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“Strengthening Disaster Preparedness in Agriculture Sector”



Situation Assessment of Disaster Risk Management in Juye County, Shandong Province, P.R China

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1.0 Background

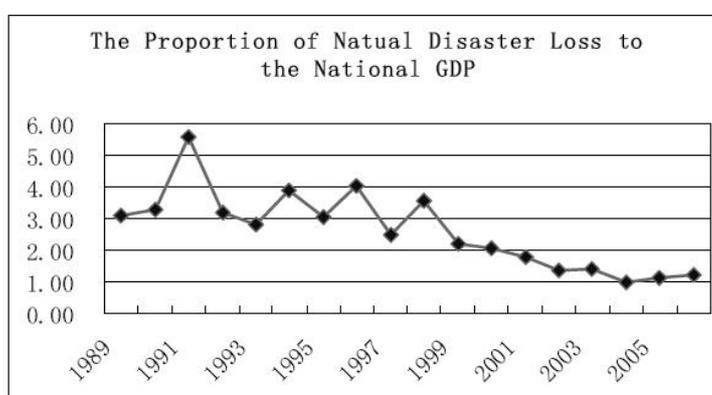
Due to its vast geographic, complex climatic, and varied geological conditions China is prone to plethora of natural hazards such as floods, drought, extreme temperature, typhoons, storms, earthquakes, landslides, hail, wild fire, pest, snow and dust storm, etc. Currently China remains one of the highly disaster prone countries in the world. Below figure shows location of major natural disasters in the country between 1900-2000 excluding earthquakes.



Source: Atlas of Natural Disaster System of China, Beijing Normal University, 2003

As per the Government statistics, on an average thousands of people are killed, more than 200 million people are affected, and direct economic losses alone is valued at billions of Yuan, which varies considerably between 3-6 % of annual GDP. Below table shows the impacts of natural disasters since 2001 and its proportionate natural disaster losses in terms of GDP. While disaster losses have been increasing many fold the % of GDP losses has been on decline due to the increase in GDP over the years. According to Ministry of Water Resources since 1990's about 63% of the total loss due to natural disaster occur as a consequence of flood which amounts to 1.7% of corresponding GDP.

Year	Person affected in (millions)	Loss of Lives (no of person)	People evacuated (in millions)	Houses collapsed (in thousands)	Direct economic loss (in Billion Yuan)
2001	372.559	2538	2.111	922	194.22
2002	427.98	2384	4.718	1895	163.72
2003	497.459	2259	7.073	3430	188.42
2004	339.206	2250	5.633	1550	160.23
2005	406.537	2567	15.703	2264	204.21
2006	n.a	3186	13.845	1933	252.81



Source: *Integrated Disaster Risk Management of China: Developing Country Perspective*, OECD

Latest statistics released by the Ministry of Civil Affairs (MoCA) for 2007 notes that, natural disasters claimed 2,325 lives, affecting about 400 million people, damaging 1.46 million houses, while nearly 15 million people were forced to leave their homes and affecting about 48.67 million hectares of farmland of which 86.2 million mu (approx. 5.74 million Hectares) turning barren. Total direct losses were about 236.3 billion Yuan (approx. 31.5 billion USD). The statistics also highlights that most of the damages and fatalities are caused due to resultant of floods and lightning or from landslides or construction collapses.

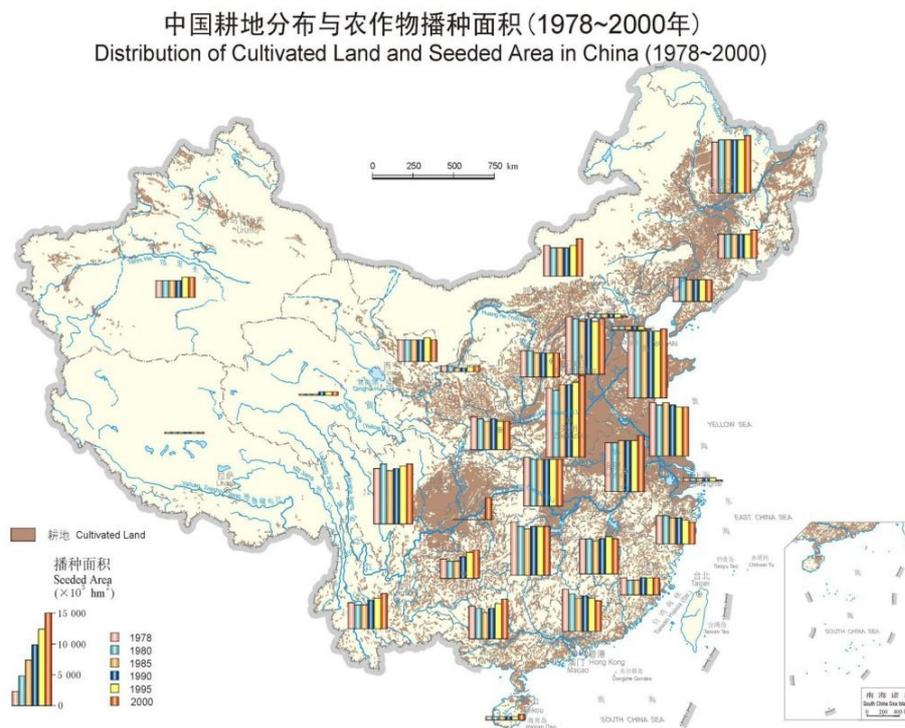
2.0 Significance of Agriculture in China Economy:

With significant portion of land not arable, China with limited agricultural land and recurrent natural disasters, food shortages and massive hunger had plagued the country in the past. With reforms, use of new technologies and construction of large scale water management and conservancy projects China has been impressively moving towards adequate food supply. Currently China is a major grain producer as well as a major grain consumer. Total agriculture GDP increased from 101.8 billion Yuan in 1978 to 2076.8 billion Yuan in 2004, while the proportion of agricultural GDP decreased over time. Reasons for increased grain

production are also attributed to increase of effectively irrigated cropland and increase of use fertilizer application.¹

Statistics issued by the Ministry of Land and Resources in May 2004, China in 2003 had 123.4 million hectares of cultivated land, 11.1 million hectares of gardens, 234 million hectares of forest land, 263.1 million hectares of grassland, 25.5083 million hectares of land for other agricultural uses, 25.3542 million hectares of land for residential, industrial and mining uses, 2.1 million hectares of land for communication and transportation uses and 3.5653 million hectares of land for water conservancy facilities. The rest was unused land².

Below figure shows distribution of agricultural land in China (1978- 2000) and its growth for five year time period since 1970's.



Source: Atlas of Natural Disaster System of China, Beijing Normal University, 2003

While the urban centers had been the engine for country's economy rural china remains largely farming economy which supplies grain requirements of the country's masses. According to the recent report by the Ministry of Agriculture per capita net income of rural residents which is around 900 million is expected to reach 4,000 yuan (546 U.S. dollars) in 2007 at the same time the income gap between the urban and rural residents continues to widen.

Due to rapid growth and increasing demand of land for expansion of cities and industries coupled with frequent natural disasters and environmental degradation China is experiencing annual decrease in area of farm lands. Net reduction of cultivated land in 2003 was 2.5 million hectares, and the per capita cultivated land decreased from 0.098 hectares in 2002 to 0.095 hectares.

¹ Impacts of, and Vulnerability and Adaptation to, Climate Change in Water Resources and Agricultural Sectors in China. Human Development Report Office OCCASIONAL PAPER- 2007 / 2008

² Source: http://www.chinability.com/chinas_land_and_resources.htm

Due to recurrent natural disasters food grain production has been seriously challenged despite increased production. Below figure shows the trend in area of agricultural land affected by natural disasters (1978-2000) and its on rise when compared with the recent figures. It can be inferred from the statistics shown below, that, on an average 16 to 30%³ of the total agricultural land is affected by natural disasters



Source: Atlas of Natural Disaster System of China, Beijing Normal University, 2003

2.1 Disaggregated losses due to Floods and Droughts:

As mentioned above, agricultural losses arising from hydro-meteorological hazards were on rise, below table shows impacts of floods and droughts for recent years during 2000-2005. It's inferred from the below table that damages caused by floods is on rise (farm land affected / damaged / economic losses) and notably economic loss in 2005 was at a staggering value of 166.20 billion Yuan while farm land affected and damaged were on higher than floods but the economic losses had been on decline in the recent years.

Losses	Flood						Drought					
	2000	2001	2002	2003	2004	2005	2000	2001	2002	2003	2004	2005
Farm land affected in million Ha	9.0	7.14	12.40	20.67	7.78	14.97	40.5	38.40	13.27	14.47	7.95	8.48
Farmland damaged in million Ha	5.40	4.25	7.44	13.30	4.02	8.22	26.80	23.70	13.27	14.47	7.95	8.48
Economic losses in billion Yuan	71.10	62.30	83.80	130	71.35	166.20	51.10	53.80	32.50	34.60	26.10	22.30

Table: Disaggregated losses due to Floods and Droughts⁴

³ Considering an annual area 125 million hectares

⁴ Source: Impacts of, and Vulnerability and Adaptation to, Climate Change in Water Resources and Agricultural Sectors in China

Below graph shows the food grain output and growth during 2002-2006⁵. Where the grain output and growth has declined sharply during 2003 during which combined damage to farmland was amounting to 164.6 million ha land (flood 130 and 34.6 million ha) and an increase in 2004 and a sharp decline in growth rate in 2005 due to combined damage amounting to 188.5 million ha (flood- 166.20 and 22.30 million ha) despite increase in production. According to the recent government statistics natural disasters in the first nine months of 2007 resulted in a loss of 44.5 million tons of grain in the country.

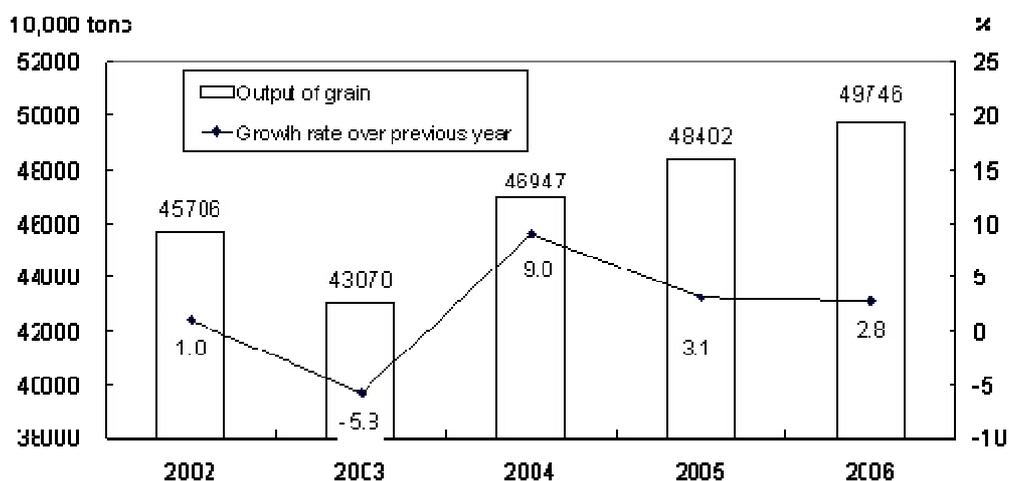


Figure: Food grain output and growth (2002-2006)

Many of the reviewed reports note that China’s agriculture is extremely sensitive and vulnerable to climate variability in a number of regions. Such as, in North China, agriculture activities are sensitive to drought and in South China, agriculture activities are sensitive to flooding. Several report projects that climate change will have serious impact on agricultural production in following years. The Government is also equally concerned about the erratic behavior of climate and impacts of climate change in the country especially its water resources and agriculture sector.

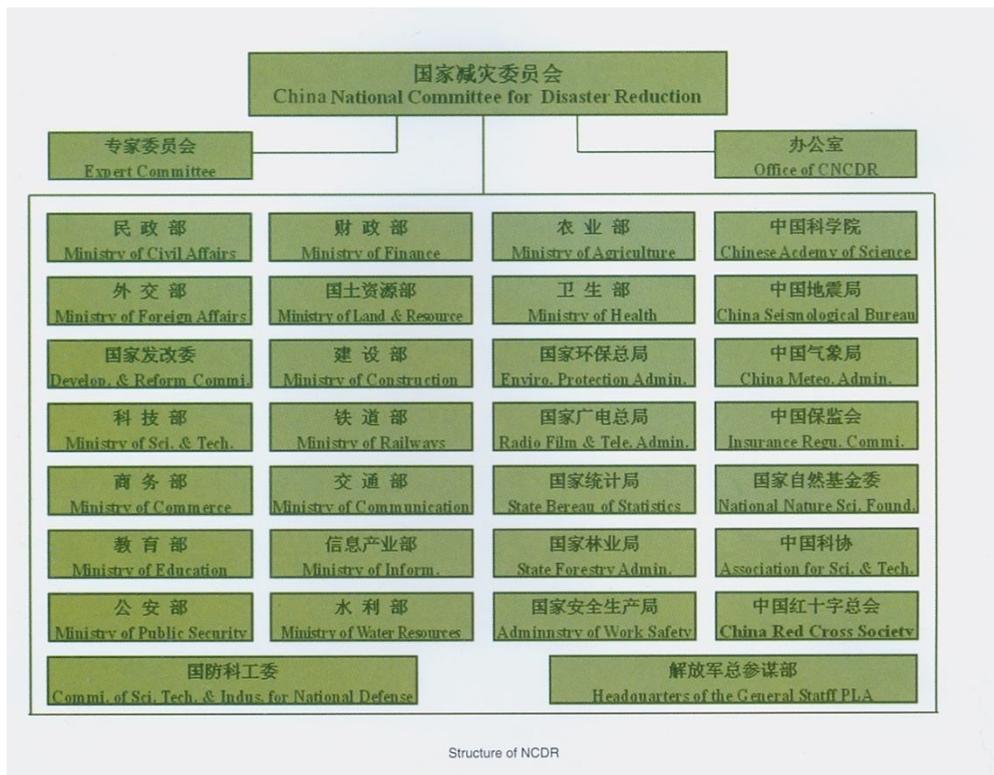
3.0 Disaster Management in China:

Since it’s founding, China has attached and paid great attention to activities related to managing natural disasters and notable progress has been achieved during the past few decades. China has embarked and completed on large scale construction works related to water management and conservancy works along its major rivers and drought affected areas which threatened the lives and livelihoods of millions of people living along the flood plains and many other activities related to geological disasters and pests. Recognizing the need for improved and efficient early warning for natural hazards the Government has invested millions of dollars in improving the disaster monitoring and early warning capacities for hydro-meteorological, geological and pest monitoring.

⁵ http://www.stats.gov.cn/english/newsandcomingevents/t20070301_402388091.htm

3.1 Institutional System:

China formed China National Committee for the International Decade on Natural Disaster Reduction (CNCIDNDR) in 1989 during International Decade for Natural Disaster Reduction IDNDR and in 2000 it was renamed as China Committee for International Disaster Reduction. In January 2005, the committee was renamed as China National Committee for Disaster Reduction (NCDR), headed by a Vice Premier of the State Council and the Ministry of Civil Affairs (MoCA) acts as its secretariat. NCDR is composed of 30 ministries and departments, including relevant military agencies and social groups.



NCDR functions as an inter-agency coordination body under the State Council, which is responsible for studying and formulating principles, policies and plans for disaster reduction, providing guidance to local governments in disaster reduction, as well as coordinating major disaster activities, and promoting international exchanges and cooperation. The National Disaster Reduction Center (NDRC) established in 2002 serves as a center for disaster information sharing and provides technical support to the NCDR.

Among 31 provinces (including 4 cities directly under the central government), 15 provinces have established provincial committee for disaster reduction to coordinate response and relief to natural disasters. Flood control and drought relief headquarters have been established at national, provincial and county levels to coordinate and implement work related to floods and droughts, but there is no institutional mechanism in place at township and village levels related to floods and droughts. Currently main relief distribution and recovery support is responsibility of Ministry of Civil Affairs, where the MoCA coordinate with other relevant ministries and departments. Moreover, currently there is no institutional mechanism in place for comprehensive disaster risk management at all levels in China.

Notable to mention, after SARS in 2003, Emergency Response Offices have been established at national, provincial and county levels to coordinate response and implement activity to emergency events including natural disasters in China since 2006.

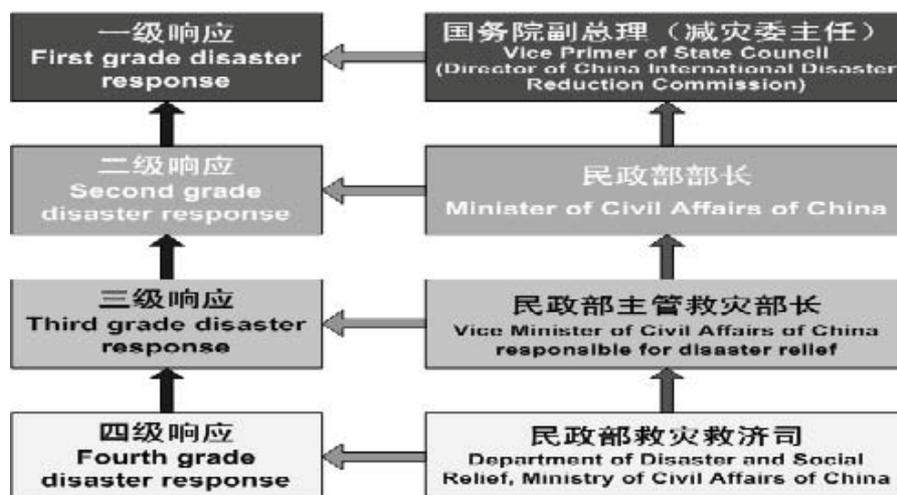
3.2 Legal systems and frameworks:

With the frequency and intensity of natural disasters on rise and taking a heavy toll on country's socio economic development and recognizing the need for legal systems and supporting framework for disaster management the Government promulgated series of laws and regulation on natural disaster management related to various sectors. According to the Government reports there are more than 30 odd laws and regulations promulgated and implemented, notable laws include

- Law of the P.R. China on Water and Soil Conservation
- Flood Control Law of People's Republic of China
- Water Conservancy Industrial Policy
- Law of the People's Republic of China on Precaution Against Earthquake and Relief
- Law of the People's Republic of China on Meteorological Services
- Law of the People's Republic of China on Emergency Response
- Environmental Protection Law of the People's Republic of China
- Construction Law of the People's Republic of China
- Regulation on preventing forest pests
- Fire Prevention Law of the People's Republic of China
- Law of the People's Republic of China on Red Cross Society, etc.

China formulated its first National Natural Disaster Reduction Plan (1998-2010) which further strengthened and signified the importance for the disaster reduction work. The plan identified guiding principles and actions for disaster reduction work in China. The plan also notably recognized agriculture sector in rural areas and the need for both structural and non-structural measures. During the Asian Conference on Disaster Reduction in September 2005 the National Action Plan for the National Disaster Reduction was promulgated.

According to the documents reviewed the emergency response system in China, which was made by the National Committee for Disaster Reduction/Ministry of Civil Affairs, is classified into four grades, which is according to the characteristics and impact of disaster. Figure below shows the response intervention mechanism to natural disasters according to the disaster impacts.



Source: *Integrated Disaster Risk Management of China: Developing Country Perspective*, OECD

Eleventh Five Year Plan for National Plan for Comprehensive Disaster Reduction

In August 2007, the State Council approved the National Plan for Comprehensive Disaster Reduction for the "Eleventh Five Year Plan" period. The National plan is set out in an objective to meet the immediate needs of strengthening the overall capacity building in disaster management. The National plan outlines the achievements and progress made during the National Disaster Reduction Plan (1998-2010) while also identified the challenges in the current system. The plans also identified and recognized existing weak links such as strengthening local coordination mechanism, mobilize NGO's and civil societies in disaster reduction, inadequate comprehensive legislation and supporting policies, disaster monitoring systems, information and assessment, insurance for natural disasters, up gradation of shelters and houses, emergency response plans and preparedness at grass root level, local level risk identification and monitoring , professionalism of staffs at all levels.

Major tasks identified for the plan period are

1. Build up capacity for management of natural disaster risk and vulnerabilities and relevant information sourcing
2. Strengthen capacity for natural disaster monitoring, early warning and forecasting
3. Build up capacity for comprehensive natural disaster prevention and resistance
4. Build up the national capacity for natural disaster emergency response and relief
5. Build up the capacity for comprehensive response to catastrophic disasters
6. Build up the capacity for disaster reduction in urban and rural communities
7. Build up the capacity of technological support for disaster reduction
8. Build up the capacity for publicizing and educating the people about the scientific disaster reduction knowledge

While the first national plan focused on large scale structural works and technical aspects related to early warning and monitoring of disasters the current plan increasingly recognizes the importance of strengthening the community level involvement and had outlined plans for piloting Community Based Disaster Risk Management (CBDRM) in the country.

Subsequently the Government also passed the National Emergency Response Law in August 2007 aimed at improving the emergency response related to natural and industrial disasters, health and public security hazards.

3.3 Policies relevant to agriculture and related disasters⁶:

The Government regards agriculture as its basis for national economy and also considers agriculture as its top priority as part of its national economic development. During these period Government promulgated series of polices and implemented projects to increase agricultural production and in order to ensure food security. After the introduction of house hold contract system in 1978 there had been significant improvements in grain production and also income level of the famers. One reason being attributed is that before reforms agricultural programs and production were driven by the government and after the introduction of agricultural reforms farmers had taken keen interest in boosting output and reducing costs. Since then the Government moved forward with cancellation of unified purchase of farm products by the State, revision to the Land Administration Law in 1998.

While the agricultural policies prior to 1997 were mainly designed to boost agricultural production and grain output in particular, policies after 1998 were redirected to help farmers to raise their income level. In 1998, the adoption of the Resolution of the CPC Central Committee on issues regarding Agriculture and Rural Work signified the fundamental switch to the policy priority of raising farmers' income.

Due to limited agriculture land, protection of cultivated land has been one of the focus areas of the Government. Over the years, the Government promulgated and implemented certain laws and regulations such as the Agriculture Law, Land Management Law and Water and Soil Conservation Law but at the same time due to increasing demands of land due to industries and expansion of cities has been a great challenge for the Government. More relevant policies have been identified to address agricultural environmental issues in recent years. Circular No. 1 of the CPC Central Committee highlighted the issues of agriculture and rural areas in 2004 and 2005 respectively, providing the policy guarantee for sound agricultural infrastructure and better preparedness for natural disasters and in the recent years the Government has committed to promote stable development of agriculture and facilitate a sustained income growth for farmers.

⁶ Source: Unpublished report: China Report on Natural Disasters in Agriculture- Natural Disaster Reduction Center of China- FAO-ADPC, April 2006

According to the OECD report⁷, in 2006, the total insurance premium of China was about 564.14 Billion Yuan with an increase of 14.4% of 2005, of which property insurance accounts for 150.94 billion, life insurance accounts for 359.26 billion and health insurance accounts for 53.94 billion. Currently the insurance penetration in China is 2.8% and considering the population and its asset value there is a wide gap between the insurance industry in China and other emerging economies in the world. The report also notes that insurance against natural disasters is still in its early stage while the agricultural insurance is still in under development. Currently some provinces are experimenting agricultural natural disaster insurance but it has very limited reach.

3.4 Projects implemented related to agriculture and disasters:

As discussed above, given the importance of agriculture to China, in the past the Government has undertaken projects comprising both structural and non-structural measures. The following section attempts to capture few of those initiatives.

Structural Measures:

Over the years the Government invested billions of Yuan in projects related to flood control, diversion and protection. According to reports the government has invested a total of 178.6 billion Yuan during 1998 - 2004 for a period of six years which is 2.36 times as much as the investment made for capital construction of water conservancy works during 1949 - 1997. It also noted that the funds have been mainly utilized to strengthen the embankment along major rivers and reservoirs. Apart from flood control and protection works the government has also focused on water conservancy works related to drought mitigation.

Non Structural Measures:

Complementing the structural measures the Government also focused on improving legislation, drawing up contingency plans to respond to natural disasters and pests, notable efforts also include improving the early warning system for weather forecasting by increasing the density of monitoring stations and launch of meteorological satellites. In addition scientific research programs were initiated through universities and technical institutions. Following are few projects which have high relevance to agriculture sector while many others and region specific projects were initiated.

1. Basic research on the mechanism and control of dangerous Invasive Alien Species (IAS) in agriculture and forestry in 2002
2. Research on averting natural risks in agriculture and disaster-related compensation mechanisms in 2006

⁷ Integrated Disaster Risk Management of China : Session III: Financial Management: Role of Insurance Industry, Financial Markets, and Governments Part B: Developing Country Perspective, OECD- 2007

3. Research on drought mechanism and monitoring approaches for China's agriculture in 2006

The government also set aside relief funds for agriculture related disasters and the fund is to support farmers affected due to natural disasters. 100 million Yuan was earmarked in 2004, and it was doubled in 2005. According to the reports the above funds provided subsidized support to farmers to procuring seeds, fertilizers and fuel. In addition special relief funds were earmarked for prevention and treatment of major plant diseases and pests.

3.5 Conclusions:

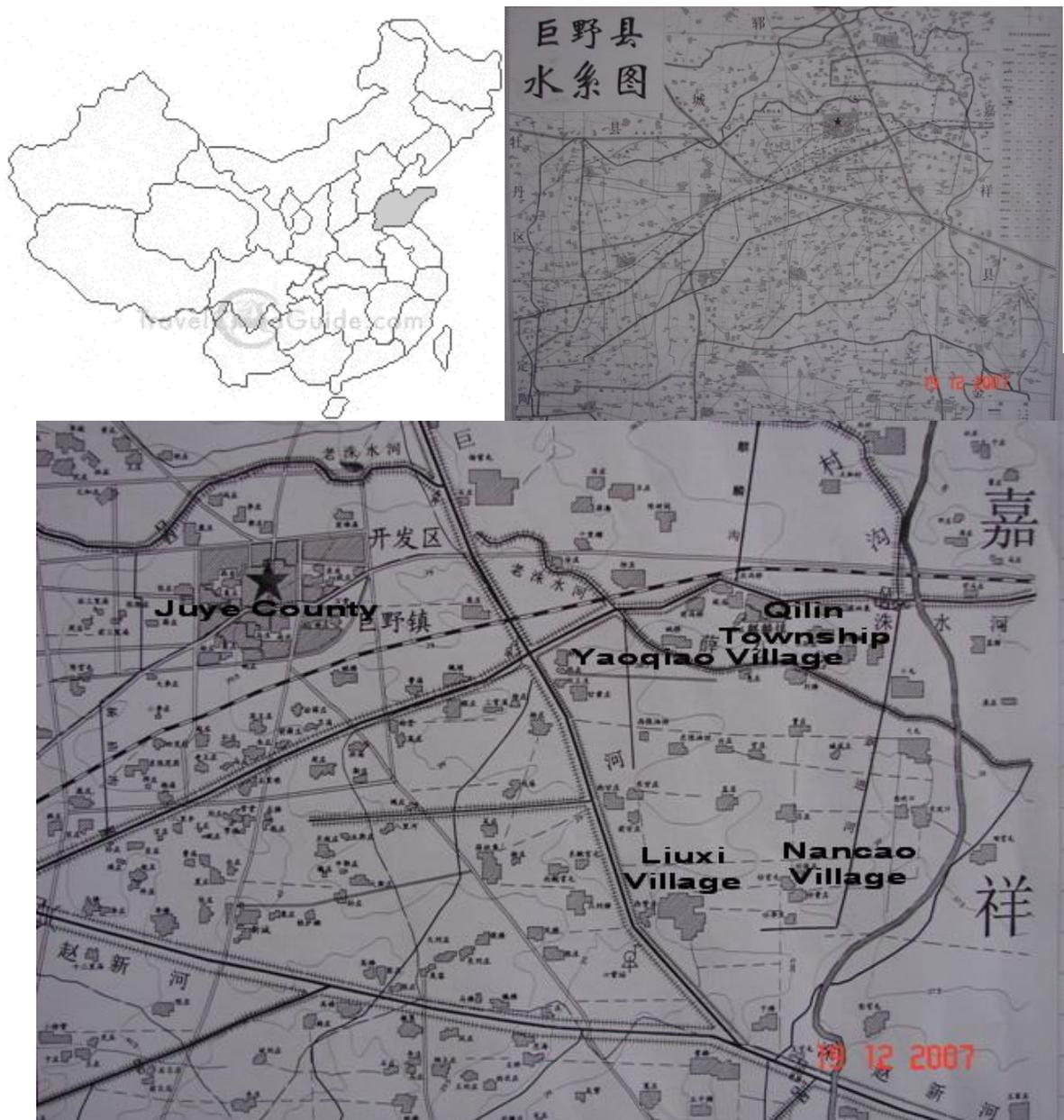
Over the past few decades the government has made great strides in effectively managing disasters through many interventions despite the increase in frequency and severity of natural disasters and related economic losses. While much attention has been paid on flood and drought mitigation measures, improving early warning systems, legal frameworks, improving and strengthening the emergency response and relief capacities there had been very little focus on managing disaster risk, such as strengthening the capacities of the local level institutions especially at the community level, risk management in agriculture through application of climate forecast information, promoting insurance as a risk sharing mechanism, recovery support. It is also noted that the current contingency plans at all levels are typically focusing on emergency response and there is a need for planning to be holistic in approach covering all phases of disaster cycle particularly pre disaster phase and to multi-hazard threats.

Notable development is the eleventh five year plan approved in August 2007 which recognizes the gaps in earlier approach and underscores the need for more proactive approach.

4.0 DRM Assessment in Juye County and Pilot Villages:

4.1 General profile of Juye County:

Juye county is located in Heze Prefecture, southwest of Shandong province along the lower reaches of Yellow river and upper catchment of Huai River. Juye county with an area of 1308 sq.km comprises of 16 townships which includes 866 administrative villages with a total population of 930,000 in 2006. The topography of the area is relatively flat with gentle slopes towards east. The entire county is criss-crossed with rivers, natural drainage and manmade channels for irrigation. These drainage and irrigation systems are back bone for agriculture in the region.

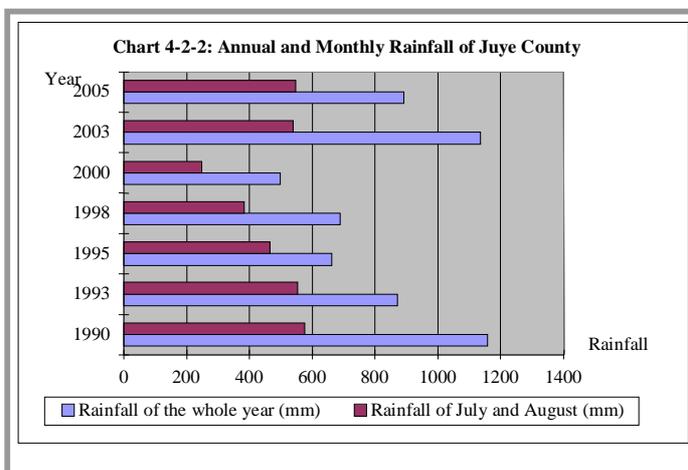


Location of Juye County, Qilin townships and three pilot villages

4.2 Climate and Rainfall:

The climate in the region is characterized by rain during the summer (June- August) and dry winter. The annual average temperature is between 11 and 14°C while the annual precipitation is between 500mm and 1000mm of rainfall.

Figure shows the annual rainfall for specific years 1990, 1993, 1995, 1998, 2000, 2003 and 2005 and corresponding monthly rainfall for July and August (source: CIAD Assessment report). It's observed that the annual rainfall received is not even and there is significant variation in rainfall during July and August for the above period. It's also observed that in 2000 annual rainfall was much lesser than average rainfall received during June and August.



4.3 Natural Hazards:-

Juye County is prone to both hydro-meteorological hazards such as floods, drought, extreme temperature, strong winds and geological hazard such as earthquakes. In the past the entire region has been highly prone to drought but during the past few decades the risk profile and trend has been shifting towards floods which is currently being considered as a major natural hazard. Though the County is prone to various natural hazards there are very limited records which are accessible from the departments and according to the anecdotal information collected through discussions and interviews there had been historical floods during 1957, 1964, 1967 and in the recent decades during 1993, 2007 and droughts in late 50's and early 70's. Due to time constrain the report does not attempt to document past disasters and its impacts but the following section tries to analyze and capture the hazard profile of the county based on the information gathered during discussions and review of documents.

Floods:

During the past few decades the County has been increasingly experiencing both large scale seasonal and localized floods during the months of July and August. Heavy rainfall concentrated during July and August coincides with the cropping period (early stage of cotton and corn) which causes severe damages to the standing crops. In general causes for flooding in the county can be attributed to many reasons which are quite complex in nature. Based on the preliminary discussion and observation the reason for increasing trend in flooding are highlighted in this section however there is a need for depth flood risk assessment.

1. Based on the rainfall records, the county receives heavy rainfall between 225 and 550mm in July and August when compared to the annual rainfall of 600-1100mm (during 1990-2005) which is almost half of the annual rainfall. Since the topography of the county is low lying when compared to surrounding counties, as a resultant runoff water drains into the county and creates water logging and flooding in the low lying areas of the county.
2. Water logging and flooding is also caused mainly due to deteriorated, inadequate drainage system and poor maintenance of the drainage and irrigation channels which have exacerbated the risk in low lying areas especially the farmlands. The current infrastructure in the county has been designed to handle 1 in 10 years' floods which are of very high return period and cannot handle extreme events. Moreover most of the flood prevention and flood control infrastructure work during the past few decades has been directed towards strengthening river embankments and primary canals but very little efforts on secondary and tertiary systems which are at the local level.
3. The recent trend in increase in flooding can also be attributed in change in land use pattern in the region resultant in excess runoff from the surrounding region.

Droughts:

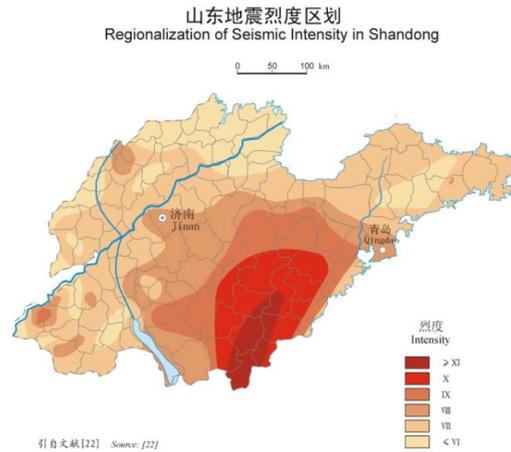
Historically the county and the river plains in the Eastern China have been prone to periodic droughts. According to the villagers interviewed the entire region faced severe drought in 1955 and consecutive droughts during 1987, 1988, 1989. But in the recent years there had been fewer drought events however drought is still a problem when the rainfall is below normal and water in the river and drainage and irrigation channels are very low.

Strong winds:

During the recent years the county has experienced meso-scale strong winds during July and August. Very recently in 2007 there had been strong winds which have damaged more than 10 houses, green houses and poplar trees in Liuxi village.

Earthquakes:

According to the seismic hazard map of Shandong province by China Earthquake Administration (CEA) shown below, Juye County lies in a seismic prone area. Based on the records and anecdotal information from the village elders, they villagers had felt earthquakes during 1937, 1964, 1970, of which 1937 had been a damaging one. As per the seismic intensity map, Juye County can expect ground shaking of VIII-IX on intensity scale. It is also to be noted that most of the structures in the county are non engineered masonry building which are highly vulnerable to earthquakes of moderate intensity.

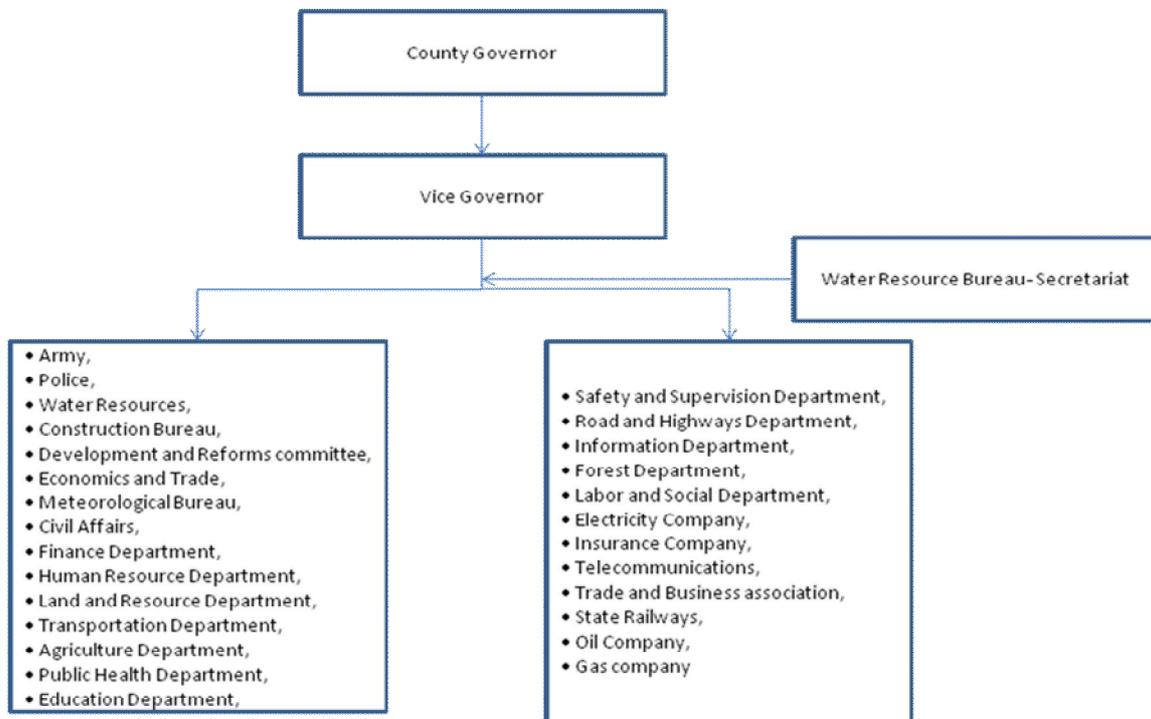


Source: *Source: Atlas of Natural Disaster System of China, Beijing Normal University, 2003*

4.4 Existing DM arrangements:

County Level:

“County Level Disaster Reduction Leading Committee” an institutional coordination mechanism is responsible for disaster management mainly related to floods and droughts. The committee consists of 28 departments, which is coordinated by the County Water Resources Bureau which is also the flood control and drought relief headquarters. The vice governor of the county is the head of the committee. Below table shows the members of the CLDRLC.



Institutional Arrangement of CLDRLC

Table: Institutions involved in Disaster Management at county level⁸

M Phases	Pre disaster			During disaster					Post disaster		Remarks
	Risk Assessment	Mitigation / Prevention	Preparedness*	Early Warning	Evacuation	Rescue	Relief	Damage and Needs Asst	Reconstruction	Rehabilitation	
Departments / Bureau											
Army					X	X	X				
Police					X	X					
Agriculture Bureau		X					X	X		X	
Finance Department							X		X	X	
Meteorological Bureau				X				X*			*Limited involvement
Water Resources Bureau		X		X				X	X		
Construction Bureau		X							X		
Development and Reforms		X							X	X	
Economics and Trade							X				
Civil Affairs							X	X	X		
Land and Resource Department				X*			X				*Early warning for Landslides
Transportation Department		X			X		X		X		
Forestry Department		X*					X		X	X	*Carbon Sequestration
Safety and Supervision Department*		X							X		*Accidents
Public Health			X*			X	X			X	*Public health awareness
Education*			X						X	X	*Targeting Schools
Highways Department		X			X						
Radio / TV			X*	X							*Awareness raising

Above table shows the involvement of county bureaus within their mandate in different phases of disaster management at county level. Currently very few agencies focus on pre disaster activities and preparedness is only limited to organisational response preparedness.

Below table shows the specific roles responsibilities of few key bureaus in disaster management at the county level.

⁸ Need to be verified

Bureau's	Pre disaster	During disaster	Post disaster
Meteorological Bureau	<ul style="list-style-type: none"> • Provide weather and climate forecast and early warning for extreme events to county bureaus 	<ul style="list-style-type: none"> • Provide weather forecast updates • Participate in Damage and Needs Assessment 	Nil
Water Resource Bureau	<ul style="list-style-type: none"> • Provide flood and drought forecast to the county bureaus • Develop pre plan for flood prevention • Implement flood prevention activities 	<ul style="list-style-type: none"> • Provide and disseminate early warning and situation update on flood and drought in the county • Coordinate sectoral bureaus during flood and drought events • Plan and develop action plan for flood response • Participate in Damage and Needs Assessment 	<ul style="list-style-type: none"> • Reconstruction of damaged infrastructures
Civil Affairs Bureau	<ul style="list-style-type: none"> • Pre plan for relief distribution 	<ul style="list-style-type: none"> • Disseminate early warning information • Coordinate evacuation and rescue operations • Coordinate and provide disaster relief assistance • Coordinate Damage and Needs assessment 	<ul style="list-style-type: none"> • Coordinate reconstruction and rehabilitation activities
Agriculture Bureau	<ul style="list-style-type: none"> • Provide technical support to farmers on pest resistant and appropriate crop varieties • In charge of preparing contingency plan for agriculture 	<ul style="list-style-type: none"> • Participate in emergency response activities • Provide relief assistance to farmers • Participate in Damage and Needs Assessment 	<ul style="list-style-type: none"> • Provide tax cuts to farmers affected due to natural disasters • Support recovery support to farmers

	disaster relief <ul style="list-style-type: none"> • Storage of fertilisers and pesticides 		
Development and Reforms committee	<ul style="list-style-type: none"> • Coordinate flood prevention projects 	Nil	<ul style="list-style-type: none"> • Support post disaster reconstruction and rehabilitation projects
Land resource department	<ul style="list-style-type: none"> • Provide forecast for landslides in the county 	<ul style="list-style-type: none"> • Provide land for setting up temporary shelters 	Nil
Construction Department	<ul style="list-style-type: none"> • Monitor and check flood prevention facilities • Supervise construction project sites 	Nil	<ul style="list-style-type: none"> • Monitor and check flood prevention facilities • Supervise construction project sites

The county has a disaster management plan, which is a basically a response preparedness plan for floods and droughts which currently which does not cover preparedness and mitigation aspects. The plan document outlines the response strategy of the county during floods and droughts, responsibilities of departments during response and also during providing relief. But the current plan does not detail out how different agencies will coordinate during emergency response.

The county response plan has identified roles of township during any flood events along the three major rivers. According to the plan there are two scenarios a) when water level in the river is 38.0m b) when the water level reaches its threshold level of 39.73m. The trigger level is kept at 38.0m and the township has to mobilize resources when the water level in the river exceeds 38.0m and take steps to protect the embankments along the rivers.

Based on the review of documents and discussions, the current institutional arrangement for disaster management is only for floods and drought and the water resource bureau has to rely on county leadership and the general office for many of their needs during any disaster events. Discussion and interview with the officials highlights the gap in coordination in the existing system and there is a need for better multi-sectoral coordination mechanism both horizontally and vertically which is currently lacking at the county level. Furthermore there is lack of understanding and clarity on disaster risk management framework and there is a need for commitment from the county leadership to support and coordinate the initiatives. Furthermore there is lack of understanding and clarity on disaster risk management framework and there is a need for commitment from the county leadership to

support and coordinate the initiatives. Though the Red Cross is present at the county level it's not part of the CLDRLC and currently plays a very limited role during emergency response supporting health related issues.

During emergencies, the respective bureau request for additional funds from the county finance department and from higher level for emergency response and relief and currently there is no specific budget or no provision of funds for undertaking any pre-disaster measures. Apart from disaster response the committee has a mandate to provide relief and support recovery activities but it is limited only for major disasters but not for recurring, small scale, localized disasters which affect the livelihoods of the communities every year. During the discussions, the county officials informed that the departments are also involved in activities such as awareness raising but these are not carried out regularly.

Township level:

Currently there is no formal institutional arrangement for disaster management below county level. Below figure shows the general organizational arrangement and the responsibilities at the township level.

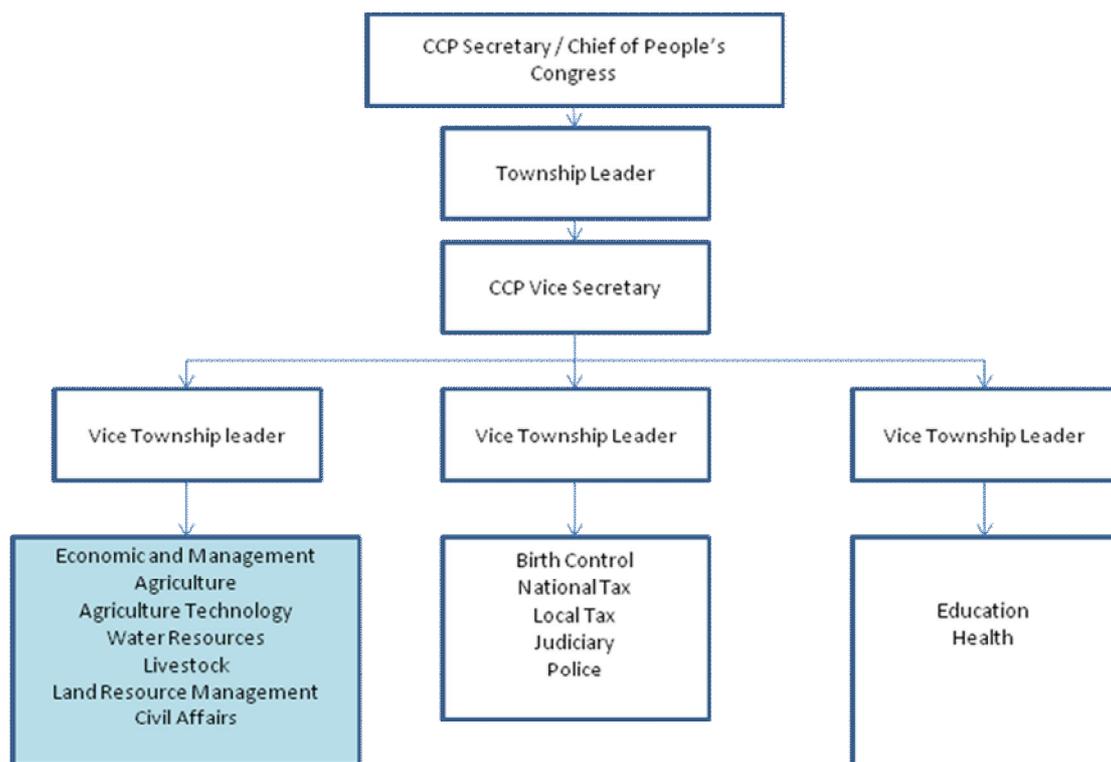


Figure: Organogram of Township

Currently the vice leader in-charge of economic management, agriculture, agriculture technology, water resources, live stock, land resource management and civil affairs handles subject related to disaster management in addition to other routine responsibilities with

limited staffs. Currently the township has a mandate to monitor the water level along the major points and inform the water resource bureau.

As practiced at the county, the township also pays more attention to emergency response which is on ad hoc basis based on the directions from the county authorities. Though the county level plan has assigned responsibility for mobilizing resources in case of flood and undertakes flood diversion work, there is no plan or management mechanism to handle emergency response. With limited staffs at the township the vice leader coordinates with 67 administrative villages during emergency response and relief distribution. Currently there is no proper system and plan in place on how the township will coordinate with the county and the village heads and responds to the needs in case of emergencies. Further the staffs at the township have limited training opportunities and exposure on disaster management; hence there is a need to strengthen the capacity at the township level so that they can support the villages which is currently missing in the existing system.

Village level:

Due to the top-down approach in disaster management the local institutions and communities play a very limited role in disaster management. Currently the village chief is responsible for disseminating the early warning information through public address system, evacuate people to safer areas and coordinate relief distribution. The village committee and the party leader support the village chief during the time of emergencies. Though there are community institutions such as women's association, farmers association and youth groups currently these institutions play a very limited role in disaster management activities except during response. Detailed assessment at village level is discussed in the following section.

4.5 Early Warning Arrangement:

Weather and Climate Forecast:

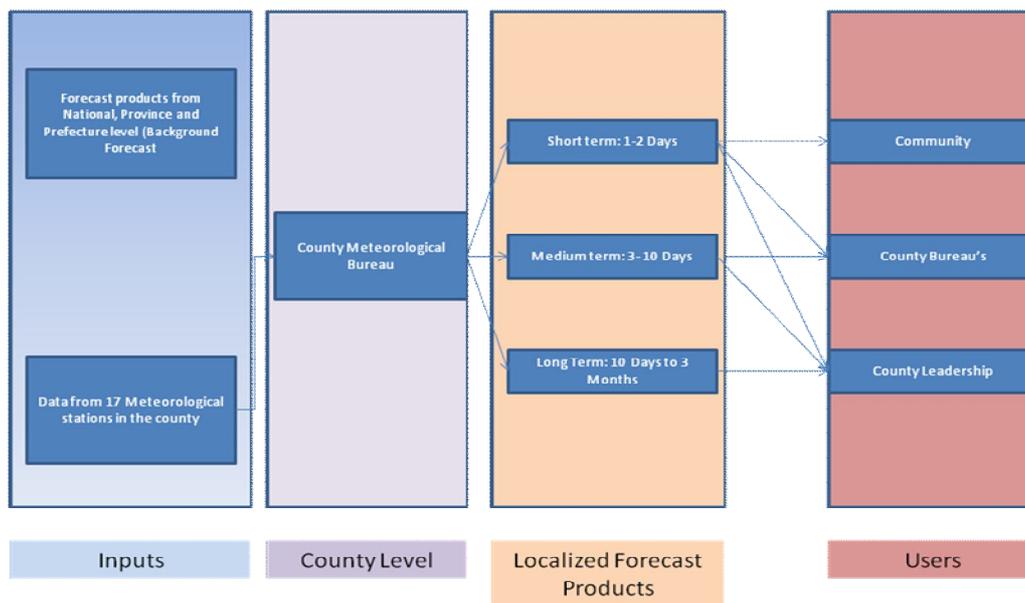
The county meteorological bureau is responsible for providing weather and climate forecast in the county. Juye county has a network of 17 Automatic Weather Stations (AWS) located in 16 townships and one within the county meteorological bureau. The bureau receives hourly data from the AWS station and then transmits to the provincial meteorological bureau. Currently there are 10 staffs at the county bureau and 16 staffs at the township level.

Based on the forecast products from the province and prefecture meteorological bureau and the observed data from the stations the county meteorological bureau provides following forecast products

Short term – 1 to 2 days

Medium term – 3 days to 10 days

Long term – 10 days to 3 months (seasonal)



Weather and Climate forecast products and its users

Currently the 1- 2 days forecast products are provided to the public which is disseminated through local TV, Newspaper, Mobile Phone and SMS, Television displays along the roads. Whereas medium term 3 – 10 day forecast information is provided to the county bureaus and long term forecast 10 days – 3 month is provided only to the county leadership. The bureau also provides information about disastrous weather events such as strong winds which is provided only to the county leader.

In 2007, the county meteorological bureau was able to predict meso-scale strong winds six hours in advance and provided warning to the county leadership but the due to the shorter lead time the authorities were not in a position to react and respond to the information. During this event more than 10 houses, greenhouses and 100's of mu of poplar tree were damaged.

Currently there is no mechanism in place to provide feedback on accuracy and usability of forecast products to the county meteorological bureau.

Flood and Drought Forecast:

The county Water Resources Bureau is responsible for issuing flood and drought forecast in the county which is also the headquarters for flood control and drought relief committee. Flood forecasting at the county level is issued based on the information received from the province and prefecture level where computer models are being used for forecasting along the rivers and in addition with water level in the river, local weather parameters which the bureau receives directly from the AWS stations in the county and the local forecast information from the county meteorological bureau.

Every year the Shandong Provincial Government organizes a meeting in month of May to share and discuss about the flood outlook for the season (June – September) and then the

forecast information is provided to the county authorities. The seasonal forecast information is currently shared and limited only to the county authorities. Currently there is no regular inflow of forecast information and the members of CLDRLC receive forecast information with a lead time of 1-3 days which is communicated to the communities through the townships.

Drought forecast information to the county water resource bureau is provided by the prefecture water resource bureau which is based on the forecast from national and provincial water resource bureau. The drought forecast information contains climate forecast for the season along with the directions to the county water resource bureau to take necessary steps to meet the water requirements. Currently the forecast information received by the water resource bureau is only shared with the flood and drought committee to take necessary steps as per the plan and to face drought situation. During the case of drought the communities are not informed about the situation in the county.

At the time of discussion with the county water resource bureau (12th Dec), fax information was received from prefecture water resource bureau regarding drought. The fax message contain drought forecast for Dec- June which indicates that the temperature during Dec-June will be high and the rainfall will be lesser than the previous year and hence a possibility of drought. Further the county authorities are advice to do their best job and store water. In response to that the water resource bureau was planning to arrange water supply to the county from the Yellow River Authority. It was noticed that the information received by the county bureau was very general and instructive which will be shared only with the committee members and no information will be provided further to township and villages.

In general the forecast products of varying lead time are available for hydro-meteorological hazards from the county meteorological bureau and water resource bureau, but it is only limited only for emergency response. Currently there is no systematic application of available products by the sectoral bureaus for managing risk through application of forecast information. Further at the community level the information provided by the county authorities are of shorter lead time only 1-3 days and the communities are caught unaware and have limited time to respond to these hazards.

5.0 Profile of Pilot sites:

Qilin Township with a population of 63,200 is located in Northeast of Juye County. The township with a total area of 220sq.km comprises of 67 administrative villages. Under the FAO-TCP project three pilot sites namely Yaaqiao, Liuxi, Nancao Village were selected by the Project Working Group as the pilot demonstration sites and all these three sites are located within the administrative division of Qilin Township. Below table provides the demographic profile of the villages which has been taken from "Report of baseline survey and Training Needs Assessment" carried out by Center for Integrated Agriculture Development in September 2007 under the project.

Profile	Yaaqiao	Liuxi	Nancao
Population	743	1483	946
Households	210	330	270
Arable Land	1128mu	1500mu	1470mu
<i>Crops</i>	<i>700mu</i>	<i>500mu</i>	<i>270</i>
<i>Poplar tree</i>	<i>300mu</i>	<i>800mu</i>	<i>1400</i>
<i>Others</i>	<i>128mu</i>	<i>200mu</i>	<i>-</i>
Total Labor force working outside	303	600	300
Other income generating activities	Greenhouse, handicrafts + Remittances from children's who migrated to cities and towns for labor	Fishing + Remittances from children's who migrated to cities and towns for labor	Livestock raising – rabbit and birds + Remittances from children's who migrated to cities and towns for labor
Per-capita income (2006)	2000 Yuan	2500 Yuan	2200 Yuan

5.1 Hazard Profile:

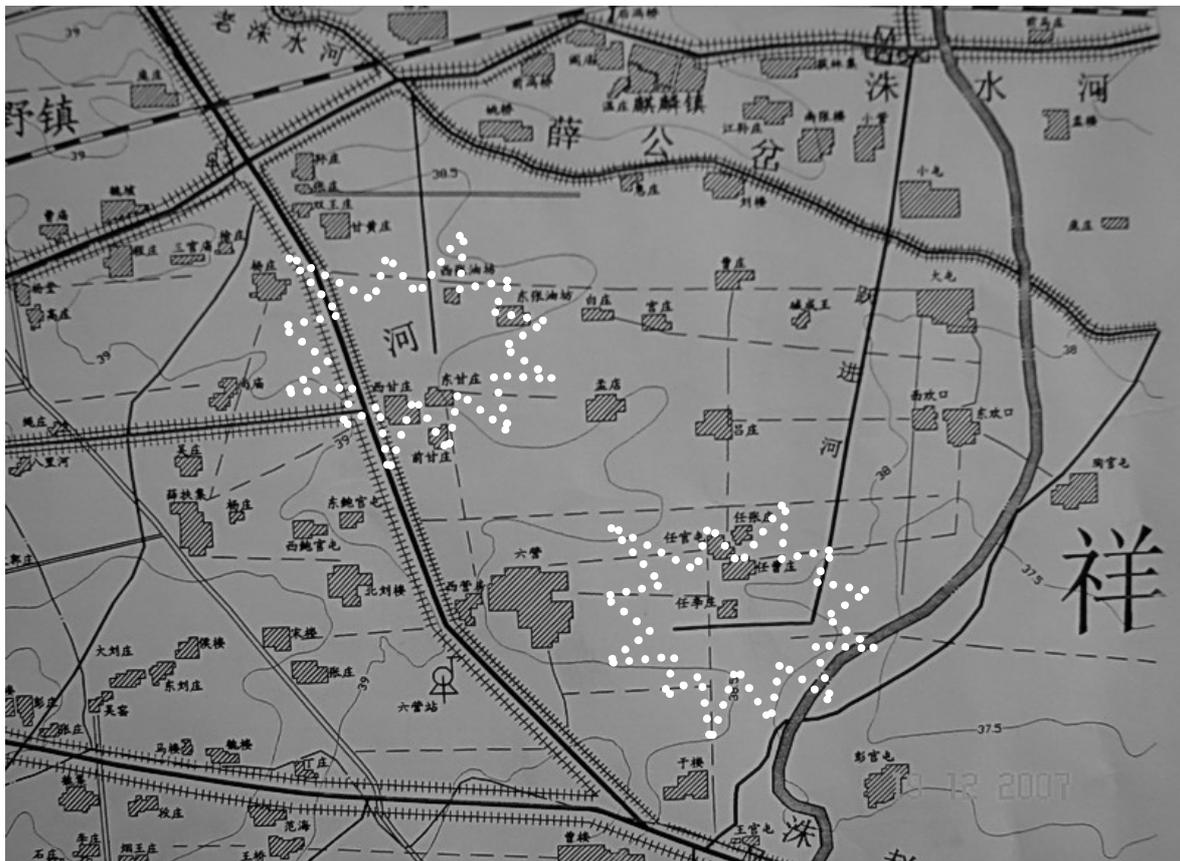
Below table shows the hazard profile and calendar which are common for all three pilot sites. Though the pilot sites are located under within the same administrative area their level of exposure and disaster impacts varies significantly due to its local topographic conditions and livelihood patterns. During 1950-1970's drought was considered to be very serious but more recently all these villages consider flood as a major hazards which affects their livelihoods every year.

Flooding and water logging is due to heavy rainfall concentration during the month of July and August, and its exacerbated due to local topographic features with inadequate, poorly maintained and deteriorated drainage and irrigation channels. Due to its topography,

rainfall-runoff water from nearby counties gets stagnated in these villages for longer duration and damages the standing crops such as cotton and corn. Figure shows the contour of the villages, where Yaaqiao and Liuxi are at an altitude of 38.5m while Nancao is at an altitude of 38.0m which is 0.5m lower than the other two villages.

Hazard calendar:

Hazard	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flood							←→	→				
Drought				←→	→							
Pest			←→	→					←→	→		
Extreme Weather	← Cold →						← Hot →					← Cold →
Earthquake												
Fire												



Above figure shows the contour, irrigation and drainage channels in Qilin Township. It's noted that primary and secondary canals are not interlinked and are incomplete (Source: county Water Resource Bureau).

Since 1990's flooding has become a recurrent event and these villages faced severe flooding during 1993, 1997, 2003 and 2007. Drought has been a serious issue in the past, based on

the anecdotal information from the villagers, there had been severe drought in 1955, and consecutive droughts in 1987, 1988, 1989 and more recently in 2001 and 2002. Though drought is not a major issue these days but it still has impacts on wheat which is at the stage of harvesting and sowing of cotton and corn especially in Nancao village where the farmers had to rely on ground water in case of water shortages.

In the recent years pest has been a serious problem affecting cotton and poplar tree. Much of the cotton in the region is affected Mian Ling Chong during September and October and very recently poplar trees which are also being affected by Mang Chun Xiang during March and April which eats the leaves of the poplar tree and affects its growth.

According to the villagers of Luixi, floods during 1957 is considered to be historic flooding in their living memory where with water level were up to window sill level of their houses and the flood water receded after 20 days. During the flood period the villagers had to use boats for their movement within the village. In 1964 there was another flooding but this was due to the barrier constructed by the nearby village and due to which there had been serious conflict between the two villages. The villagers also shared that between 1960- 1970 there had been conflict between the villages every year and by excavated of a new drainage channel in 1971 reduced the flooding.

Though fire is not a major hazard in the pilot villagers, few of the interviewed farmers noted that chances of fire from the cotton straw is possible and it could cause severe damage as they are stored outside the houses and there is no provision for fire extinguishers in the villages and in townships.

5.2 Livelihood and Economic Activities:

Majority of the households in the pilot villages are farmers and are dependent on agriculture. Below table shows the various crops grown and area sown in the pilot villages. During 1970-80's farmers in the villages had been cultivating rice for two seasons but due to water shortage they shifted to wheat, corn, and soya bean. Due to recurrent natural disasters such as floods and periodic droughts and pests there had been lesser yield and in order to cope with it farmers had to change their crops to reduce the losses.

In 2001 the county officials through township recommended the farmers to grow poplar tree which has been widely adopted by many farmers in all three villages. It is striking to note that change in cropping pattern in the three villages after the introduction of poplar tree where Yaaqiao being the least with 25%, Liuxi with 53% while Nancao has been 80% to poplar trees⁹.

⁹ Source: From field interviews and baseline assessment report CIAD Assessment report

Cropping Calendar:

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wheat	●					→				←		●
Cotton				←						→		
Corn						←				→		
Rice				←						→		
Poplar Tree	←											→

Autumn and Winter crop area in Mu:

Village	Yaoqiao		Liuxi		Nancao	
Crops	Autumn	Winter	Autumn	Winter	Autumn	Winter
Wheat	-	700	-	500		270
Cotton	700	-	500	-	270	
Corn	-	-	-	-	-	-
Rice	-	-	-	-	-	-
Vegetables	128	-	200	-	-	-
Poplar Tree	300		800		1200	
Total Area	1128mu		1500mu		1470mu	

Based on the interview with the villagers the shift in cropping pattern is considered as a coping strategy to deal with natural disasters which is being attributed to following reasons

1. Lesser yield due to recurrent natural disasters such as droughts during April and May, floods during July and August, and due to pest infection.
2. Due to limited economic opportunity in the village and recurrent losses due to natural disasters, youngsters from majority of the households in these villages have migrated to nearby towns and cities for labor such as construction, raising fish, garment companies or in restaurant and the elderly people are left alone with their grand children's. Since most of the crops need intensive labor and due to non availability of labor in the farm field, farmers have shifted to poplar tree which needs less labor and can withstand flooding and moreover they can sell them in the market for good price. It was also informed that the youngsters come back to the village to help their families during planting and harvesting period.

According to the farmers interviewed there had been very little support from the county agricultural bureau in providing technical support for deciding their cropping calendar. In the past most of the trainings and support had been only related to promoting certain varieties of seeds and fertilizers and in general there had been no proper training to the farmers.

Many families in the pilot villages are also involved in small scale economic activities such as livestock raising - rabbit, birds etc and handicrafts and few households in Yaoqiao Village

are involved in greenhouses for producing vegetables. In 2006, annual net per capita income of the households in Yaaqiao was 2000 Yuan, in Luixi was about 2500 Yuan and in Nancao was 2200 Yuan this is well below the national average of 3587 Yuan. In addition to the income from the field the households in these villages also depend on the remittances from their children's working in the nearby town and cities.

Currently there are farmers association in each of the village focusing on greenhouse in Yaaquio, fishing in Liuxi and livestock raising in Nanacao which is currently open to the villagers. Due to limited knowledge and training on farmer's cooperatives currently these farmers association are not functioning efficiently to link with the market and to meet the demands of the members and promote business. *For more information about the status and functioning of farmers association refer to the baseline assessment report of Center for Integrated Agriculture Development.*

5.3 Vulnerability:

Historically, livelihoods of the communities in the region have been exposed to recurrent natural disasters due to their underlying vulnerability to natural hazards. Currently their cropping calendar is more vulnerable to climate related risks and there is no support provided from the agriculture bureau to the farmers on managing climate risk through application of forecast information as well as pest management. It was also informed that by shifting to poplar tree the farmers are now facing emerging problem like pest and recent damages due to strong winds. Few of the farmers interviewed noted that they will not be interested to plant poplar tree next time if the county and township authorities recommend it.

Other than their livelihoods the physical vulnerability of the villagers to natural hazards is also high. Since majority of youngsters- both male and female from the villages have migrated to nearby towns and cities for labor the village is left with the elderly people, women and their grand children's. During the group discussion with villagers one of the farmer mentioned that they don't have enough able bodied people in the village since most of them are elderly and sick and if in case there is any emergency

One other concern expressed during the meeting was health related problems in these villages especially Nancao where the longevity is only 60-62 years which is much lesser than the national average of 70.8 years. This is attributed to poor quality of drinking water which leads to much health related issues. It was also noted that the communities are not able to afford to the health related expenses and they had to either borrow money or depend on the remittances from their children's.

they don't have the capacity to respond. Migration for labor has arisen mainly due to recurrent natural disasters and very limited opportunity for the farmers to diversify their livelihoods in the villages. The relative physical vulnerability of the people is also very high to hazards such as earthquakes which can strike without warning and most of the people in

the village are elderly and children's who are considered to be more vulnerable during any disaster events. The building stocks in these villages are masonry buildings which are more vulnerable during any moderate earthquakes. Furthermore are not aware of their risk to earthquakes and low level of preparedness in case of earthquakes.

5.4 Drainage system:

The irrigation and drainage channel in the county is quite complex which consists of rivers, primary, secondary and tertiary channels and drainage system criss-crossing the entire county. The above figure shows the rivers and primary canal system in the county. From direct observation and discussion with the local authorities and villagers, maintenance of the secondary and tertiary canals has been neglected for a long period. It was also informed that in past to some extent the villagers had been involved in cleaning and maintain the canals but after the introduction of household contract system the farmers encroached the drainage and canal by filling soil in order to increase their cropping area as well as to have proper access to their land from the road which blocks the water way.

One other reason is that few of the drainage channels are not interconnected and they act as standalone system, due to which the water gets discharged in the low lying areas during heavy rain. For e.g In Nancao, the village which is 0.5m lower than the surrounding villages is intersected by canal which ends two- three kms from the village and there is no discharge point for this canal (refer to above figure). The villagers demand is that if a canal excavated and connected to the river the problem related to flooding in the village can be reduced.

Currently the water resource bureau has limited resources to maintain the primary system and that the budget for maintenance is also not adequate. Due to limited resources maintenance of the secondary and tertiary channels by both authorities and the villagers, many of the channels are encroached which has reduced the flow capacity.

Below figure shows the condition of drainage systems in the three pilot sites.



1. Access road to a farm land cutting the drainage channel



2. Culvert built across the drain with limited opening



3. Present condition of a gate and the tertiary channel in Luixi village



4. Drainage channel along the road encroached and poorly maintained.

According to villagers, since they are poor they are not in a position to invest resources in clearing the drain though it may yield some better result they would like to have the intervention by the county and township authorities.

5.5 Disaster Management

While the above section covers issue related to disaster the following section attempts to assess the current situation, opportunities and constrains faced by the communities related to different phases of disaster management cycle at the local level.

Early warning:

Currently the villagers receive weather forecast information and flood warning through province and county TV channel and emergency information through the public address system by their village chief which is communicated by township authorities. According to

the villagers the warning information provided is of very short lead time which is mostly 1-3 days. Villagers also pointed out that the weather forecast is not accurate and the information provided to them was very limited and they could not understand and react to it. One recommendation from the people interviewed was if there is a lead time of 3- 5 days or more the village chief can mobilize people from the village to clean the drainage channel so that the flood water can be drained out and if there is a longer range forecast available the village and township authorities can request the water resource bureau to support them.

While questioned whether the farmers can mobilize themselves through farmers association and undertake routine maintenance of the drainage channels , one of the Village representatives responded saying that they need support from the from the local authorities if not it will be difficult for the farmers to mobilize resources to clean the drainage channels before the flooding season regularly.

Currently there is no early warning system for drought since the county water resource bureau responds to the water requirements by supplying adequate water through pumping water from the rivers and the communities are not aware or informed about that they are experiencing drought in their region.

With regard to pest the villagers receive information about the possible locust infection through province and county TV and the local authorities. Based on the information they are able to respond by spraying pesticides to protect their crop especially cotton but however they are not very successful. In the recent years, poplar trees had been damaged by locusts and the villagers have difficulty in spraying pesticide since the locusts damage the tree leaves and moreover the trees have grown up and they had to kill the insects when they only fall on the ground which is also quite laborious work.

Disaster Response:

Currently, disaster response is a subject of county and township authorities and the participation of local level institutions where it's much needed is very limited. During floods village chief issue warning to the households in the low lying area through the public address system and evacuate them to safer places through the support of village committee members. Currently local institutions such as women group, farmers association, youth groups which are present at the village level which has very limited role during the response period. One important point to be considered is the capacity of the villagers themselves during emergency response, since there are few youngsters or able bodied men left in the village the response capacity of them is very limited and there is lack of human resources and equipments for emergency response.

Relief, Rehabilitation and Reconstruction:

Relief, rehabilitation and reconstruction are subject of the county and the Province and the State. The role of township and village committee is to coordinate the activities. Damage

assessments related to natural disasters are carried out by the township authorities and as of today and there is no systematic assessment of damages and moreover it is carried out only for large scale events. Relief support is provided only for large scale events and there is no provision for providing support provided in case of recurring localized events damaging / destroying the farm land or properties. Currently insurance for agriculture is not widely being practiced and this due to higher premium rates for which the farmers are not able to afford.

Preparedness, Prevention and Mitigation:

Though there had been very little focus on preparedness, prevention and mitigation but here had been attempts made by the farmers in order to reduce their exposure to floods and droughts. In Nanacao, during the discussion with the farmers group it was informed that, in the past settlement area of the Nancao village was at the same level of their farmland and the due to which the entire village was flooded annually. During 90's the villagers raised the level of the settlement area by 0.5m by land filling and after that the settlement area of the village is less prone to flood when compared with their farmland.

While attempts had made by the community to secure their livelihoods by diversifying their crops such as by planting poplar tree, farmers perceive that they will not get anticipated benefits. The farmers feel that there is not much support provided by the agriculture extension for their cropping calendar and local authorities for improving the drainage systems.

Drought Management in Nancao Village:

In the past due to periodic droughts in the region farmers in Nancao Village undertook a collective action by digging a common well (approximately 20m deep) from which they can cover an area of 10-15mu. Under this arrangement farmer whose land falls into the area shared the cost of digging the well. Though the well is common for the farmers in that area they were using their own machine to pump water from the well. According to the farmers they find it difficult to operate a common pump since it is difficult to manage and operate a common pump.

6.0 Training Needs Assessment:

One of the prime objectives of the Technical Cooperation Project (TCP) is to build technical and institutional capacity of relevant local institutions at the county level about the concepts and practical application of in Disaster Risk Management techniques and tools. Currently training and capacity building related to disaster management (emergency response and relief) is organized at National and Province level and it's limited to leaders of civil affairs and relevant departments and there is no specialized training for technical staffs of the bureaus in disaster management and other cross cutting issues. During the assessment mission, Training Needs Assessment (TNA) was also carried out to assess the needs of various stakeholders to establish towards an ideal DRM system in Juye county within the scope of project objectives. Based on the discussions, with the county officials and various stakeholders involved and by assessing their felt and observed needs following topics / areas are suggested targeting different levels.

Sl. no	Topics / Areas related to DRM	Focus area (Subjects to be arranged according to preference levels)	Target group
1	Disaster Risk Management ¹⁰	<ul style="list-style-type: none"> • DRM Concepts and terminologies • DRM framework 	County – CLDRLC members , County General Office, County and Township leader, Township officials and village heads
2	Community Based Disaster Risk Management – Concepts and Practices ¹¹	<ul style="list-style-type: none"> • CBDRM: An Overview • Conceptual Guide and Approaches • Participatory Disaster Risk Assessment • Participatory Risk Reduction Planning 	County– Water Resource, Civil Affairs, Agriculture, Health, Education, Meteorological, Development and Reforms, Finance, General Office, Red Cross, Township: Township leader, officials Village: Village leader,

¹⁰ Already completed in Sep 07 during the inception program but still there is a need for training county level staffs

¹¹ Already completed in Dec 07, but very limited participation from County and Township

			Farmers Association / Cooperatives, Women Association
3	Climate Forecast Application / Early Warning	<ul style="list-style-type: none"> • Application of available climate forecast information for decision making process and seasonal calendar • Improve early warning information flow and dissemination 	County Bureau's: Meteorological Bureau, Agriculture Bureau, Water Resource, General Office of County, Township officials Agriculture Extension
4	Disaster Inventory (Training Workshop)	<ul style="list-style-type: none"> • Refine and evolve a comprehensive baseline data base - disaster inventory with special focus to agriculture and allied sectors • Develop guidelines for disaster inventory • Facilitate enhanced disaster preparedness and emergency response 	County Civil Affairs, Water Resource Department, Agriculture Department, Transportation Department,
5	Contingency Crop Planning (Training Workshop)	<ul style="list-style-type: none"> • Development of scenarios • Contingency crop plan to reduce the impacts of climate variability on crop production • Evolve options to enable rapid recovery in the agriculture sector in the event of a disaster 	County Level: Agriculture Bureau, Water Resource Department, Meteorological Department , Civil Affairs bureau Forest Bureau Agriculture Extension
6	Risk Assessment	<ul style="list-style-type: none"> • Flood Risk Analysis and Mapping 	County Level:

		<ul style="list-style-type: none"> • Vulnerability and Flood Damage Assessment • Capacity Analysis 	<p>Agriculture Bureau, Water Resource Bureau ,</p> <p>Meteorological Bureau, Civil affairs Bureau and other lead technical institutions</p>
7	Damage and Needs Assessment (Training Workshop)	<ul style="list-style-type: none"> • Assessment and its types • Elements of the assessment process • Assessment Planning • Assessment methodology and tools 	<p>County Level:</p> <p>Agriculture Bureau, Water Resource Bureau ,</p> <p>Meteorological Bureau, Civil affairs Bureau</p> <p>Township officials</p>

7.0 Conclusion and Recommendations:

The objective of the current study was of two fold

- a) Review and assess the relevance of lessons learned from past and ongoing development and research projects in China in Agriculture and crop & fishing subsector related to disaster prevention and preparedness
- b) Assess the local hazard risks, the existing DRM system, locally existing risk mitigation and coping strategies, county level early warning system, existing DRM planning mechanism and already applied natural disaster prevention / preparedness strategies at the farmers level.

Based on the discussions and interview with key stakeholders at the county and township at communities, review of secondary information, few of the key points have been distilled from the situation assessment report for project considerations.

1. Institutional Mechanism

County Level:

- At the county level, County Level Disaster Reduction Leading Committee (CLDRLC) is responsible for disaster management mainly related to hazards such as floods and droughts which currently focuses on response oriented approach. Discussions and interview with the officials highlights that coordination gaps exist among the various bureaus in the current system and there is a need for effective multi-sectoral mechanism with improved coordination.
- Further, there is a need to shift from current emergency response approach to proactive multi-hazard, disaster risk management approach to reduce the losses and secure the livelihoods of the communities.
- Currently there is lack of understanding and clarity on disaster risk framework among sectoral bureaus and there is a need for commitment from the county leadership to support and coordinate the initiatives. The FAO TCP project can act as a catalyst to strengthen the DRM system in the county.

Township level:

- Currently there is no formal institutional arrangement for disaster management below county level. At present one of the vice leader of the township handles subject related to disaster management in addition to other routine responsibilities with limited staffs and resources.
- There is a need for establishing an institutional system with adequate technical expertise at the township level to act as a bridge between county and the villages to support disaster risk management activities.

Village Level:

- Due to lack of institutional arrangements and very limited support for disaster management currently villages play a very limited role in disaster management activities including in emergency response phase.
 - There is a need to strengthen the village level system by encouraging communities to participate in disaster risk reduction activities and this can be initiated through Community Based Disaster Risk Management framework.
 - Though CBDRM approach is widely practiced in many countries in the region, currently it's currently being piloted in the country. The 11th five year plan approved by the State Council in August 2007, increasingly recognizes the importance of strengthening the community level involvement and had outlined plans for piloting Community Based Disaster Risk Management (CBDRM) in the country.
 - The county leadership and bureaus should take proactive steps to encourage and promote the involvement of local institutions in disaster risk management activities at the local level.
2. Early Warning Information Flow / Climate Forecast Application:
- Currently forecast products of varying lead time is available for hydro-meteorological hazards from the county meteorological bureau and water resource bureau, but the information is shared and limited to only few bureaus at the county level. Moreover the information made available to the bureau's is only used for emergency response and there is no systematic application of available forecast information for managing risk.
 - Further more information received by the community is very limited and of shorter lead time due to which the communities are caught unaware and have very limited time to respond. The county bureau's has to play a proactive role in providing the forecast information to all its users including the farmers, so as to encourage users to undertake risk reduction and evolve response options through application of forecast information.
3. Community Based Disaster Risk Management
- Due to lack of institutional arrangements and top-down approach in disaster management, local institutions and communities play very limited role in disaster management activities. There is a need to strengthen the institutional system at the village level by encouraging communities and local institutions particularly farmers association / women's association / youth groups to participate in disaster risk reduction activities and this can be initiated through Community Based Disaster Risk Management (CBDRM)framework.

- While implementing any risk reduction activities special attention to be paid for vulnerable groups elderly people, women and children's as there is very limited support mechanism available within the household level.

4. Multi- hazard Risk Assessment

- Risk assessment forms the basis for any long term risk management programmes and activities. During the past few decades there has been a shift in risk pattern from drought to floods in recent years. The current infrastructure in the county has been designed to handle 1 in 10 years' floods which are of very high return period and cannot handle extreme events. There is a need for a robust institutional system with technical capacity to monitor the risk trend in the county. This can form the basis for long term risk reduction measures for various sectoral bureaus in the county.
- Due to the complex nature of flood in the pilot sites in the county there is a need for comprehensive flood risk assessment in the county, based on which the CLDRLC can develop a develop flood mitigation strategy, plan and actions for the county.

5. Structural and Non structural measures

- Water logging and flooding in the county is caused mainly due to deteriorated, inadequate drainage system and poor maintenance of the drainage and irrigation channels which have exacerbated the risk in low lying areas especially the farmlands. Due to which structural intervention is currently being recognized as a preferred method among bureaus and community for managing flood risk in the county
- Though structural measures are important aspects of flood mitigation, complementary risk management - non structural measures such as locally relevant , appropriate early warning with sufficient lead time, flood preparedness planning, emergency response planning, awareness raising on threshold limits, community preparedness, building codes, land use planning, flood recovery measures such as insurance are also equally important for any risk reduction measures. Hence the county should focus on both structural and non structural measures for flood risk management.

6. Livelihoods

- Majority of the households in the pilot villages are farmers and are dependent on agriculture. Due to recurring natural disasters such as floods and periodic droughts and pests there had been lesser yield and in order to cope with it farmers had to change their crops to reduce the losses. But still crops such as cotton and corn are more vulnerable to floods and pest. Due to limited economic opportunity in the village and recurrent natural disasters youngsters from

majority of the households in these villages have migrated to nearby towns and cities for labor.

- In 2001 the County officials through township recommended the farmers to grow poplar tree which has been widely adopted by many households in all three villages. Though farmers find poplar tree easier to grow but in the recent years they are facing emerging problem such as strong winds and pest which have damaged the trees.
- Many households in the pilot villages are also involved in small scale economic activities such as livestock raising - rabbit, birds etc and handicrafts and few households in Yaaqiao Village are involved in greenhouses for producing vegetables. Currently the farmers' cooperative is in a very early stage of its functioning and there is a need for strengthening their function in promoting the livelihoods as well as in disaster risk reduction measures.
- Farmers are in need of technical support to diversify their crops and reduce the losses. The agriculture bureau should intensify the dialogue with the farmers in evolving suitable seasonal cropping calendar by application of forecast information and introducing new seed / pest resistant crop varieties which can mitigate the losses.

7. Training and Capacity Building in DRM

- Currently training and capacity building related to disaster management (emergency response and relief) is organized at National and Province level and it's limited to leaders of civil affairs and few other relevant departments. At the county level there is a need to strengthen the existing institutional system, sensitize and train the county leaders and bureaus and its technical staffs on DRM aspects, further township and local level institutional mechanism need to be established and trained in DRM aspects in order to enable them to be better prepared and protect their livelihoods.
- Training Needs Assessment has been carried out to assess the needs of various stakeholders to establish an ideal DRM system in Juye County within the scope of project objectives (Annexure) which can be organized systematically according to preference levels.

8.0References:

1. The National Natural Disaster Reduction Plan of People's Republic of China (1998-2010), China National Committee for IDNDR
2. UN/ISDR Country Report- China
3. Integrated Disaster Risk Management of China: Developing Country Perspective, OECD- Peijun Shi, Jing Liu, Qinghai Yao, Di Tang, Xi Yang
4. Atlas of Natural Disaster System of China, Beijing Normal University, 2003
5. Flood Mitigation and Disaster Relief Strategy of China, Duan Hongdong
6. Unpublished report: China Report on Natural Disasters in Agriculture- Natural Disaster Reduction Center of China- FAO-ADPC, April 2006
7. Report of Baseline Survey and Training Needs Assessment (FAO-TCP /CPR 3105) - Center for Integrated Agricultural Development-CIAD, China Agricultural University, September 2007
8. Impacts of, and Vulnerability and Adaptation to, Climate Change in Water Resources and Agricultural Sectors in China- Li Yue, Lin Erda and Li Yan, Human Development Report 2007/2008
9. Web resources:
 - a. <http://www.china.org.cn/e-china/geography/index.htm>
 - b. <http://www.mca.gov.cn/>
 - c. <http://www.stats.gov.cn/english/>
 - d. <http://www.gov.cn/english/>
 - e. <http://www.chinalaw.gov.cn/indexEN.jsp>