in the hill region.

Regional distribution of crop production

- 3.20. According to MOAC, in 2007, the total cultivated area of agricultural land in Nepal was 3,091,000 ha of which 1,059,865 ha (34 percent) were irrigated in the 2006/07 cropping season. Table 3.1. shows the main crops grown in 2006/07 of which summer season paddy accounted for 1.4 million ha or 33 percent of total cropped area. The next most important crop was summer maize (20 percent of total area) followed by winter wheat (16 percent of total area) and overall cereals accounted for three quarters of all cropped area. Cash crops accounted for 10 percent of total cultivated area and Other Crops 14 percent of cultivated area, of which pulses and vegetables were the most important crops. The total cultivated area for summer season and winter season crops and permanent crops was 4.3 million ha, implying a cropping intensity of 140 percent.

Table 3.1. Nepal Crop Production 2006-07

Crop	Area (ha)	% of Area	Production (Metric Tons)	Average Yield (kg/ha)
Paddy	1,439,525	33%	3,680,838	2,557
Maize	870,401	20%	1,819,925	2,091
Millet	265,160	6%	284,813	1,074
Wheat	702,664	16%	1,515,139	2,156
Barley	26,580	1%	28,293	1,064
Total Cereals	3,304,330	76%	7,329,008	2,218
Oilseed	184,218	4%	135,660	736
Potato	153,534	4%	1,943,246	12,657

(Cont.)

Crop	Area (ha)	% of Area	Production (Metric Tons)	Average Yield (kg/ha)
Tobacco	2,729	0%	2,648	970
Sugar Cane	64,019	1%	2,599,789	40,610
Jute	11,726	0%	16,815	1,434
Total Cash Crop	416,226	10%	4,698,158	11,288
Pulses	319,557	7%	274,375	859
Fruits	57,595	1%	575,095	9,985
Vegetables	191,922	4%	2,298,689	11,977
Cardamom	11,712	0%	6,792	580
Ginger	13,170	0%	160,576	12,193
Garlic	4,806	0%	30,308	6,306
Turmeric	3,079	0%	25,399	8,249
Chili	4,780	0%	15,569	3,257
Cotton	50	0%	45	900
Tea	16,420	0%	15,168	924
Coffee	616	0%	731	1,187
Total Other Crops	623,707	14%	3,402,747	5,456
Total All Crops	4,344,263	100%	15,429,913	3,552

Source: Agri-Business Promotion and Statistics Division, MOAC, Dec 2007.

- 3.21. Crop production is concentrated in the Terai Region, accounting for nearly 1.9 million ha, followed by the Hills, accounting for 1.5 million ha or 41 percent of cultivated area, and finally in the Mountains crop production is very insignificant with only 0.3 million ha, or 8 percent of total cultivated area (see Table 3.2.). There are marked differences in the crop types grown in each region: in the Mountains, barley, potatoes and millet are the major crops; in the Hills where a temperate climate prevails maize, millet, barley and potatoes are the most important crops, while the Terai is the food-grain bowl of Nepal accounting for 70 percent of all paddy area and 57 percent of wheat area, as well as being the principal cash crop producing region for oilseeds, tobacco and sugar cane.
- 3.22. The design of any crop insurance program for Nepal should take into account the differences in the importance of each crop type in each agro-ecological/altitudinal zone.

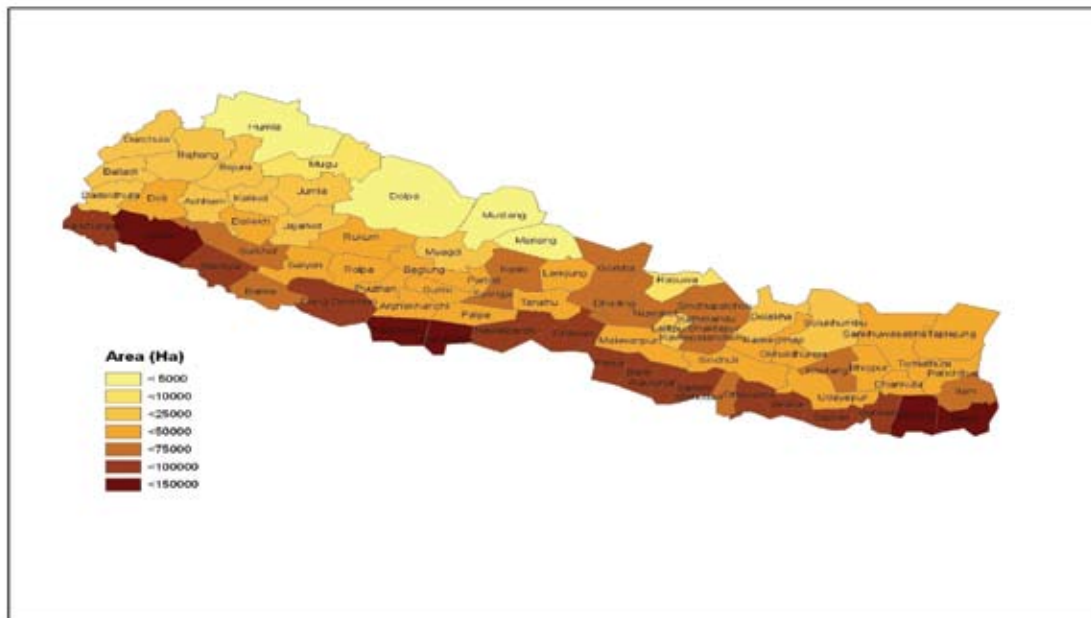
Table 3.2. 2006/07 Cropped Area by Ecological Region

Crop	Mountain	% of Total	Hill	% of Total	Terai	% of Total	Total Nepal
Paddy	62,263	4%	367,710	26%	1,009,552	70%	1,439,525
Maize	88,288	10%	613,774	71%	168,339	19%	870,401
Millet	53,174	20%	200,186	75%	11,800	4%	265,160
Wheat	53,173	8%	246,223	35%	403,268	57%	702,664
Barley	12,026	45%	13,576	51%	978	4%	26,580
Oil Seed	4,450	2%	38,402	21%	141,366	77%	184,218
Potato	25,825	17%	66,658	43%	61,051	40%	153,534
Tobacco	0	0%	14	1%	2,715	99%	2,729
Sugar Cane	294	0%	1,070	2%	62,655	98%	64,019
Total	299,493	8%	1,547,613	42%	1,861,724	50%	3,708,830

Source: Agri-Business Promotion and Statistics Division, MOAC, Dec 2007.

- 3.23. As an extension to the above analysis, Figure 3.4. shows the distribution of the 3-year average cropped area for cereals and cash crops by district. The analysis clearly shows that the major crop producing districts are located in the Terai. The most important crop producing districts with greater than 100,000 hectares of crops include Jhapa and Morang in the Eastern Terai, Rupandehi and Kapilvastu in the Western Terai, and Kailali in the Far Western Terai. Conversely, cereal and crop production is very restricted in the western and far western Mountains.

Figure 3.4. Nepal: Average cultivated Area 2004/05-2006/07 Cereals and Cash Crops by District



Source: World Bank, from MoAC Data 2008.

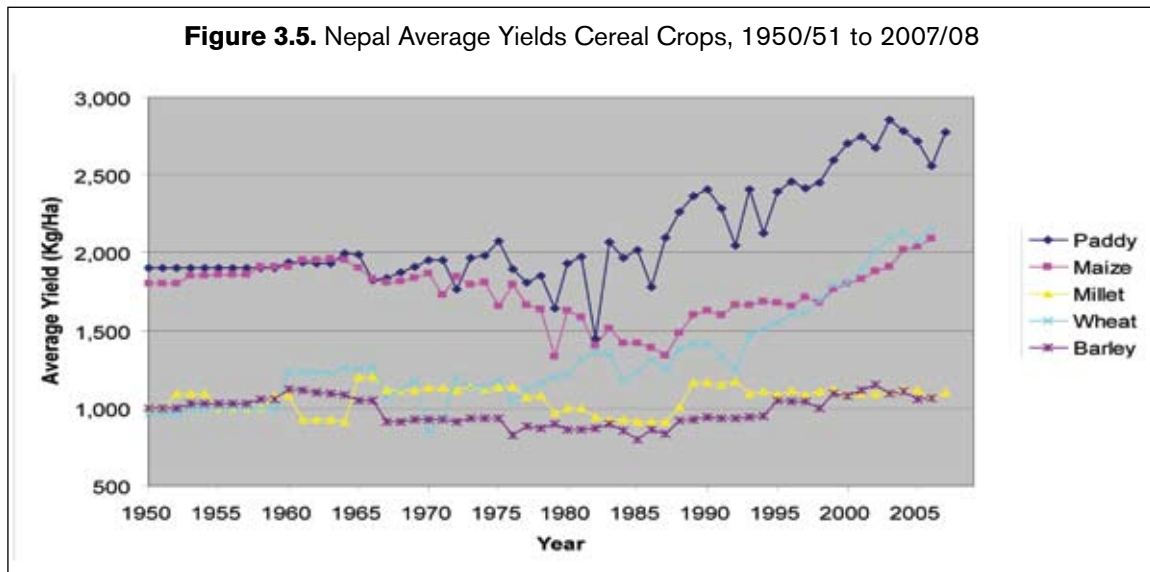
Crop production and yields

- 3.24. In Nepal, crop production and yields are collected on a routine basis by the Central Bureau of Statistics and the MOAC using sample surveys, area estimation, crop-yield cutting and visual estimation. The lowest level of reporting of annual cultivated area, production and yield data is the district level; then higher levels of aggregation include the agro-ecological Zone, the development region and finally aggregation at a national crop level (crop-cutting methods are discussed further in Chapter 4 and [Annex 3](#)).

National crop yields

- 3.25. Figure 3.5. reports the national average yields (in kilograms per hectare) for the 5 principle cereal crops, paddy, maize, wheat, barley and millet for the 47 year period 1950/51 to 2007/08. Paddy and wheat show technological progress (improved hybrid seeds and use of fertilizers, etc.), yield trend increases since the late 1970s and in 2007/08, average yields at a national level of about 2,750 kg/ha and 2,250 kg/ha, respectively. Average maize yields declined during the 1970s and 1980s but yields have recovered over the past 15 years and now average about 2,250 kg/ha. Millet and barley which are mainly grown as subsistence crops in the Mountains and Hills have not experienced any yield increase over the past 50 years.
- 3.26. The analysis in Figure 3.5 also shows that national average yields in paddy have experienced several major reductions (losses) in 1982/83 (29 percent reduction on previous 5-year average yield), which was a major El Nino

year.²⁴ There are three other years when national paddy yields were reduced by more than 10 percent, 1986/87, 1992/93 (which was also a strong El Nino Year) and 1994/95. Finally national yields of paddy were suppressed in 2006/07. These yield reductions relate to years of drought and/or delayed onset of the monsoon, plus losses due to flooding. National yields of maize were reduced by 18 percent in 1979/80 and in the case of wheat, yields in 1970/71 were 28 percent below the previous 5-year national average. In most other years national average yields of maize and wheat have shown technology increases and there have not been further major yield loss years. The average national yields of barley and millet have remained very stable over time with no significant yield loss years at a national level.



District crop yields

- 3.27. A time-series analysis has been conducted on the variation in district-level yields for the 13-year period 1994/95 to 2006/07 for all five main cereal crops and the four main cash crops grown in the 75 districts of Nepal. Full details of this analysis are presented in Annex 5 and key findings are summarized in this section.
- 3.28. **In general, reported district average yields for the principle cereals appear to be stable.** Table 3.3. shows a summary analysis of variability of the district-level annual average yields for the 13 years classified by the level of the coefficient of variation in mean yield. The key feature is the very low percentage of districts which exhibit a coefficient of variation in 13-year mean yields of greater than 20 percent: for millet and barley only 3 percent of all districts with > 1,000 planted area per crop had a COV greater than 20 percent; and for wheat, which exhibits the highest degree of variation yield variability, only 15 percent of districts had a COV greater than 20 percent.
- 3.29. **The reported district-level average yields should be interpreted with caution for the following reasons.** First, the yields are an average for all irrigated and rain-fed and local and HYV varieties and this will tend to mask variation in the average district yield. Second, the yields are calculated on a harvested area basis and not planted area basis, thus reducing yield variability still further. Finally, in districts where the crop is grown on a small scale, the reported annual yields are estimates which may remain unchanged for several years. Issues relating to the available yield data are discussed further in Annexes 3 and 5.

²⁴ Previous studies for Nepal have found a strong negative correlation between El Nino Years and monsoon rainfall (which is reduced) and paddy yields (which are correspondingly reduced) and La Nina years (enhanced rainfall and higher paddy yields). The analysis presented in this study in Annex 4 does not, however, find a strong correlation between El Nino years and national crop yields for most of the stations analyzed.

Table 3.3. Variability of District-level Average Crop Yields (% of Districts)

District-level Coefficient of Variation in Mean Yield	Paddy	Maize	Millet	Wheat	Barley	Total
<10%	23%	15%	62%	4%	26%	26%
[10% to 15%]	58%	46%	30%	30%	40%	41%
[15% to 20%]	13%	32%	6%	51%	31%	26%
> 20%	6%	6%	3%	15%	3%	7%
Total Districts	100%	100%	100%	100%	100%	100%

Source: World Bank, from MOAC District Annual average yields.

Relationship between crop yields and rainfall levels

- 3.30. A summary of the relationship between district average yields in paddy and district rainfall is presented in Table 3.4. for 9 weather stations for the 13 years 1994/95 to 2006/07, and the full results of this analysis are presented in Annex 4. The correlation between rainfall and district-level paddy yields is highly significant in Sindhuli District only as shown by the R^2 values of 0.71 for annual rainfall and 0.72 for monsoon rainfall.
- 3.31. The relationship between rainfall and district-level yield is not, however, strong in any other district. This finding is similar to that found in many other countries and is a reflection of the fact that there are many other factors apart from rainfall which affect yield outcome, including: the timeliness of rainfall at the start of the season and distribution of rainfall throughout the growing season, seed variety, quantity of fertilizer use and plant protection measures, presence or absence of supplementary irrigation, etc. Also in the context of Nepal, it should be noted that the district is often very large, covering 50,000 ha to 100,000 ha of paddy and in this case it is likely that the single rainfall station does not reflect spatial variation in rainfall patterns at the district level. As a final point, reported district yields include the average yields for both irrigated and non-irrigated cropping and the net effect is probably to mask any relationship between rainfall and crop yields.

Table 3.4. Correlation between District-level Annual Average Paddy Yields and Annual Rainfall 1994/95 to 2006/07 (R-Square Values)

Station	Annual Rainfall	Monsoon Rainfall (June-Oct)
Dadeldhura	0.0193	0.0235
Jumla	0.089	0.0056
Banke	0.2557	0.2858
Kaski	0.0313	0.0337
Sindhuli	0.7067	0.7194
Chitwan	0.2237	0.1019
Dhankuta	0.1479	0.2155
Siraha	0.0166	0.0219
Morang	0.1954	0.104

Source: World Bank, from MOAC District Yield Data and Meteorology Department Rainfall Data

- 3.32. Annex 4 presents a more detailed analysis of the correlation between 30-year national average yields for the 5 principle cereal crops and rainfall for the 9 selected stations. This analysis shows that national paddy yields are positively and significantly correlated with annual rainfall in Biratnagar, Lumle and Rampur. National wheat yields are positively and significantly correlated with Lumle and Rampur annual rainfall, while Barley yields are positively

and significantly correlated with Rampur rainfall only. For monsoon rainfall (June to October) the most positive and significant correlations are for Lumle and Rampur monsoon rainfall and paddy, wheat and barley yields. Other statistically significant correlations are negatively signed, indicating yield reduction with increased rainfall, which is unexpected. Finally an analysis between late onset of the monsoon rainfall and national crop yields only produced consistently significant results for all crops at Lahan weather station—in this case reduced yields and delayed/late onset of monsoon rains. The fact that this extended 30-year time series analysis was conducted on national as opposed to district-level yields is probably the main reason for the lack of correlations between rainfall and yields, but also as noted above there are many other factors that influence crop yields apart from total rainfall.

- 3.33. In the pre-planning and design stages for any pilot crop area-yield index or crop weather index insurance program, a detailed analysis between rainfall variability at the individual district level will need to be conducted and if possible, yield data collected for individual VDCs.

Crop damage statistics by cause of loss

- 3.34. Some limited district-level crop damage statistics by crop for 2 years 2003-04 and 2006-07 have been collected. The available data for 2003-04 are reported in Annex 3 and show by crop and district the area (in hectares) 100 percent damaged by flood, sand-filling (siltation following flood) and river erosion. In 2003/04 a total of 73,016 ha of paddy were reported as damaged due to flooding, the main affected districts being Rautahat, Salahi, Dhanusha and Mahottari, Central Terai. Flooding can be a major problem in the Monsoon season in the Terai and in 2008 major flood losses have been reported between July and September in Kanchanpur and Kailali districts, Far Western Terai and also in Saptari Eastern Terai where flooding of the Koshi river has caused an estimated NRs 10 billion of damage to paddy crops and infrastructure.²⁵
- 3.35. Drought damage is very difficult to quantify. Because planted area is not systematically reported along with final harvested area (which is reported) for each crop in each district, it is not possible to make a formal assessment of the area lost due to drought. MOAC data also includes limited information on crop hail damage which is a particular problem for vegetables grown in the hill regions and damage due to landslide and snowfall.

CROP PORTFOLIO RISK ASSESSMENT - DESIGN FEATURES

- 3.36. The Crop Risk Assessment Model, CRAM, described in this section is based on an analysis of variation in district-level time series annual average crop yields for the main food crops and cash crops grown in Nepal. The principle objectives of this model are to assist decision makers to assess the spatial distribution of crop production values throughout the 75 districts of Nepal and to quantify the risk in terms of crop production and yield loss for the principle food crops and cash crops in each district and region.
- 3.37. The key underlying crop production, yield and valuation data which the CRAM model for Nepal is built on include:
- **Selected crops:** the 5 main food crops (paddy, maize, millet, wheat and barley) and 4 cash crops (oilseeds, potato, tobacco and sugar cane) for which district-level²⁶ crop area, production and yield data are available for the past 13 years 1994/95 to 2006/07.
 - **Cultivated area:** In order to remove seasonal variation from the cultivated area in each district, the model takes the average sown area for the past 3 seasons 2004/05, 2005/06 and 2006/07 for each crop. The

²⁵ Personal communication, K Devkota October 2008.

²⁶ District-level area, production and yield data for 1994/95 to 2003/04 are reported in the Central Bureau of Statistics, Statistical Year Book of Nepal 2005, and data from 2004/05 to 2006/07 are taken from the MOAC's Agri-Business Promotion and Statistics Statistical Information on Nepalese Agriculture 2004/05, 2005/06 and 2006/07.

model then assumes that cropped area has remained constant over the past 13-years. For the purposes of the risk analysis exercise, the minimum cropped area in any one department is set at 1,000 ha for all crops (except for tobacco which is set at a minimum of 250 ha), but this can be amended by the user.

- **Crop yields:** the crop yields are based on the reported district average yields (total production (in metric tons) divided by cultivated and harvested area (ha));
- **Crop output prices:** the 9 crops are valued at the published 2006/07 average farm gate gross margin sales prices for Nepal which are detailed in Annex 5. These prices can be amended by the user.

3.38. **Modeling of Yield Losses and the Value of Losses.** Under a district area-yield index policy, an indemnity is due when the actual average district yield for a specified crop falls short of an insured yield coverage level which is established as a percentage of the district average yield (typically the coverage level is set at between 50 percent and 90 percent maximum of the long-term average yield). The CRAM is programmed for each crop in each district to calculate for each of the past 13 years the difference between the actual historical yield and the insured yield for that year. In any year where the actual yield is below the insured yield the amount of yield loss is calculated as a percentage of the insured yield to derive the pure loss cost (claim/liability x 100 percent). The average pure loss cost for each crop is then calculated as a simple average over the 13 years of yield data.

3.39. In summary, the CRAM uses a historical database of 13 years of actual yield data for all major crops grown in all 75 districts of Nepal to (i) model the expected value of losses under an area-yield index insurance program as if this were operating in the forthcoming 2008/09 season; and (ii) to establish the technical rates for an area-yield index program. Full details of the assumptions used in the design of the CRAM are contained in [Annex 5](#).

CROP RISK ASSESSMENT MODEL – OUTPUTS AND APPLICATIONS

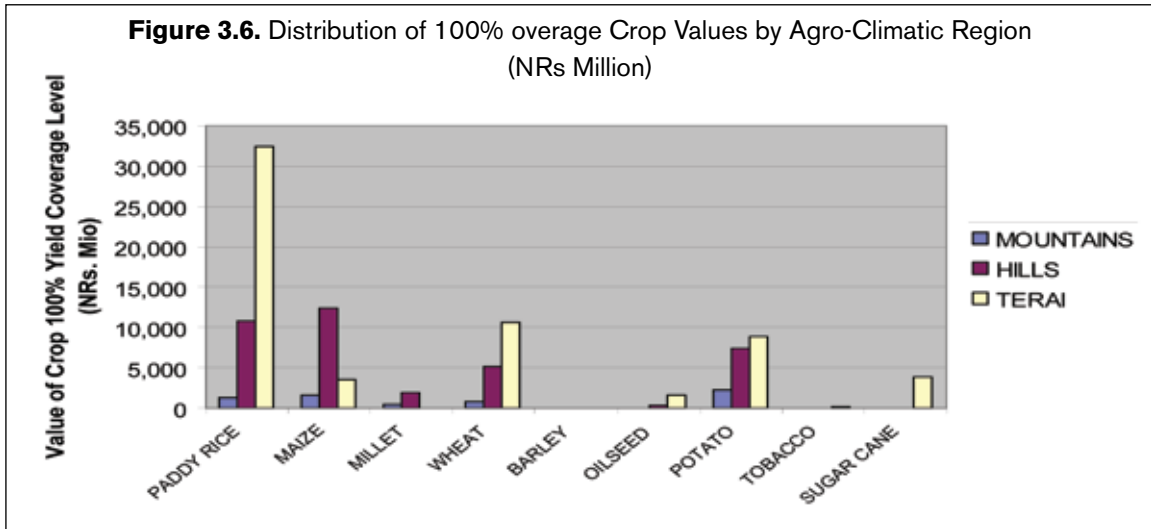
National aggregate crop values

3.40. Table 3.5. and Figure 3.6. present the 100 percent coverage level values for the 9 crops for each of the major agro-climatic risk zones and in total. The total exposed values amount to NRs 106 billion (US\$1.51 billion). Agricultural crop production in the Mountains only accounts for 6 percent of the total value of crop production, followed by the Hills at 36 percent of total value, and crop production is most important in the Terai, valued at 58 percent of total. Paddy is the most important crop, accounting for 42 percent of total crop value, followed by potato (18 percent of total values), maize and wheat. The five other crops are relatively insignificant in terms of financial exposures.

Table 3.5. Nepal: Total Values at Risk for 100% Yield Coverage Level (NRs Million)

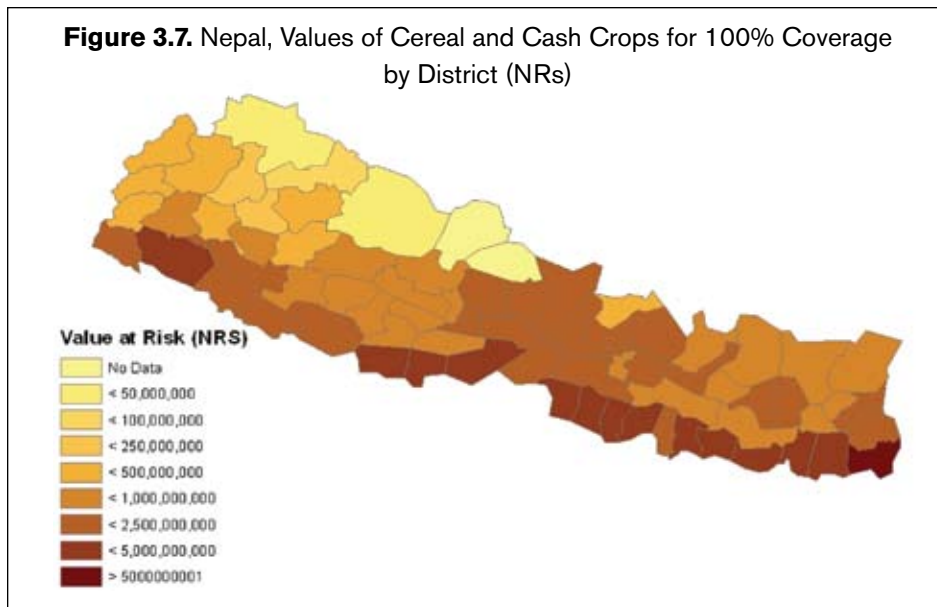
Crop	Mountains	% of Values	Hills	% of Values	Terai	% of Values	Total Nepal	% of Values
Paddy Rice	1,358	1.3%	10,800	10.2%	32,394	30.6%	44,551	42.1%
Maize	1,566	1.5%	12,344	11.7%	3,503	3.3%	17,413	16.5%
Millet	509	0.5%	1,973	1.9%	76	0.1%	2,558	2.4%
Wheat	870	0.8%	5,213	4.9%	10,610	10.0%	16,693	15.8%
Barley	66	0.1%	23	0.0%	0	0.0%	89	0.1%
Oilseed	16	0.0%	316	0.3%	1,644	1.6%	1,977	1.9%
Potato	2,217	2.1%	7,383	7.0%	8,863	8.4%	18,463	17.5%
Tobacco	0	0.0%	0	0.0%	225	0.2%	225	0.2%
Sugar Cane	0	0.0%	0	0.0%	3,831	3.6%	3,831	3.6%
Total	6,603	6.2%	38,052	36.0%	61,145	57.8%	105,800	100.0%

Source: World Bank, from MOAC District Yield Data



Source: World Bank, from MOAC data.

3.41. The distribution of total values (100 percent coverage level) by district is shown in Figure 3.7. The concentration of values in the Terai is clearly shown and the crop districts with the highest exposed values at 100 percent coverage level in excess of NRs 3,000 million (US\$43 million) per district include Jhapa, Morang, Sunsari, Bara, Rupandehi and Kailali. Conversely, the crop values in the districts of the three Western Mountain Regions are very low at less than NRs 50 million (US\$0.7 million) and in the cases of Manang and Mustang Districts the 3-year average cultivated area is less than 1,000 ha in all cases thereby registering a zero sum insured value. The values of each crop by District are presented in Annex 5.



Note: No data mean less than 1000 hectares of crops grown in district.

Source: World Bank, from MOAC data

3.42. In the planning of any public-private crop insurance program for Nepal, due consideration must be given to the distribution of crop values and careful accumulation control exercised.

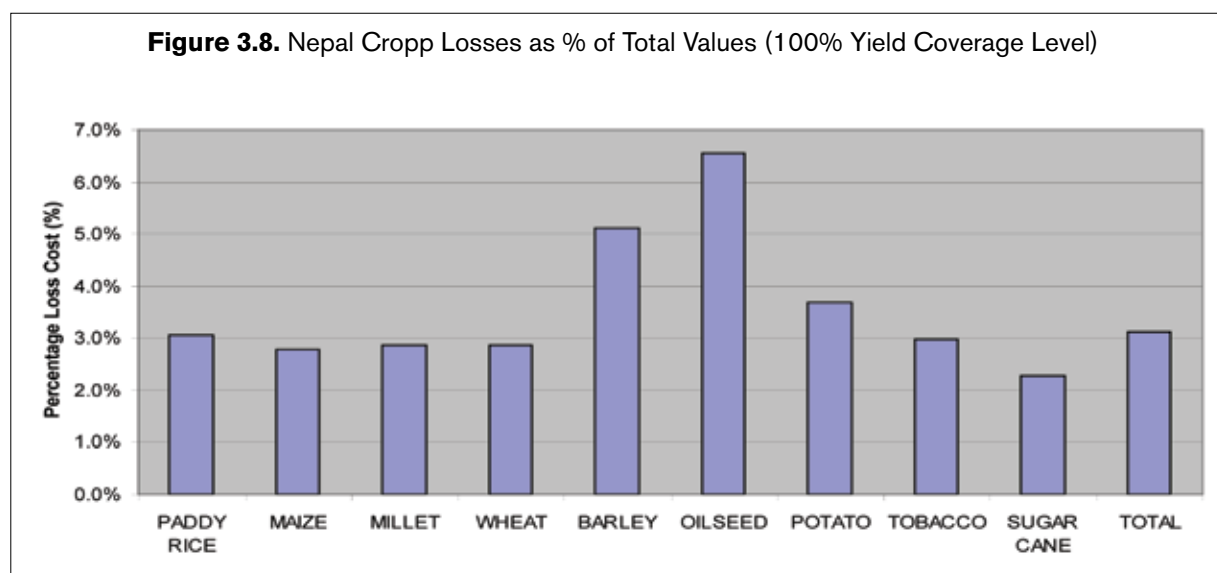
Expected claims costs for national crop portfolio

- 3.43. The CRAM is programmed to calculate the expected values of losses or claims costs and associated pure loss costs for insured yield coverage levels ranging from 100 percent down to 50 percent of the expected 2008/09 district average yield for each of the 9 major crops grown in Nepal.
- 3.44. For the 100 percent insured yield coverage level, Table 3.6. and Figure 3.8 show the average annual expected claims costs for each of the 9 crops and in total. Over the past 13 years, the average value of lost production has been NRs 3.3 billion per year (US\$47 million), representing 3.1 percent of the total value of national crop production for the 9 crops. Paddy, the largest crop accounting for 42 percent of total crop values exhibits fairly stable production and yields with a 3.1 percent loss cost. Oilseeds exhibit the highest loss costs with average annual losses of 6.5 percent of the total value, followed by barley with 5.1 percent loss cost and potato, 3.7 percent loss cost. Sugar Cane is the most stable crop with the lowest average loss cost of 2.3 percent.

Table 3.6. Nepal: Annual Average Value of Crop Losses (100% insured yield Coverage Level)

Crop	3-Year Average Planted Area (ha)	Total Insured Value (100% yield coverage) NRs	% of Values	Value of Losses (100% Yield coverage) NRs	Losses as % of Total Values
Paddy Rice	1,510,234	44,551,477,710	42%	1,368,508,385	3.1%
Maize	857,080	17,413,354,903	16%	485,452,924	2.8%
Millet	261,892	2,557,815,966	2%	73,321,277	2.9%
Wheat	683,504	16,692,899,778	16%	478,566,704	2.9%
Barley	26,412	88,667,981	0%	4,537,607	5.1%
Oilseed	186,701	1,977,096,710	2%	129,229,387	6.5%
Potato	150,396	18,463,007,515	17%	681,102,730	3.7%
Tobacco	2,822	224,688,838	0%	6,682,323	3.0%
Sugar Cane	61,722	3,830,911,611	4%	87,002,439	2.3%
Total	3,740,761	105,799,921,013	100%	3,314,403,774	3.1%

Source: World Bank, from MOAC data.

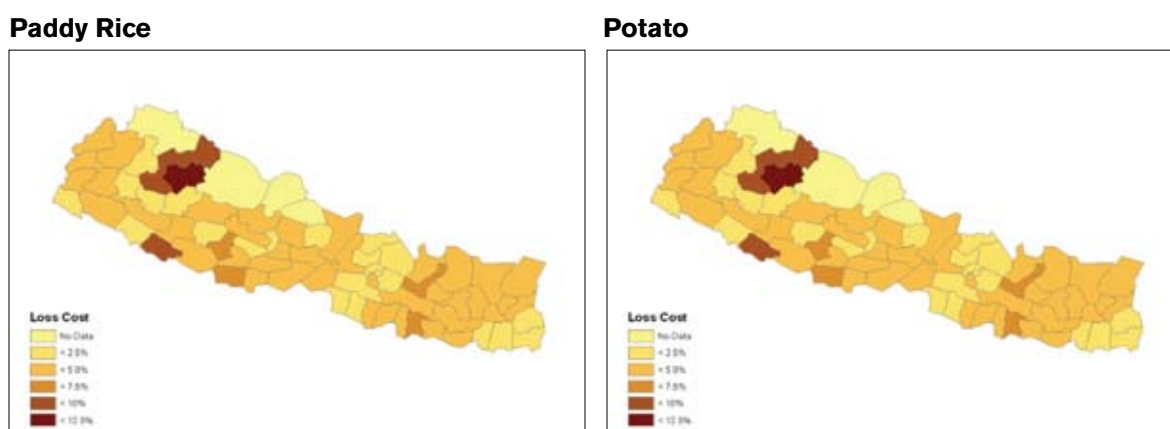


Source: World Bank, from MoAC Crop Yield Data.

Geographical distribution of crop losses

- 3.45. **The exposure to losses varies by crop and by district.** Very little paddy rice is grown in the Mid-Western Mountains and Far Western Mountains (Districts of Humla, Mugu, Jumla, Dolpa) but the crop is very exposed to yield variation as shown by the annual average losses of between 8.0 percent (Mugu) and 10.3 percent (Jumla) of the value of paddy production in these regions (Figure 3.9.). This is due to a combination of low rainfall and lack of supplementary irrigation. Conversely in the Terai, paddy production is much more stable particularly in Morang and Sunsari Districts. However, high yield losses in excess of 7.5 percent of the value of production are experienced in paddy grown in Banke District, Mid-Western Terai and to a lesser extent this applies to paddy grown in Kapilvastu, Saptari, Mahottari and Dhanusha Districts in the Terai.
- 3.46. The pattern of losses in potato is very variable with the highest losses (with associated loss costs of between 8 percent and 12 percent) in the Hill districts of Kathmandu, Myagdi, Lamjung, and Baglung. High losses are also experienced in potatoes grown in several districts of the Terai including Saptari and Kanchanpur.
- 3.47. Annex 5 provides further details of the pattern of losses in all 9 major crops. In the design of any future crop insurance program in Nepal, this type of analysis of the geographical distribution of losses by crop type and by region will be important for portfolio planning and for achieving a balanced spread of risk. In other words, it is important to ensure that crop insurance does not focus only on the most risky crops in the most risk exposed districts, but that a balanced spread of risk is achieved across the three major ecological zones.

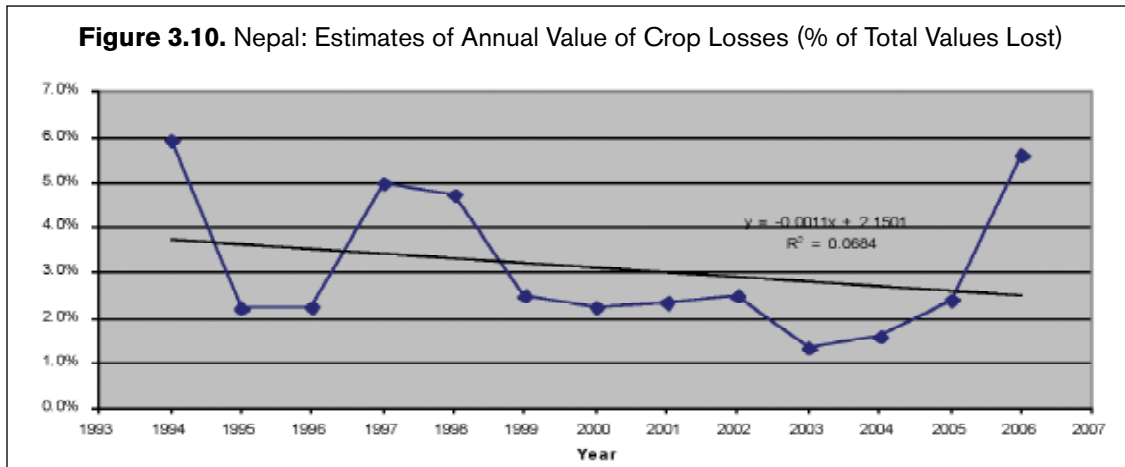
Figure 3.9. Distribution of Crop Losses by Crop and by District (Loss Costs for 100% coverage)



Note: "No data" means less than 1,000 hectares of crops grown in district.
Source: World Bank, from MOAC District Yield Data.

Trends in crop production losses and claims costs

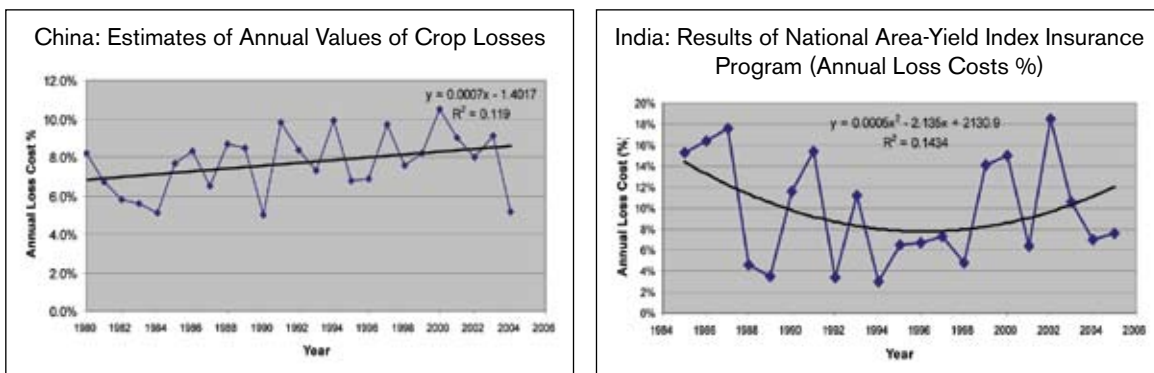
- 3.48. Figure 3.10 shows that over the past 13 years (1994 to 2007) there has been a slight trend toward decreasing crop losses in Nepal. The worst loss year was 1994/95 with total crop losses valued at NRs 6.3 billion (US\$90 million) or 5.9 percent of the total value of production. 2006/07 was also a severe loss year with overall losses of NRs 5.9 billion (US\$85 million) and corresponding loss cost of 5.6 percent. In 2006/07 the highest losses were incurred in paddy rice on account of the delayed onset of the monsoon and upwards of 100,000 ha of drought losses in transplanted paddy seedlings with losses valued at NRs 4.2 billion or 9.5 percent of the total national value of this crop. High losses were also recorded in barley with 8.4 percent loss cost in 2006/07.



Source: World Bank, from MOAC District Yield Data.

- 3.49. It is interesting to compare the levels of crop production losses in Nepal, with its direct neighbors including China and India (Figure 3.11).
- 3.50. China is very exposed to a combination of droughts, floods and typhoon and average annual crop losses are about 7.8 percent of the total value of production, or more than double the average annual losses of 3.4 percent of the value of national production in Nepal. It is noticeable that the trend is for increasing value of crop losses in China.
- 3.51. India has implemented a national area-yield index crop insurance program for more than 25 years. The annual average lost cost (excess of the policy deductible) is nearly 10 percent and shows very high peaks with the highest losses incurred in 1986/87 (loss cost 17.5 percent) and again in 2002/03 (loss cost 18.5 percent). Drought is the major cause of claims under the Indian scheme.
- 3.52. The analysis suggests that annual crop production in Nepal is less exposed to losses from climatic and other natural perils than in both China and India, but this finding should be interpreted with caution because the available yield data may underestimate actual losses.

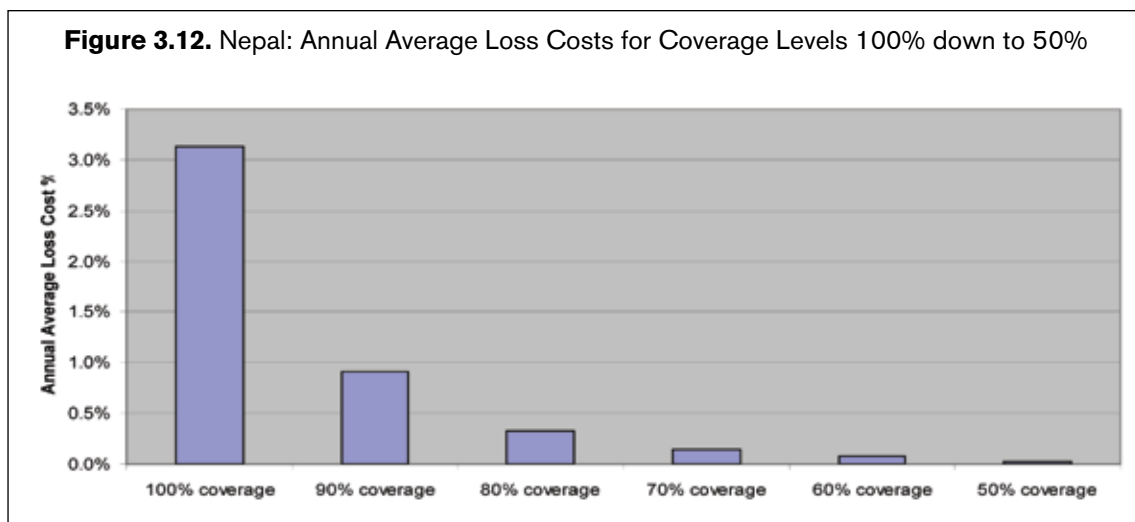
Figure 3.11. Annual Value of Crop Losses, China and Annual Crop Insurance Claims India



Source: World Bank 2008.

Area yield insurance and impact of different coverage levels on claims costs

- 3.53. The above analysis for Nepal at 100 percent coverage level illustrates the 13-year pattern of value losses when district-level crop production and yields fall below average (100 percent coverage level) across the 9 crops and 75 districts, and the severe losses to both farmers and the national economy in a late monsoon/severe drought year such as 2006/07.
- 3.54. No crop area-yield index insurance program will, however, agree to insure 100 percent of the average yield. The CRAM model is programmed to adjust the insured yield coverage level from 100 percent down to 50 percent (or lower if required) of the 2008/09 expected trend yield for each crop and district and automatically to recalculate the sum insured (liability), the annual claims cost for each of the 13 years and the average loss cost and finally the claims value corresponding to each coverage level.
- 3.55. Figure 3.12 illustrates the reduction in overall claims costs for the national portfolio for reduced coverage levels from 100 percent coverage down to 50 percent insured yield coverage. As previously noted in Table 3.6, at 100 percent coverage level the total sum insured for the national crop portfolio would amount to NRs 106 billion (US\$1.5 billion) and annual expected claims would amount to NRs 3.3 billion (US\$47 million) equivalent to an annual loss cost of 3.13 percent. The most noticeable change is that if the coverage level were to be fixed at 90 percent of expected yield for all 9 crops in all 75 districts, the total insured values would be reduced by 10 percent to NRs 95 billion (US\$1.36 billion), but the expected value of claims would be reduced by nearly three quarters to only NRs 870 million (US\$12 million) with a corresponding loss cost of 0.91 percent (Figure 3.12). At 80 percent coverage level the total sum insured would be reduced by a further 10 percent to NRs 85 billion (US\$1.2 billion), but expected claims would be reduced by a factor of three times to NRs 278 million (US\$4 million) and the loss cost would be reduced to 0.33 percent. The major reduction in expected claims at 90 percent or 80 percent coverage level is due to the stability in the reported district-level annual crop production and yields in most districts over the 13-year reference period. Further reductions in expected claims are shown for coverage levels down to 50 percent in which case the loss cost is as low as 0.03 percent. (Figure 3.12). It should be noted, however, that annual average loss costs at a more disaggregated level (e.g., sub-districts) would be higher because crop yields are more volatile than at the district aggregated level.



Source: World Bank, from MoAC data (2008).

3.56. The above analysis is useful for general portfolio planning and indicates that on average an 80-90 percent coverage level could be offered for a district-level area-yield index crop insurance program. We emphasize, however, that coverage levels should be set individually for each crop and each district based on the actual yield variability in that district. Full details of the calculated loss costs for each crop in each district are presented in Annex 5.

Probable maximum loss

3.57. The analysis of 13-year district yields shows that 1994/95 was the worst loss year in this series with total crop losses valued at NRs 6.3 billion (US\$90 million) or 5.9 percent of the total value of national crop production. Although 1994/05 was a severe loss year in Nepal, even worse crop losses could occur in future. From an insurance view point, underwriters need to know with a high degree of confidence the maximum losses that they might incur (termed the Probable Maximum Loss, PML²⁷) either 1 in 100 years, or if it is necessary to be even more conservative, 1 in 250 years. This information is an invaluable aid to structuring an insurance and reinsurance program and to determining how much capital must be reserved to cover the PML loss year.

3.58. Figure 3.13. shows the results of the World Bank's PML loss cost analysis for return periods of 1 in 2 years up to a maximum of 1 in 250 years for the Nepal 9-crop national portfolio and assumed coverage levels ranging from 100 percent down to 50 percent of 2008/09 district-level expected trend yield.²⁸ The analysis shows that:

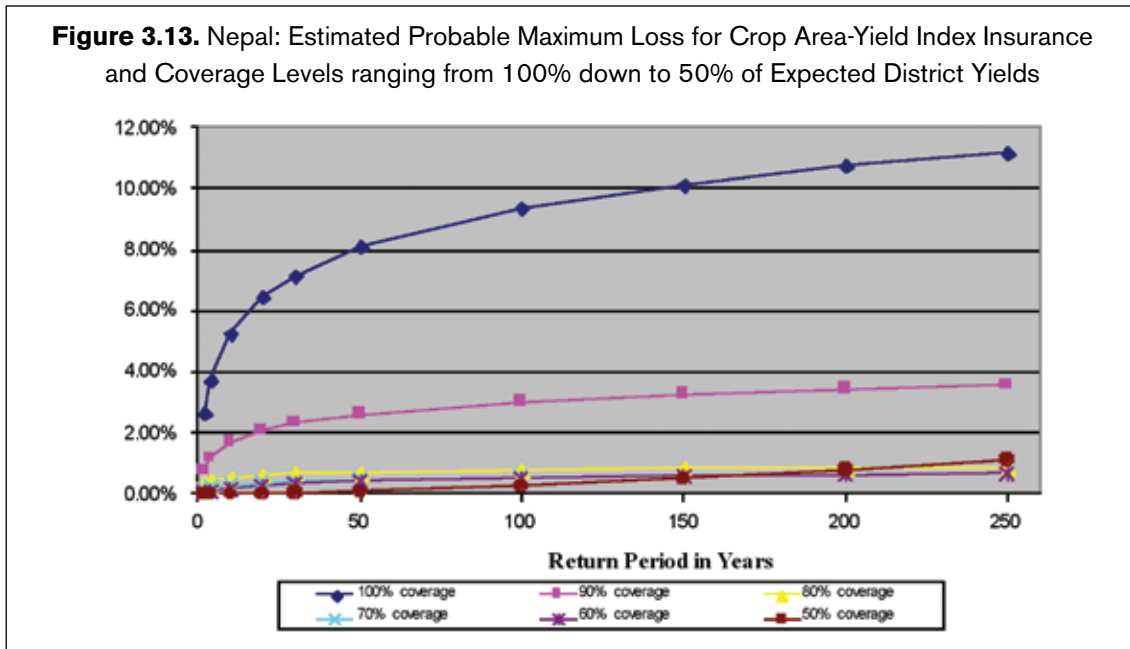
- The losses in 1994/95 with 5.9 percent loss cost at 100 percent coverage level equate approximately to a 1 in 15-year return period;
- The 1 in a 100 year estimated PML loss cost is 9.4 percent at 100 percent coverage level, equivalent to a financial loss of NRs 9.9 billion (US\$142 million).

3.59. For an area-yield Insurance program which provides a coverage level of between 70 percent and a maximum of 90 percent of district-level expected trend yield, the corresponding calculated 1 in a 100 year PML loss costs are: 0.5 percent at 70 percent coverage (NRs 405 million losses), 0.8 percent at 80 percent coverage (NRs 662 million losses) and 3.0 percent loss cost at 90 percent coverage (NRs 2.9 billion losses). Further details of the PML Loss costs are given in Annex 5.

3.60. The 1 in 100 year PML calculated loss cost values should set the amount of risk capital allocated by the insurer (original premiums and claims reserves and purchased reinsurance) for any specified insured yield coverage level under the modeled 9-crop national portfolio. Similar modeling can be conducted for any crop portfolio that is selected and entered in the CRAM.

²⁷ The Probable maximum Loss is defined as "An estimate of the maximum loss that is likely to arise on the occurrence of a single event considered to be within the realms of probability, remote coincidences and possible but unlikely catastrophes being ignored".

²⁸ The PML Loss Costs are calculated using statistical simulation techniques which are described in [Annex 5](#).



Source: World Bank 2008, from MOAC data.

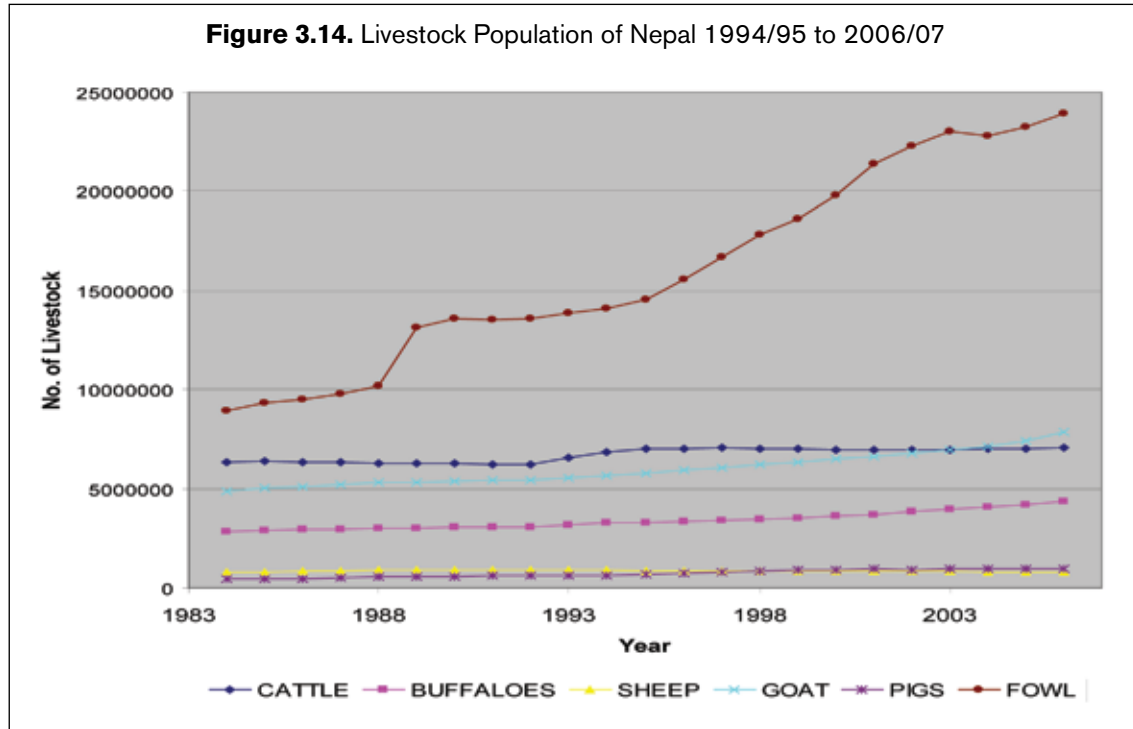
LIVESTOCK RISK ASSESSMENT

Livestock production in Nepal

- 3.61. Agriculture accounts for about 33 percent of GDP in Nepal and the livestock sector contributes about 40 percent (13 percent of GDP). Livestock are very important with 3,017,500 households recorded under the 2001 census (90 percent) owning livestock. Cattle are the most popular class of animal owned by 68 percent of households (average of 3 cows per household), goats (50 percent of households, average 4.1 goats per household) and buffalo (owned by 47 percent of households, average of 2.2 animals per household).
- 3.62. The very small average size of herds poses a major challenge for the design and implementation of livestock insurance in Nepal because of the potentially very high administration costs in relation to the volume of premiums generated for each livestock holding.
- 3.63. Figure 3.14 presents national livestock numbers for the main classes of animals and poultry. In 2006/07 there were an estimated 7 million head of cattle in Nepal of which about 13 percent were dairy cattle. The national cattle herd has remained very stable over the past 10 years. The number of buffalo has increased by about 25 percent over the past decade and currently stands at 4.4 million head, of which 26 percent are dairy buffalo. Goats are very important particularly in the Mountain regions and the national flock is estimated at 7.8 million head in 2006/07, followed by pigs and sheep, which number less than 1 million animals. There are nearly 24 million poultry in Nepal.

Availability of livestock mortality statistics

- 3.64. Nepal has a very efficient, well staffed and managed Directorate of Animal Health (DAH) which is part of the Department of Livestock Services (DOLS) of the MOAC. There is a national network of 359 livestock centers and 640 livestock sub-centers providing veterinary services at sub-district level.



Source: MOAC, 2007.

- 3.65. Livestock disease incidence and mortality rates are routinely monitored and reported by the DAH and DOLS staff in each VDC. The data presented by DAH in their annual report cover major diseases in terms of the number of outbreaks, number of animals affected, numbers of dead animals and numbers of vaccinated animals, but there is no analysis of mortality rates for each class of animal.
- 3.66. The DAH does not, however, record livestock mortality rates due to causes other than diseases. For livestock insurance purposes it is necessary to establish livestock mortality rates due to all causes including natural perils of fire, flood, lightning, landslide, storm, and or accidental death due to falling, fracture, poisoning, wild animals, electrocution, and in female animals birth related complications, etc. As such any formal risk assessment for risk rating and risk layering purposes is limited by data availability.

Issues relating to all risk mortality insurance including Class A epidemic livestock diseases

- 3.67. Chapter 2 noted that all the non-regulated livestock insurance initiatives in Nepal over the past 20 years have provided all risk mortality coverage for cattle, buffalo and sheep and goats, including coverage against all diseases including a series of highly contagious Class A epidemic diseases which have the potential to cause widespread losses in livestock throughout Nepal.
- 3.68. The DAH has adopted the World Organization for Animal Health (Office Internationale des Epizooties, OIE) classification for communicable livestock diseases including Class A epidemic diseases (highly contagious diseases with potential for rapid spread irrespective of international borders and which are of serious socio-economic public health consequence and associated with high mortality rates in the affected livestock and of major importance in the international trade of livestock and livestock products) and class B and C diseases which are less contagious but still have serious economic consequences for the livestock owner.

- 3.69. Table 3.7. presents the DAH's reported Class A Disease outbreak statistics for the 4 year period 2004 to 2007 for 5 Class A diseases which are endemic in Nepal including:
- **Foot and Mouth Disease (FMD)**, one of the most highly contagious diseases with serious economic consequences and which affects bovidae (cattle and buffalo), sheep, goats and swine. The disease results in low mortality rates in adult animals but can lead to high mortality rates in young animals due to myocarditis;
 - **Pestes de Petits Ruminants (PPR)**, which can cause mortality rates of 50 percent to 80 percent in sheep and especially goats;
 - **Sheep and Goat Pox**, which can cause mortality rates of 5 percent to 10 percent in endemic areas, and mortality rates as high as 100 percent for imported animals;
 - **Classical Swine Fever** which only affects pigs and can lead to 100 percent mortality rates in young pigs;
 - **Newcastle disease** in poultry.
- 3.70. The reported livestock data show that although Nepal experiences a large number of FMD outbreaks each year (average of 721 outbreaks yearly over the 4 years), with an average of about 17,000 animals infected per year, the mortality rates are exceptionally low at only 218 head of animals per year, which would equate to a mortality rate of less than 0.15 percent in cattle and buffalo. Table 3.6 also reports the numbers of treated FMD animals and number of animals which are vaccinated to prevent further spread of the disease. As reported in Chapter 1, Nepal uses vaccination to treat and prevent the spread of FMD or other contagious diseases as opposed to the use of culling of infected animals and unaffected animals in the affected livestock areas, with the exception of avian flu, which carries a government slaughter order. The incidence of other Class A disease outbreaks is also very low and the mortality rates associated with these diseases is also extremely low: for Pestes des Petits Ruminants (PPR), the annual mortality rates in sheep and goats are only 876 animals or less than 0.01 percent of the national herd, and for classical swine fever the average annual mortality rate is only 0.041 percent of total animals.
- 3.71. Although the 4-year statistics reported by the DAH suggest extremely low mortality levels in livestock in Nepal due to Class A epidemic diseases, the fact remains that there is a potential for highly virulent strains of the diseases to cause catastrophic losses in the national livestock herd.
- 3.72. The Taiwan FMD outbreak in 1997 provides an illustration of the huge losses that can occur in national livestock herds, in this case resulting in major economic losses. The 1997 FMD outbreak in Taiwan was a completely new and unknown strain that only affected pigs. Failure to identify the initial outbreak and intentional contamination of herds by pig owners led to the national herd being infected and culling (obligatory government slaughter) of over 3.8 million head of pigs in an attempt to stamp out the disease. The estimated cost of this outbreak was US\$6.9 million.
- 3.73. The World Bank team is not aware of any systematic epidemic disease modeling in Nepal, but we recommend that such a study should be conducted as a priority if the non-regulated insurance sector intends to continue providing "all risks" mortality insurance for cattle and buffalo.
- 3.74. Very few international livestock insurance programs offer all risk mortality insurance coverage in livestock and indeed most insurers and reinsurers specifically exclude Class A epidemic diseases from their standard livestock coverage. Where underwriters agree to insure against epidemic diseases this is usually done under a separate catastrophe disease policy which provides restricted business interruption cover. In other countries, governments assume the responsibility for compensating livestock producers in the event of epidemic disease outbreaks that carry government slaughter order. This applies particularly in the EU. This theme is considered further in the next Chapter.

Table 3.7. Class A Epidemic Disease Outbreaks in Nepal and Livestock Mortality Rates (2004–2007)

Class A Diseases	Number of Affected Animals					% Infection and Mortality Rates in National Herd				
	2004	2005	2006	2007	Average	2004	2005	2006	2007	Average
Number of Outbreaks										
Foot and mouth disease	894	947	860	185	721.5					
Peste des petits ruminants	26	43	242	320	157.75					
Sheep and goat pox	28	47	10	2	21.75					
Classical swine fever (hog cholera)	6	19	23	30	19.5					
Newcastle diseases / Ranikhet	50	150	67	43	77.5					
Number of Affected Animals										
Foot and mouth disease	19,315	20,376	22,748	4,074	16628.25	0.174%	0.182%	0.199%	0.036%	0.147%
Peste des petits ruminants	2,199	2,714	6,798	19,574	7801.25	0.027%	0.033%	0.078%	0.226%	0.093%
Sheep and goat pox	266	614	88	30	249.5	0.003%	0.007%	0.001%	0.000%	0.003%
Classical swine fever (hog cholera)	70	1,085	1,111	936	800.5	0.007%	0.112%	0.112%	0.095%	0.082%
Newcastle diseases / Ranikhet	58,200	27,201	35,516	8,533	32,362.5	0.255%	0.117%	0.148%	0.036%	0.138%
Number of Dead Animals										
Foot and mouth disease	200	497	149	23	217.25	0.002%	0.004%	0.001%	0.000%	0.002%
Peste des petits ruminants	941	548	1,506	510	876.25	0.012%	0.007%	0.017%	0.006%	0.010%
Sheep and goat pox	1	30	0	0	7.75	0.000%	0.000%	0.000%	0.000%	0.000%
Classical swine fever (hog cholera)	41	982	271	305	399.75	0.004%	0.102%	0.027%	0.031%	0.041%
Newcastle diseases / Ranikhet	1,497	3,082	3,992	1,371	2,472.25	0.007%	0.013%	0.017%	0.006%	0.011%
Number of Treated Animals										
Foot and mouth disease	13,069	16,582	22,580	2,408	13,794.75	0.123%	0.148%	0.198%	0.021%	0.122%
Peste des petits ruminants	346	2,205	5,288	1,222	2,265.25	0.004%	0.027%	0.061%	0.014%	0.027%
Sheep and goat pox	242	594	88	30	238.5	0.003%	0.007%	0.001%	0.000%	0.003%
Classical swine fever (hog cholera)	20	94	840	631	396.25	0.002%	0.010%	0.085%	0.064%	0.041%
Newcastle diseases / Ranikhet	2,332	8,195	21,882	6,872	9,821.75	0.010%	0.035%	0.091%	0.029%	0.042%
Number of Vaccinated Animals										
Foot and mouth disease	30,491	31,328	35,730	15,087	28,159	0.275%	0.280%	0.313%	0.132%	0.250%
Peste des petits ruminants	994,051	652,422	620,016	613,739	720,057	12.472%	7.924%	7.159%	7.086%	8.591%
Sheep and goat pox	0	0	0	229	57.25	0.000%	0.000%	0.000%	0.003%	0.001%
Classical swine fever (hog cholera)	641	9,517	2,625	4,863	4,411.5	0.068%	0.991%	0.265%	0.491%	0.454%
Newcastle diseases / Ranikhet	181,728	124,779	145,800	169,893	155,550	0.797%	0.537%	0.609%	0.710%	0.663%

Source: Veterinary Epidemiology Centre, Directorate of Animal Health, DoLS.

Box 3.1. Taiwan Foot and Mouth Outbreak in Swine 1997

Taiwan 1997: On March 19, 1997, a sow at a farm in Hsinchu was diagnosed with a strain of FMD that infected swine only. The cause of this outbreak remains unknown, however, the farm was located near a port city with a thriving pig smuggling industry and illegal slaughterhouses. It is likely that the FMD was introduced through contaminated meat scraps or introduction of smuggled swine into the herd.

Once the index case was diagnosed, the disease spread rapidly through the swine herds in Taiwan. There are several reasons why the disease spread so rapidly:

- very high swine density
- garbage feeding
- hog farms close to slaughterhouses
- frequent social farm visits
- incomplete diagnostic laboratory capability
- no vaccination program

In addition to these problems, swine vesicular disease (SVD) was endemic to Taiwan. The clinical signs of this disease are virtually indistinguishable from FMD. To further complicate matters, laboratory analysis was often not employed to diagnose SVD. Therefore, it is likely that several reported cases of SVD were actually FMD. Also, once FMD was confirmed, there was considerable delay between diagnosis and the implementation of depopulation and disposal. Finally, the indemnity payments offered to farmers for swine infected with FMD were often more than the market value of the pig leading many farmers to intentionally introduce FMD onto their farms.

These factors contributed to the rapid spread of FMD across Taiwan and the destruction of over 3.8 million swine at an estimated cost of US \$6.9 billion. Prior to this outbreak, Taiwan had been the leading exporter of pork to Japan. The disease devastated the Taiwanese pig industry and eliminated the export market.

Source: Extension Disaster Education Network <http://www.eden.lsu.edu/>

Livestock mortality rates and premium rates for livestock insurance

- 3.75. In the absence of accurate livestock mortality rates covering all causes of loss for each class of livestock under different management systems, the only information available is through (a) general information provided by the DoLS which indicates that the national mortality rate for cattle and buffalo is about 2 percent to 3 percent per annum and considerably higher for the small ruminants and pigs; and (b) livestock insurance results which show varying loss cost rates of between 0.9 percent (SLFC) and 3.0 percent (DICGC).
- 3.76. The average 2 to 3 percent mortality rate in Nepal's cattle and buffalo herd coupled with the very low epidemic disease mortality rates of less than 0.15 percent for FMD are comparable to the average rates of between 6 and 10 percent currently charged by no-regulated insurers..

CONCLUSIONS TO RISK ASSESSMENT

Cereal crops

- 3.77. The analysis of district-level crop production and yields shows that summer monsoon paddy is exposed in several districts of the Terai to a combination of flood and or drought. This crop may therefore be a priority for any area-yield index or possibly weather index program.
- 3.78. District-level production and yields are very stable for most crops especially for winter season wheat, barley and millet. The potential demand for area-yield crop insurance may be lower for these crops unless there is a high degree of variation in yields between individual farmers in each district. It has not, however, been possible under this study to access individual farmer crop yield data to investigate the degree of variability in yields at the farm level.
- 3.79. The district-level crop production and yield data appear to provide a good basis on which to establish an area-yield crop insurance program and for the purposes of establishing yield coverage levels and pure loss cost rates. We noted, however, that the district represents a large geographical area and the largest districts in the Terai have upwards of 100,000 ha of paddy and other cereals. Such units may be too large to offer area-yield insurance and point to a need to reduce the insured unit to the sub-district level if time-series yield data are available (this theme is discussed further in Chapter 4).
- 3.80. The CRAM model represents a simple and flexible tool for conducting an analysis of variation in Department-level time series average crop yields which provides useful information on the relative levels of crop exposure by department, crop type and insured yield coverage level. The model can be used for portfolio risk assessment and to establish a balanced crop insurance portfolio.

Livestock

- 3.81. Mortality rates due to Class A epidemic diseases appear to be extremely low in Nepal which is unexpected. This is due in part to the very effective disease prevention and control programs implemented by the DAH/DoLS.
- 3.82. Although disease mortality rates appear to be very low, it is recommended that the current all risk mortality policies offered by all non-regulated livestock insurers be reviewed and restrictions placed on diseases. There is also a need for a formal assessment of the epidemic disease exposure to different classes of livestock in Nepal.
- 3.83. Overall mortality data for livestock are not available, but evidence suggests mortality rates for cattle and buffalo are between 2 percent and 3 percent, and somewhat higher for small animals.
- 3.84. In the absence of comprehensive livestock mortality statistics, it will be necessary to conduct local surveys of livestock mortality rates for each class of livestock at the time of implementing new livestock insurance schemes in order to develop technical premium rates.

CHAPTER 4

OPPORTUNITIES FOR AGRICULTURAL INSURANCE PRODUCT DEVELOPMENT IN NEPAL

- 4.1. This Chapter provides a review of crop and livestock insurance products which are commonly available in international agricultural insurance markets, some of which may be suitable for Nepal's predominantly small-scale farmers. The first part reviews crop insurance products and the second livestock products.

SUITABLE CROP INSURANCE POLICY OPTIONS FOR NEPAL

- 4.2. Table 4.1. provides a summary of the main internationally available crop insurance products and the World Bank's assessment of their suitability for smallholder agricultural conditions in Nepal in the start-up phase of new market-based pilot crop insurance programs.
- 4.3. Four traditional individual-farmer crop insurance products are listed, of which single peril crop hail and named peril crop insurance are identified as potentially being suited to development in Nepal. However, two other individual grower products—multiple-peril crop insurance (MPCI) and crop revenue insurance—are identified as not being suitable in a start-up phase.
- 4.4. Under the new range of index products, area-yield index insurance and crop weather index insurance are identified as offering potential for consideration in the start-up phase of a new pilot crop insurance program for Nepal.

Table 4.1. Potential Crop Insurance Products for Nepal

Type of Crop Insurance Product	Basis of Insurance and Indemnity	Suitable for Nepal in start-up phase?
<i>Traditional Individual Farmer Insurance</i>		
1. Single peril Hail	% Damage	YES
2. Named Peril (e.g. Hail + Fire + Frost)	% Damage	YES
3. Multiple Peril Crop Insurance (MPCI) (incl. Drought)	Loss of Yield	NO
4. Revenue Insurance	Loss of Yield and Price	NO
<i>New Crop Index Insurance</i>		
5. Aggregate Yield Shortfall Insurance	Loss of Aggregate Yield	NO
6. Area-Yield Index Insurance (e.g. NAIS, India)	Area-Yield Index	YES
7. Crop Weather Index Insurance	Weather Index (e.g., rainfall)	YES
7.1. Micro-Weather Index Insurance (individual farmers)	Weather Index (e.g., rainfall)	YES
7.2. Meso-Weather Index Insurance (financial institutions)	Weather Index (e.g., rainfall)	YES
7.3. Macro-Weather Index Insurance (governments)	Weather Index (e.g., rainfall)	NO

- 4.5. The key features and advantages and disadvantages of these crop insurance products are reviewed in the sections below and further details are presented in Annex 6 along with specimen wordings and case study examples.
- 4.6. Those perils that cause damage to a crop in a defined time period and cause measurable damage, such as hail or fire, are the most simple to insure; windstorm and frost are less easy to insure and drought, excessive moisture, and pest and disease are the most complex. Annex 6 provides a “peril classification” guide indicating criteria of insurability, complexity and accessibility to re-insurance coverage—a key component in the development of a sustainable program.

NAMED PERIL CROP INSURANCE (HAIL, FROST, WIND)

- 4.7. Single peril hail insurance is the simplest and best known type of indemnity-based crop insurance which has operated for many years in Europe, North America, Australia and New Zealand.
- 4.8. Under a damage-based indemnity system, physical loss or damage to the crop is measured in the field soon after a specific loss event due to an insured peril and the claim is usually settled shortly after the time of loss. Normally the damage is measured as a percentage loss, and this percentage is applied to the agreed sum insured (i.e., incurred production costs) for the crop. The sum insured may be adjusted downwards if the actual crop is found to be below the normal production potential for uninsured reasons, for example poor crop establishment. A deductible is usually applied to the loss expressed as “percentage damage”, although this can be a fixed value. This method is most applicable to programs with single or a limited number of discrete event perils (e.g., hail, windstorm and frost).
- 4.9. In the hill region of Nepal **hail** was identified as a major exposure in **vegetable** and **citrus production** and possibly also in **apples** and other **tree fruit**. There could be major opportunities in Nepal to develop individual grower crop-hail insurance through the cooperatives. Hail insurance products/wordings are readily accessible through international associations of hail insurers; premium rates can initially be set based on transferred international experience and so long as suitably high each and every loss deductibles are maintained, the rates should not be high; and finally, standardized damage-based loss assessment procedures can be accessed from the international hail associations, and training provided to cooperative members.
- 4.10. For hail coverage of horticultural and vegetable crops which have extended harvesting periods, such as tomatoes and peppers, the methods of indemnity calculation and loss assessment procedures need to take into account the extended harvest.
- 4.11. Similarly, there appear to be opportunities to develop **single peril wind cover** for bananas grown in Nawalparasi District, Terai, and possibly for other crops using a damage-based indemnity policy. Box 4.1 summarizes features of the banana windstorm product developed by the Windward Islands Crop Insurance Limited WINCROP and which was specifically designed for small-holder banana producers often with less than 1 acre to 5 acres of bananas. The pilot banana windstorm program in Nawalparasi could be strengthened by incorporating features of the WINCROP Policy including most importantly a clear definition of the insured damage and introduction of an each and every loss deductible.
- 4.12. Finally these may be opportunities to develop **named-peril crop hail** and **frost coverage** for frost susceptible crops in the hill region.
- 4.13. There is a need for the 5 Regional Departments of Agriculture to identify the main crops in their regions and the key peril/risk exposures and to conduct a crop insurance demand study with farmer groups in order to prioritize the crop insurance needs of Nepal’s small-holder and semi-commercial and commercial farmers.

Box 4.1. WINCROP: Banana Windstorm Scheme: Key features

- 1. WINCROP (Windward Islands Crop Insurance (1988) Limited):** is a mutual insurance company with headquarters in Dominica owned by the 4 Island government of the Windward Islands and farmer members of the Banana Growers Export Associations on each island; it began operations in 1987/88.
- 2. Insurance Legislation:** WINCROP operates under the statutes of the Windward Islands Banana Insurance Act.
- 3. Insured Interest.** Windstorm (& volcanic eruption) damage to export bananas.
- 4. Nature of Coverage:** From the outset by agreement of the export industry windstorm coverage was made mandatory for all banana export producers on all islands. Today coverage is voluntary on St Lucia.
- 5. Basis of Insurance and Indemnity:** Damage-based indemnity policy covering physical losses due to (a) snapping, (b) toppling and (c) uprooting of the banana matt and (d) leaf damage such that there are 4 or fewer remaining undamaged leaves on the main pseudostem.
- 6. Insured Unit:** the banana production from each individual plot or holding.
- 7. Sum insured:** rolling average of past 36 months banana deliveries from each holding valued at a fixed sum insured which is currently EC\$ 0.1 per pound of bananas (or about 33% of the costs of production). This low sum insured is the maximum farmers are able to afford and is adequate to rehabilitate and replant the plots after a major loss.
- 8. Deductible:** The Wincrop Policy carries an each and every loss percentage damage deductible. In view of the very high exposure to hurricane or tropical storm damage the deductible on all Islands currently stands at 20%.
- 9. Rates:** Premium rates are adjusted on an actuarial basis according to the loss experience on each Island. Rates vary between about 10% and 20% of the sum insured on the most exposed Islands.
- 10. Grower Enrollment, Policy Issuance and Premium Collection:** WINCROP has developed a low cost system for underwriting large numbers of very small farmers on the 4 Islands. All growers are registered with the Island Banana Export Associations or Companies (BGAs/BGCs) and their production deliveries are recorded for each holding. WINCROP uses the production delivery records to establish the sum insured. Premium is automatically deducted on a monthly basis from each grower's current deliveries and paid over by the BGAs.
- 11. Loss Assessment:** WINCROP has developed low cost sample plant count procedures for estimating the percentage windstorm damage in each damaged holding. The company maintains a large network of trained On Call Assessors (OCAs) on each Island who conduct loss assessment under the supervision of WINCROP permanent staff. For major hurricane events where several thousand holdings may be damaged, area-based loss assessment is used.
- 12. Reinsurance:** WINCROP has purchased a combination of proportional and non-proportional excess of loss reinsurance from international reinsurers over the past 29 years of operations.
- 13. Government Support:** WINCROP's original share capital was contributed by the individual Island Governments/ BGAs. WINCROP does not receive any form of financial support or premium subsidy from the Island Governments.
- 14. Key Challenges.** At its peak in the early 1990s WINCROP insured over 30,000 smallholders across the Islands. Due to the decline in the banana industry there are currently less than 7,500 registered banana producers on three islands (Grenada has ceased banana exports) and with the reduced size of scheme this is impacting severely WINCROP's ability to sustain major hurricane losses.

MULTIPLE PERIL CROP INSURANCE, MPCl

- 4.14. Traditional individual grower multiple-peril agricultural crop insurance (MPCl), is widely practiced throughout the world. The international experience with individual grower MPCl has, however, often been poor, with problems of low uptake, high anti-selection and moral hazard, high administrative costs and underwriting results which have generally been negative; also, the programs have been very exposed to systemic losses in severe drought or flood years. Most individual grower MPCl is highly dependent on government premium subsidies and/or subsidies on claims payments. In developing countries which are dominated by very small farm size, the costs associated with administering individual grower MPCl are often prohibitively high.
- 4.15. In Nepal, the extremely small size of holding (average <0.8 ha) and lack of farm-level yield data does not lend itself to individual grower MPCl. The World Bank does not therefore recommend individual farmer MPCl in the start-up phase of any new crop insurance programs through the public or private and cooperative sectors in Nepal.

AREA-YIELD INDEX CROP INSURANCE

Features of area yield index insurance

- 4.16. Crop area-yield index insurance, represents an alternative approach which aims to overcome many of the drawbacks of traditional individual grower MPCl crop insurance. The key feature of this product is that it does not indemnify crop yield losses at the individual field or grower level. Rather, an area-yield product makes indemnity payments to growers according to yield loss or shortfall against an average area yield (the index) in a defined geographical area (e.g., county or department). An area-yield index policy establishes an insured yield which is expressed as a percentage (termed the "coverage level") of the historical average yield for each crop in the defined geographical region which forms the insured unit. Farmers whose fields are located within the Insured Unit (IU) may purchase optional coverage levels which typically vary between a minimum of 50 percent and a maximum of 90 percent of historical average yield. The actual average yield for the insured crop is established by sample field measurement (usually involving crop cutting) in the Insured Unit and an indemnity is paid by the amount that the actual average yield falls short of the insured yield coverage level purchased by each grower.
- 4.17. The key advantages of the area-yield approach are that moral hazard and anti-selection are minimized, and the costs of administering such a policy are much reduced; this offers the potential to market this product at lower premium costs to growers. The main disadvantage of an area-yield policy is that an individual grower may incur severe losses due to localized perils e.g. hail, or flooding by a nearby river, but because these localized losses do not impact the county or departmental average yield, the grower does not receive an indemnity.

International experience with crop area-yield index insurance

- 4.18. The origins of area-yield insurance date back to 1952 in Sweden. India introduced area-yield coverage in the late 1970's and the USA and Canada introduced area-yield insurance in the early 1990's. Other countries which have developed area-yield insurance in the past decade include Morocco, Sudan, Brazil and Mexico.
- 4.19. In India the Agricultural Insurance Company of India (AICI), a public sector specialist crop insurer, is responsible for implementing area-based crop insurance under the National Agricultural Insurance Scheme (NAIS). This program has operated for over 20 years and key features include:

- The program is targeted at small and marginal farmers (with less than 2 hectares) who are highly dependent on access to seasonal crop credit. Crop insurance is compulsory for borrowing farmers and voluntary for non-borrowing farmers;
- The insured unit is normally the block or *panchayet* which comprises a group of nearby villages and which may include up to 10,000 ha or more of a single crop and several thousands of small and marginal farmers. Farmers may select insured yield coverage levels of 60 percent, 80 percent or maximum of 90 percent of the 5-year average area-yield;
- The program is administered through the rural agricultural bank branch network in each state and department and block (group of villages). The AICI maintains a national headquarters staff and a small regional team in each state. It has not, however, attempted to establish branch offices as there is no need to duplicate the rural bank branch network. The insurers' administrative costs are kept to a minimum by linking insurance with rural finance.
- Actual area-yields are established through sample crop-cutting. This is a major and costly exercise and suffers from delays in processing the results. Indemnity payments are therefore often delayed for 6 months or more.
- By virtue of being a mainly compulsory program, the NAIS scheme is the world's largest crop insurance program, currently insuring about 20 million Indian farmers (representing an insurance uptake rate of about 18 percent of all farmers). The program is, however, highly dependent on government subsidies and operates at a significant financial loss.

4.20. In the USA, area-yield index insurance is marketed under the name Group Risk Plan. Further details of the experience with area-based crop insurance are contained in [Annex 6](#).

Crop area-yield insurance for Nepal: choice of insured unit and yield data quality

- 4.21. **In order to operate an area-yield index program it is necessary to have an objective and accurate system of measuring average crop yields** for each selected crop within the defined geographical area or insured unit. Furthermore there should ideally be a minimum of 10 to 15 years of historical yield data on which to calculate (a) the normal average yield for the selected crop; (b) the insured yield coverage level, expressed as a percentage of the average yield; and (c) the underlying pure loss cost rates associated with each coverage level.
- 4.22. The methods of yield data estimation in Nepal are reviewed in Annex 3 and centre on sample crop-cutting which is used to establish average yields for the principle cereal and cash crops, but for minor crops visual estimation techniques are adopted. From a crop insurance viewpoint, visual estimation is not deemed sufficiently objective or accurate for establishing actual average yield and for indemnifying yield shortfall at an area-level and therefore only those crops which are the subject of crop-cutting at harvest can be considered for an area-yield program in Nepal.
- 4.23. **The National Guidelines for crop cutting stipulate that a minimum of 40 crop cuts** (average size 2m x 5 m crop cut) should be taken per district for the major food crops of paddy, wheat, maize and millet, 30 crop cuts per district for potato and only 20 crop cuts for oilseeds, sugar cane and lentils. The authors note that the sample size of 40 crop-cuts per crop at a district level is a relatively low density of crop sampling on which to establish within statistically acceptable confidence limits that the calculated district-average yields lie within ± 5 percent of true yield.
- 4.24. **The area-yield estimation system is further complicated in Nepal in that crop cutting has to take into account (i) irrigated versus non irrigated cultivation and (ii) use of improved seed varieties versus local varieties.** As such it is possible to end up with a very small number of samples for each category

of crop, as shown in Table 4.2. Under this hypothetical example for maize in District X, 30 percent of the crop is irrigated and 70 percent un-irrigated thereby requiring that out of the total of 40 crop-cuts which are taken, 12 crop cuts should be conducted on irrigated maize plots and 28 crop-cuts carried out on rain-fed maize plots. The sample size is then further adjusted to take into account improved maize varieties (65 percent of area) and local varieties (30 percent of maize).

- 4.25. **The key drawbacks of the current system of yield measurement are that the density of crop cutting is inadequate** to (a) adopt a lower level of insured unit for the district; and (b) in that none of the reported time series district data distinguishes between irrigated versus non-irrigated or local versus improved varieties. These issues must be addressed under any pilot area-yield index insurance program.

Table 4.2. Number of sample plots required for crop cutting process per crop/district

S.N.	Types of land	Improved varieties cultivated areas	Local varieties cultivated areas	Total
1	Irrigated	10	2	12 (30%)
2	Un-irrigated	16	12	28 (70%)
	Total	26 (65%)	14 (35%)	40 (100%)

Source: K Devkota Field Visits June 2008.

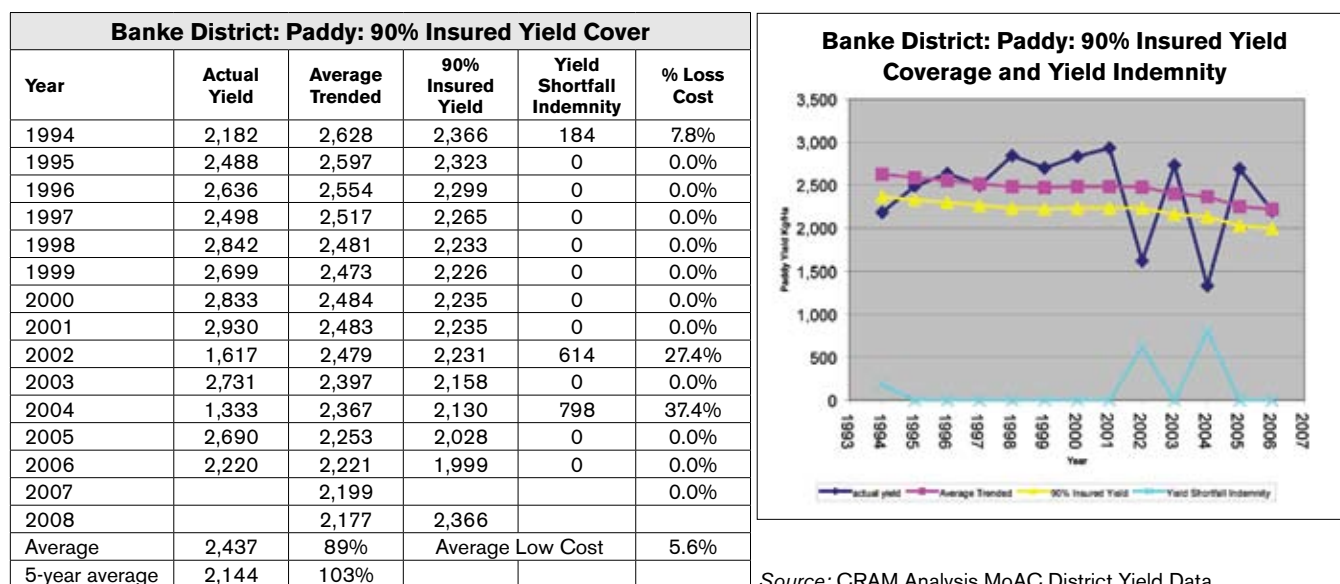
Area-yield insurance for Nepal: coverage levels and calculated rates

- 4.26. Standard statistical procedures have been used to adjust the 13-year district-level annual average yield data including (a) data cleaning to correct for outlier yields and (b) yield trending to establish central tendency in the time series yields. By trending the 1994/95 to 2006/07 yields for each crop in each district it is possible to extend the trend to calculate the expected average trend yield for 2007/08 and 2008/09. All insured yields are calculated in the CRAM as a percentage of the 2008/09 expected yield. The expected trend yields are reported in Annex 5.
- 4.27. Typical insured yield coverage levels for an area-yield index are between 50 percent and 90 percent maximum of the expected trend yield. These trend yields are presented in Annex 6.
- 4.28. The procedures for calculating pure loss cost rates under an area-yield index program are again described in Appendix 6. The rates are a function of the insured yield coverage level and the degree of variation in historical yields for each insured crop in each insured unit.
- 4.29. An example of the yield trending and yield loss cost rating methodology is presented in Figure 4.1. below for paddy grown in Banke District. The thirteen year average yield for paddy is 2,473 kg/ha, but over the past 5 years, the average yield has been nearly 13 percent lower at 2,114 kg/ha. Major yield reduction or loss has been experienced in 2 of the 13 years, 2002/03 and again in 2006/07. The effect of yield trending is to smooth the 13-year actual yields as shown in Figure 4.1. The trended yields have been extrapolated to calculate the expected trend yield for 2008/09 of 2,177 kg/ha which reflects very accurately the actual average yield over the past 5 years.
- 4.30. For the maximum recommended 90 percent Insured yield coverage level, Figure 4.1. shows the 90 percent trend yields for each year and then the difference between the 90 percent insured yield and the actual historical yield. Years in which the actual yield falls below the 90 percent insured yield would have resulted in an indemnity corresponding to the amount of yield shortfall. The amount of yield shortfall is expressed as a pure loss cost

by dividing the kilograms of yield shortfall by the insured yield and expressing this as a percentage. Figure 4.1. shows that for paddy grown in Banke District, at the 90 percent coverage level there would have been 2 indemnity payout years, 2002/03 (loss cost 27.5 percent) and 2006/07 (loss cost 37.4 percent), giving an average annual pure loss cost rate over the 13 years of 5.6 percent.

- 4.31. **The effect of reducing the insured yield coverage level is to reduce the yield shortfall trigger and thus the indemnity payouts and pure loss cost rates.** For Banke paddy, at an 80 percent insured yield coverage level, the pure loss cost is reduced to 3.7 percent; at 70 percent coverage, the pure rate is 2.0 percent; at 60 percent coverage level there would only have been 1 claim year 2006 with average pure rate of 0.5 percent and finally at 50 percent insured yield coverage level, there would have been no years in which actual historical yield would have been below the 50 percent insured yield and the calculated average pure loss cost rate is 0 percent.
- 4.32. **As a guideline, the commercial premium rate for an area-yield index policy may be about double the pure loss cost rate.** For paddy grown in Banke District, this would suggest that an affordable coverage level for small and medium farmers might be 80 percent with a 2008/09 insured yield of 1,959 kg/ha and corresponding commercial premium rate of 7.4 percent and expected frequency of payout of 1 in every 6.5 years. For the maximum 90 percent coverage level the 2008/09, insured yield would be 2,177 kg/ha and the commercial premium rate would be on the order of 11.2 percent which is probably too high to be affordable by small and marginal farmers.

Figure 4.1. Banke District, Mid-Western Terai: Paddy Loss Cost Rating Methodology for 90% insured yield Coverage Level



Crop area-yield insurance for Nepal: crops and districts suited to this product

- 4.33. Full details of the calculated pure loss cost rates for coverage levels of 90 percent down to 50 percent of expected trend yield for each of the 9 crops (5 food crops and 4 cash crops) grown in the 75 districts of Nepal are presented in Annex 6 and a summary of the calculated average²⁹ pure loss cost rates for each crop and coverage level is shown in Table 4.2.

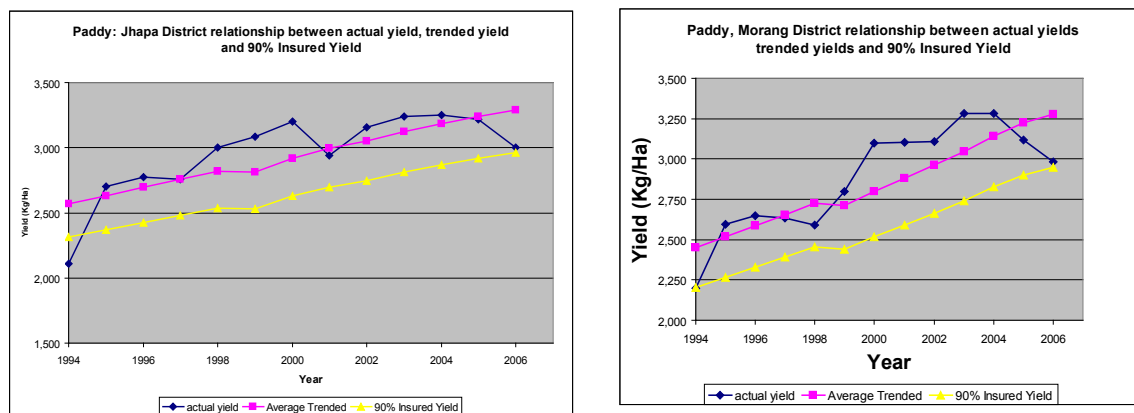
²⁹ The district average pure loss cost rates are simple averages.

Table 4.2. Average District Pure Loss Cost Rates Coverage Levels 50%–100%

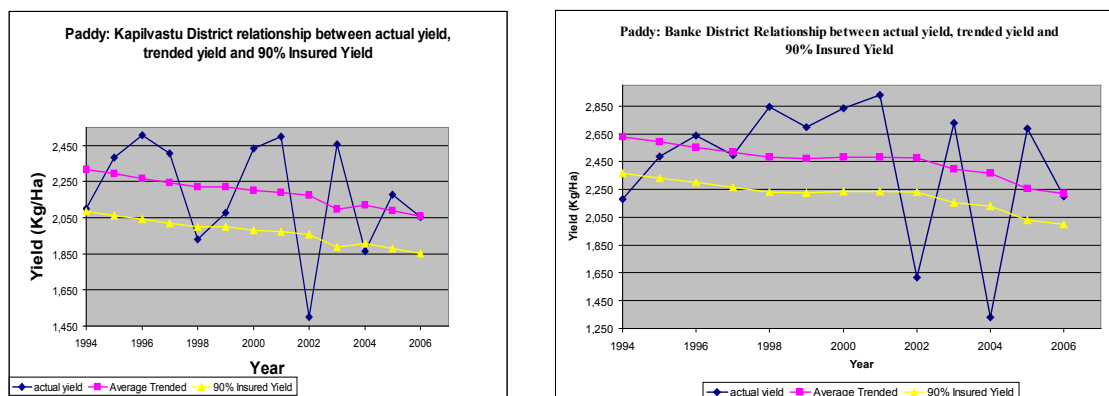
Coverage Level	100%	90%	80%	70%	60%	50%
Paddy Rice	3.4%	1.0%	0.4%	0.2%	0.1%	0.0%
Maize	3.1%	0.9%	0.4%	0.2%	0.1%	0.0%
Millet	3.0%	0.6%	0.1%	0.0%	0.0%	0.0%
Wheat	3.3%	0.9%	0.2%	0.0%	0.0%	0.0%
Barley	5.2%	1.9%	0.6%	0.3%	0.2%	0.1%
Oilseed	6.2%	3.1%	1.8%	1.3%	1.0%	0.6%
Potato	3.8%	1.5%	0.6%	0.2%	0.1%	0.0%
Tobacco	3.0%	1.0%	0.0%	0.0%	0.0%	0.0%
Sugar Cane	2.4%	0.6%	0.4%	0.3%	0.3%	0.3%

Source: CRAM 2008

- 4.34. **In general, the 13-year average district-level crop yields for most crops in Nepal are very stable** and this is reflected in the low average loss cost rates in Table 4.2. In most districts the probability of actual yield falling below the 80 percent insured yield coverage level is very low for most crops. This applies particularly to wheat which is one of the principle winter cereal crops and where there would have been no payouts over the past 13 years at 80 percent coverage level in the important wheat growing districts of Jhapa, Dhanusha, Mahottain, Sarhali, Bara and Parsa, and with only minor claims in Saptari and Siraha. Millet and barley are mainly subsistence crops and are grown on a minor basis; again these 2 crops exhibit very stable yields in most districts. We emphasize, however, that further analysis of yield variation will be required in the future in order to confirm the calculated pure-loss costs. Should there be evidence of yield variability being underestimated, the calculated loss cost rates should be adjusted accordingly.
- 4.35. **Summer monsoon paddy and maize exhibit more variability in the 13 year average yields at coverage levels of 80 percent and 90 percent** and these are considered to be the priority crops for an area-yield index program. This is considered further below with reference to selected districts.
- 4.36. **Paddy growing districts which are not well suited for area-yield index insurance.** Large districts in the Eastern Terai such as Jhapa and Morang, both with an average of more than 90,000 ha of paddy, exhibit very stable average district yields over the past 13 years. For the maximum 90 percent insured yield coverage level, Figure 4.2. shows that in Jhapa there would have been a small claim in 1994/95 and in Morang, zero claims over 13 years because actual yields of paddy have not fallen below the 90 percent coverage level in any year. Area-yield index insurance may not be very suitable in these large departments with very stable paddy yields.
- 4.37. **Paddy growing districts that may be suitable for area-yield index insurance.** Conversely, Kapilvastu District (Western Terai), with an average of 69,000 ha of paddy and Banke (Mid-Western Terai) with an average of 30,000 ha of paddy, may be more suitable for testing an area-yield crop index program. In Kapilvastu there has been 1 major yield loss year in paddy, 2002/03 (actual average yield only 1500 kg/ha, and 23 percent loss cost at 90 percent coverage level); and then 2 minor losses in 1998/99 and again in 2004/05 and with a calculated 13-year average loss cost of 2.2 percent (Figure 4.3.). Banke is another district which is exposed to flood and drought, having experienced 3 losses in 13 years at 90 percent coverage level, 1994/95, 2002/03 and 2004/05 with a long-term average loss cost of 5.6 percent. It will be necessary to ensure that in any future crop insurance program that districts are selected to ensure a balance of risk: it would be inadvisable to only select a relatively high risk district such as Banke for pilot testing a paddy area yield index.

Figure 4.2. Relationship between Actual, Trend and 90% Insured Paddy Yields,, Jhapa and Morang Districts

Source: Authors, from MOAC, 2007.

Figure 4.3. Relationship between Actual, Trend and 90% Insured Paddy Yields, Kapilvastu and Banke Districts

Source: Authors, from MOAC, 2007.

- 4.38. **In the case of summer maize, districts which might be considered under a pilot area-yield index program include Dhankuta (average of nearly 20,000 ha maize and 3.2 percent average loss cost at 90 percent coverage), Jhapa (22,000 ha maize and 5.1 percent average loss cost at 90 percent coverage level) and Chitwan (20,500 ha maize and average of 1.3 percent loss cost at 90 percent coverage level).**

Conclusions on crop area-yield index insurance for Nepal

- 4.39. **In Nepal there may be possibilities to pilot test an area-yield index program in districts where there are areas of homogeneous rain-fed or irrigated cropping** and where farmers use similar varieties, crop husbandry and technology levels. This may apply especially to paddy rice grown in flood and/or drought prone areas of the Terai.
- 4.40. **The biggest issue facing the design of an area-yield index pilot program for Nepal relates to the density and accuracy of crop-cutting** as a method of establishing average yields for the insured crop. Currently official average yields are only available at a district level for food and cash crops and in the larger districts this area unit of insurance is probably too large and may result in major problems of basis risk where yields of the same crop are not relatively homogeneous throughout the district. Further research will be required to address this issue through an analysis of variation in MOAC individual crop-cutting yield results for selected crops in

selected districts.³⁰ Finally, an area-yield index program would need to operate separately for irrigated and non-irrigated crops in each district because of the very different yield responses, especially in drought years. Separate historical yield data should be made available for irrigated and non-irrigated crops for rating purposes.

WEATHER-BASED CROP INSURANCE

- 4.41. **Crop Weather Index Insurance (CWII), represents another example of non-traditional crop insurance which may have applications for Nepalese small holder agriculture.** CWII is a relatively new crop insurance product which has only been implemented on a commercial basis in Mexico and India for about 5 years and in Malawi for the past 3 years.
- 4.42. **CWII is a simplified form of insurance, where payments are made based on a weather index, rather than measurement of crop loss in the field.** The index is selected to represent, as closely as possible, the crop yield loss likely to be experienced by the farmer. The most common application of CWII is against drought, where rainfall measurements are made at a reference weather station(s), during defined period(s), and insurance payouts are made based on a pre-established scale set out in the insurance policy. The sum insured is normally based on the production costs for the selected crop and indemnity payments are made when actual rainfall in the current cropping season as measured at the selected weather station falls below pre-defined threshold levels.

International experience and advantages and disadvantages of CWII

- 4.43. **The most relevant experience with CWII for Nepal comes from India,** where micro-level CWII has been developed for a wide range of summer season and winter season crops. Annex 6 of this report presents case-study material from India and also from Malawi on the experience in these countries with crop weather index insurance.
- 4.44. Key findings from international experience with CWII are shown in Box 4.2., and key advantages and constraints are shown in Box 4.3.

³⁰ Under this feasibility study the World Bank has not had access to individual plot by plot crop-cutting yield results.

Box 4.2. Key international experiences in weather-index insurance.

- 1. Types of hazard covered by index insurance.** The most important hazard for which weather index insurance has been developed is for drought (rainfall deficit). Index insurance is particularly promising for slow-onset hazards (such as drought), as opposed to a sudden-event hazard (such as frost, or windstorm).
- 2. Types of crop covered by index insurance.** The most important crops for which index insurance has been developed are for annual rain-fed, field-scale crops (e.g. cereals, oilseeds, fiber crops). Nevertheless, index insurance is under development internationally for a wide range of annual and perennial crop types.
- 3. Drought contract design in 3 plant growth phases.** Standardization of product design has been achieved through experience. The timing of rainfall during growth season is equally as important as the total amount, in the final yield outcome for the farmer. Index contracts for drought divided into three phases (establishment/vegetative phase; flowering/reproductive phase; and grain filling/ripening phase) allow improved index correlation with yield, which is understood by the farmer.
- 4. Use of weather station measurements for weather index insurance.** The simplest form of weather index insurance uses primary weather parameters, (principally daily rainfall), measured at specific weather stations, to form the index.
- 5. Weather observing infrastructure and data.** Adequate recording station network and historical data, in terms of length (typically 20 years minimum daily records), and quality (missing data) are needed. Experience, even in LDCs, shows there are usually enough weather stations and data to begin piloting initiatives. However the ultimate reach of any index-based weather insurance program may be extended by addition of additional automated rainfall stations.
- 6. Scalability.** Weather index insurance is not a universal product, and may be difficult to scale-up rapidly. For drought insurance, product design and appropriate parameters need to be adapted to location and crop type. A high degree of input is required to design and adapt the product, but the advantage is that the operational distribution and management requirements of the product are very much reduced, compared to conventional MPCI insurance.
- 7. Linkage of index-insurance to input supply and credit is effective.** The experience of India, Malawi, and other countries, is that demand for weather-index insurance from farmers is high, where there is an integrated “package” approach to increasing farmer productivity, which addresses constraints such as access to quality seed, and credit, within the supply chain.
- 8. Stakeholder groups.** Implementation of pilot programs requires that a high degree of attention be devoted to stakeholder participation and leadership. Local ownership and capacity building are central to creating sustainable programs.
- 9. Farmer education and extension.** Education efforts are critical for both stakeholders and farmers. A key is the design of simple contracts which are easy to communicate to customers.
- 10. Risk layering and reinsurance.** The insurance sector is often receptive to the advantages of index insurance products, in enabling them to reach new markets through appropriate and transparent products, but remains concerned over the catastrophic nature of weather risk (and weather trends). Risk layering can structure financial protection through the reinsurance market and, if required, through government.

Source: World Bank (2008).

Box 4.3. Summary of advantages and challenges of index insurance

Advantages	Challenges
<p>Less moral hazard The indemnity does not depend on the individual producer's realized yield.</p> <p>Less adverse selection The indemnity is based on widely available information, so there are few informational asymmetries to be exploited.</p> <p>Lower administrative costs Does not require underwriting and inspections of individual farms.</p> <p>Standardized and transparent structure Uniform structure of contracts.</p> <p>Availability and negotiability Standardized and transparent, could be traded in secondary markets.</p> <p>Reinsurance function Index insurance can be used to more easily transfer the risk of widespread correlated agricultural production losses.</p> <p>Versatility Can be easily bundled with other financial services, facilitating basis risk management.</p>	<p>Basis risk (note 1) Without sufficient correlation between the index and actual losses, index insurance is not an effective risk management tool. This is mitigated by self-insurance of smaller basis risk by the farmer; supplemental products underwritten by private insurers; blending index insurance and rural finance; and offering coverage only for extreme events.</p> <p>Precise actuarial modeling Insurers must understand the statistical properties of the underlying index.</p> <p>Education Required by users to assess whether index insurance will provide effective risk management.</p> <p>Market size The market is still in its infancy in developing countries and has some start-up costs.</p> <p>Weather cycles Actuarial soundness of the premium could be undermined by weather cycles that change the probability of the insured events (i.e., El Niño events).</p> <p>Microclimates Make rainfall or area-yield index based contracts difficult for more frequent and localized events.</p> <p>Forecasts Asymmetric information about the likelihood of an event in the near future will create the potential for intertemporal adverse selection.</p>

Source: World Bank (2005).

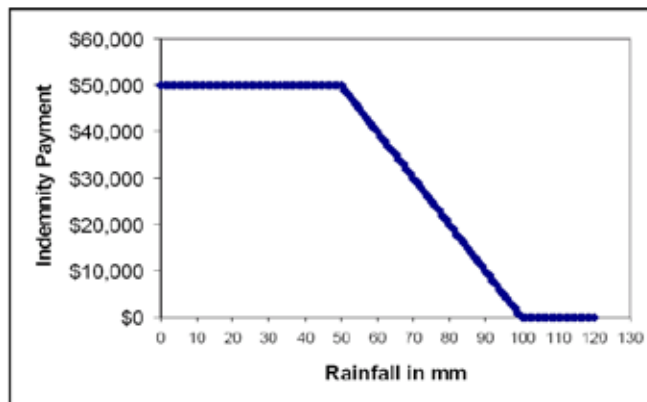
Note 1: **Basis Risk.** Since index-insurance indemnities are triggered by exogenous random variables, such as area yields or weather events, an index-insurance policyholder can experience a yield or revenue loss and not receive an indemnity. The policyholder may also experience no yield or revenue loss and still receive an indemnity. The effectiveness of index insurance as a risk management tool depends on how positively correlated farm yield losses are with the underlying index

Examples of weather index product design

- 4.45. Figure 4.4. illustrates the principles of a simple growing season rainfall deficit (drought) index product for a specific crop grown in an area represented by a nominated weather station where actual rainfall is measured during the growing season. The coverage is open to any farmer growing the crop in a radius of say no more than 25 kilometers of the nominated weather station. In this hypothetical example, the contract starts to pay an indemnity when actual rainfall falls below 100 mm (this threshold is termed the trigger) and pays a proportional indemnity of \$1000 per mm of rainfall shortfall up to a maximum payout at 50 mm rainfall (termed the exit or limit) of \$50,000. The rainfall deficit index should be carefully calibrated such that the trigger point reflects the rainfall level at which crop yield reduction or losses are experienced by the insured farmers and the exit point should reflect the point at which major crop loss or crop failure occurs. Under this example if actual growing season rainfall during the defined period as recorded at the station were only 60 mm, the indemnity which would be paid out to all insured growers would be 40 mm x \$1000/mm or \$40,000.

4.46. Figure 4.5. presents an example of a multi-stage crop weather index contract which is designed to make payouts in 3 distinct phases of the crop cycle: (i) sowing and crop establishment, (ii) growth and flowering and (iii) yield formation to harvest. This type of contract was first pioneered by the Indian insurance company ICICI Lombard and sold to farmers for the first time in 2004. The design proved to be popular with groundnut and castor farmers in Andhra Pradesh and farmers of other crops, as well as intermediaries who found the contracts easy to communicate and retail to farmer clients. The design was therefore chosen as the prototype groundnut structure for the first Malawi pilot in 2005 and subsequent African pilots. It is also being piloted in other parts of Africa and in Central America.

Figure 4.4. Payout Structure for a Hypothetical Rainfall Deficit Index

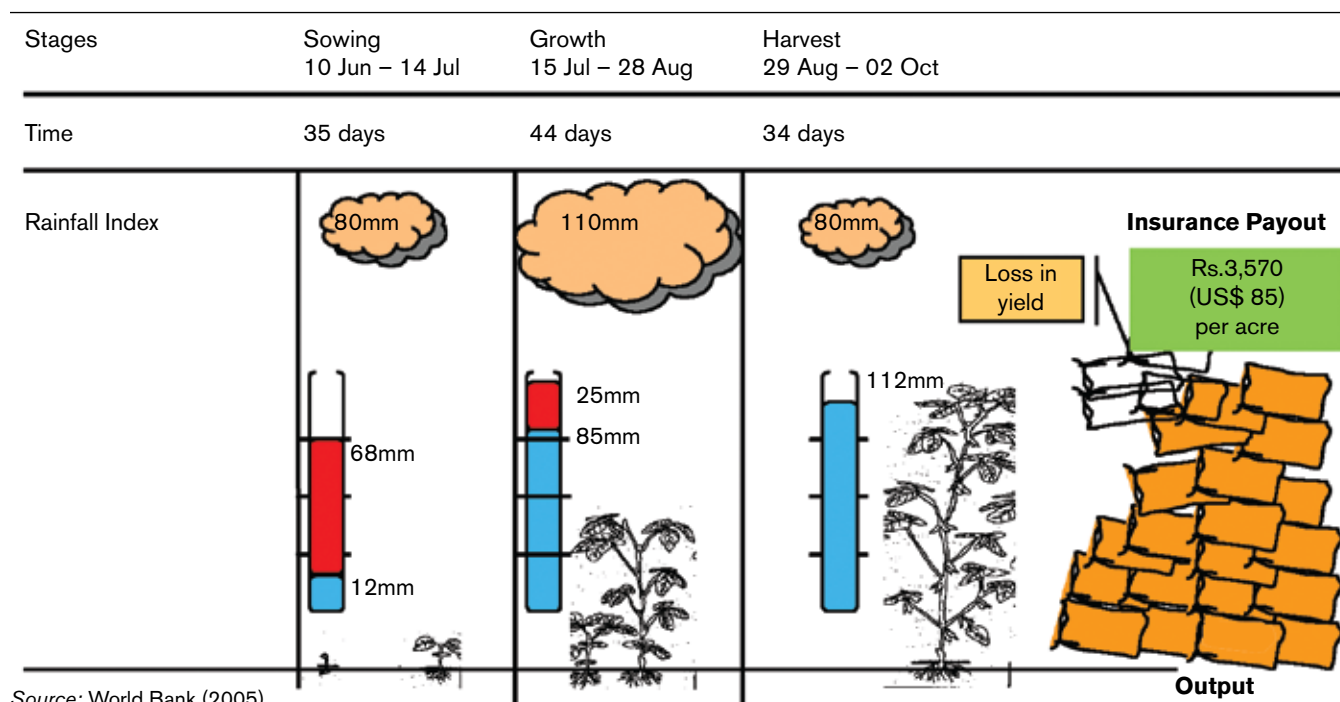


Source: Authors

4.47. The multi-stage contracts usually have a dynamic start date which is triggered when actual precipitation exceeds a defined threshold level required for sowing of the crop and then triggers payments in each phase if actual precipitation falls below the defined triggers. Such concepts are generally well understood and accepted by farmers.

4.48. These multi-stage weather index products can be designed to include both excess rainfall and deficit rainfall and additional weather parameters such as temperature or relative humidity.

Figure 4.5. India: Multi-Stage Rainfall Deficit Index Cover, Groundnuts



Source: World Bank (2005).

Applications of crop weather index insurance (CWII) for Nepal

- 4.49. On the basis of the World Bank's investigations to date it appears that CWII could offer the best potential for introduction into Nepal under a carefully designed pilot program for one or two selected crops grown under rain-fed conditions and where coverage would initially be provided for excess rainfall or rainfall deficit (drought) and possibly for low temperatures (frost). This recommendation is based on the fact that there is a high density of weather stations with a long time series of weather data on which basis to calculate the technical rates required for such a policy objectively, and which would also act as measuring stations during the insurance period and also trigger an indemnity.
- 4.50. Under this feasibility study the concepts of weather index insurance have been discussed with the MOF, MOAC, the Insurance Board and private insurance companies. These organizations have little or no knowledge or exposure to crop weather index insurance products and programs, but they have expressed an interest in testing such a cover in Nepal.
- 4.51. The feasibility study did not include a formal demand assessment with farmers for weather index insurance, but short panel discussions were held in July 2008 with farmers groups in 2 cooperatives and Annex 2 reports on farmer's views on the weather index product and their potential demand for this type of coverage.
- 4.52. In summary, potential pilot programs for weather index insurance in Nepal might include:
- Rain-fed paddy grown in the Terai—excess rainfall, rainfall deficit
 - Potatoes grown in the hill region—low temperature (frost), relative humidity.

LIVESTOCK INSURANCE

Types of livestock insurance product

- 4.53. The international livestock insurance market is very much more restricted than the crop insurance market. The types of livestock policy available range from simple animal mortality & accidental death insurance through to all risk cover including epidemic diseases and specialist business interruption coverage against epidemic diseases (Box 4.4.).
- 4.54. Classes of insured animals include cattle and buffalo, sheep and goats, pigs, horses, and even poultry insurance and aquaculture insurance. Livestock insurance for cattle, sheep, goats and pigs is most commonly provided for loss of individual animals, while the business interruption coverages are usually provided on a herd/flock basis with a per event deductible. For individual animal coverage, the sum insured is usually based on the market value of the animal according to its age, breed and use, and in the event of loss, the insured is responsible for a coinsurance of between 10 percent and 20 percent of the value of the animal.

Box 4.4. Range of Livestock Insurance Products

Range of Products	There are a number of livestock insurance products, which range from basic animal mortality and accidental injury coverages to comprehensive all risk insurance including epidemic diseases. In addition, specialist policies are available to cover loss of animals in transit or at exhibitions, carcass rejection at the slaughterhouse and loss of use through to pet insurance.
Mortality Cover	The most common form of livestock insurance coverage is named-peril animal mortality cover. Mortality coverage commonly insures against death or accidental injury requiring slaughter due to: suffocation due to machinery breakdown, poisoning & pollution, fire lightning & explosion, flood and windstorm, subsidence and landslide, riot, strike & malicious damage. Standard mortality coverage generally excludes: diseases and especially epidemic disease and all forms of consequential loss and legal liability.
All Risk Cover	In some countries all risk mortality coverage is extended to cover named diseases or epidemic diseases, with an accompanying high deductible and/or high rates. (e.g., Germany, Czech Republic, Hungary).
Consequential Loss/ Business Interruption Coverage for Epidemic Diseases	Specialist policies which are designed to indemnify both loss of animals following an epidemic and also the reduction or loss of income arising out of the ban on sales of animals or animal products (milk, eggs, etc.) for up to 12 months post-event. (e.g., Germany since 1990 and Mexico since 2005).

Source: Authors.

- 4.55. There is a very restricted **reinsurance** market for livestock insurance and key reinsurers generally offer standard mortality coverage only, under which:
- They often exclude all diseases. Reinsurers may, however, be willing to consider specific named diseases so long as these are not highly contagious.
 - Class A epidemic diseases are nearly always excluded by international reinsurers (See box 4.5. for list of Class A communicable diseases). Chapter 3 noted that that several of these Class A diseases are endemic in Nepal and under the existing livestock credit-guarantee or all risk livestock mortality insurance coverages, these Class A diseases are insured.
 - Consequential loss is excluded.
 - Government Slaughter Order is specifically excluded.
 - Legal liability of any nature is normally excluded.

Box 4.5. Class A Communicable Diseases of Livestock and Poultry

Class A Epidemic Diseases, Notifiable to the Office International des Epizzoties	
1) Foot and Mouth Disease	8) Rift Valley Fever
2) Vesicular Stomatitis	9) Bluetongue
3) Swine Vesicular Disease	10) Sheep Pox and Goat Pox
4) Rinderpest	11) African Horse Fever
5) Peste des Petits Ruminants	12) Classical Swine Fever
6) Contegious Bovine Pleuropneumonia	13) Highly Pathogenic Avian Influenza
7) Lumpy Skin Disease	14) Newcastle Disease

International experience with livestock insurance

- 4.56. Spain** has one of the largest livestock insurance programs in Europe. The program is implemented by Agroseguero which is a pool of Spanish commercial and mutual coinsurance companies. Insured classes of livestock include cattle (intensive beef fattening, through to dairy cattle), sheep and goats and poultry.
- 4.57. The basic coverage provided for most classes of animal is named peril mortality and accidental injury coverage and it specifically excludes all epidemic diseases. In cattle, non-epidemic diseases may be insured, for example mastitis. There are two specialist livestock insurance programs 1) BSE (Bovine Spongiform Encephalitis) coverage for cattle and 2) A policy which insures the costs of carcass destruction following the death of an insured animal—this coverage is available for cattle. The Agroseguero policy provides individual animal coverage against loss of the market value of the animal and carries a 20 percent coinsurance on the claim. The livestock insurance programs have been operating for over 25 years and have now achieved a very high level of penetration.
- 4.58. Agroseguero is a national agricultural crop and livestock insurance program. The program attracts high levels of premium subsidies for both crops and livestock. In 2007 the livestock insurance program insured more than 1.2 million head of cattle and 2.2 million sheep and goats and generated total premium of 218 million (average rate 6 percent) of which premium subsidies accounted for 74 percent of premiums. Over the past 5 years the program has operated at an average loss ratio of nearly 90 percent. A key feature of this program is that it is reinsured by the Consorcio de Seguros, the national reinsurer and by international stop loss reinsurers. See further details in Box 4.6.

Box 4.6. Spain: Agroseguero Livestock Insurance Program

Agroseguero has underwritten crops and livestock since 1980. The program is Europe's largest public-private agricultural insurance program and government support takes the form of premium subsidies and reinsurance protection through the national catastrophe reinsurer, Consorcio de Compensacion de Seguros.

Insured Classes of Animal: Cattle (intensive feed lot, beef and dairy cattle), Sheep and Goats, Poultry and Aquaculture Insurance.

Key Livestock Products:

- 1) **Simple Accident & Mortality Coverage.** Epidemic diseases are excluded. Available for cattle, sheep and goats.
- 2) BSE disease coverage for cattle
- 3) Costs of carcass destruction for cattle

Scale of Livestock Insurance Program 2007 (Uptake levels):

No. of insured cattle under standard mortality policy: 1.25 million animals (20% of national herd)

Carcass destruction coverage for cattle: > 5 million head of cattle (about 90% of national herd)

Sheep and Goats: 2.2 million insured animals (9% of national herd)

Scale of Livestock Insurance Program 2007 (Insurance statistics):

- 1) Total sum insured 3.6 billion
- 2) Total Premium 218 million (average rate 6.0%)
- 3) Premium Subsidies 162 million (74% of premium)
- 4) Average Loss ratio 2003 to 2007: 89%

Source: Agroseguero 2008.

- 4.59. In contrast to the highly commercial livestock insurance scheme in Spain, India has been operating a community-based livestock mortality insurance scheme since 2005 which is showing encouraging results (Box 4.7). The program contains many features which are similar to the SFCL and CLDP livestock insurance programs in Nepal.

Box 4.7. Community Run Livestock Insurance Scheme in India

Livestock are susceptible to different types of risks, both idiosyncratic and covariant. Death of the animals in accidents is not uncommon. Mortality among livestock is one of the principal reasons for the loan defaults of the poor. In the absence of a comprehensive insurance for livestock, considerable numbers of the livestock are subject to the risk of disease and death and hence the grievous loss in the livelihoods of the poor.

Loan Protection Scheme for Dairy Cows and Buffalo

This livestock insurance scheme provides relief to the members/family of the self-help group (SHG) that owns the milk cattle, in the case of death of the animal. This is a premium-based scheme: every individual animal (Buffalo/Cow) shall be covered against an annual premium equal to 4% of the value of the animal (plus a small entry fee). The value of the animal is estimated by a veterinarian. The coverage value decreases with the age of the animal as follows:

- up to three months from the date of insurance: 90% of value of animal
- three to six months: 85%
- six to nine months: 82%
- nine months to one year: 80%.

The insurance policy is renewed during the next year after deducting a depreciation of 20% in the animal cost. The scheme is totally self-managed by the community. Accounting, monitoring and documentation systems are conceived and designed in house.

Claim procedure

Upon the death of an insured animal, the claim form is sent to the Village Organization (VO). A member of the sub-committee verifies the claim by visiting the village. After discussing the issue with the sub-committee, the claim is either settled or rejected. The settled claim is given to the VO by way of check. The VO pays the claim amount to the beneficiary.

Performance

The community based animal insurance scheme is among the first of its kind in India. The scheme is community-based and relies on peer monitoring.

The number of animals insured increased from 3,500 in 2005 to 25,500 in 2008. Premiums collected increased from US\$3.7 million in 2005 to US\$8 million in 2008. The claims ratio has been stable, at around 2.6%. This makes this scheme financially viable. Operating costs represent 12% of the premium income. It is essential to keep the operating costs (e.g., underwriting cost, loss assessment costs, claims processing costs) at the minimum to ensure the sustainability of the scheme. The success of the scheme relies critically on the peer monitoring system, which enables the community-based organization to prevent false claims. The community supervision and vigilance that was found to be very effective should increase.

Source: World Bank 2008

Key issues and recommendations for livestock insurance coverage in Nepal**Existing all risk mortality coverage for cattle and buffalo**

4.60. The policy terms and conditions of cover for the DICGS livestock credit-guarantee coverage was reviewed (a copy is attached in Annex 2). This policy affords all risk mortality coverage and loss of use of the animal. The policy does not specifically state the insured perils, but the only stated exclusions are negligence, war, civil war and insurrection. It is therefore understood that this policy implicitly insures against death of the insured animal against any disease including Class A epidemic diseases which in Nepal center on FMD and contagious bovine pleuropneumonia in cattle and buffalo. While the mission was not able to review a copy of the policy wordings for the SFCL and CLDS livestock insurance programs we understand that these policies are also all risk mortality coverages.

- 4.61. This review has shown that none of the livestock insurance programs in Nepal are currently reinsured and they are therefore very exposed to catastrophic losses, particularly epidemic diseases of livestock. This section has stated that reinsurers will not accept the current unrestricted epidemic disease coverage afforded by the Nepalese livestock insurance policies.
- 4.62. On the basis of this review, the following strengthening of the existing livestock policies could be considered:
- There is a need to introduce a simplified and standard livestock accident and mortality policy for cattle and buffalo, which specifically excludes all Class A and Class B contagious diseases;
 - The standard livestock policy should clearly state the range of insured perils. The insured perils should include natural perils such as fire, flood, landslide, fire and accidental injury and death.
 - A technical review of the premium rates should be undertaken. These currently range from a flat 6 percent on the DICGS program and 10 percent for the SFCL program. If epidemic diseases are excluded it may be possible to offer insurance at lower rates.
 - If the community-based livestock insurance programs are to attract pooled reinsurance protection in the future, it will be necessary to introduce standard policy wording(s) across all cooperatives and MFIs, to agree on standard rates and discounts and uniform risk acceptance, loss notification and loss assessment procedures.
 - While most small farmers with less than 5 head of cattle or buffalo will probably continue to purchase individual animal insurance, options for larger livestock owners should be considered, including herd coverage with explicit deductibles.
 - There is also a need to consider ways of scaling up coverage. Currently about 10,000 head of cattle and buffalo are insured each year under the government and community livestock insurance programs and this only represents about 0.1 percent of the national herd.
- 4.63. It is recommended that if sufficient demand for livestock epidemic disease cover exists, this should be offered as a separate policy.

Coverage for other classes of animals

- 4.64. The DICGC Policy was originally designed to include sheep and goats, pigs and other classes of animals including donkeys and horses. This also applied to the SFCL livestock insurance program.
- 4.65. **Sheep and goats** are very important to the livelihoods of rural households in the hill and mountain regions and there is a potential demand for mortality cover for this class of animal. Currently it is understood that livestock insurance is not widely available for small ruminants, sheep and goats. There is one exception, namely the CLDP which is promoting a goat multiplication exchange program for the landless poor households (HH's) in the hill and mountain regions. Under this program the HH is provided between 1 to 3 goats and on the birth of the kids these are repaid in kind to the project. The program is protected by mortality coverage. If in the future insurance coverage is expanded for small ruminants, it will be necessary to design low cost administrative procedures for enrolling animals and tagging animals and for premium collection and payment of claims. The most obvious low cost delivery channel would be to market coverage through the MFIs and rural cooperatives.
- 4.66. The **large-scale commercial poultry sector** offers a potential for insurance by the private commercial insurers, at least one of which is interested in developing poultry insurance. The major constraints to development of poultry insurance appear to be part technical, namely a lack of knowledge and expertise in the design of suitable

poultry insurance products/policy wordings, and part financial, namely the lack of access to international agricultural reinsurance capacity for poultry. The demand for poultry insurance is likely to include epidemic diseases including Newcastle disease which is usually insurable so long as the flock is inoculated, and avian flu which reinsurers are likely to reject given the fact that there is a national compulsory slaughter and compensation scheme in Nepal.

- 4.67. Finally there may be a future demand for **aquaculture insurance** in Nepal.

CHAPTER 5

OPERATIONAL ISSUES FOR AGRICULTURAL INSURANCE

- 5.1. Chapter 2 highlighted a series of challenges to the introduction of agricultural crop and livestock insurance in Nepal not least of which is the lack of communication networks (roads) in much of the hill and mountain regions, the absence of a rural commercial insurance network with which to administer and underwrite agricultural insurance, and the very small size of crop and livestock enterprises with the inherent problem that the administrative costs per individual insurance policy may often exceed the premium paid.
- 5.2. This feasibility study did not permit a detailed review of the operating systems, procedures and resources of (a) the non-regulated crop and livestock insurers in Nepal or (b) the private commercial insurers which are currently not providing any agricultural insurance products or services. This section therefore aims to identify a series of common administrative and operational requirements for crop and livestock insurance based on international norms, and it considers the implications and issues for developing operating systems and procedures in the context of Nepal.
- 5.3. We note that the administrative and operating requirements of traditional crop and livestock insurance are very much greater than for the crop weather index products reviewed in Chapter 4. Where applicable these differences are highlighted below.

UNDERWRITING

Policy design and wordings

- 5.4. The livestock policy wording was reviewed, namely that of the DICGC (copy included in Annex 2). This is a detailed and comprehensive policy wording but could be strengthened in specific areas to bring it into line with international norms.
- 5.5. If, in the future, crop and livestock insurance offered through the private commercial insurers and the non-regulated MFIs and Mutual Cooperative insurers is to (a) be scaled up in Nepal (b) be legally recognized by the Insurance Board and (c) attract reinsurance protection, this will require standardization of the products and wordings and terms and conditions of coverage. The design of crop and livestock wordings is a specialist task and is identified as a key function for the proposed technical support unit identified in the next Chapter. Specimen wordings are also usually available from national crop and livestock insurance associations, examples including the US Crop Hail Association and the US Risk Management Agency which is responsible for the national MPCl program.

Grower /herder registration and pre-inspections

- 5.6. **Crops.** For simple named peril crop insurance against single perils such as hail or wind which are outside the control of farmers, there is very little need for the insurance company to conduct an in-field pre-inspection to verify that the crop has been sown in accordance with standard procedures and that there are no pre-existing conditions (e.g. drought stress and/or pest or disease damage) and to confirm the yield potential of that crop. It

is therefore common to accept applications without any requirement for pre-inspections.

- 5.7. In the case of individual grower MPCI, however, a pre-inspection at the time of germination and stand establishment is almost always essential in order to confirm: (a) the yield potential on which basis an insured yield is established; (b) that the crop has germinated and does not presents any pre-existing conditions (moisture stress, weed infestation, pests and disease); (c) that the actual planted area conforms to that declared by the insured; and finally (d) that there is no adverse selection (e.g. the plot is not located in a river flood plain where there is a known and predictable exposure to seasonal flood). Pre-inspections are very time consuming and expensive and in the context of Nepal would only be viable where a cooperative insurer conducts its own pre-inspections of members' fields.
- 5.8. **Area-yield index insurance** does not require pre-inspections because the basis of insurance and indemnity is the area yield and not the performance of the crop on individual farmers' fields. As noted in Chapter 3, a major advantage of area yield index insurance is that moral hazard and anti-selection are avoided.
- 5.9. **Crop weather index insurance.** A major advantage of a CWII program is that because it does not insure against physical loss in individual grower's crops and fields, there is no requirement for pre-inspections and the product is also free from moral hazard and anti-selection.
- 5.10. **Livestock.** For the operation of individual animal all risk insurance the following pre-conditions apply:
- The need for pre-inspections of each insured animal by a qualified veterinarian and certification that at the time of registration each animal is in sound health and that its vaccination records are up to date;
 - A system of animal identification typically involving ear tagging or branding.
 - A monthly or quarterly system of stock control and notification of the insurer regarding any changes in the number of insured animals; registration of new purchases; and a system for collecting additional premiums due.
- 5.11. The cost implications can be very high for the Insurer of livestock pre-inspections and registration of the insured animals. Currently in Nepal the cooperative insurers are making use of members who receive basic training from the Livestock Department in animal health and in administering vaccinations—these village-level veterinary assistants are then responsible for assessing the health of each insured animal and for certifying clean health before the animal can be insured. This system appears to be very cost effective and is much cheaper than the DICGC program which relies on third parties to register and inspect the animals and which has incurred average administrative costs of 88 percent of premium over time. (See Chapter 2 for details).

Policy issuance and premium collection

- 5.12. The private insurance companies in Nepal currently do not have a field network of agents to deliver the policy or coverage note to the individual insured or mechanisms to collect premiums from individual crop or livestock producers.
- 5.13. The main challenges therefore in Nepal are to develop linkages with other organizations that already have financial operations with the insured farmers, for example through the cooperatives and or credit and microfinance organizations (MFIs). This means that the cost of collecting premiums (and paying indemnities) becomes a marginal cost rather than the full cost of establishing a full network of offices or agents dedicated specifically to crop insurance operations.
- 5.14. Clearly the administrative processes of an insurance program which is designed to provide collateral to a bank

or rural MFI for loan disbursement can be incorporated within the bank's procedures. Where there is a large number of small farms, and if this is to be a target sector, then affiliation with a bank or MFI may be the most attractive route. Under such arrangements the bank or MFI is often willing to provide up-front financing of the insured farmers' premiums at the time of policy inception and to add the premium cost amount to the seasonal loan which is due to be repaid at harvest.

- 5.15. There are a number of insurance programs which are successfully operated by centralized marketing organizations where deductions of premium at source is feasible, communications with member farmers is quick and easy and payment of indemnity can also be quickly made.

DISTRIBUTION (CROP-CREDIT LINKAGES)

- 5.16. The linkages of crop and livestock insurance with credit provision through the ADBL and other banks and MFIs and Savings and Credit Cooperatives (SACCOS) needs to be considered carefully. The role of seasonal production credit in Nepal appears to be critical to enabling farmers to invest in improved seeds and fertilizers and to raise their production and yields. Similarly, few livestock producers can afford to purchase large animals (cattle and buffalo) with which to establish dairy production without livestock investment loans.
- 5.17. To date nearly all livestock insurance in Nepal has been explicitly linked to credit and in some cases it appears that the livestock loan has been conditional on the farmer purchasing livestock mortality insurance—or in other words compulsory or bundled insurance.
- 5.18. In many parts of the world public or private sector credit to agriculture is protected by a compulsory insurance cover. From an insurer's viewpoint there are major advantages of automatic or compulsory crop-credit insurance in that (a) anti-selection is reduced; (b) there is less need for pre-inspections; (c) the costs of promoting and marketing the agricultural insurance program are reduced; and (d) the insurance uptake and spread of risk and premium volume is generally much higher than under a purely voluntary program. Examples of compulsory schemes include the major crop and livestock insurance programs in India, the Philippines and Mexico.
- 5.19. There are advantages for a scheme involving small farmers to be compulsory rather than voluntary, unless other circumstances allow the insurer to avoid adverse selection and high administrative costs. Even with a compulsory scheme there must be worthwhile incentives built in to counter moral hazard. Clearly operating an insurance scheme together with a credit program can offer the level of control required by insurers reflecting the common interests of banks and insurers—if insurance is not taken out by the farmer then he will not be eligible for a loan. Loan applicants would also normally go through an initial appraisal procedure which will assist in evaluating the management potential of the farmer.
- 5.20. Where agricultural credit and insurance are linked there is a potential for the bank or MFI to reduce its interest rates to the extent that climatic or natural risk exposures have been transferred to the insurance policy. The Malawi weather-based crop insurance program and the Mongolia livestock index-based insurance program are examples where the lending banks have reduced their interest rates to those producers who agree to purchase drought index insurance. This is a subject which will require further discussion between the Nepalese banks/MFIs and agricultural insurers.
- 5.20. On the basis of discussions with the MOF, the Insurance Board and other Nepalese institutions involved in crop and livestock insurance, it is understood that in principle crop and livestock insurance should be provided on a voluntary basis as opposed to being bundled with credit and other services.

LOSS REPORTING AND LOSS ASSESSMENT

Loss notification

- 5.21. Loss reporting is a major issue under smallholder crop and livestock insurance schemes. Under a traditional insurance model the policy wording specifies the insured's obligations to notify the insurer within a specified time of any event which may give rise to a claim on the policy. Initial notification is usually by telephone from the insured either directly to the insurer or through the insurance broker, and the insured is then required to follow this up with a written report providing estimates of the percentage of damage.
- 5.22. Loss reporting is often a major issue under smallholder crop and livestock insurance schemes. Under the Windward Islands banana insurance scheme following an insured event the company would formally announce over the radio that losses should be reported in person by the insured or his representative over the next 10 days and that failure to declare a loss would result in the loss not being adjusted. The reported claims would then be consolidated and mapped and an action plan drawn up for in-field loss assessment.
- 5.23. Loss notification is likely to be much more complicated in Nepal under a conventional insurance program because of the restricted communications and lack of rural branch networks of the private commercial insurers. This problem does not, however, apply to the community-based mutual (cooperative) crop and livestock schemes and where losses can immediately be advised to the Mutual Insurance Committee.

Loss assessment

- 5.24. **Traditional indemnity-based crop insurance.** The design and operation of a fair system of loss assessment is essential for the long-term viability of any indemnity-based crop insurance program. There must be adequate field representation, preferably in the form of trained agronomists in a supervisory role, with less-qualified persons carrying out field assessments.
- 5.25. **Crop damage-based loss assessment.** Different types of programs require different approaches to loss adjustment. Crop hail loss adjustment is usually relatively simple and can be conducted in-field in the individual growers' insured field shortly after the time of loss and involves sampling of the percentage damage to the crop using standardized procedures. Similarly the adjustment of windstorm damage in crops involves simple and loss cost damage-based procedures. A damage-based indemnity system needs the capability to bring together manpower effectively to enable a quick response to a loss and carry out effective in-field measurement of losses.
- 5.26. **Yield-based loss assessment.** An individual grower yield-based indemnity program, on the other hand, requires timely field inspections during the course of the growing season, regardless of requirements in the event of loss. This can be a significant organizational and administrative cost burden. Depending on the structure of the scheme, estimates of crop data are needed from field inspection of the crop, backed up where possible with delivery records from processing plants, wholesalers and other crop buyers. Under a loss of yield policy losses can only be finally adjusted at the time of harvest when an estimate of actual yield is made and where this falls short of the insured yield established at the start of the season, the yield difference or amount of loss is indemnified. A major drawback of yield-based loss assessment is that it is practically impossible to isolate and adjust insured causes of yield shortfall or loss from uninsured causes, for example failure by the insured to carry out adequate weed control or pest and disease control.
- 5.27. **Area-yield indexes.** The procedure for estimating the actual average yield in the insured unit usually involves sample crop-cutting and yield measurement in representative plots and locations throughout the insured unit, to then calculate the average yield. Where the actual area-yield falls short of the insured yield, all insured growers

in that area receive the same indemnity irrespective of the actual yield performance on their own plots. While this system of yield assessment is much less costly than under an individual grower MPCl program, key issues include: (i) the need to ensure that the crop cuts are located at random and are not deliberately located in areas of poor crop stands and low yields; (ii) that the crop-cuts are conducted impartially and accurately; and (iii) the sample of crop-cuts is sufficiently large to estimate the true mean to a high degree of statistical confidence. In India, where area-yield index insurance has operated since 1980 on a massive scale, a key issue is the delay in processing and publishing the results of crop-cutting which means that losses may be indemnified more than 6 months after the close of the season.

- 5.28. **Crop weather index insurance.** One of the major advantages of a CWII is that the basis of indemnity does not require any in-field measurement of loss. Rather the indemnity is paid out according to the amount that the weather parameter has been triggered during the policy period—for example the amount of excess rainfall or rainfall deficit as measured at the official meteorological recording station. In this case losses can be indemnified within a matter of weeks after the close of the coverage period. The indemnity payout is also fully transparent. A final advantage is that there are major cost savings in loss assessment and claims settlement compared to a traditional indemnity-based crop insurance policy.
- 5.29. **Livestock loss assessment.** Under a conventional full-service delivery model where the insurance company is responsible for appointing a veterinary inspector to report on each and every accidental injury or death of the animal, the costs of inspecting losses often amount to more than 50 percent of the premium charged. Under the community-based programs currently being implemented in Nepal losses are inspected by the trained livestock paramedics in each cooperative and these costs are therefore minimized.
- 5.30. The very large numbers of MFIs and cooperatives in Nepal offer a potential to develop and strengthen the existing community-based delivery model for microfinance and microinsurance at very much lower administrative and operating expenses than the private commercial companies could achieve.

CHAPTER 6

INSTITUTIONAL AND FINANCIAL CHALLENGES

- 6.1. This Chapter is devoted to a review of the potential roles that the Government of Nepal (GoN), the private insurers, the banking, microfinance and cooperative sectors might play in future under a public-private partnership for agricultural insurance in Nepal.
- 6.2. It is important to stress that a blueprint approach to developing a national framework and program for agricultural crop and livestock insurance would not work in Nepal. Any programs are likely to be location-specific and will need to reflect the local risk exposures (there are many micro-climates in Nepal and while flood and or drought are key exposures in the Terai, hail and landslide are of major concern in the hills), and take into account infra-structural constraints (many of the hill/mountain regions are very remote) and the presence or absence of local service organizations (seeds, fertilizers, credit, output markets, etc.). In addition, the delivery models for providing crop and livestock insurance products and services to Nepal's predominantly small and marginal farmers are likely to be very much more diversified and involve local communities, MFIs, NGOs and or cooperatives providing linked microfinance and microinsurance, than in developed countries where insurance is typically provided by a few large commercial insurers and protected by commercial reinsurance arrangements.

PUBLIC-PRIVATE PARTNERSHIPS IN AGRICULTURAL INSURANCE: INTERNATIONAL EXPERIENCE

Origins of agricultural insurance

- 6.3. The origins of agricultural insurance can be traced back to France in the 18th century when groups of livestock farmers came together to form cooperative or mutual livestock insurance companies. Similarly crop-hail mutual insurers started in many European countries in the 19th century and these products were transferred by emigrants to the USA and Canada and Argentina in the late 19th century and early 20th century. The tendency since then has been for many of the mutuals to either fail because they lacked reinsurance protection against catastrophe losses, or to be replaced by private commercial companies, but leading examples of mutual insurers that continue to operate today include Austrian Hail, Groupama in France, the National Farmers Union in the UK, and several mutual insurers in the USA, South Africa and Argentina. In Mexico, the Fondos program for self insurance groups represents an interesting mutual crop-credit insurance model for small crop and livestock producers which may have applications to Nepal.

Rationale for and types of government intervention in agricultural insurance

- 6.4. The US Federal Crop Insurance Program represents one of the earliest examples of government intervention in the provision of public-sector crop insurance; its origins date back to the early 1930s. In the 1980's there was a major expansion of public-sector crop insurance in developing countries including Central and Latin America, India and the Philippines. Most recently, since 2000, governments have increased their intervention in agricultural insurance both in developed markets in the USA and Europe (e.g., subsidized MPCl in France, and in emerging markets of Poland, and Romania) and especially in developing countries (e.g., new subsidized programs in China, South Korea, Brazil, Chile, and Turkey).

- 6.5. Reasons cited as to why governments should intervene in agricultural insurance often include:
- Poorly developed insurance markets and non-availability of private-sector agricultural crop and livestock insurance;
 - Financial capacity constraints of private commercial insurers, particularly for systemic risk (drought, flood, epidemic diseases, etc);
 - High costs of insurance administration;
 - Inability of farmers to afford agricultural crop and livestock insurance premiums.
- 6.6. In 2008, agricultural crop and/or livestock insurance are available in about 80 countries. Agricultural insurance is most developed in high income countries in North America, Europe, and Australasia. The programs in the USA and Canada carry very high levels of government financial intervention in the form of premium subsidies and subsidies on the operating and administration costs and reinsurance programs. In Europe 15 of the 27 countries with agricultural insurance have public-private supported programs, of which the largest program is the Spanish national agricultural insurance scheme. In the remaining 12 European countries the programs are implemented exclusively by private commercial insurers with no form of government subsidy.
- 6.7. In Asian developing countries, public-sector agricultural insurance has a lengthy tradition in India and the Philippines, and public-private subsidized agricultural insurance is now being heavily promoted by government in China and South Korea. In Latin America many countries introduced public-sector agricultural insurance programs in the 1970s and 1980s, most of which have now been terminated and/or privatized. Today agricultural insurance is found in about 15 Latin American countries: the largest programs are located in Mexico where the commercial insurers receive a high level of support from government and in Argentina which is a private crop-hail insurance market and until recently had received no government subsidies. Agricultural insurance is poorly developed in most of Africa, the main exceptions being Mauritius, Sudan and Morocco where the programs operate with government support, and South Africa which has a well developed private and mutual company crop hail and MPCl insurance market with no government intervention.
- 6.8. Table 6.1. provides a summary of the types of government support in a sample of the major national agricultural (mainly crop) insurance programs from developed and developing countries.
- 6.9. **Public sector vs. private-sector agricultural insurers.** In the 1970s and 1980s many governments in developing countries created public sector agricultural insurers to underwrite highly subsidized multiple peril crop insurance for small-scale farmers. These public-sector programs tended to act as a major disincentive for the entry of private commercial insurers into agricultural insurance. The majority of the public-sector agricultural programs performed very poorly, prompting governments to: (a) terminate the programs; or (b) take measures to strengthen and reform the public-sector programs; or (c) transfer responsibility for implementation to the private insurance sector. It is noticeable that most of the new crop and livestock insurance programs which have been introduced in the past decade have been implemented by private commercial insurers with or without support from government, including Chile, Brazil, Colombia, Honduras, Sudan, South Africa, Turkey.
- 6.10. In 2008, Canada was the only major high income nation where crop insurance continued to be provided through the provincial government public crop insurers. By contrast, a higher number of developing countries currently have public insurance companies, including India, Philippines and Brazil (Table 6.1.).

Table 6.1. Government Support to Agricultural Insurance in 2008 – Major territories

Forms of Government Financial Support							
Country	Year of Inception	Agricultural Insurance POOL (coinsurers)	Public-sector MPC I Insurer	Premium Subsidies	Subsidies on	Financial Support to R & D and Training	Public-Sector Crop Reinsurance
Developed							
USA	1930's	No	No	Yes	Yes	Yes	Yes
Canada	1970's	No	Yes	Yes	Yes	Yes	Yes
Spain	1980	Yes	No	Yes	No	No	Yes
Portugal	1979	No	No	Yes	No	No	Yes
Italy	1970's	No	No	Yes	No	No	No
France	2005	No	No	Yes	No	No	No
Developing							
India	1985	No	Yes	Yes	Yes	No	Yes
Philippines	1980	No	Yes	Yes	Yes	No	No
China	1950's	Yes	No	Yes	Yes	No	Yes
Brazil	1950's	No	Yes	Yes	Yes	No	Yes
Mexico	1990	No	No	Yes	No	Yes	Yes
Chile	2000	Yes(No)	No	Yes	No	Yes	No
Colombia	2000	No	No	Yes	No	No	No
S. Korea	2001	No	No	Yes	Yes	No	Yes
Turkey	2005	Yes	No	Yes	No	No	Yes

Source: Stutley (2007).

6.11. **Coinsurance pools in agricultural insurance.** In several countries government has promoted the formation of agricultural coinsurance pools of which the largest is the Agroseguro, Spain's pool program formed in 1980. Since 2000, coinsurance pools have also been formed in Chile,³¹ Turkey and China (Table 6.1.). A pool is a legally binding risk sharing agreement entered into by a number of independent insurance companies for the purposes of collectively underwriting an agreed upon class(es) of insurance. Each insurer participates in the premiums and claims and profits and losses according to its proportionate interest (percentage share of 100 percent) in the pool. The potential benefits of an insurance pool include the ability to underwrite a much broader and larger book of business and the potential to achieve a much better geographical spread of risk, than if the each company were operating independently; economies of scale in the costs of developing new products and programs and in underwriting risks and in adjusting claims where a single lead coinsurer is appointed (or a separate technical support unit is created) to administer the business on behalf of the pool members. There are also major potential cost savings in the purchasing of reinsurance protection for a pooled coinsurance program. As noted in Chapter 2, Nepal has experience with operating an insurance pool to underwrite terrorism coverage.

6.12. In developing countries where insurance markets are often poorly developed and there is no tradition of crop or livestock insurance or rural insurance infrastructure, a pool coinsurance program may be a much more attractive proposition to commercial insurance companies than if they were to try to operate independently. Indeed a pool approach may be the only economically viable solution by which barriers to entry by individual companies can be overcome, including:

- Where the company has a low capital and reserves base the ability to participate in and to share in the results of the business by taking up a very small share in the pool. For example, in Spain, there are about 35 partici-

31 The Chilean Crop Insurance Pool has now been disbanded and the two main insurers operate independently.

pating coinsurers, some with shares of less than 1 percent, and in Turkey the 16 participating commercial insurers each have an equal 6.5 percent share in Tarsim, the managing insurance company they created to underwrite crop and livestock business in 2006;

- Sharing in the costs of the centrally-based technical and underwriting staff and claims adjusters as opposed to having to recruit these staff to their own company;
- Sharing in the costs of staff training and in product design and development and in the creation of marketing and loss adjustment infrastructure and systems and procedures;
- Shared costs of the pool reinsurance program.

- 6.13. **Premium Subsidies.** Currently the most common form of government support to agricultural insurance is through direct insurance premium subsidies, applicable to all the countries listed in Table 6.1.³² Governments often justify premium subsidies as a means of making crop insurance affordable to all farmers and especially small farmers. However, the costs of government premium subsidies are extremely high in most countries. In 2005, MPCl premium subsidies in the USA amounted to US\$2.34 billion (59 percent of MPCl premiums), in Canada, US\$350 million (50 percent of MPCl premiums) and in Europe US\$600 million (32 percent of total premiums).³³ Similarly in Asia high levels of premium subsidies apply to almost all the major programs including India, Philippines, China and South Korea. In Latin America, Chile introduced premium subsidies in 2001 and in Brazil, the federal government ratified the reintroduction of premium subsidies in 2005 and is projecting to increase their financial support for premium subsidies from US\$1.0 million in 2005 to US\$50 million in 2007 and US\$100 million in 2009. In Europe, Spain, Italy and Portugal provide extremely high levels premium subsidies to their farmers. Turkey and France have introduced premium subsidies since 2005.
- 6.14. **Reinsurance support.** The next most common form of government support is to the reinsurance of agriculture. In India, government excess of loss reinsurance protection is free of any charge, while in Canada, USA and South Korea it is provided at favorable (subsidized) terms.³⁴ In Spain, Mexico and Brazil agricultural reinsurance protection is provided at commercial market rates by the national reinsurers, Consorcio de Compensacion de Seguros (Spain), Agroasemex (Mexico) and the Brazilian Reinsurance Institute, IRB, (Brazil); this also applies to Portugal where the government offers a voluntary crop stop loss reinsurance program.
- 6.15. **Subsidies on administrative and operating expenses.** In several countries government also offers subsidies on the insurance company's administrative and operating expenses. In the most comprehensive form in the USA, government effectively subsidizes 100 percent of the insurer's acquisition costs, administrative costs and the costs of adjusting crop losses. These subsidies are paid directly to the insurance company and the farmer only bears his share of the pure risk premium.
- 6.16. **Other forms of government support to agricultural insurance.** In some countries governments provide financial subsidies for product research and development and for training and education programs.
- 6.17. Further information on the structure and features of a selection of these public-private crop insurance programs are presented in Annex 7. The lessons from international experience can provide useful insights for insurance planners in Nepal as it develops its own private-public partnership for agricultural insurance.

³² Legislation passed by the World Trade Organization (WTO) over the past twenty years has been directed at phasing out all direct price support subsidies on agricultural commodities. Conversely, agricultural insurance premium subsidies are exempted (permitted) under Green Box legislation and many governments, especially in Europe, have used this loophole to increase their support to agricultural insurance premium subsidies.

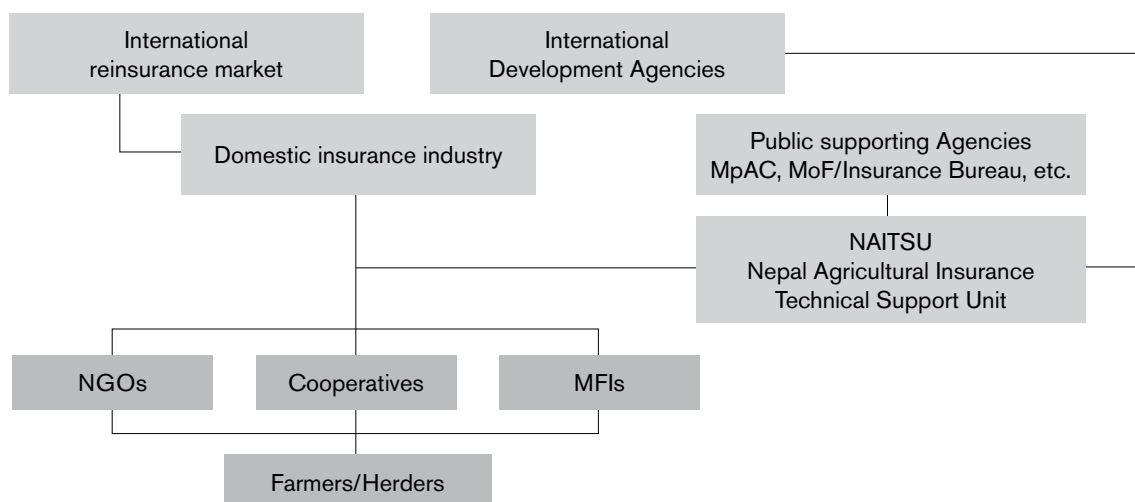
³³ In Europe 15 (55%) of the 27 countries reviewed have government financial support to premium subsidies. Source: European Commission 2006, "Agricultural Insurance Schemes – Administrative Arrangement No Agri 2005-0321. Final Report", December 2006.

³⁴ In China, ChinaRe, the national reinsurer, participates in agricultural reinsurance on a strictly commercial basis. There are, however, several provincial pilot programs in 2008 where the local government is involved in providing free stop loss co-reinsurance.

TOWARDS A PUBLIC-PRIVATE PARTNERSHIP FOR AGRICULTURAL INSURANCE IN NEPAL

- 6.18. It is clear from this feasibility study that the development of agricultural insurance in Nepal will require the active participation of both public and private sectors. Figure 6.1. provides an illustrative framework showing the relationship between the key stakeholders. Any agricultural insurance initiative should be led by the private commercial insurers wherever possible and/or the MFIs and cooperative mutual insurers, with the support of the GoN. Nepal does not have a national reinsurer and therefore reinsurance will have to be provided primarily from a combination of the local private commercial insurers and international reinsurance companies, although this does not preclude GoN from contributing towards the financing of catastrophe risk layers.

Figure 6.1. Illustrative Institutional Framework for Public-Private Agricultural Insurance Partnership in Nepal



- 6.19. Figure 6.1. also introduces the concept of a Nepal Agricultural Insurance Technical Support Unit (NAITSU), which would be staffed by a small team of two or three agricultural crop and livestock insurance experts and whose mandate would be to provide technical support to the stakeholders to develop, rate and implement new products and programs.

Agricultural insurance delivery models for small farmers in Nepal

- 6.20. In reviewing the potential roles that government, the private commercial insurers, the banks, MFIs, cooperatives and NGOs might play in developing agricultural insurance in Nepal, it is useful to distinguish between the different types of institutional model for providing insurance and microinsurance products and services to Nepal's predominantly small-scale crop and livestock producers. ProVention (2006) identifies four main delivery models for providing microinsurance as described in Box 6.1.
- 6.21. The **Full service model** whereby private commercial insurers (or occasionally public insurers) assume full responsibility for the supply of agricultural insurance products and services is the most common institutional form of insurance in the major public-private agricultural insurance programs reviewed above.
- 6.22. In Nepal, the private commercial sector has yet to assume any direct role in agricultural insurance and most of the livestock and crop insurance initiatives identified in Chapter 2 all fall under the **community-based model**, while the DICGC livestock credit guarantee (insurance) program for bank credit can be classified as a **provider model**.

Box 6.1. Institutional Models for Small Farmer Insurance (Microinsurance)

- **Full-service model:** commercial or public insurers provide the full range of insurance services from initial development of the product, through distribution, to absorbing risk
- **Partner-agent model:** commercial or public insurers, together with microfinance institutions or nongovernmental and other organizations, collaboratively develop the product. The insurer absorbs the risk and the agent markets the product through its established distribution network. This lowers the cost of distribution and thus promotes affordability.
- **Community-based model:** local communities, MFIs, NGOs, and/or cooperatives develop and distribute the product, manage the risk pool, and absorb the risk. As with insurance mutuals, there is no involvement on the part of commercial insurers.
- **Provider model:** banks and other providers of microfinance can directly offer or require insurance contracts. These are usually coupled with credit, for example, to insure against the risk of default.

Source: ProVention 2006 (Cohen and McCord 2003).

Role of private commercial insurers

6.23. Chapter 2 showed that to date, in Nepal, none of the 16 non-life general private commercial insurers have been involved in the provision of agricultural insurance. The key challenges facing the private commercial insurers appear to center on:

- Their lack the expert knowledge and experience to underwrite crop and livestock insurance;
- The high start-up costs associated with: (a) designing new crop and livestock insurance products; (b) rating these products; (c) design of loss assessment systems and procedures; and recruiting key underwriting and field staff and training these personnel;
- The companies do not have rural branch networks to market crop and livestock insurance directly to Nepali farmers, nor to underwrite and adjust claims from potentially large numbers of small farmers;
- The very small average size of Nepali farmers and the potentially prohibitively high administrative costs of trying to implement individual farmer crop and livestock insurance;
- Overcoming the legal barriers to collaboration with the MFIs and cooperative insurers in the provision of agricultural insurance products and services to Nepali farmers. Insurance legislation does not permit the MFIs and cooperatives to issue any form of insurance policy and restricts them to acting as licensed agents of the private commercial insurers, selling the insurers' products (policies) which have been authorized by the Insurance Board, for which they may earn a fee (brokerage). Currently, however, in Nepal there are no traditional crop or livestock insurance policies or non-traditional index coverages which are approved by the Insurance Board and which the private commercial insurers could market through the MFIs, cooperatives and other rural sector service organizations.

6.24. To counter these drawbacks the private commercial insurers have considerably larger financial reserves than the non-regulated MFI and mutual (cooperative) insurance sectors and a key advantage in that they have access to international reinsurance markets.

6.25. In the future, if the private commercial insurers wish to become actively involved in underwriting crop or livestock insurance, this could be through the following three main ways:

- (a) As a **direct insurer**, operating singly as individual insurers. It is likely, however, that start-up development costs and operating costs constraints listed above will make it very unlikely that any Nepali insurer will in the near future develop its own crop or livestock insurance portfolio;

- (a) As a direct insurer participating in an **insurance (or coinsurance) pool**³⁵ thereby benefiting from economies of scale through shared costs of:
- Product design and rating
 - Policy marketing and sales
 - Underwriting and claims control and loss adjustment
 - Purchasing of a common (pooled) reinsurance protection program.
- (a) (c) Indirectly as a **reinsurer** of the cooperative mutual crop and livestock insurance programs.

- 6.26. **Insurance (coinsurance) pool structures.** If the non-life insurers elect to form a coinsurance pool, they will need to consider the institutional framework for the pool. In some countries including China and Malawi, the coinsurers have elected to appoint one company as the lead coinsurer responsible for staffing and managing a specialist agricultural underwriting and claim administration department or unit, and the coinsurers have then contributed to the running costs of the lead coinsurer.
- 6.27. In Spain and Turkey the private commercial insurers elected to form a new specialist insurance company to underwrite the business on behalf of the coinsurers, namely Agroseguro in Spain and Tarsim in Turkey. This latter option is considerably more expensive in the start-up phase as it is necessary to capitalize, staff and equip the completely new agricultural insurance company.
- 6.28. Given the fact that Nepal has eight years of experience with the operation of a Terrorism Insurance Pool, this structure may be the most appropriate to adopt for underwriting crop and livestock insurance if the private commercial insurers agree to this option. The Insurance Board advise that, in principle, agricultural insurance could also be underwritten through the existing Pool.
- 6.29. **Reinsurance of the MFIs and mutual insurers.** If the legal issues can be overcome, the potential for the commercial insurance companies to enter into excess of loss reinsurance arrangements with the MFIs and cooperative sector has potential benefits for both parties. This could probably only operate under a pooled reinsurance agreement whereby all mutual livestock and or crop insurers agreed to reinsure their programs under a pooled reinsurance program. An illustrative example based loosely on the SFCL mutual livestock insurance program is presented in Figure 6.2. In this simple example it is assumed that the 200 individual mutuals agree to purchase a pooled reinsurance program from the named insurer(s) with stop loss reinsurance protection excess 100 percent³⁶ loss ratio up to 250 percent loss ratio in two layers. According to the analysis of PML exposures on the SFCL program it may also be necessary to purchase additional catastrophe reinsurance above 250 percent loss ratio either through international reinsurers and or GoN.
- 6.30. In this case the main benefits to the insurer(s) would be that they would not need to invest in agricultural sales staff and field level loss assessors as these functions would be assumed by the mutual insurers and the insurer(s) would not be exposed to first loss. The MFIs/cooperatives would benefit from the provision for the first time of reinsurance protection against catastrophe losses.

³⁵ As noted in Chapter 2, Nepal has considerable experience with the operations of a Terrorism Insurance Pool which is supported by nearly all the non-life insurance companies. This model could be replicated for agricultural crop and livestock insurance.

³⁶ The 100% of premium primary retention level may need to be reduced to say 80% or 90% according to the mutual's financial reserves and ability to pay for insurance and reinsurance protection.

Figure 6.2. Illustrative Example of Stop Loss Reinsurance for Livestock Cooperatives

Loss		NRs
	International Reinsurers and/or Government	
	Catastrophe excess of Loss Reinsurance	
	Private Insurance Companies	
250%	Private Insurance Companies	37,500,000
	Layer 2: 100% xs 150% Loss ratio	
150%	Private Insurance Companies	22,500,000
	Layer 1: 50% xs 100% Loss ratio	
100%	Primary Retention	15,000,000
	Mutual Cooperative	
	Insurers	
Assumptions:		
1) 200 Livestock Cooperatives (average 50 Insured animals)		
2) Number of Insured Cattle/ Buffalo		10,000
3) Average sum insured per Animal		15,000
4) Total sum insured		150,000,000
5) Premium (Average Rate 10%)		15,000,000

Source: World Bank 2008.

Roles of mutual cooperatives and MFIs

- 6.31. There are two major potential roles for the cooperatives/MFIs in Nepal: (i) they could act as “insurance agents” for the private commercial insurance companies and market the commercial crop and livestock policies of the insurance companies to their members and receive a commission for this service; and (ii) they could continue to develop and underwrite their own crop and livestock credit guarantee cum insurance products as currently practiced.
- 6.32. Chapter 2 showed that the cooperatives are the most active community-based microinsurance organizations which have been involved in the provision of mutual livestock mortality insurance for 20 years and also in the pilot crop insurance programs over the past two years. Currently the major advantages of mutual agricultural insurance appear to center on:
- the mutual insurers are formed by members of the local cooperatives and are trusted by their insured members;
 - The mutual insurers operate under a legal and regulatory framework prescribed by the Department of Cooperatives;
 - The mutual insurers are able to operate at very low overhead costs (marketing, underwriting and loss adjustment costs);
 - The Cooperatives are often involved in the provision of a range of products and services to their members including savings and credit, input supply and output marketing, and act as a channel for crop and livestock extension services from the MOAC and its line departments. There is therefore a potential to provide crop and livestock insurance as part of a “packaged approach” linked to credit and input provision.

- The cooperative movement in Nepal has a major rural network throughout the country to channel, implement, manage and administer agricultural insurance products and services to smallholder farmers. In 2007 the Department of Cooperatives had 9,720 affiliated cooperatives with 1.3 million members, of which 3,056 cooperatives with 287,538 members were involved in agriculture (Table 6.2).³⁷

Table 6.2. Status of Agricultural Cooperatives in Nepal (2007)

Nature	No.	Male Members	Female Members	Capital (NRs 000)	Savings (NRs 000)	Investment (NRs 000)
Dairy	1,564	59,841	31,035	28,171	38,103	33,403
Agriculture	1,192	177,603	52,477	32,895	259,263	343,354
Small Farmers	213	48,645	19,914	18,109	199,627	602,787
Coffee	65	937	594	341	367	0
Tea	22	512	532	6,102	7,332	5,520
Total	3,056	287,538	104,552	85,619	504,692	985,064

Source: Sharma 2007

6.33. The challenges for developing agricultural insurance through the cooperatives include:

- Although the mutual insurers have considerable accumulated experience with livestock insurance they have very limited experience with crop insurance and lack the technical knowledge to design, rate and implement crop insurance;
- The products and services currently offered by the cooperatives do not comply with the legal requirements laid down by the Insurance Act of 1992 and the Insurance Regulations 1993, and as such are not legally recognized. Unless the insurance legislation is amended, the private commercial insurance sector and mutual cooperative sectors will not be able to collaborate in the provision of crop and livestock insurance products and services to Nepali farmers.
- In addition to legal constraints, the products and services offered through the mutual insurers require strengthening and standardizing before they could be considered by the private commercial insurers. This applies particularly to the crop insurance products currently being piloted in Nepal and where strengthening is required in the design and wordings and rating of the products; proper deductibles need to be introduced and formal and standardized loss assessment procedures need to be developed.
- The Mutual Insurers have very limited financial reserves and none are formally protected by any form of insurance or reinsurance protection. The individual mutuals are therefore very exposed to catastrophe losses which exceed their reserves. In the event that claims exceed their reserves they will either have to pro rata down each claim settlement, or to default on their obligations to each claimant which would probably result in the collapse of the mutual. Ways of providing pooled reinsurance protection to the cooperative insurers urgently needs to be introduced in Nepal.

6.34. Mexico offers one of the most useful examples of smallholder mutual crop and livestock microinsurance and reinsurance in a developing country and features of the Mexican model may be applicable to the future development of mutual (cooperative) insurance in Nepal.

6.35. Mexico has 18 years of experience with the operation of small farmer mutual crop and livestock insurance through the "Fondos de Aseguramiento" (Self Insurance Funds, SIFs) program which is reinsured by Agrosemex, the national agricultural reinsurance company. The SIFs are legally registered small-scale crop and livestock producer mutual companies whose primary function is to access group crop and livestock credit. The

³⁷ Sharma, T.M. 2007. Status of Cooperative Sector in Nepal, Department of Cooperatives March 20, 2007.

Fondos program was originally conceived as a vehicle to provide small and marginal farmers access to credit: individually these farmers were too small to be eligible for credit, but collectively they could access group credit. As part of the agreement with the lending banks, crop and livestock credit provision was linked on a mandatory basis to crop and livestock insurance.

- 6.36. Since 1990 Agroasemex has provided advisory support and training to SIF members to form and register SIFs. Agroasemex also assists the SIFs in accessing short-term and medium-term production and investment credit, and provides technical assistance and training on crop and livestock insurance policy design and rating and in loss assessment procedures. Agroasemex closely monitors the activities of the SIFs on a seasonal basis.
- 6.37. In 2005 there were 176 functioning SIFs in 24 Mexican states, of which 159 were crop producer SIFs and 17 livestock SIFs. Table 6.3. shows that in 2007 the SIFs insured more than 1 million hectares of crops and more than 4 million head of livestock (mainly cattle and pigs), generating MXN 647 million of premium (US\$60 million).³⁸ For crops, the basic coverage is an individual grower MPCl coverage which either insures against loss of the costs invested in the crop or against loss of yield: for livestock the policy is a herd-based catastrophe mortality and disease coverage which carries very low average rates. The crop and livestock products underwritten by the SIFs are eligible for federal government premium subsidies which average about 33 percent of full premium. Today after 18 years of operation, the Mexican SIF program is a major agricultural insurance program for small and marginal farmers.

Table 6.3. Mexico: 2007 Coverage By Self Insurance Funds

Item	insured area (000Ha)/ No. Insured Animals (000)	Total sum insured (MXN mio)	Total Premium (MXN Mio)	Average Rate (%)	Premium Subsidy (MXN Mio)	Premium Subsidy (%)
Crop	1,034.3	8,927.8	588.2	6.6%	194.9	33%
Livestock	4,106.6	15,154.9	59.0	0.4%	19.0	32%
Total		24,082.7	647.2	2.7%	213.9	33%

Source: Agroasemex 2008.

- 6.38. A key feature of the Mexican SIFs is the stop loss reinsurance protection provided by Agroasemex to each SIF. Under the agreement between Agroasemex and the SIFs, Agroasemex is responsible for setting the premium rates for each crop and livestock program and then for the provision of stop loss reinsurance protection. The SIF is entitled to deduct 25 percent of original premium to cover its administrative and operating (A&O) expenses. The SIF then retains an average 70 percent of the premium net of A&O expenses, equivalent to 52.5 percent of gross premium to settle retained claims. The remaining average 22.5 percent of gross premium is paid to Agroasemex as a stop loss reinsurance premium (Figure 6.3.).
- 6.39. In the event of a claim, the individual SIF is responsible for settling claims up to a loss ratio of 52.5 percent plus any claims reserves held over from previous years. Any claim excess of this level is reinsured by Agroasemex. Agroasemex, in turn, purchases stop loss retrocession protection on the Fondos program from international reinsurers.
- 6.40. In any underwriting year if the SIF generates an underwriting surplus (profit), 30 percent of the surplus must be added to a special claims reserve for catastrophe events and the remaining 70 percent is allocated to a social fund which may be divided among the SIF members to invest in income generating activities or to contribute towards crop and livestock insurance premiums.

³⁸ Agroasemex 2008, Sistema Nacional de Aseguramiento al Medio Rural: Informe Final de Operaciones al cierre del ejercicio 2007.

Figure 6.3. Agroasemex Stop Loss Reinsurance of Self Insured Funds

Allocation of Original Gross Premium					
100%	Agroasemex Stop Reinsurance (22.5% of Gross Premium)				
77.50%	SIF Retained Claims (52.5% of Gross Premium)				
			Allocation of Underwriting Surplus		
			→ Special Claims Reserve, Catastrophe Losses	30%	
			Surplus for the Social Fund	70%	
25%	SIF Administrative Expenses (25% of Gross Premium)				

Source: World Bank 2008.

6.41. Many of the features of the Mexican self-insurance funds program and the lessons learned over the past 18 years are relevant to the future expansion of mutual agricultural insurance in Nepal. One of the key differences is that Nepal does not have a public-sector organization like Agroasemex to provide a combination of technical assistance and most importantly, reinsurance protection, to the mutual (cooperative) insurers. This is a major issue which will need to be addressed and is likely to require a combination of private commercial insurance and international reinsurance and government reinsurance protection (risk financing and reinsurance are discussed further towards the end of this Chapter).

Roles of rural banks and MFIs

6.42. Chapter 2 showed the important role the Rural Banks have traditionally played in the promotion of and development of livestock insurance in Nepal and two “bundled” schemes where livestock insurance has been linked to livestock credit (microfinance) were reviewed including:

- 1) The DICGC livestock mortality insurance (credit-guarantee) scheme in conjunction with three development banks, the NRB, RBB and NBL; and
- 2) The SFLC mutual livestock mortality insurance scheme linked to livestock microfinance from the Small Farmer Development Bank (SKBB).

6.43. Furthermore, Chapter 2 identified the role of one Nepalese NGO, the Centre for Self-Help Development (CSD), in the provision of livestock investment microfinance and a livestock mortality protection scheme (microinsurance) for poor women livestock producers in Nepal. Unlike the DICGC and SFLC livestock insurance programs the CSD does not receive any form of premium subsidy support from government. The CSD program in common with the SFLC cooperative livestock insurance does not have any form of reinsurance protection and it is therefore potentially very exposed to catastrophic epidemic disease losses. In addition CDS offers a range of voluntary life, housing and maternity health insurance services to its female members.³⁹

6.44. At an international level, rural banking and microfinance services often include life insurance for the head of household or recipient of the microfinance, healthcare expenses, funeral expenses and property and contents insurance. Microinsurance for farmers to cover the loss of small scale assets, livestock and crops against natural and climatic disasters (flood, drought, and hurricane) is, however, only just emerging. Chapter 4 identified the

³⁹ Further details contained in CSD Annual Report Financial Year 2005-06.

major drawbacks for insurers of offering traditional indemnity-based multiple-peril crop insurance products to small farmers on a voluntary basis including problems of moral hazard and adverse selection down to the very high costs of policy administration and loss adjustment. The new crop weather index-based schemes which are being developed in countries such as India, Malawi and Central America appear to offer an innovative solution which is adapted to the needs of small farmers and which can be promoted and distributed through the MFIs and cooperatives either on a voluntary stand alone basis, or as part of a bundled program linked to seeds, fertilizers and microcredit; in addition, these weather index schemes are fully protected by insurance and reinsurance.⁴⁰

Nepal has three decades of experience with rural banking and microfinance. In 1980, there were only two commercial banks and two development banks in Nepal. Over the past 27 years there has been a major growth in the banking and microfinance sectors. Table 6.4 shows that in 2007 there were 203 NRB licensed bank and non-bank financial institutions in Nepal and which are formally registered with and supervised by the NRB. In addition, there are more than 3,000 savings and credit cooperatives and as many as 10,000 NGOs/MFIs involved in this sector.⁴¹ According to the CECI “of the 20 million rural inhabitants, 31 percent are classified as poor and only about 700,000 (11 percent of poor) are served by formal microfinance institutions (MFIs).⁴²

Table 6.4. Nepalese Financial Institutions registered with Nepal Rastra Bank 2007

Type of Financial Institution	Number
Commercial Banks	19
Development Banks	35
Financial Companies	72
Microcredit development banks	11
Savings and Credit Cooperatives	19
Non-governmental organizations (NGOs)	47
Total	203

Source: CECI 2008.

- 6.45. The very large number of MFIs (and savings and credit cooperatives, SACCOS) in Nepal potentially provides a major delivery channel for crop and livestock insurance products and services to small farmers. The key hurdles which the MFIs currently face in developing crop and livestock insurance are similar to those listed previously for the cooperatives, including (a) lack of technical knowledge and expertise in the design and rating of these insurance products; (b) legal and regulatory barriers to the provision of microinsurance products; and (c) lack of financial capacity and access to reinsurance protection to underwrite agricultural insurance products and services. In this connection it is understood that the Centre for Microfinance, CMF, Nepal, is currently in discussion with the NRB and the Insurance Board to seek ways of legalizing the provision of life insurance and health insurance through the MFIs. It is hoped that in due course this initiative may be extended to legalizing the provision of crop and livestock insurance by the MFIs and cooperatives.

Role of Government of Nepal

- 6.46. International experience tends to suggest that implementation of agricultural insurance is most efficient and effectively managed by the private commercial crop insurance sector. However, where insurance markets and infrastructure are poorly developed, governments may have important roles to play in promoting agricultural

⁴⁰ It is outside the scope of this report to provide a detailed review of the current crop and livestock microinsurance initiatives. Readers should refer to ProVention/IIASA 2006 which provides a very good overview of microinsurance for natural disaster risks in developing countries.

⁴¹ CECI (2008), Micro-financing towards Empowerment of Disadvantaged Groups in Nepal: Innovations and Practices, prepared by Micro Finance Department NRB, Sahakarya Project, Centre for International Studies and Cooperation, March 2008.

⁴² Ibid. 2008, page 3.

insurance, particularly in the start-up phases of new private commercial agricultural insurance programs. This section reviews some of the roles for government under a public-private partnership and specifically the roles that Government of Nepal may wish to consider in order to promote agricultural crop and livestock insurance in Nepal.

- 6.47. **Legal and Regulatory Framework.** One of the most important functions for government in facilitating agricultural insurance markets is the establishment of an appropriate legal and regulatory framework and where necessary to enact specific agricultural insurance legislation.
- 6.48. This review has shown that currently one of the major constraints to developing agricultural insurance in Nepal is the lack of compatibility between the legislation contained in the Insurance Act 1992 and the Cooperative Insurance Act. Under the Insurance Act of 1992, only licensed insurance companies are allowed to offer insurance. In addition, non-life insurance companies are required to hold minimum capital of NPR 100 million. The Insurance Board is currently considering amending the Insurance Act to allow for micro-insurance for health and life (with lower capital requirements). Similar amendments are required to facilitate agricultural (crop and livestock) microinsurance through the Mutual (cooperative) insurers and MFIs. In addition, it is possible that the Insurance Board will need to enact special legislation to permit the introduction and operation of weather index insurance in Nepal.
- 6.49. **Enhancing Data and Information Systems.** Time-series data and information on crop production and yields and climate are essential for the design and rating of any traditional crop insurance product or new weather index product. Governments can provide an invaluable service by creating national databases and making these data bases available to all interested private commercial insurers either free of cost, or at concessionary rates.
- 6.50. In Nepal there is an efficient crop production and yield collection and reporting system through the MOAC and Central Bureau of Statistics (CBS). Currently crop yields are only reported at the district level and do not distinguish between rain-fed yields and irrigated yields. This system could be enhanced by increased government investment in crop-cutting resources to provide reporting of yields at the sub-district-level, by constructing a national database of individual crop-cutting results and by increased monitoring and recording of crop damaged area by cause of loss.
- 6.51. Climatic weather data is also widely available through the Department of Hydrology and Meteorology which maintains a network of manual rainfall and weather stations throughout Nepal. If in the future crop weather index insurance is introduced into Nepal, government could usefully support this program by investing in the upgrading and automating of the weather stations to ensure data integrity.
- 6.52. **Product research and development.** Among the major start-up costs for any new crop or livestock insurance program is the design (including the design of loss assessment procedures), rating of new products, and pilot testing of the new products and programs. Such costs may be prohibitive for individual private commercial insurers especially in developing countries. In such situations there is justification for government to provide financial support to product design and rating, especially where the products and rates are then made available to all interested insurers. Such a need applies specifically to Nepal where there is very little experience in the design and rating of crop and livestock insurance programs. In this context it is recommended that GoN consider establishing and funding the Nepal Agricultural Insurance Technical Support Unit (NAITSU), which would assume key responsibility for data and information acquisition and for designing and rating crop, livestock, aquaculture and forestry insurance products on behalf of all commercial and cooperative insurers in Nepal.
- 6.53. **Education, training and capacity building.** Governments can play an important role in the introduction of new agricultural insurance programs by supporting (a) farmer awareness and education programs and (b)

capacity building and workshops and technical training programs for key agricultural insurance staff. The field studies conducted under this mission have identified a major need in Nepal for farmer awareness and general education about the role of crop (and livestock) insurance. Capacity building and specialist education will also be required at the insurance company level. Currently in Nepal there is no agricultural insurance expertise in the private commercial companies. If the private commercial insurers are to take an active role in agricultural insurance, specific training for senior crop and livestock insurance managers and professionals will need to include product design, actuarial and rating, underwriting and claims administration and loss assessment systems and procedures. The company field staff will also need to receive suitable training in operating systems and procedures. Similar training also needs to be provided to staff in MFIs and cooperatives who are involved in agricultural insurance.

- 6.54. **Catastrophe risk financing.** Agricultural insurance often has to protect against catastrophe perils of flood, drought, windstorm in crops and epidemic disease outbreak in livestock. Most insurance companies do not have adequate capital to retain their catastrophe risk exposures and they typically purchase some form of contingency financing and or reinsurance protection. For new companies which do not have large amounts of capital and have not yet built up claims reserves, the ability to retain risk is usually low and they typically need to purchase quota share treaty reinsurance and to then seek non-proportional reinsurance protection on their retention. In start-up situations where the insurance company does not have an established track record and loss history, the costs of reinsurance protection may be very high. In such situations, government support to the reinsurance program may be highly cost effective. Indeed the review of international experience shows that many governments both in developed and developing countries provide subsidized reinsurance to the crop and livestock insurers.
- 6.55. The single most important issue identified under this review of the non-regulated agricultural insurance initiatives in Nepal is the absence of any form of reinsurance protection for the livestock and crop insurance programs currently being implemented. If the commercial insurers and international reinsurers are unable to reinsure these initiatives at an affordable premium, GoN may need to consider ways of participating in a structured risk financing program.
- 6.56. **Public sector premium subsidies.** Governments justify the provision of agricultural insurance premium subsidies on the grounds that they make insurance more affordable for farmers, particularly small and marginal farmers, thereby increasing the rate of adoption and uptake of agricultural insurance. This argument may apply to individual grower multiple peril crop insurance, MPCl, where average premium rates commonly vary between 7.5 percent and 10 percent for coverage levels of 65 percent to 75 percent of normal average yield. However, this argument does not apply to private crop-hail insurance which has been widely marketed in Europe, USA, Australasia and Argentina for nearly a century with average rates of 2.5 percent to 5.0 percent and with no premium subsidy support from governments.
- 6.57. Premium subsidies are the most widely practiced form of government support to agricultural insurance and as more farmers purchase crop and livestock insurance either on a voluntary or compulsory basis (for example, compulsory crop-credit insurance programs) the annual budget for premium subsidies is increasing dramatically in many developed and developing countries.
- 6.58. There are, however, a series of major drawbacks to direct insurance premium subsidies. Many countries provide single flat rate premium subsidy, typically 50 percent of the full commercial price of insurance for all farmers, all crop types and all risk regions.⁴³ These undifferentiated premium subsidies disproportionately benefit the larger farmers to the detriment of small and marginal farmers, and they actively promote farmers in the highest risk

⁴³ Annex 7 presents a review of the different types of premium subsidy regimes in various countries. Not all countries have flat rate premium subsidies. Spain and Portugal have highly developed premium subsidy scales which differentiate between crop types and risk regions and type of farmer purchasing coverage, etc.

rated regions to grow high risk crops which are not best suited to that region, knowing that they are protected by their highly subsidized crop policy, and this in turn can result in severe moral hazard. Premium subsidies once introduced are very difficult to reduce or to withdraw⁴⁴ and in the major developed and developing economies reviewed above, the costs of premium subsidies to the taxpayer are now extremely high and could not be afforded by the smaller developing countries such as Nepal.

- 6.59. The GoN should seek to finance premium subsidies only where a clear social need is identified and where the premium subsidies are targeted at special needs groups and are provided for a specific period of time and which can be withdrawn once the program has attained a critical mass.

Future role of Deposit Insurance and Credit Guarantee Corporation (DICGC)

- 6.60. In Chapter 2 it was noted that the DICGC was originally established by government in 1974 to guarantee bank loans paid out under the Priority Sector Loan scheme and that commencing in 1987/88 the DICGC provided animal mortality guarantee protection for livestock investment credit. With the phasing out of the Priority Sector Loan scheme the volume of credit guarantee business underwritten by the DICGC has declined significantly. Under any public-private initiative for agricultural insurance GoN will need to decide on the future role of the DICGC.

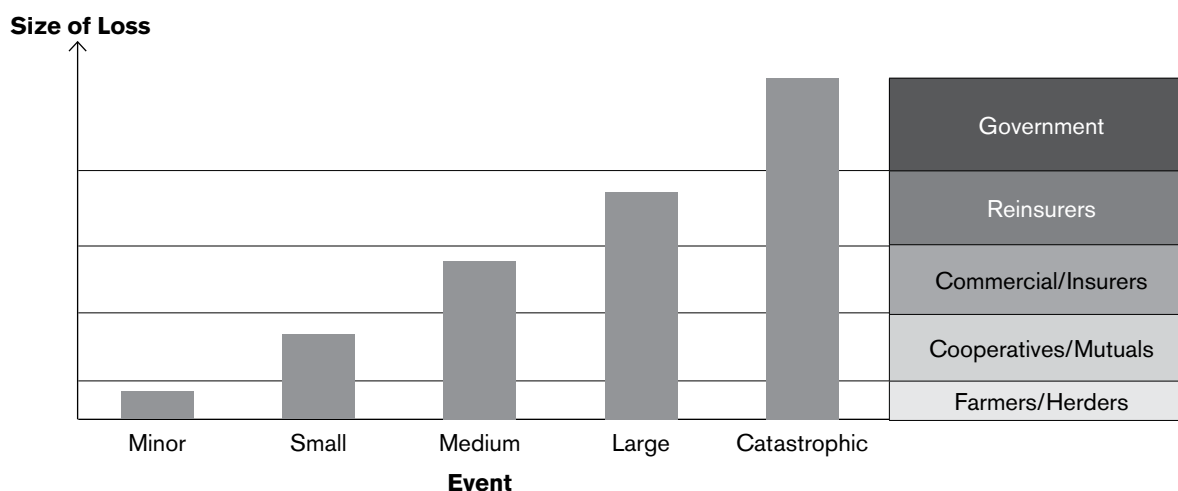
Government role in ex-post natural disaster relief funding in Nepal

- 6.61. Under any public-private initiative for agricultural insurance GoN will also need to decide on the future role of the Natural Disaster Relief Program. Experience shows that where free public-sector disaster relief continues to be provided after the introduction of agricultural insurance this tends to act as a major disincentive for farmers to purchase agricultural insurance. Options for GoN to consider include phasing out disaster relief, or to only offer this in future for perils which are not covered by private sector and mutual sector crop and livestock insurance programs.

RISK FINANCING AND REINSURANCE CONSIDERATIONS

- 6.62. Currently in Nepal none of the pilot crop insurance or livestock insurance programs offered through the cooperatives and NGOs and MFIs or the public-sector (DICGC) are protected by any form of catastrophe reinsurance. The individual cooperatives are currently extremely exposed to catastrophe loss events and there is a need to examine some form of individual or preferably "pooled" reinsurance program to cover loss events which exceed their premium plus claims reserves.
- 6.63. There are many options for structuring risk financing and reinsurance programs including both proportional and non-proportional reinsurance. Figure 6.4. provides an example of a non-proportional insurance and reinsurance structure involving both mutual and private commercial insurers with protection for large-scale and catastrophe events from international reinsurers and possibly government.

⁴⁴ It is interesting to note that of the 15 countries in Table 6.1. with premium subsidy support, Colombia is the only country which originally, in the mid-1990's, introduced crop insurance premium subsidies which were explicitly provided to individual farmers for a period of only 3 years and with declining subsidy levels over this period. In all other countries, governments do not have any explicit mechanisms for reducing and phasing out premium subsidies over time.

Figure 6.4. Agriculture Risk Layering and Financing

Source: Authors.

CONCLUSIONS

- 6.64. In the short term the Nepalese private commercial insurance sector appears to lack the underwriting capability and rural infrastructure actively to implement and administer small-holder agricultural insurance and it is therefore unlikely to get directly involved in individual farmer crop or livestock insurance, although there could be exceptions either under a carefully designed pilot weather index insurance coverage or for larger commercial livestock operations. In the short term an important role of the private insurance sector could be to provide pooled reinsurance protection for the mutual (cooperative) and MFI agricultural insurers.
- 6.65. The current livestock and crop insurance initiatives through the cooperatives and/or MFIs appear to offer the best potential for replication and scaling-up in Nepal. They should be promoted and strengthened by creating some form of pooled excess of loss reinsurance. Ways of establishing a linkage between the cooperative insurance sector and the private commercial insurers need to be explored, but unless insurance legislation is amended the insurance products and services offered by the cooperatives will not be legally recognized.
- 6.66. The role of GoN will be very important in the development and expansion of private commercial and mutual crop and livestock insurance products and services in Nepal. Key roles for government appear to center on: (i) enabling suitable agricultural insurance legislation to be introduced, (ii) funding of insurance infrastructure and start-up costs, and (iii) providing catastrophe reinsurance protection.
- 6.67. It is also suggested that GoN consider the formation of a Nepal Agricultural Insurance Technical Support Unit, NAITSU, which would be responsible for the key functions of (a) data and information acquisition and analysis, (b) product design and rating, and (c) training and education for private commercial insurers and MFI/Cooperative Insurers. The NAITSU would also be a key institution in the pilot testing of any future crop hail and named peril damage policies and area-yield index products and crop weather index products as identified in Chapter 4.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

- 7.1. The final chapter summarizes the key outcomes and conclusions of the technical and operational analysis of crop and livestock products that could be developed and piloted in Nepal. It provides recommendations on the next possible steps for the development of agricultural insurance that the Government of Nepal and insurance companies may want to consider, in order to make agricultural insurance attractive to farmers and viable for insurance companies without relying on heavy government subsidies.

CONCLUSIONS

- 7.2. ***There is no commercial private sector crop or livestock insurance in Nepal.*** No commercial insurance company offers crop or livestock insurance in Nepal. This is due to a lack of technical expertise of insurers to develop and service agricultural insurance, the absence of a network of insurance agents in the countryside and, more generally, a lack of knowledge of the agricultural sector.
- 7.3. ***Credit-linked livestock insurance has been offered for more than 20 years.*** There are more than 20 years of experience of individual animal livestock insurance linked to credit provision either through the Deposit Insurance and Credit Guarantee Corporation (a public sector entity) in conjunction with various agricultural development banks, or livestock producer cooperatives (e.g., individual animal mortality insurance provided by the Small Farmer Cooperative Ltd, SFCL, to their members, and by the Community Livestock Development Project, CLDP). Currently one NGO/MFI is offering livestock insurance to its members. The scale and levels of penetration of the cooperative livestock insurance programs is limited at present but provides a model which could be developed and strengthened in the future.
- 7.4. ***Crop insurance is offered on a small scale by some cooperatives.*** In 2008 with technical and financial assistance from MOAC, several farmer cooperatives have begun piloting named-peril crop insurance for their members (e.g., windstorm cover for bananas provided by the Agriculture Insurance Multipurpose Cooperative Limited of Kawaswoti and Shiva Mandir VDCs of Nawalparasi; and paddy maize and vegetable insurance in Janodya Multipurpose Cooperative Ltd, Ramnagar, Nawalparasi. Currently these crop insurance programs are being implemented on a very small scale.
- 7.5. ***Most farmer organizations are interested in developing crop and livestock insurance in Nepal, but expressed their lack of knowledge*** of the range of products and programs available. There is a major need for awareness and education programs for farmers, insurers, banks and other service organizations involved in agricultural/rural development in Nepal.
- 7.6. ***No “one-size-fits-all”.*** Any agricultural insurance programs in Nepal are likely to be location specific and will need to reflect the local risk exposures (flood and/or drought are key exposures in the Terai, while hail and landslide are of greater concern in the hills), and take into account infrastructural constraints and the presence of local service organizations.

- 7.7. **Each type of Nepali farmer needs tailor-made agricultural insurance solutions.** Subsistence farmers: traditional crop or livestock insurance will not benefit these farmers. Semi-commercial farmers: the cooperatives and microfinance institutions are already assisting with livestock insurance and new pilots for crop insurance and these initiatives should be built-on. Commercial farmers: insurance through the cooperatives/microfinance institutions, and possibly private sector insurance for the biggest farmers.
- 7.8. **The role of the private commercial insurance sector may be limited in the short term.** In the short term the commercial insurance industry lacks the underwriting capability and rural infrastructure to implement and administer small-holder agricultural insurance cost-effectively and it is therefore unlikely to get directly involved in individual farmer crop or livestock insurance, although there could be exceptions either under a carefully designed pilot weather index insurance cover or for larger commercial livestock operations.
- 7.9. **Mutual agricultural insurance is likely to offer potential for development in Nepal.** The current livestock and crop insurance initiatives through the cooperatives and/or MFIs appear to offer the best potential for replication and scaling-up in Nepal. They should be promoted and strengthened by creating some form of pooled excess of loss reinsurance. Ways of establishing a linkage between the cooperative insurance sector and the private commercial insurers need to be explored, but unless insurance legislation is amended the insurance products and services offered by the cooperatives will not be legally recognized.
- 7.10. **The current (livestock and crop) mutual insurance programs managed by some cooperatives face technical and financial challenges.** At the request of their members, some cooperatives have developed and implemented small-scale mutual crop and livestock insurance. While these programs are overall technically sound, they could be further improved and strengthened, and the main issue is their financial viability. These programs do not hold adequate financial reserves to sustain catastrophic losses.
- 7.11. **The current agricultural mutual insurance programs do not operate under the Insurance Law.** Under the Insurance Act of 1992, only licensed insurance companies are allowed to offer insurance. In particular, non-life insurance companies are required to hold minimum capital of NPR 100 million. The Insurance Board is currently considering amending the Insurance Act to allow for micro-insurance for health and life (with lower capital requirements). Such amendments could be applied to agricultural (crop and livestock) micro-insurance.
- 7.12. **The development of any agricultural insurance product relies on a proper risk assessment.** To date there does not appear to have been any formal assessment of risk either for the livestock sector or the crop sector. Livestock mortality statistics are only accessible at an aggregated national level and for a limited number of years. Time-series production and yield data for annual crops are available at district level for about 10 to 15 years, although they do not distinguish between irrigated and non-irrigated yields. This district production and yield data has been used to develop a risk model for annual crops. The data on causes of loss are unavailable, with a few exceptions.
- 7.13. **Crop insurance products have been identified which could be further developed and piloted in the second phase.**
- *Named peril crop insurance.* High value crops such as vegetables, citrus and fruits are exposed to hail losses in the hill regions. Individual grower crop *hail insurance* is an option which should be considered under any future pilot projects. *Bananas windstorm damage* is another example of a specific named peril coverage which could be introduced into Nepal relatively easily.
 - *Area yield crop insurance.* Area yield crop insurance, where the indemnity is based on the realized average yield of an area such as a district, could be pilot-tested in the Terai, where cropping systems and climate are

relatively homogeneous at the district level. Ideally, area-based crop insurance would operate at a smaller administrative level, namely the individual Village Development Committee (VDC) level, but this would only be feasible if the density of crop-yield sampling was to be increased and yields officially reported at the VDC level. Any attempts to introduce area yield crop insurance will, therefore, depend on data availability.

- *Weather based crop insurance.* Weather based crop insurance may provide the best potential for Nepal, not least because there appears to be access to good quality time series daily rainfall data for 30 to 40 years and there is a fairly good network of stations, although most stations are manual. *Drought index insurance* could be piloted on rain-fed crops in the most drought prone areas. *Frost index insurance* could be piloted in the hill regions.

- 7.14. ***The role of the government, with the assistance of the donor community, is essential for the development of agricultural insurance in Nepal.*** It should focus on stimulating crop and livestock insurance through the cooperative and rural banking/microfinance sectors. The GoN could facilitate a review of existing insurance legislation with a view to bringing cooperative and MFI insurance practices and regulations into line with those of the private commercial insurance sector and to legitimize insurance through these organizations.
- 7.15. ***There is a need for technical assistance in the design and implementation of agricultural insurance products.*** The government, with the help of donors, could support the creation of a Technical Support Unit. Technical assistance is required to enable insurers to develop risk assessment methodology; develop rate-making methodology; develop crop and livestock products; develop loss adjustment procedures; train underwriters and sales agents; train field assessors and loss adjusters; educate farmers and livestock producers on the role and functions and benefits of risk transfer/insurance.
- 7.16. ***The Government should also strengthen the risk market infrastructure,*** such as the agricultural and weather data collection and management systems, or the legal and regulatory framework to allow for index-based insurance. The Government may also play an important role in providing catastrophe reinsurance if local insurers and/or international reinsurers are unwilling to provide excess of loss reinsurance protection for the cooperative/microfinance agricultural crop and livestock insurance initiatives.

MOVING AHEAD

- 7.17. ***The development of agricultural insurance will require addressing major institutional and technical/operational challenges.*** Strong collaborations between the Government of Nepal, and particularly the Insurance Board, the domestic insurance industry, the farmer cooperatives the microfinance and banking sectors, with support from the line ministries (MoAC, MoF) and the NGOs.
- 7.18. ***Promoting the role of private commercial insurers.*** The 1992 Insurance Act permits Private Commercial Insurers to appoint agricultural cooperatives and MFIs to act as agents on their behalf. Wherever possible the private sector should be encouraged to develop agricultural crop and livestock insurance products and to channel these through the cooperatives and MFIs to Nepal's predominantly poor and marginal farmers.
- 7.19. ***Enabling legal and regulatory environment for the development of agricultural insurance.*** Mutual livestock insurance has operated for several years outside the Insurance Law; this is not sustainable nor desirable as this program grows. The insurance legal and regulatory framework in Nepal could be revised to allow for the development of agricultural mutual cooperative insurance. Likewise, it could be revised to allow for the development of index-based insurance. The revision of the legal and regulatory framework should not be a precondition for the development of pilot agricultural insurance programs, as long as these pilots can be properly

supervised, as shown in the Mongolia livestock insurance pilot. However, any nationwide expansion of the program would need suitable amendments to the insurance legal and regulatory framework.

- 7.20. **Strengthening ongoing crop and livestock mutual insurance programs.** Additional technical assistance could be provided to the on-going small-scale mutual crop and livestock insurance programs to strengthen their technical features (e.g., policy terms and conditions) and their financial features (e.g., reinsurance).
- 7.21. **Design and implementation of new agricultural insurance pilots.** Agricultural insurance programs could be piloted to ascertain the viability of agricultural insurance in Nepal and serve as a demonstration effect. These pilot programs could be linked to an existing agricultural development program (e.g., improved seed varieties, fertilizers, crop credit). A technical support unit, supported by the Government of Nepal and the donor community, could assist in the design, rating and implementation of pilot program. Potential agricultural insurance pilots are:
1. Pilot programs for named peril policies:
 - Citrus, vegetables–Hill Regions–hail and frost
 - Mangoes–Terai–hail
 2. Pilot programs for area-yield index: paddy rice–drought/flood prone areas of Terai
 3. Pilot programs for weather index
 - Rain-fed paddy–Terai–excess rainfall, rainfall deficit
 - Potato–Hills–temperature (frost), relative humidity.
- 7.22. **Enabling legal and regulatory environment for the development of agricultural insurance.** The development of agricultural insurance in Nepal will mainly rely on partnerships between the cooperatives/MFIs and the domestic insurance industry. Agricultural mutual insurance has operated for several years outside the Insurance Law, which is not sustainable nor desirable as this program grows. The legal and regulatory framework in Nepal could be revised to allow for the development of agricultural mutual cooperative insurance. Likewise, it could be revised to allow for the development of index-based insurance.
- 7.23. **Creation of the Nepal Agricultural Insurance Technical Support Unit.** A specialized technical support unit, the Nepal Agricultural Insurance Technical Support Unit (NAITSU), should be established to assist stakeholders in the development of agricultural insurance in Nepal. NAITSU would be responsible for the key functions of (i) data and information collection and management; (ii) insurance demand assessment; (iii) product design and rating; (iv) training for insurance companies, MFIs, farmer cooperatives and farmer groups; (iv) awareness campaigns. NAITSU would report to a Steering Committee with representatives of the public and private stakeholders.

GLOSSARY

Accumulation	The concentration of similar risks in a particular area such that an insured event may result in several losses occurring at the same time.
Actuarial	Branch of statistics dealing with the probabilities of an event occurring. Actuarial calculations, if they are to be at all accurate, require basic data over a sufficient time period to permit likelihood of future events to be predicted with a degree of certainty.
Ad hoc Response	Disaster relief arranged in the aftermath of a disaster. Ad hoc responses are generally less efficient than planned responses or a well-designed risk-management framework.
Adverse Selection	Adverse selection occurs when potential insurance purchasers know more about their risks than the insurer does, leading to participation by high-risk individuals and nonparticipation by low-risk individuals. Insurers react by either charging higher premiums or not insuring at all, as in the case of floods.
Agricultural Insurance	Insurance applied to agricultural enterprises. Types of business include crop insurance, livestock insurance, aquaculture insurance, and forestry, but normally exclude building and equipment insurance, although these may be insured by the same insurer under a different policy.
Area-Based Index Insurance	The essential principle of area-based index insurance is that contracts are written against specific perils or events (such as area yield loss, drought, or flood) defined and recorded at a regional level (for example, at a county or district level in the case of yields, or at the local weather station in the case of insured weather events). Indemnities are paid based on losses at the regional level rather than farm level.
Asset Risk	Risk of damage or theft of production equipments and assets.
Asymmetric Information	An information imbalance due to one party in a transaction possessing more or better information than the other party (parties), such as knowledge of hidden costs or risky behavior. Buyers of insurance products typically have better information about their level of risk exposure, which they may hide from insurers in order to gain lower premium rates.
Basis Risk	The risk with index insurance, that the index measurements will not match individual losses. Some households that experience loss will not be covered, for example, and some households that experience no loss will receive indemnity payments. As the geographical area covered by the index increases, basis risk will increase as well.
Capacity	The maximum amount of insurance or reinsurance that the insurer, reinsurer, or insurance market will accept.
Catastrophe	A severe, usually sudden, disaster that results in heavy losses.
Ceding company	A direct insurer that places all or part of an original risk on a reinsurer
Claim	An insurer's application for indemnity payment after a covered loss has occurred.
Cognitive Failure	In the case of decision making in risk management, cognitive failure occurs when decision makers fail to account for the possibility of infrequent catastrophic risks.
Coinsurance	1. The situation where the insured is liable for part of each and every loss, which

is often expressed as a percentage of the sum insured. 2. When each of several insurers covers part of a risk.

Collective Policy	A policy issued on behalf of a number of insurers or a policy covering a number of items, each being insured separately.
Commission	A proportion of the premium paid by the insurer to the agent for services in procuring and serving the policyholder.
Correlated Risk	Risks that are likely to affect many individuals or households at the same time. A clear example is a fall in commodity price. For example, coffee growers in the same community are likely to be simultaneously affected by a decrease in price. Futures and options markets can be used to transfer these risks to parties outside the local community. Another example is a widespread drought, which can damage agricultural production over an entire region.
Country Risk Profile	The level of risk exposure of a country, determined by the occurrence of events such as price shock and adverse weather events that impact major private and public assets and economic activities within a country at the micro, meso, and macro levels.
Crop Insurance	Provides financial compensation for production or revenue losses resulting from specified or multiple perils, such as hail, windstorm, fire, or flood. Although most crop insurance pays for the loss of physical production or yield, coverage is often available for loss of the productive asset, such as trees in the case of fruit crops.
Deductible (Excess)	An amount representing the first part of a claim, which an insured has to bear as stated in the policy. The deductible is frequently expressed as a percentage of the sum insured, but may just as often be a monetary amount.
Default	Failure to fulfill the obligations of a contract.
Direct Premium Subsidy	A subsidy which is calculated as a percentage of the insurance premium paid. Such a subsidy is problematic, because it disproportionately benefits high-risk farmers who pay higher premiums. Attracting higher-risk farmers can significantly increase the costs of insurance.
Disaster-Index Insurance	An insurance contract in which payments are triggered by extreme weather events. Disaster-index insurance is a form of weather insurance, which covers catastrophic weather events or the extreme tail of the probability distribution of weather events for a region or country. <i>See also Index Insurance.</i>
Drought	One of the most commonly requested peril coverages by farmers, but it is also one of the most difficult perils to insure because of problems of definition, isolation, and measurement of effects on crop production. In contrast to most weather perils, drought is a progressive phenomenon, in terms of an accumulating soil moisture deficit for plant growth, and its impact on crop production and yields is often extremely difficult to predict, then measure and isolate from other noninsured causes.
Due Diligence	The responsibility of an external reviewer to perform an investigation of risk associated with a potential client, considered prudent and necessary for an adequate assessment of that client's level of risk. The process associated with "due diligence" in insurance includes underwriting, contract design, rate making, and adverse selection and moral hazard controls.
Endogenous Market Factor	A factor occurring within the market which impacts market transactions, such as fluctuations in local supply or demand or political instability within a country.

Ex ante Risk Mechanism	Action taken prior to a potential risk event. Making preparations before a disaster helps avoid inefficient, quick-response coping decisions. If ex ante strategies are not in place, resort will be to short-term coping strategies that have no significant benefit in the long run.
Ex post Risk Mechanism	Risk-management strategies that are developed in reaction to an event, without prior planning. Although ex post strategies have a role to play in a risk-management program, risk-management mechanisms can be more effective when introduced ex ante.
Exposure	The amount (sum insured), exposed to the insured peril(s) at any one time. In crop insurance, exposure may increase, and then decrease, during the coverage period, following the growth stages of the crop from planting to completion of harvest.
Exogenous Market Factor	A factor occurring outside the market which impacts transactions within the market, such as a shift in the global demand for a commodity.
Financial Intermediary	An institution (such as an insurance company, bank, or microfinance institution) that serves as a middle man or acts as a go-between for sellers and buyers of financial services such as credit or insurance.
Financial Risk	Risk that income will not reach expected levels, or the invested value in a crop will be lost due to adverse changes in weather and price. Many agricultural production cycles stretch over long periods of time, and farmers must anticipate expenses that can only be recouped once the product is marketed, leading to cash-flow problems that can be made even more severe by a lack of access to credit, or the high cost of borrowing in rural areas.
Fondo	According to Mexican laws, fondos are nonprofit organizations constituted by the farmers as civil associations without the need to provide any capital endowment, except their willingness to associate among themselves. From a risk-financing perspective, fondos pool crop-yield risks from farmers with similar risk profiles.
Franchise	An amount of loss which has to be reached before the insurer will pay a claim, and once this threshold is met, the insurer has to pay the claim in full. For example, a farmer insures his crop for \$1,000 with a franchise of \$100. If the claim is for \$99, then this is borne by the farmer. If the claim is for \$101, however, then the whole amount of the \$101 is paid by the insurer.
Gross Net Premium Income	Gross written premium of a primary insurer, minus cancellations, refunds, and reinsurance premium paid to other reinsurers.
Guaranteed Yield	The expected physical yield of a crop stated in the insurance policy, against which actual yields will be compared when adjusting any losses.
Hazard	A physical or moral feature that increases the potential for a loss arising from an insured peril or that may influence the degree of damage.
High-Probability Low-Consequence Events	High-probability, low-consequence risks are frequent risks that cause mild to moderate damage. Insurance products for high-frequency, low-consequence losses are seldom offered, because the transaction costs associated with frequent loss adjustment makes the insurance cost prohibitive for most potential purchasers. These high transaction costs are in part due to information asymmetries that cause the problems of moral hazard and adverse selection. <i>See also Moral Hazard and Adverse Selection.</i>

In-Between Risk	Agricultural production risks, such as natural disasters, that lack sufficient spatial correlation to be effectively hedged using exchange-traded futures or options instruments. At the same time, they are generally not perfectly spatially independent, and therefore traditional insurance markets cannot cover these risks. Skees and Barnett (1999) refer to these risks as “in-between” risks. Because of their unique characteristics, in-between risks require more innovative instruments.
Indemnity	The amount payable by the insurer to the insured, in the form of cash, repair, replacement, or reinstatement in the event of an insured loss. This amount is measured by the extent of the insured’s pecuniary loss. It is set at a figure equal to but not more than the actual value of the subject matter insured just before the loss, subject to the adequacy of the sum insured. For many crops, this means that an escalating indemnity level is established as the growing season progresses.
Independent Risk	Risks such as automobile accidents, fire, or illness that generally occur independently across households. Such statistical independence allows effective risk pooling across entities in the same insurance pool, making insurance possible. For independent risks, the law of large numbers suggests that, on average, the insurance indemnity paid to claimants in a particular year can be offset by the premiums received from clients who did not experience indemnifiable losses. <i>See also Risk Pooling.</i>
Index Insurance	Index insurance makes indemnity payments based not on an assessment of the policyholder’s individual loss, but rather on measures of an index that is assumed to proxy actual losses. Two types of agricultural index insurance products are those based on area yields, where the area is some unit of geographical aggregation larger than the farm, and those based on measurable weather events. <i>See also Weather-Index Insurance.</i>
Informational Constraint	Limited access to or availability of reliable data can be a significant constraint to the development and performance of risk transfer markets.
Institutional Risk	Institutional or regulatory risk is generated by unexpected changes in regulations, especially in import and export regimes, and influences producers’ activities and their farm profits.
Insurability	The conditions that determine the viability of insurance as a method of managing a particular risk.
Insurable Interest	An insurance policy is valid only if the insured is related to the subject matter insured in such a way that he or she will benefit from its survival, suffer from loss or damage caused to it, or may incur liability in respect of it.
Insurance	A financial mechanism that aims to reduce the uncertainty of loss by pooling a large number of uncertainties so that the burden of loss is distributed. Generally, each policyholder pays a contribution to a fund in the form of a premium, commensurate with the risk he introduces. The insurer uses these funds to pay the losses (indemnities) suffered by any of the insured.
Insurance Agent	The person who solicits, negotiates, or implements insurance contracts on behalf of the insurer.
Insurance Broker	The person who represents the insured in finding an insurer or insurers for a risk and negotiating the terms of the insurance contract. A broker may also act as an agent (that is, for the insurer) for the purposes of delivering a policy to the insured and collecting premiums from the insured.

Insurance Policy	A formal document (including all clauses, riders, and endorsements) that expresses the terms, exceptions, and conditions of the contract of insurance between the insurer and the insured. It is not the contract itself but evidence of the contract.
Insured Peril	The cause of loss stated in the policy, which on its occurrence entitles the insured to make a claim.
Layer	The term used to define a range of potential loss that is covered by insurance. For example, an insurance contract may pay indemnities only for losses within a specified range of magnitude. <i>See also Risk Layering.</i>
Livestock Risk	The risk of death, injury, or disease to livestock.
Loss Adjustment	Determination of the extent of damage resulting from occurrence of an insured peril, and settlement of the claim. Loss adjustment is carried out by the appointed loss adjuster who works on behalf of the insurer.
Loss Ratio	The proportion of claims paid (or payable) to premium earned. A loss ratio is usually calculated for each class of business in which an insurer participates. Analysis of loss ratios can be useful in assessing risks and designing appropriate insurance structures.
Low-Probability High-Consequence Events	Low-probability, high-consequence risks are events that occur infrequently yet cause substantial damage. Decision makers, including agricultural producers, tend to underestimate their exposure to low-probability, high-consequence losses, because people forget the severity of the loss experienced during infrequent extreme weather events. Thus, an insurance product that protects against these losses is frequently discounted or ignored altogether by producers trying to determine the value of an insurance contract.
Macro Level	The economic level at which countries and large donor agencies working with these countries experience risk of weather-induced humanitarian crisis or economic instability caused by price volatility.
Market Failure	The inability of a market to provide certain goods at the optimal level because market prices are not equal to the social opportunity costs of resources. The high cost of financing catastrophic disaster risk prohibits most private insurance companies from covering this risk, resulting in market failure.
Market Risk	Input and output price volatility are important sources of market risk in agriculture. Prices of agricultural commodities are extremely volatile as a result of both endogenous and exogenous market shocks, and some commodities experience shocks more frequently than others do.
Meso Level	The economic level at which banks, microfinance institutions, producers, traders, processors, and input providers experience risk due to the vagaries of weather and price.
Micro Level	The economic level at which individual farm households experience risks due to shocks such as adverse weather events, price fluctuations, or disease.
Microclimate	The climates of localized areas, which may differ considerably from the climate of the general region. These climate variations are caused by geographical differences in elevation and exposure.
Moral Hazard	In insurance, moral hazard refers to the problems generated when the insured's behavior can influence the extent of damage that qualifies for insurance payouts. Examples of moral hazard are carelessness, fraudulent claims, and irresponsibility.

Non proportional Treaty Reinsurance	An agreement whereby the reinsurer agrees to pay all losses which exceed a specified limit arising from an insured portfolio of business. The limit is set by the reinsurer and may be monetary (for example, excess of loss) or a percentage (for example, stop loss). The rates charged by the reinsurer are calculated independently of the original rates for the insurance charged to the insured.
Personal Risk	The risk to an individual of personal injury or harm.
Premium	The monetary sum payable by the insured to the insurers for the period (or term) of insurance granted by the policy. Premium = premium rate x amount of insurance Also, the cost of an option contract—paid by the buyer to the seller.
Premium Rate	The price per unit of insurance. Normally expressed as a percentage of the sum insured.
Probable Maximum Loss	The largest loss believed to be possible for a certain type of business in a defined return period, such as 1 in 100 years, or 1 in 250 years.
Proportional Treaty Reinsurance	An agreement whereby the insurer agrees to cede and the reinsurer agrees to accept a proportional share of all reinsurances offered within the limits of the treaty, as specified on the slip. Limits can be monetary, geographical, by branch, class of business, and so forth. The reinsurer has no choice of which risks to accept or decline; he is obliged to accept all good and bad risks that fall within the scope of the treaty.
Quota Share Treaty Reinsurance	An agreement whereby the ceding company is bound to cede and the reinsurer is bound to accept a fixed proportion of every risk accepted by the ceding company. The reinsurer shares proportionally in all losses and receives the same proportion of all premiums as the insurer, less commission. A quota share often specifies a monetary limit over which the reinsurer will not accept to be committed on any one risk—for example, 70 percent each and every risk, not to exceed \$700,000 any one risk.
Rapid-Onset Shock	A sudden large shock, such as a flood, hurricane, frost, freeze, excess heat, high wind speed, storm, or commodity price shock. Rapid-onset events are easier to identify than slow-onset shocks, and their impact can be easier to determine.
Rate On Line	A rate of premium for a reinsurance which, if applied to the reinsurer's liability, will result in an annual premium sufficient to meet expected losses over a number of years.
Regulatory Risk	Institutional or regulatory risk is generated by unexpected changes in regulations, especially in import and export regimes, and influences producers' activities and their farm profits.
Reinsurance	When the total exposure of a risk or group of risks presents the potential for losses beyond the limit that is prudent for an insurance company to carry, the insurance company may purchase reinsurance (that is, insurance of the insurance). Reinsurance has many advantages, including (1) leveling the results of the insurance company over a period of time; (2) limiting the exposure of individual risks and restricting losses paid out by the insurance company; (3) possibly increasing an insurance company's solvency margin (percent of capital and reserves to net premium income), hence the company's financial strength; and (iv) enabling the

reinsurer to participate in the profits of the insurance company, but also to contribute to the losses, the net result being a more stable loss ratio over the period of insurance.

Risk Aggregation	The process of creating a risk-sharing arrangement that gathers together or pools risks, thereby reducing transaction costs and giving small households or other participants a stronger bargaining position.
Risk Assessment	The qualitative and quantitative evaluation of risk. The process includes describing potential adverse effects, evaluating the magnitude of each risk, estimating potential exposure to the risk, estimating the range of likely effects given the likely exposures, and describing uncertainties.
Risk Management	Care to maintain income and avoid or reduce loss or damage to a property resulting from undesirable events. Risk management involves identifying, analyzing, and quantifying risks and taking appropriate measures to prevent or minimize losses. Risk management may involve physical mechanisms, such as spraying a crop against aphids, using hail netting, or planting windbreaks. It can also involve financial mechanisms such as hedging, insurance, and self-insurance (carrying sufficient financial reserves so that a loss can be sustained without endangering the immediate viability of the enterprise in the event of a loss).
Risk Mitigation	Actions taken to reduce the probability or impact of a risk event, or to reduce exposure risk events.
Risk Retention	Risk retention is the process whereby a party retains the financial responsibility for loss in the event of a shock.
Risk Transfer	Risk transfer is the process of shifting the burden of financial loss or responsibility for risk financing to another party, through insurance, reinsurance, legislation, or other means.
Risk Coping	Strategies employed to cope with a shock after its occurrence. Some examples of risk-coping strategies include the sale of assets, seeking additional sources of employment, and social assistance.
Risk Financing	The process of managing risk and the consequences of residual risk through products such as insurance contracts, CAT bonds, reinsurance, or options.
Risk Layering	The process of separating risk into tiers that allow for more efficient financing and management of risks. High-probability, low-consequence events may be retained by households to a certain extent. The market insurance layer is characterized by the ability of the market to manage risks through insurance or other contracts. Low-probability, high-consequence events characterize the market-failure layer, and at this layer of risk, government intervention may be necessary to offset the high losses.
Risk Pooling	The aggregation of individual risks for the purpose of managing the consequences of independent risks. Risk pooling is based on the law of large numbers. In insurance terms, the law of large numbers demonstrates that pooling large numbers of roughly homogenous, independent exposure units can yield a mean average consistent with actual outcomes. Thus, pooling risks allow an accurate prediction of future losses and helps determine premium rates.
Shock	An unexpected traumatic event such as death in the family or loss of land and livestock, which can be caused by catastrophic weather events or other unexpected

phenomenon. Price shocks occur when the price of a commodity changes dramatically due to changes in local or global supply and demand, affecting the livelihood of households dependent on this commodity, for either income or caloric intake. Economic shocks can occur at the micro, meso, and macro levels and can have long-term consequences for the economic well-being of actors at each level.

Slow Onset Shock

A shock that unfolds slowly, such as drought; it starts unnoticed, and its impact is difficult to assess or may not be recognized until high losses are realized.

Social Safety Net

Various services, usually provided by the government, designed to prevent individuals or households from falling below a certain level of poverty. Such services include free or subsidized health care, child care, housing, welfare, and so on.

Stop Loss

This term, usually applied to reinsurance business, refers to a policy that covers claims once they have exceeded a certain amount. A policy with a stop-loss provision is a non-proportional type of reinsurance, where the reinsurer agrees to pay the reinsured for losses that exceed a specified limit, arising from any risk or any one event. For example, a reinsurer may agree to pay claims of \$200,000 in excess of \$100,000. If the claims are more than \$300,000, the reinsured (that is, the insurer) will have to bear the remainder of the claims or make additional financing arrangements to cover the remaining risk exposure.

Subsidy

A direct or indirect benefit granted by a government for the production or distribution (including export) of a good or to supplement other services. Generally, subsidies are thought to be production- and trade-distorting and to cause rent-seeking behavior, resulting in an inefficient use of resources.

Transaction Costs

Transaction costs are the financial costs or effort required to engage in business transactions, including the cost or time spent obtaining information. Transaction costs of insurance include those associated with underwriting, contract design, rate making, adverse selection, and moral hazard.

Underwrite

To select or rate risks for insurance purposes.

Weather-Index Insurance

Contingent claims contracts for which payouts are determined by an objective weather parameter (such as rainfall levels, temperature, or soil moisture) that is highly correlated with farm-level yields or revenue outcomes. *See also Index Insurance.*

Yield Risk

Unique to agricultural producers; like most other entrepreneurs, agricultural producers cannot predict the amount of output that the production process will yield, due to external factors such as weather, pests, and diseases.