

State: Himachal Pradesh

Agriculture Contingency Plan for District: Kinnaur

1.0 District Agriculture profile			
1.1	Agro-Climatic/Ecological Zone		
	Agro Ecological Sub Region (ICAR)	Western Himalayas, Warm Subhumid (To Humid With Inclusion Of Perhumid) Eco-sub region. (14.1)	
	Agro-Climatic Zone (Planning commission)	Western Himalayan Region (I)	
	Agro Climatic Zone (NARP)	High Hills Temperate Dry Zone (HP-4)	
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Nothern parts of Chamba, Kullu, major Southern part of Lahaul & Spiti (Keylong), Kalpa (Kinnaur), Kinnaur, Shimla	
	Geographic coordinates of district headquarters	Latitude	Longitude
		31° 05' 50"- 32° 05' 15" N	77° 45' -79° 00' 35" E
		Altitude	
		2350m to 6816m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Horticulture Research Station, Sharbo, Dr YSP University of Horticulture and Forestry	
	Mention the KVK located in the district with address	KVK-Kinnaur at Reckong Peo, PIN 172107 (HP) 01786-222122 FAX: 01786-222122 Mobile: 09418244888	
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisoreries in the Zone	IMD, Kalpa	

1.2	Rainfall	Normal RF(mm)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):21.70%	303.04	1 st week of July	3 rd week of September
	NE Monsoon (Oct-Dec): 8.98%	44.68		
	Winter (Jan- March): 49.50% (Precipitation is in the form of snow)	177.48		
	Summer (Apr-May): 19.82%- Pre monsoon	157.04	1 st week of April	
	Annual	682.24		

Source: Strategic Research and Extension Plan of District Kinnaur-Department of Agriculture

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non- agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallow	Other fallow
	Area ('000 ha)	624.3	7.07	37.58	124.83	317.59	3.44	0.08	131.12	2.08	0.11

Source: Strategic Research and Extension Plan of District Kinnaur-Department of Agriculture

1.4	Major Soils (common names like red sandy loam deep soils (etc.,))*	Area ('000 ha)	Percent (%) of total
	Sandy Loam soils	5.808	0.93
	Sandy soils	1.745	0.2
	Rock Land	616.247	98.7
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	7.55	119
	Area sown more than once	1.46	
	Gross cropped area	9.02	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	4.8		
	Gross irrigated area	5.7		
	Rainfed area	2.7		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		-	
	Tanks	72	0.0043	0.08
	Open wells		-	
	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation	Not available		
	Other sources (please specify) Flow irrigation schemes (Glaciers melts) through <i>Kuhls</i>	158	4.868	99.02
	Total Irrigated Area			
	Pump sets	Not applicable		
	No. of Tractors	Not applicable		
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited			
	Critical			
	Semi- critical			
	Safe	There is no exploitation of ground water		
	Wastewater availability and use			
	Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

1.7 Area under major field crops & horticulture (2008-09)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>				
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	Maize		0.32	0.321					0.32
	Paddy	0.02							0.02
	Wheat					0.32	0.32		0.32
	Barley					1.02	1.02		1.0
	Pulses			1.99					1.9
	Minor millets								1.5

	Horticulture crops - Fruits	Area ('000 ha)		
		Total	Irrigated	Rainfed
	Apple	8.832		8.83
	Nuts and Dry Fruits	1.249		1.24
	Other Temperate	0.409		0.40

	Fruits			
	Subtropical Fruits	0.012		0.01
	Horticulture crops - Vegetables	Total	Irrigated	Rainfed
	Potato	0.13	0.13	
	Peas	1.80	1.80	
	Cabbage	0.11	0.11	
	Beans	0.02	0.02	
	Capsicum	0.29	0.29	
	Chillies	0.02	0.02	
	Total	2.38	2.38	
	Medicinal and Aromatic crops	Total	Irrigated	Rainfed
	Kalazeera	0.029	0.00	0.029
	Kuth	0.005	0.005	
	Chilgoza	Grown naturally and harvested as community resource	Grown naturally and harvested as community resource	
	Total	0.034	0.034	

	Plantation crops	Total	Irrigated	Rainfed
		No plantation crops are grown		
	Fodder crops	Total	Irrigated	Rainfed
		-		
	Grazing land	317.549		
	Sericulture etc	-		
	Others (specify)	-		

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	Not available	Not available	10.07
	Improved cattle			
	Crossbred cattle			8.078
	Non descriptive Buffaloes (local low yielding)			7(brought by migratory Gujars in lower belt of Nichar Block)
	Descript Buffaloes			
	Goat			34.63
	Sheep			74.38
	Indigenous			48.09
	Crossbred			26.28
	Others (Camel, Pig, Yak etc.)			0.01
	Commercial dairy farms (Number)	Not applicable	Not applicable	
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial	Not applicable	Not applicable	
	Backyard		5.23	

1.10	Fisheries (Data source: Chief Planning Officer)						
	A. Capture : Not applicable						
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Nets		Storage facilities (Ice plants etc.)
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks		
	B. Culture : Not applicable						
			Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)		
	i) Brackish water (Data Source: MPEDA/ Fisheries Department)		Not applicable				
	ii) Fresh water (Data Source: Fisheries Department)						
	Others						

Among fish two families *Salmo-fario* (Brown trout) and *Orenius sinuatus* are found in Baspa river of Sangla valley and Shongtong Tapri belt of Sutlej river. The indigenous fish fauna is uniformly distributed in the waters of the district. At Sangla , there is a trout fish hatchery for the production of trout fish fingerlings . Fish production from trout farm was 0.28 metric tonne during 2006-07. There were 7 licensed fishermen during the year 2006-2007.

1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Maize	589.9	1840	-	-	-	-	589.9	1840	1179.8
	Paddy	18.5	843	-	-	-	-	18.5	843	27.75
	Wheat	-	-	527.1	1632	-	-	527.1	1632	790.65
	Barley	-	-	1099.6	1078	-	-	1099.6	1078	1649.4
	Pulses	1.454	731	-	-	-	-	1.454	731	0.727
	Potato	-	-	2.60	13000	-	-	2.60	13000	0
	Vegetables	-	-	-	-	32174	12711	32174	12711	0
Major Horticultural crops (Crops to be identified based on total acreage)										
	Apple							40.277	5217	
	Nuts and Dry Fruits							0.246	201	
	Other Temperate Fruits							0.213	590	
	Subtropical							0.055	4583	

Fruits									
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1.12	Sowing window for 5 major field crops	Maize	Paddy	Wheat	Barley	Potato	Pulses
	Kharif- Rainfed	1 st week of April				2 nd Week of April	2 nd week of April
	Kharif-Irrigated		1 st week of April				
	Rabi- Rainfed			1 st week of Nov	2 nd week of October - 2 nd week of November		1 st week of October
	Rabi-Irrigated			1 st week of Nov			

- There is only one cropping season from April to October: for other months of the year, the area receives heavy snowfall; however in lower belts of Nichar block 2 crops are also taken as cropping season extends to 10 months. The total cropping period for wheat and barley may go up to 9-10 months as the crops remain dormant under snow cover for a period of 3-4 months.

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought			
	Flood			
	Cyclone			
	Hail storm			
	Heat wave			
	Cold wave			
	Frost			
	Sea water intrusion			
	Pests and disease outbreak (specify)			

	Others (specify) There are flash floods			
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- * Flash floods in Satluj and landslides / glaciers are also a phenomenon. Cloud bursts also occur. The flash floods are very severe

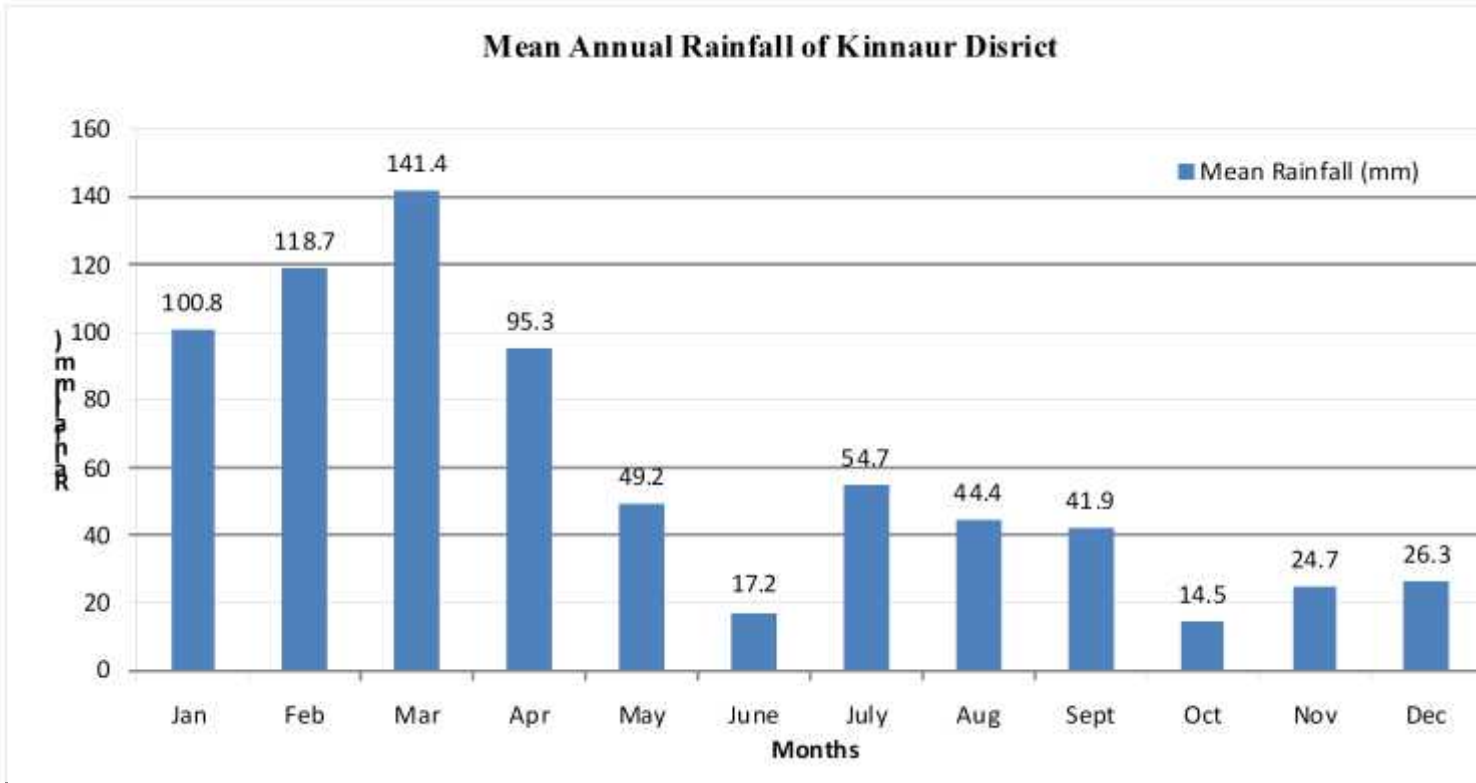
1.14	Include Digital maps of the district for	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

Annexure-I: Location map of Kinnaur District in Himachal Pradesh

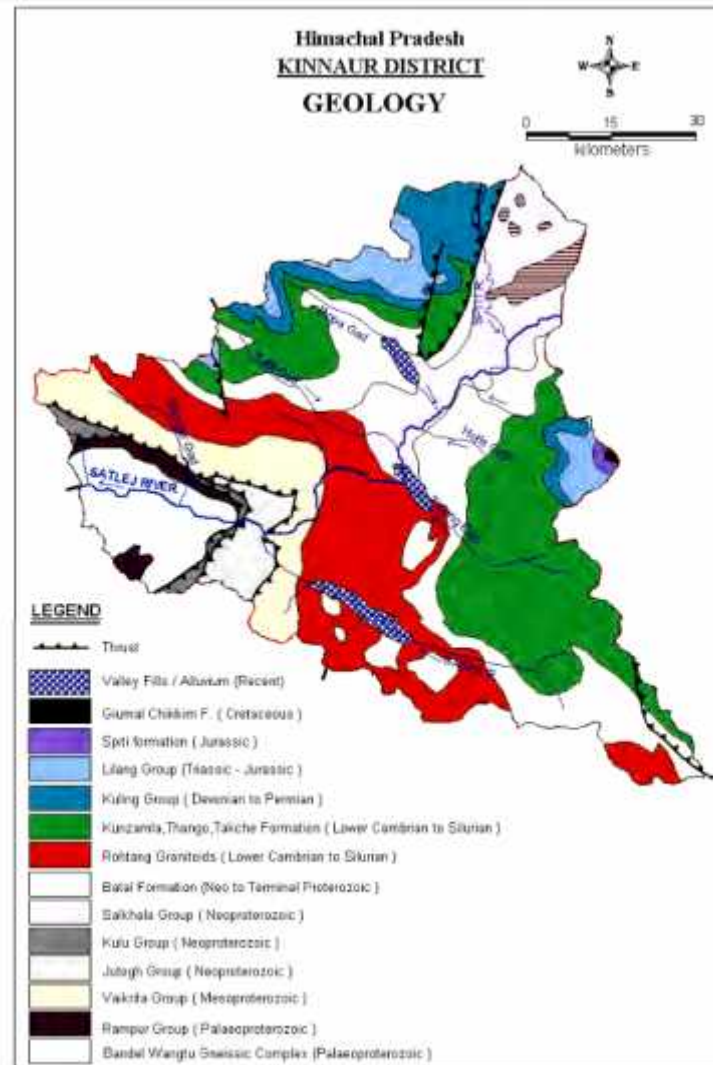


Source: DAP, Kinnaur (HP)

Annexure-II: Mean Annual Rainfall of Kinnaur District



Annexure-III



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition		Suggested Contingency measures			
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (3rd week of July)	Dry temperate high hills	Maize- Fallow Maize: local	No change	<ul style="list-style-type: none"> • Gap filling with improved seeds if the plant population is around 70% of optimum • Otherwise re-sow the crop in ridge and furrow system across the slope • Adopt soil and water conservation measures like terracing to conserve and harvest rainwater during kharif/ fallow period • Tillage to control weeds and to conserve moisture during kharif • Mulching with green debris within rows 	Link Department of Agriculture and KVK to create awareness of the technology among the farmers
		Rajmash- Fallow	Rajmash- Fallow Rajmash: Kanchan, Jawala		

		Peas- Fallow Pea: Lincoln and AP-1	Peas- Fallow Pea: Lincoln and AP-1	<ul style="list-style-type: none"> • Adopt soil and water conservation measures like terracing to conserve and harvest rainwater during kharif/fallow period • Tillage to control weeds and to conserve moisture during kharif • Timely weed control • Gap filling with improved variety if the plant population is around 70% of optimum
		Potato- Fallow Potato: Kufri Jyoti	Potato- Fallow Potato: Kufri Jyoti	<ul style="list-style-type: none"> • Mulching with local weeds /grasses • Conservation tillage • Gap filling with improved seeds if the plant population is around 70% of optimum • Otherwise re-sow the crop in ridge and furrow system across the slope
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	<ul style="list-style-type: none"> • Gap filling with seedlings like finger millet or gap fill with seeds if the plant population is around 70% of optimum • Sowing of crop across the slope • Timely weed control
	High Hills Temperate Dry and Cold	Apple	No change	<ul style="list-style-type: none"> • Half moon shaped basins to harvest run-off • Weed control in tree basin

	Deserts	Vegetables Cropping system	No change	<ul style="list-style-type: none"> • Mulching with local weeds /grasses • Conservation tillage • Gap filling with improved seeds if the plant population is around 70% of optimum • Otherwise resow the crop in ridge and furrow system across the slope 	
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	<ul style="list-style-type: none"> • Gap filling with seedlings like finger millet or gap fill with seeds if the plant population is around 70% of optimum • Sowing of crop across the slope • Timely weed control Mulching with local grasses 	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 4 weeks (1 st week of August)	Dry temperate High hills	Maize- Fallow Maize: local	No change Maize- Fallow Maize: local	<ul style="list-style-type: none"> • Mulching with local grasses/ organic materials • Weed control measures • Ridge and furrow planting 	LinkDepartment of Agriculture , KVKs and NGOs for the Supply of seeds

		Rajmash- Fallow Rajmash: Kanchan, Jawala	Rajmash- Fallow Rajmash: Kanchan, Jawala mproved varieties suitable for temperate zone such as <i>Baspa, triloki and Kailash</i>	<ul style="list-style-type: none"> • Gap filling with improved varieties if the plant population is around 70% of optimum 	and training to the farmers
		Peas- Fallow Pea: Lincoln and AP-1	Peas- Fallow Pea: Lincoln and AP-1 Improved varieties suitable for temperate zone such as AP-1, Super AP-1		
		Vegetables	Potato- Fallow Potato: Kufri Jyoti Improved varieties suitable for temperate zone and resistant to cold and diseases		
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local		
		Vegetables	vegetables		

		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	<ul style="list-style-type: none"> • Gap filling with the seeds when the plant population is around 70% or more than optimum plant stands • Timely weed control • Mulching in crop rows 	
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					

Delay by 6 weeks (3rd week of August)	Dry temperate High Hills	Maize- Fallow Maize: local	Change in cropping pattern towards Millets The cropping patterns can be Ogla-fallow Phaphra-fallow- Millets (Ogla/ Phaphra)- fallows Maize fodder- fallow	<ul style="list-style-type: none"> • Mulching with grasses • Gap filling • Life saving glacial water diversion • Maintenance of soil cover with green materials • Addition of high doses of FYM and organic manures by 1-2 tones /ha • Intercropping with legumes • Re-sowing/ Gap filling with higher (15-20%) seed rate • Regular weeding 	LinkDepartment of Agriculture , KVKs and NGOs for the Supply of seeds and training to the farmers Awareness campaign by the Department of Agriculture ,KVK and NGOs
		Rajmash- Fallow Rajmash: Kanchan, Jawala	Rajmash- Fallow Rajmash: Kanchan, Jawala	<ul style="list-style-type: none"> • Mulching with grasses Life saving glacial water diversion 	
		Peas- Fallow Pea: Lincoln and AP-1	Peas- Fallow Pea: Lincoln and AP-1	<ul style="list-style-type: none"> • Maintenance of soil cover with green materials 	
		Potato- Fallow Potato: Kufri Jyoti	Potato- Fallow Potato: Kufri Jyoti	<ul style="list-style-type: none"> • Addition of high doses of FYM and organic manures by 	

	High Hills Temperate Dry and Cold Deserts	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	1-2 tonnes /ha <ul style="list-style-type: none"> • Gap filling with higher (15-20%) seed rate • Regular weeding 	
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma			

Condition		Suggested Contingency measures			
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks	Dry temperate High Hills	Maize- Fallow Maize: local	Change in cropping pattern in favor of millets The cropping patterns can be <ul style="list-style-type: none"> • Ogla-fallow • Phaphra-fallow • Millets (ogla, phaphra)-fallows • Maize fodder-fallow 	<ul style="list-style-type: none"> • Mulching with local grasses • Intercropping • Adopt weed control measures 	Link Department of Agriculture and KVK to provide awareness and training amongst famers Use of local

		Wheat- Fallow Wheat: local	Wheat- Fallow Wheat: local	<ul style="list-style-type: none"> • Mulching with local grasses • Adopt weed control measures 	ITKs Continue	
		Rajmash- Fallow Rajmash: Kanchan, Jawala	Rajmash- Fallow Rajmash: Kanchan, Jawala			
		Peas- Fallow Pea: Lincoln and AP-1	Peas- Fallow Pea: Lincoln and AP-1			
		Potato- Fallow Potato: Kufri Jyoti	Potato- Fallow Potato: Kufri Jyoti			
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma			
	High Hills Temperate Dry and Cold Deserts	Apple	Apple			
		Vegetables	Vegetables			
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation	Remarks on Implementation
Early season drought (Normal onset)					

				measures		
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Dry temperate High Hills	Maize- Fallow Maize: local	Re sowing/ Gap filling with higher (15-20%) seed rate in case of crop failure Regular weeding	<ul style="list-style-type: none"> • Mulching with local grasses • Weed control measures 	Awareness by extension workers of the Department of Agriculture , KVKs and NGOs	
		Rajmash- Fallow Rajmash: Kanchan, Jawala				Re sowing/ Gap filling with higher (15-20%) seed rate Regular weeding
		Peas- Fallow Pea: Lincoln and AP-1				
		Potato- Fallow Potato: Kufri Jyoti				
		Milletts (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma				
	High Hills Temperate Dry and Cold Deserts	Apple Vegetables Milletts (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma				

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	Dry temperate High Hills	Maize- Fallow Maize: local	Life saving irrigation Re sowing/ Gap filling with higher (15-20%) Intercropping with legumes like mash	Mulching with local grasses Intercropping Adopt weed control	Awareness by extension workers of the Department of Agriculture , KVKs and NGOs
		Rajmash- Fallow Rajmash: Kanchan, Jawala	Life saving irrigation Gap filling with higher (15-20%)		
		Peas- Fallow Pea: Lincoln and AP-1			
		Potato- Fallow Potato: Kufri Jyoti			
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma			

	High Hills Temperate Dry and Cold Deserts	Vegetables	Life saving irrigation Gap filling with higher (15-20%)	Mulching with local grasses Appropriate weed control	
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Life saving irrigation Gap filling with higher (15-20%)	Mulching with local grasses Appropriate weed control	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
Mid season drought (long dry spell)			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At flowering/ fruiting stage	Dry temperate High Hills	Maize- Fallow Maize: local	Life saving irrigation	Critical irrigations through glacial melts	Link Department of Agriculture and KVK to provide awareness amongst farmers and also Link MGNERAGA for the support
		Rajmash- Fallow Rajmash: Kanchan, Jawala			
		Peas- Fallow Pea: Lincoln and AP-1			
		Potato- Fallow Potato: Kufri Jyoti			

		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma			of water harvesting structures Use of local ITKs
High Hills Temperate Dry and Cold Deserts		Apple Apple Standard Varieties, Royal Delicious, Kalidevi, Seed Rootstock Plants Apple	Training and pruning of apple orchards Thinning of fruits in apple Use of Standard high colour varieties of apple drought resistant varieties viz., Red chief, Use of spur type cultivars of apple Use of Clonal rootstocks viz., Malling and Merton of apple	Use of Mulching (plastic and hay mulch) Manual weeding Clean basin cultivation Use of drip irrigation foliar spray of urea @ 0.5 % to replace soil application Use of drippers and sprinkler irrigation	The Department of Agriculture and Horticulture to provide awareness amongst famers Use of local ITKs
		Vegetables	Life saving irrigation	Critical irrigations through glacial melts	
		Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)					
	Dry temperate High Hills	Maize- Fallow Wheat- Fallow Barley- Fallow Rajmash- Fallow Peas- Fallow Potato- Fallow Ogla- Fallow	Life saving irrigation Regular weeding Maintenance of soil cover with mulching Early harvesting at physiological maturity at a reasonable yield level	Plan for land preparation and sowings of rabi crops like Barley, Millets (Ogla, Phaphra), buckwheat , vegetables Pea (October Month)	Link Department of Agriculture, Horticulture, KVKs and NGOs for awareness on technologies and trainings amongst the farmers
	High Hills Temperate Dry and Cold Deserts	Apple Vegetables Millets (Ogla/ Phaphra)- Barley Ogla: local Phaphra: local Barley: Dolma	Use of maize as fodder If the damage is very severe		Use of local ITKs

2.1.2 Drought - Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agonomic measures	Remarks on Implementation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
low rainfall and snow fall	Agri-horticulture	Apple+Peas-Apple + Ogla	Vegetables , millets (kodra, phaphra),short growing season crops like vegetables	Re sowing/ Gap filling with higher (15-20%) Seed Rate Regular weeding Mulching with local grasses Intercropping with legumes like mash, raj mash Use of water harvesting systems Storage of glacial melts	Link Department of Agriculture, Irrigation and Public Health , Department of Horticulture, KVKs and NGOs for awareness campaigns Implement the programmes with Collaboration with the projects like RKVY, National Horticulture Mission and MNERAGA
		Apple+Barley-Apple + Fallow	Apple+Barley-Apple + Fallow	Mulching with local grasses within tree basins	
		Apple+Rajmash-Apple + Fallow	Apple+Rajmash-Apple + Fallow	Use of water harvesting systems Storage of glacial melts	
		Apple+Vegetable-Apple + Fallow	Apple+Vegetable-Apple + Fallow	Gap filling with higher (15-20%) seed rate	
		Apple+Pulses (Rajmash)-Apple + Fallow	Apple+Pulses (Rajmash)-Apple + Fallow		
		Buckwheat- Fallow	Buckwheat-Fallow	Gap filling with higher (15-20%) Seed Rate Regular weeding Mulching with local grasses Intercropping with legumes like mash, rajmash Use of water harvesting systems Storage of glacial melts	
		Maize-wheat	Maize-wheat		
		Maize-Barley	Maize-Barley		

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Not applicable				

- The irrigation in the area is through *kuhls* only. The *kuhls* are the water channels diverted from the snow melts/ rivers and brought to the field under the effect of gravity. These are the community resources and are shared on collaborative basis as per the community water distribution systems.

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Not applicable				
Non release of water in canals under delayed onset of monsoon in catchment					
Lack of inflows into tanks due to insufficient /delayed onset of monsoon					
Insufficient groundwater recharge due to low rainfall					

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)- Not applicable as the area receives majority of the precipitation through snowfall only

Condition	Suggested contingency measures			
Continuous high rainfall in a short span leading to water logging	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Heavy rainfall with high speed winds in a short span ²	Not applicable			
Outbreak of pests and diseases due to unseasonal rains				

2.3 Floods: Not applicable

Condition	Suggested contingency measure			
Transient water logging/ partial inundation	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Continuous submergence for more than 2 days				
Sea water intrusion				

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone*

Extreme event type	Suggested contingency measure ^r			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Not applicable			

Cold wave			
Horticulture			
Apple and other temperate fruits			In case of flowering of apple during March April if cold wave persists then smoking with grass is practiced
Frost	Not applicable		
Horticulture	Not applicable		
Hailstorm			
Maize	Use of Anti-hail Guns wherever feasible		
Pulses			
Potato & Other vegetables			
Horticulture			
Apple	Use of Anti-hail nets, anti-hail guns wherever feasible		
Other temperate fruits			
Cyclone	Not applicable		

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event^s	During the event	After the event
Drought			
Feed and fodder availability	Collect crop residues, collect tree fodder, use mangers, use chaff cutters, hay storage,	Utilization of fodder from Perennial & reserve sources, Open grazing in forests and alpine slopes/ community lands and feeding of crop residues; use of mangers and chaff cutters, feeding of household waste	Culling undesirable Livestock (sheep and goats), Raising of fodder trees, replacement of unproductive animals with improved ones

Drinking water	Storage of water in tanks , Traditional water ponds , rivers	Utilization of stored water, Stall drinking , rivers , traditional water ponds	Rejuvenation of water sources
Health and disease management	Advance preparation with medicines and vaccination, Local ethno pharmaceutical and modern medicines	Treatment of affected livestock by mass campaign, Modern veterinary care , veterinary camps , insulation	Proper veterinary care , awareness , capacity building of locals, health care management
Floods			
Feed and fodder availability			
Drinking water			
Health and disease management			
Cyclone			
Feed and fodder availability			
Drinking water			
Health and disease management			
Cold wave			
Shelter/environment management	Brought back from high hill pasture lands to nearby pastures ; restricted open grazing	Stationary conditions in cowsheds , group living, dry grass flooring, gunny bags on windows, gunny bags wrapped on the belly of milking animals , restricted open grazing during sunny days only	Open grazing, grazing in open sun , massage of milking animals and other species, hot water bath of animals
Health and disease management	Traditional herbs fed to animals	Warm living conditions, syrup of <i>lassi</i> (curd juice) after roasting fed to animals , avoid exposure to cold and rains/ snow.	Open grazing in sunny days and feeding of medicinal herbs . In case of acute problem , veterinary care

2.5.2 Poultry (Backyard only)

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event ^a	During the event	After the event	
Drought				
Shortage of feed ingredients	Surplus storage of poultry feed ; No special preparations as these are kept as backyard activity	Utilization of surplus feed; No impact as these is kept in captivity. Moreover these are kept as backyard and household waste is sufficient for their keeping	Kept as backyard activity Availing Insurance Culling affected birds	Collaboration with Directorate of Animal Husbandry
Drinking water	Storage of water in tanks	Utilize stored water	Kept as backyard activity and local drinking water is sufficient	Water storage structures can be constructed in collaboration with MNERAGA , HTM and other schemes of the Department of Rural Development
Health and disease management	Advance preparation with medicines and vaccination	Mass Vaccination, Locally managed with the help of veterinary care	Kept as backyard activity and local health care is practiced	Collaboration with Directorate of Animal Husbandry
Floods	Not applicable			
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Cyclone	Not applicable			

Shortage of feed ingredients				
Drinking water				
Health and disease management				
Heat wave and cold wave				
Shelter/environment management	Proper Ventilation and warm space	Proper aeration and fan , open spacing, water supply , warm space	Kept as backyard activity so no proper action is taken	Collaboration with Directorate of Animal Husbandry
Health and disease management	Local	Local and Veterinary care	Kept as backyard activity and local knowledge about veterinary care is practiced	

2.5.2 Fisheries/ Aquaculture (*It is a supportive activity only*)

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought	Not applicable		
A. Capture			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow			
(ii) Changes in water quality			
(iii) Any other			
B. Aquaculture	Not applicable		
(i) Shallow water in ponds due to insufficient rains/inflow			

(ii) Impact of salt load build up in ponds / change in water quality			
(iii) Any other			
2) Floods	Not applicable		
A. Capture	No specific action is taken as it is a supporting activity only and fishes are collected from natural ponds, rivers only .		
Marine			
Inland			
(i) No. of boats / nets/damaged			
(ii) No.of houses damaged			
(iii) Loss of stock			
(iv) Changes in water quality			
(v) Health and diseases			
B. Aquaculture	Not applicable		
(i) Inundation with flood water			
(ii) Water contamination and changes in water quality			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
3. Cyclone / Tsunami	Not applicable		
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			

Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds			
(ii) Changes in water quality (fresh water / brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)			
4. Heat wave and cold wave	Not applicable		
A. Capture			
Marine			
Inland	.		
B. Aquaculture	Not applicable		
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			
(iii) Any other			

- No specific action is taken as it is a supporting activity only and fishes are collected from natural ponds, rivers only.