State: BIHAR

Agriculture Contingency Plan for District: Sitamarhi

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)		
	Agro-Climatic Zone (Planning Commission)	Middle Gangetic Plain Region (IV)		
	Agro Climatic Zone (NARP)	North West Alluvial Plain Zone (BI-1)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Zone – 1 (Saran, Siwan, Goplaganj, Muzaffarpur, E. Champaran, W.Champaran, Sitamarhi, Sheohar, Vaishali, Darbhanga , Madhubani, Samastipur		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		25^0 53' N & 26^0 27' S	85^0 40' E & 85^0 86' W	56 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RAU, Pusa, Samastipur (Bihar)		
	Mention the KVK located in the district with address	PC,Krishi Vigyan Kendra, VII & P.O- Balha Madhusudan, Via- Janakpur Road, Pupri, Sitamarhi -843320		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Rajendra Agricultural University, Pusa, Samastipur		

1.2	**Rainfall (Zone-I)**	**Normal RF(mm)**	**Normal Rainy days (number)**	**Normal Onset**	**Normal Cessation**
	SW monsoon (June-Sep)	1358.2	45	3rd week of June	2nd week of October
	NE Monsoon(Oct-Dec)	92.1	03	-	
	Winter (Jan- Feb)	209.4	03		
	Summer (Mar-May)	20.5	04		
	Annual	1680.2	55		

1.3	**Land use pattern of the district**	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 fallows	Other fallows
	Area ('000ha)	259.8	122.9	6.4	2.3	0.3	69.6	12.6	-	24.9	19.6

1. 4	**Major Soils**	**Area ('000 ha)**	**Percent (%) of total**
	Sandy Soils	13.887	6.67
	Fine Sandy Loam Soils	89.548	43.00
	Clayey Soils	51.995	24.96
	Saline/ Calcareous Soils	52.835	25.37

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	122.9	110%
	Area sown more than once	12.6	
	Gross cropped area	135.5	

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	49.1		
	Gross irrigated area	60.2		
	Rainfed area	73.8		
	Sources of Irrigation	Number	Area (ha)	Percentage of total irrigated area
	Canals			
	Tanks	2951	2.4	3.8
	Open wells	13495		
	Bore wells	500		
	Lift irrigation schemes			
	Micro-irrigation			

	Other sources			
	Total Irrigated Area		60.2	
	Pump sets Tuber wells	26953		
	No. of Tractors	2500		
	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	17	100%	Arsenic- 0-0.4ppm or 0-400 ppb
	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 (as per figures of 2008-09)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Rice	14.9	56.13	71					71
	Wheat				16.8	3.7	20.5		20.5
	Maize				6.91	1.09	8		8
	Mustard/Toria				0.2	1.4	1.6		1.6
	Greengram							1	1
	Lentil				0.6	0.4	1		1

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mango	10.2		
	Litchi	0.6		
	Guava	0.5		
	Banana	1		
	Papaya	0.02		
	Aonla	0.17		

	Horticulture crops - Vegetables	Total	Irrigated	Rainfed
	Potato	8.4	8.4	
	Sponge goBlackgram	1.4	1.4	
	Tomato	1.1	1.1	
	Cauliflower	2.2	2.2	
	Cabbage	1.8	1.8	
	Brinjal	2.0	2.0	
	Okra	1.5	1.5	
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
	Plantation crops	**Total**	**Irrigated**	**Rainfed**
	Fodder crops	**Total**	**Irrigated**	**Rainfed**

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	334.046	361.900	695.946
	Improved cattle	-	-	-
	Crossbred cattle	4.500	15.000	19.500
	Non descriptive Buffaloes (local low yielding)			
	Descript Buffaloes	105.895	110.000	215.895
	Goat	107.144	130.000	237.144
	Sheep	10.000	67.000	77.000
	Other (Camel, Pig, Yak etc.)	334.046	361.900	695.946
	Commercial dairy farms (Number)	-	-	-

1.9	Poultry	No. of farms	Total No. of birds ('000)
	Commercial		90.7
	Backyard		208

1.10	**Fisheries** (Data source: Chief Planning Officer)

	A. Capture						
	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**	
		2000		**2500**		**1800**	
	B. Culture						
				Water Spread Area (ha)	**Yield (t/ha)**	**Production ('000 tons)**	
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)			3544	3.5	10350	
	ii) **Fresh water** (Data Source: Fisheries Department)						

1.11 Production and Productivity of major crops (Average of last 5 years: 2004-08)

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 identified based on total acreage)										
	Rice	99.4	1400					99.4	1400	
	Wheat			43.2	2100			43.2	2100	
	Maize			17.6	2200			17.6	2200	
	Mustard/Toria			1.02	625			1.02	625	
	Greengram			0.85		0.9	900	1.75	900	
	Lentil				0.85				0.85	
Major Horticultural crops (Crops identified based on total acreage)										
	Mango							45.7		
	Guava							5.7		
	Banana							26.5		

	Litchi							15.3		
	Lemon							1.9		

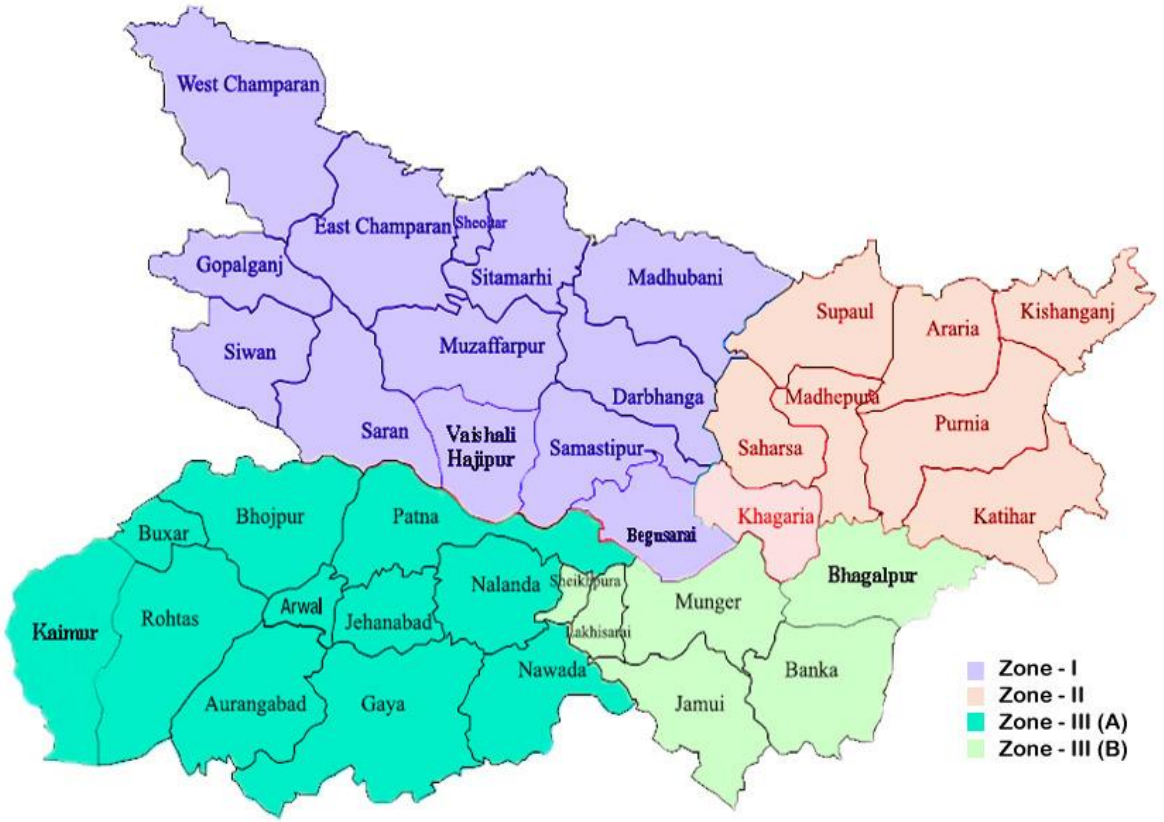
1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	**Rice**	**Wheat**	**Maize**	**Lentil**	**Potato**
	Kharif- Rainfed 1. Up land 2. Mid Land 3. Lowland	1 -2nd week of July 2nd-3rd week of June 3rd week of May- 1st week of June	-	-	-	-
	Kharif-Irrigated	3rd week of May – 4th week of June	-	-	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	2nd week of November - 2nd week of December	3rd week of October - 2nd week of November	2nd week of October - 2nd week of November	3rd week of October - 2nd week of November

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 - BPH, L.B., S.B., Aphid	√		

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

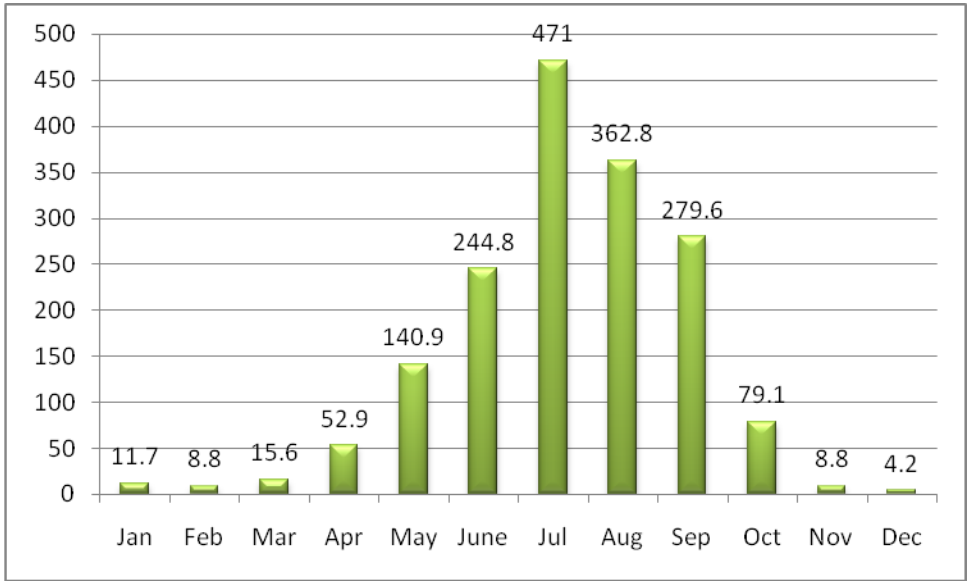
Agro climatic Zones of Bihar



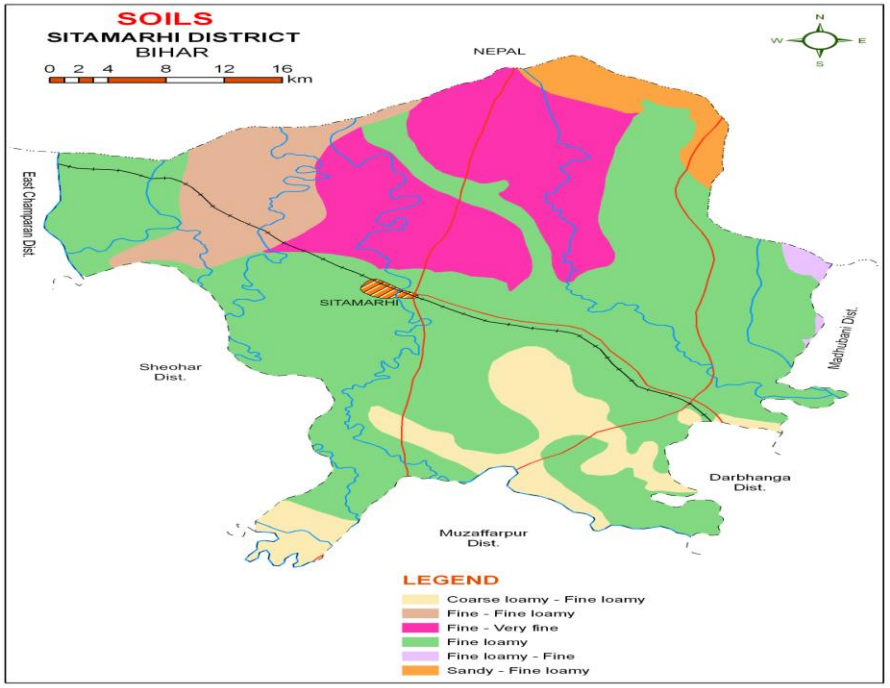
Source: krishi.bih.nic.in

Annexure II

Mean annual rainfall (mm)



Annexure-III



Source: NBSS&LUP, Kolkata

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 1st week of July	Upland heavy loamy soils	Rice-Wheat	Rice – Wheat Rice- Prefer Long to medium duration varieties Greengram - Pusa Bashaki, SML 668, PDM-44, T-44 Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	• Adopt normal package of practices • Direct seeding of drought tolerant varieties in dry soil in June/ July with pre emergence herbicide application under sufficient soil moisture conditions. • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected districts. • Interculture for timely weed control in direct seeded rice • Groundwater to be used for life saving irrigation to upland crops and transplanted rice	-
	Medium land	Rice- Wheat	Rice-Wheat Rice- Prefer Long to medium duration varieties Rice - Rajendra sweta (135-140d), Rajendra mahsuri (140-150 days), Sita (130-140d), Rajendra Bhagawati, Rajendra Suwasni, Rajshree (140d),		
	Lowland	Rice – Wheat	Rice – Wheat Rice- Prefer Long to medium duration varieties Rice- Rajshree (140d), Rajendra Suwasni (115-120 d), Rajendra Sweta,Mahamaya (125-130d), Birsamati (130 d), ‘ Swarna sub-1		

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 4 weeks 3rd week of July	Upland heavy loamy soils	Rice- Wheat	Rice-Wheat Rice- Prefer Medium to short duration varieties like Saroj (100-110d), Birsa Dhan-201 (100-115d), Rajendra Bhagwati. Etc.	• Direct seeding of rice with medium duration drought tolerant varieties with pre emergence herbicide application under sufficient soil moisture conditions followed up with a post-emergence weedicide application 20-25 days later for effective weed management. • Normal sowing of rice can be used with enhanced NPK to boost the early vegetative growth in late plantings under sufficient moisture • Interculture for timely weed control in direct seeded rice	- Seeds from RAU, Pusa, NSC, TDC , BRBN etc.
	Medium land	Rice – Wheat	Rice-Wheat Direct sowing / 20d old dapog seedlings with medium to short duration varieties – BR34, Rajendra Dhan-201(130-135d), Rajendra Bhagwati,	• Where field is moist, direct seeding of medium duration varieties (125 days) can be done during second fortnight of July in midlands. Post-emergence herbicide application use is essential • Use mat nursery/ dapog nursery , mat nursery (dapog method) can be raised for quick availability of young seedlings for transplanting of	
	Lowland	Rice – Wheat Makhana (in ponds) Var. local	Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta, Swarna sub-1		

			(130-140 days long duration variety should be selected)	medium duration varieties by first fortnight of August in mid and low lands • Raise staggered community nursery preferably with short duration varieties in mid and lowlands • Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. • Enhanced dose of nitrogen with full basal dose of NPK at the time of transplanting to boost the early vegetative growth in late plantings under sufficient moisture • Timely interculture for weed control in direct seeded rice • Life saving irrigation	

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 6 weeks 1st week of August	Upland shallow red soils	Pigeonpea-Greengram	Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant Blackgram-30 , Pant Blackgram-19 Finger millet- DB-7, BR-5, BR-10, Coimbatore-1	• Life saving irrigation	Seeds from RAU, Pusa, NSC, TDC , BRBN etc.
	Upland heavy loamy soils	Rice-Wheat	Rice – Wheat Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant Blackgram-30 , Pant Blackgram-19 Finger millet- DB-7, BR-5, BR-10,	• Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected	

			Coimbatore-1 Rice- Prefer short (early matured) varieties like Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi , Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)	districts • Life saving irrigation	
	Medium land	Rice – Wheat	Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant urd-30 , 19 Finger millet- DB-7, BR-5, BR-10, Coimbatore-1	-	
		Rice – Wheat	Rice (Short duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta Saroj	• Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Direct seedling of Rice • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands • Enhanced basal dose of NPK to boost the early vegetative growth • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected districts • Life saving irrigation	
	Lowland	Rice-Wheat-Greengram (Greengram)	Rice (Short Duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj If dry spell continues, direct seeding of short duration rice varieties (100 days) can be done in midlands by first fortnight of August and extra short duration (70-75 days) up to 25th August		

Condition			**Suggested Contingency measures**		
Early season	**Major Farming**	**Normal Crop /**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on**

drought (delayed onset)	situation	Cropping system	including variety		Implementation
Delay by 8 weeks 3rd week of August	Upland shallow to heavy soils	Pigeonpea-Greengram	Blackgram/Finger millet -Sep. Pigeonpea / Late Wheat/Lentil/ Potato/ Rai/ Mustard	• Moisture conservation • Inter cultivation • Sowing of *rabi* crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
		Rice-Wheat	Blackgram/Finger millet -Sep. Pigeonpea / Late Wheat/Lentil/ Potato/ Rai/ Mustard Rice- Prefer Early matured varieties like Turanta dhan (75d), Prabhat (90d), Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi, Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)		
	Medium land	Maize-Wheat	Sesame –Rabi maize/ Late Wheat Sesame – Krishna, Pragati	• Supply of contingency crop seeds of Toria, Maize (QPM varieties, Swann composite-65-70 days; HM-4 hybrid baby corn), Arhar (Bahar, NDA1, Pusa 9), Urd (Navin and T9), Cowpea and Horsegram need to be ensured for taking up of sowing in September in midlands • Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts	
		Pigeonpea – Greengram	September Pigeonpea-Greengram Greengram – Samrat, Pusa Vishal, SML 668, PDM-44, T-44 Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I		

		Rice-Wheat	Direct seeded rice (DSR) with short duration (80-90 days) varieties (Turanta dhan, Prabhat, Anjali, Vandana, CR-Dhan-40 etc.) can be taken up in midlands till the end of August subject to availability of at least one assured irrigation Early Rice-Prabhat, Dhanlaxmi, Richharia, Turanta	• Direct seeding of rice • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Use of 20 days old dapog seedling in rice. • Enhanced basal dose of NPK in rice to boost early vegetative growth • Supply of contingency crop seeds of Toria, Maize (QPM varieties, Swann composite-65-70 days; HM-4 hybrid baby corn), Arhar (Bahar, NDA1, Pusa 9), Urd (Navin and T9), Cowpea and Horsegram need to be ensured for taking up of sowing in September in midlands • Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts	
	Lowland	Rice- Potato	Rice-Potato/Wheat Rice- Rajshree, Santosh , Sita Rajendra Suwasni, Rajendra Sweta	• Double transplanting of rice (karuhan) can be done with 30 + 45 days old seedlings of long duration or photosensitive varieties up to 30th August with close planting (40-45 hills per square meter) • Application of organic manure and vermi compost	
		Rice-Wheat-Green gram	Sept. Pigeonpea-Greengram Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I		

			Sesame-Rabi maize Sesame – Krishna, Pragati	initially for Rice and other crops. • Sowing of *rabi* crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables can be taken up on time for maximizing productivity from lowlands with support from the government for timely supply of inputs and in a way *rabi* production would compensate the production loss during *kharif.* • Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts	

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Very deep, calcareous fine loamy soils	Rice-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	• Gap filling • Thinning	• Timely interculture for weed control in direct seeded rice • Mulching • Conservation tillage • Life saving irrigation	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium land	Maize-wheat Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Maka-3	• Gap filling		
		Pigeonpea-Greengram	• Pre-sowing irrigation • Higher seed rate		

		Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	• Gap filling through Dapog nursery		
	Lowland	Rice-Wheat-Green gram Rice- Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta	• Gap filling through Dapog nursery		

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	Very deep, calcareous fine loamy soils	Rice-Potato Rice –Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	• Gap filling of existing crop • Postponement of top dressing • Foliar application with 2% Urea to boost up the vegetative growth	• Inter culturing • Mulching • Conservation tillage • Foliar spray with (1%) MOP • Life saving irrigation	
		Pigeonpea -Greengram Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	-		
	Medium land	Rice-Wheat-Green gram Rice- - Rajendra Bhagawati, Rajendra Suwasni Rajshree, Prabhat	• Gap filling of existing crop • Postponement of top dressing		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Up land	Rice-Wheat Vegetables– Wheat	• Postpone the top dressing • Foliar application with 2% Urea to boost up the vegetative growth	• Interculture • Foliar application with 2% MOP	

	Medium land	Maize-wheat	• Postpone the top dressing • Foliar application with 2% Urea or MOP	• Mulching • Conservation tillage • Life saving irrigation	
		Pigeonpea -Greengram	-		
	Lowland	Rice-Wheat-Greengram	• Postpone the top dressing • Foliar application with 2% Urea		

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Upland calcareous fine loamy soils	Rice-Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta , Saroj	• Foliar application with 2% Urea to boost up the vegetative growth • Mulching • Life saving irrigation	• Foliar application with 2% Urea or MOP • Open the furrow during evening and left furrow open overnight and plank in the next morning before sunrise for growing of early rabi crops like wheat, Rabi Maize/Pulses /Oilseeds/ Vegetables • Sowing of *rabi* crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables can be taken up on time for maximizing productivity from lowlands with support from the government for timely supply of inputs and in a way *rabi* production would compensate the production loss during *kharif.*	
	Medium land	Maize-Wheat Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Maka-3			
		Pigeonpea Var. Bahar, Narendra Arhar-1			
	Lowland	Rice-Wheat-Greengram Rice- Rajshree, Santosh ,Sita, Rajendra Suwasni, Rajendra Sweta			

2.1.2 Drought - Irrigated situation

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				
Limited release of water in canals due to low rainfall					
Non release of water in canals under delayed onset of monsoon in catchment					

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Upland	Rice-Wheat/Oilseeds/ Pulses/ Rabi maize	Short duration of Rice –Pigeonpea Blackgram /sesame-Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	• Direct seedling of rice • Dapog nursery for rice in midlands and lowlands • Application of organic manure and vermicompost • Mulching • Groundwater to be used for life saving irrigation to upland crops,	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium Land	Rice-Wheat/Oilseeds/ Pulses/ Rabi Maize	**1.**Short duration of Rice- Pigeonpea 2.Blackgram-Wheat 3.Sesame –Wheat Rice- - Rajendra Bhagawati, Rajendra Suwasni, Rajshree, Prabhat		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Lowland	Rice-Wheat/Oilseeds/ Pulses/ Rabi maize	Short duration Rice-Wheat/ Lentil-Mustard/Linseed Rice- Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta	vegetables and transplanted rice	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Upland	Rice-Wheat/Oilseeds/ Pulses/ Rabi maize	Short duration of Rice- Wheat Pigeonpea/Blackgram/ Sesame- Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	• Dapog nursery for rice • Direct seedling of rice • Mulching • Application of organic manure and vermicompost • Groundwater to be used for life saving irrigation to upland crops, vegetables and transplanted rice	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium Land	Rice-Wheat/Oilseeds/ Pulses/ Rabi maize	Short duration of Rice- Wheat Pigeonpea/Blackgram/ Sesame- Wheat Rice- - Rajendra Bhagawati, Rajendra Suwasni, Rajshree, Prabhat		
	Lowland	Short duration of Rice- Wheat Pigeonpea/Blackgram/ Sesame- Wheat	Short duration Rice-Wheat/Lentil/Mustard/Linseed Rice- Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta		

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**

water logging				
Rice	• Drainage management • Re-transplanting through Dapog nursery if needed • Gap filling • Resowing with drum seeder	• Drainage management • Subsequently crop if totally damaged i.e. Toria	• Drainage management • Subsequent crop if totally damaged • Harvest at physiological maturity	Storage at safer place
Maize	• Drainage management • Gap filling • Resowing, if completely damaged	• Drainage management • Alternative maize or other rabi crop if totally damaged	• Drainage management • Subsequent if totally damaged • Harvest at physiological maturity	Storage at safer place
Pigeonpea	• Drainage management • September sowing if Khrif Arhar is completely damaged • Gap filling if needed	• Drainage management • Alternative maize or other rabi crop if totally damaged	• Drainage management • Subsequent if totally damaged • Harvest at physiological maturity	Storage at safer place
Vegetables	• Resowing , if required • Replanting	• Drainage management	• Drainage management	Storage at safer place
Horticulture				
Mango	• Drainage management • Replanting if completely damaged • Gap filling	• Drainage management	• Drenching with copper fungicides • Drainage management • Harvesting at proper maturity	
Litchi	• Drainage management • Replanting, if completely damaged	• Drainage management	• Drainage management • Spray and pasting of trunk with suitable fungicide • Drenching with copper fungicide	
Banana	• Drainage management • Replanting, if completely damaged	• Drainage management	• Drainage management • Spray and pasting of trunk with suitable fungicide	
Papaya	• Drainage management • Replanting, if completely	• Drainage management	• Drainage management • Spray and pasting of	• Safe storage and transportation

	damaged		trunk with suitable fungicide	
Heavy rainfall with high speed winds in a short span[2]				
Rice	• Drainage management • Replanting if completely damaged • Gap filling if needed	• Drainage management • Subsequent crop if totally damaged i.e. Toria	• Drainage management • Subsequent crop if totally damaged	Storage at safer place
Maize	• Resowing If completely damaged • Gap filling if needed • Drainage management	• Drainage management • Alternative maize or other crop if totally damaged	• Drainage management • Subsequent crop if totally damaged	Storage at safer place
Pigeonpea	• Resowing If completely damaged • Gap filling if needed • Drainage management	• Drainage management • Alternative crop if totally damaged	• Drainage management • Alternative crop if totally damaged	Storage at safer place
vegetables	▪ Drainage management ▪ Gap filling	• Drainage management	• Drainage management • Drenching with copper fungicide	
Horticulture				
Mango	• Drainage management • Replanting if substantially damaged	• Drainage management • Drenching with copper fungicides	• Drainage management • Harvest at proper time	
Litchi,	▪ Drainage management ▪ Gap filling	Drainage management	• Drainage management • Drenching with copper fungicide	
Banana, Guava	• Drainage management • Replanting if substantially damaged	• Drainage management • Staking	• Drainage management • Harvest at proper time	
Outbreak of pests and diseases due to unseasonal rains				

Rice	❖ Seedling treatment with granular insecticide – Cartap hydrochloride or phorate 10G or carbofuran 3G. ❖ Maintain shallow water in nursery beds ❖ Providing good drainage.	❖ Use copper fungicides against Bacterial leaf blight. ❖ Split application of N fertilizer (3-4 times)	❖ Harvest at physiological maturity	Proper drying and safe storage
Maize	❖ Drainage, and yellowing mainly due to nitrogen deficiency apply N split doses ❖ Application of granular insecticides viz. Thimet 10g, or Carbofuran 3g. in whorl of maize	❖ Foliar blight control through Mancozeb @ 2.5g/l or Zineb/ Maneb @ 2.5-4 g/lit of water (2-4 applications at 8-10 days interval)	❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity	❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage ❖ Proper dying
Pigeonpea	❖ Provide drainage ❖ Seed treatment with 1 g carbendizim +2g thiram/kg seed.	Provide drainage	Provide drainage	❖ Proper dying • Storage at safe place and transportation
Horticulture				
Vegetables	• Drainage management	• Drainage management	• Drainage management	
Mango	**Anthracnose:-** The foliar infection can be controlled by spraying of copper oxychloride (0.3%) Use bio control agent viz *Streptosporangium pseudovulgare* **Bacterial canker:** Regular inspection of orchards, sanitation and seedling certification are recommended as preventive measures.	**Anthracnose:-** Apply Carbendazim/ Thiophanate methyl (1g/lit) to control of Anthracnose. Blossom infection can be controlled effectively by spraying of Bavistin (0.1%) at 15 days interval. **Mango powdery mildew:** Spray wettable sulphur(0.2%) & calixin or karathane (0.1%) during second week of December	**Mango powdery mildew:** Prune diseased leaves and malformed panicles harbouring the pathogen to reduce primary inoculum load. Spray wettable sulphur (0.2%) when panicles are 3-4" in size Spray dinocap (0.1%) 15-20 days after first spray. Spray tridemorph (0.1%)	Harvest at proper time **Anthracnose:-** Pre-harvest sprays of hexaconazole (0.01%) or Carbendazim (0.1%) at 15 days interval should be done in such a way that the last spray falls 15 days prior to harvest. Diseased leaves, twigs, and fruits, should be

	Mango stones for raising seedlings (root stock) should always be taken from healthy fruits. Use of wind-breaks helps in reducing brushing/ wounding and thus reduces the chance of infection.		15-20 days after second spray. Spraying at full bloom needs to be avoided. **Mango bacterial canker:** Three sprays of Streptocycline (200 ppm) at 10 days intervals reduce fruit infection. In severe infection, spraying of Streptocycline (300 ppm) or copper oxychloride (0.3%) is more effective.	collected and burnt to avoid the spread for next season
Litchi	Fruit Fly: Monitor adult fruit flies emrgence by using methyl eugenol or sex pheromone traps.	Fruit Fly: First Spray delta menthrin 0.0025% plus molasses 0.1% . after 10-12 days spray fenthion 0.05% + molasses 0.1% followed by dimethoate 0.045% + molasses 0.1% if required	Harvest at proper time	Fruit Fly: Collect all fallen infested fruits and put in a drum covered with fine wire mesh. Harvest fully matured fruits one week earlier to escape egg laying
Banana	Provide drainage	Provide drainage	Harvest at proper time	
Guava	Provide drainage	Provide drainage	Harvest at proper time	

2.3 Floods

Condition	**Suggested contingency measures**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	• Provide drainage • Re transplanting through dapog nursery seedlings • Gap filling	• Provide drainage • Gap filling • 40-45 days old seedlings may be used • Kharuhan (double transplanting) mehod	• Provide drainage • Harvest at physiological maturity • Lentil as paira crop can be taken	Storage at safer place
Maize	• Provide drainage	• Provide drainage	• Provide drainage	Storage at safer place

	• Re sowing Gap filling		• Harvest at physiological maturity	
Pigeonpea	• Provide drainage • Re sowing • Gap filling if needed	• Provide drainage	• Provide drainage • Harvest at physiological maturity	Storage at safer place
Horticulture				
Mango	• Re planting • Gap filling • Provide drainage	• Drenching with copper fungicides • Provide drainage	• Drenching with copper fungicides • Provide drainage	
Litchi	• Gap filling • Replanting • Provide drainage	• Drenching with copper fungicides • Provide drainage	• Drenching with copper fungicides • Provide drainage	
Banana	• Replanting • Gap filling • Provide drainage	• Drenching with copper fungicides • Provide drainage	• Drenching with copper fungicides • Provide drainage	
Guava	• Replanting • Gap filling • Provide drainage	• Drenching with copper fungicides • Provide drainage	• Drenching with copper fungicides • Provide drainage	
Continuous submergence for more than 2 days[2]				
Rice	• Gap filling, • Re sowing	• Replanting through Kharuhan (double transplanting) method by 3-4 seedlings per hill • Short duration rice variety	• Toria/Late wheat if completely damaged	Storage at safer place
Maize	• Re sowing	• Re sowing or gap filling	• Toria/Late wheat if completely damaged	Storage at safer place
Horticulture				
Mango	• Provide drainage			
Guava	• Provide drainage			
Banana	• Provide drainage			
Sea water intrusion[3]	Not Applicable			

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

Extreme event type	**Suggested contingency measure[r]**			
Heat Wave[p]				
Maize,	Provide irrigation	Provide irrigation	Provide irrigation	
Pigeonpea	Provide irrigation	Provide irrigation	Provide irrigation	
Wheat	Provide irrigation	Provide irrigation	Provide irrigation (Terminal heat)	

Horticulture				
Mango	Provide irrigation	Provide irrigation	Provide irrigation	
Litchi	Provide irrigation	Provide irrigation	Provide irrigation	
Papaya	Provide irrigation	Provide irrigation	Provide irrigation	
Cold wave[q]				
Wheat	-	Provide irrigation , Mulching		
Maize	-	Provide irrigation , Mulching		
Mustard	-	Provide irrigation , Mulching		
Potato	-	Provide irrigation , Mulching		
Pulses	-	Provide irrigation , Mulching		
Horticulture				
Vegetables		Provide irrigation, Mulching		
Frost				
Wheat		Provide irrigation, Mulching		
Chickpea		Provide irrigation , Mulching		
Pigeonpea		Provide irrigation , Mulching		
Lentil		Provide irrigation , Mulching		
Horticulture				
Vegetables		Provide irrigation , Mulching		
Tomato & Potato		Earthing up Provide irrigation , Mulching		Harvest in dry weather
Hailstorm	Not Applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought	Not Applicable		

Cyclone	Harvest all the possible wetted grain (rice/ wheat/maize etc) and use as animal feed after drying. Arrange for storing minimum required quantity of hay (25-50 kg) and concentrates (10-25 kg) per animal in farmer's / LS keepers house/ shed for feeding during cyclone. Don't allow the animals for grazing in case of early fore warning (EFW) Incase of EFW, shift the animals to safer places. Identification of animals may be done. Keep animals untied in the shed in case of EFW.	Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers. Diarrhea out break may happen, arrangement should be made to mitigate the problem Protect the animals from heavy rains and thunder storms In severe cases un-tether **or** let loose the animals Arrange transportation of highly productive animals to safer place Spraying of fly repellants in animal sheds	Repair of animal shed Deworm the animals through mass camps Vaccinate against possible out breaks Proper disposable of the dead animals / carcasses by burning / burying with lime/ bleaching powder in pit Bleach / chlorinate (0.1%) drinking water or water resources Collect drowned crop material, dry it and store for future use Sowing of above mention short duration fodder crops in unsown and water logged areas Application of urea (20-25kg/ha) in the CPR's to enhance the bio mass production.
Floods	**1. Reserve feed/ fodder bank at community level** Each district should have reserves (feeding 5000 ACU maintenance ration for about 1-3 weeks period) of the following at any point of the year for mobilization to the needy areas. Complete feed block or urea molasses mineral bricks may be stored. Checking of feed availability may be made at 3 months interval, particularly before onset of monsoon. Silage:20-50 t Urea molasses mineral bricks (UMMB): and complete feed block	**1. Immediate measures** Transportation of animals to elevated areas. Temporary shelter arrangement. Stall feeding of animals with stored hay and concentrates. Proper hygienic and sanitation of the animal shed/ temporary shelter. Application of lime/ bleaching powder or ash may be applied around shed. In severe floods, un-tether or let loose the animals Emergency outlet establishment for required medicines or feeds in each village. Checking of animals for injury and illness. Spraying of fly repellants in animal sheds. Smoke may be	Repair of animal shed. Bring back the animals to the shed. Cleaning and disinfection of the shed with bleaching powder/ lime or ash. Bleach (0.1%) drinking water / water sources Deworming with brood spectrum dewormers. Vaccination against possible out breaks Proper disposable of the dead animals / carcasses by burning /

	(CFB) 50-100 t Hay:100-250 t Concentrates: 20-50 t Minerals and vitamin supplements mixture:1-5 t **2. Preparation and storage of silage and hay and crop by-products at household level. The feed storage may be established in high land where shelter may be taken during flood.** Preserve the fodder in the form of hay from Berseem, cowpea, oat & other grasses as well as silage from (a Maize- harvesting at dough stage. (b) Jowar - at flowering stage. (c) Oat (d) Hybrid Napier – 40-45 day old. (e) Water hycianth mixing with Rice straw in ratio of 4:1 with 70 kg molasses /ton of clean water hyacinth. Bales of hay and other dry fodder should be stored and covered with asbestos sheet or polythene sheet. Preserve crop by-products like broken rice/ wheat/ maize, bran, chunies etc and dried plant of masoor, Greengram, etc in *bhuskar*. The height of *bhuska*r may be high (above the water level of last flood). **3, Creation of permanent fodder seed banks in all flood prone areas.** **4. General precautions** In case of EFW, harvest all the crops (Sorghum, Maize, Rice, Wheat, Horse gram,	generated at night inside the shed to prevent animals from mosquito bite. Govt. may supply feed block or urea molasses minerals bricks or concentrate as flood relief. Bleaching powder and lime may also be supplied. If stored feed are not available, feeding of animals may be done with top feeds (tree leaves,, aquatic plants, sugarcane tops) etc. as mentioned in drought. Fungal infected straw/ feed should not be fed. Bleach (0.1%) drinking water / water sources. If bleaching powder is not available, treat with lime powder. Produce smoke with mosquito replants in the shed during night.	burying with lime and bleaching powder in pit. . Subsidy may be given for proper disposal of dead animals. Proper drying the harvested crop material and proper storage. Wet feed/ straw may be dried for animal feeding. Care should be taken not to feed fungal infected feed. Wet straw may be treated with urea (1%) to prevent fungal growth and enrichment. Govt. may supply cattle feed at frequent interval or at sufficient quantity to feed the animals. If available feed is insufficient quantity, concentrate mixture may only be fed to milch and pregnant animals. Feed wastage may be reduced by offering feed in small quantity feed in several times (4 times a day) Aquatic plants like duck weed, water hyacinth and banana plants may be fed to dry and unproductive animals along with wheat straw.

	etc) that can be useful as fodder in future (store properly) Don't allow the animals for grazing Arrange for storing minimum required quantity of hay (25-50kg) and concentrates (25kgs) per animals in farmer / LS keepers house / shed for feeding animals during floods Arrangement for transportation of animals from low lying area and also for rescue animal health workers. Keep animals untied in the shed. Permanent marking/ identification of animals. **5. Strengthening of co-operative sectors in flood prone areas for milk marketing and inputs of medicine, seed , feed and veterinary care. One person in each village may be trained with primary veterinary health care and emergency rescue operation.** **6. Emergency kit preparation** Emergency medicine Temporary shelter Torch Rope		Sugarcane tops, bamboo leaves and mango leaves may be fed to milching, pregnant and small ruminants. When local grass will be available, may be fed to all animals. Newly grown grasses may contain high amount of nitrate. Care may be taken to feeding grasses after flood water is receded. There may be leaching of essential minerals due to waterlogging. So, mineral mixture may be fed to all animals. Mineral mixture may be supplied by the Govt. at subsidized rate. Timely treatment of animals may be done by increasing of number of veterinary dispensary and mobile veterinary clinics. Medicine may be supplied at free of cost. Flood prone zones are susceptible to liver fluke, so, drug may be given to control fluke infestation. Smoke may be generated at night inside the shed to prevent animals from mosquito bite.

			Farmers may be given soft loan for purchase of new animals. Cooperative society may be extended to this area which will help in following 1. Society will provide loan through bank. In a month, price of 3 weeks milk will be given to the farmers and 1 week price will be given to bank for repay of loan. 2. Farmers will get medicine at wholesale rate. 3. Concentrate feed will be provided by co-operative at subsidized rate. 4. Timely treatment of animals will be done. 5. Marketing channel for milk will be steady. Subsidy may be given for construction of temporary animals shed (Bamboo based). Animals should come under insurance coverage. Small-scale income generating activities like backyard poultry, duckery, goatery may be started. For this purpose, farms may be developed in non-flood prone zones where these animals will be raised up to certain age and will be distributed to the affected farmers for immediate income generation.

			Fodder cultivation may be encouraged with supply of fodder seed.
Heat & Cold wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) Water sprinklers / foggers in the shed ot frequent washing of animals. **iii)** Application of white reflector paint on the roof or putting rice straw on the roof of the shed. **Cold wave :** Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	Allow the animals early in the morning or late in the evening for grazing during heat waves Allow for grazing between 10AM to 3PM during cold waves Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves. Molasses may be added in the concentrate feed during heat waves. Put on the foggers / sprinkerlers and frequent washing of animals during heat weaves and heaters during cold waves In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves. Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
Health and Disease management	Specify the endemic diseases (species wise) in that region. Identification of veterinary staff and animal health workers. Constitution of Rapid Action Veterinary Force Storage of emergency medicines and medical kits Timely vaccination (as per enclosed vaccination schedule) against all endemic diseases Surveillance and disease monitoring network	Rescue of sick and injured animals and their treatment Conducting mass animal health camps Animals may be checked for any external injury and illness, Pregnant animals may be checked for any discomfort and uneasiness. Animals may be de wormed with suitable anti-parasitic drug and be checked and treated for ecto-parasites, if any. De worming will improve fodder and feed absorption.	Conducting psahu sibir, mass animal health camps, fertility camps and deworming camps. Conducting fertility camps. Disposal of carcass by above means. Pregnancy toxemia may occur due to prolonged under-feeding. Hypoglycemia is also observed. Treatment may be provided to affected animals. Adequate attention is to be paid to disinfect the premises of temporary sheds with the help of bleaching powder, phenol, carbolic acid etc. In no case the carcass/ cadaver should come in contact with healthy

	establishment Provision for mobile ambulatory van.	During flood do not leave halter or headstalls on animals. Do not tie animals together when releasing. Report the location, identification and disposition of livestock and poultry to authorities handling the disaster. During flood cases of malaria, diarrhea, respiratory infection, fever, injury, leg gangrene and snake bite may be high. Precaution may be taken to treat the affected animals.	animals rehabilitated in sheds. During flood cases of malaria, diarrhea, respiratory infection, fever, injury, leg gangrene, water born diseases and snake bite may be high. Precaution may be taken to treat the affected animals Diseases that can occur during flood should be given special attention and accordingly medicines should be made available in the health camp for the following mentioned diseases. Salmonella spp. Escherichia coli Giardiasis Amoebiasis Rotavirus Leptospirosis Scabies Black leg Malignant Edema Foot rot Anthrax Botulism Tetanus Red water Black disease Entertoxemia Liver fluke Amphistomiasis Brooders pneumonia Malaria Snake bite.

Insu rance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals
Drinking water	Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals) Identification of water resources	Restrict wallowing of animals in water bodies/resources	Specify the options (place and area) for establishment of drinking water reserves

Vaccination schedule in small ruminants (Sheep & Goat)

Disease	**Season**
Foot and mouth disease (FMD)	Before rainy season and in winter / autumn
PPR	All seasons, preferably in June-July
Black quarter (BQ)	May / June
Enterotoxaemia (ET)	May
Haemorrhagic septicaemia (HS)	March / June
Sheep pox (SP)	December / March

Vaccination programme for cattle and buffalo:

Disease	**Age and season at vaccination**
Anthrax	In endemic areas only, Feb to May
HS	May to June
BQ	May to June
FMD	November to December

2.5.2 Poultry

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought	Not Applicable		
Floods			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, wheat etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging	Routine practices are followed

Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house with bleaching powder/ lime etc. Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed
Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Heat wave			

Shelter/environment management	Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged Don't allow for scavenging during mid day	Routine practices are followed
Health and disease management	De worming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed. Increase energy and vitamin concentration in feed (supplementation with grain).	Routine practices are followed
Cold wave			
Shelter/environment management	Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity	Close all openings with polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening	Routine practices are followed
Health and disease management	Arrangement for protection from chilled air	Supplementation of grains Antibiotics in drinking water to protect birds from pneumonia	Routine practices are followed

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
1) Drought			
A. Capture			
(i) Shallow water in ponds due to insufficient rains/inflow	(i) Thinning of population (ii) Arrangement of water supply from external resource (iii) Deepening of ponds for more	(i) Partial harvesting (ii) Addition of water (iii) Stocking of air breathing fishes (Singhi, Magur or	(i) Maintenances of remaining stock till favorable condition achieved (ii) If not feasible, total harvesting

	storage of water	Murrel)	or transfer of fishes may be done. (iii) Preparation of the pond for next crop.
(ii) Impact of salt load build up in ponds / change in water quality	(i) Regular monitoring of water quality parameter. (ii) Arrangement of aeration (del) (iii) Addition of water from external resource	(i) Arrangement of aeration. (ii) Addition of water (iii) Monitoring of water quality (iv) Reduction of manuring according to water level.	(i) 10 to 15% exchange of water
2) Floods			
A. Capture			
B. Aquaculture			
(i) Inundation with flood water	(i) Elevation/ Renovation of pond dyke. (ii) Sale of table size /marketable size (del) fishes (iii) construction of earthen nursery ponds in upland areas	i. Collection of naturally bred seeds (Spawn /fry /fingerling) from flooded water ii. Stocking in nursery ponds for rearing iii. Enhancement of dykes by sand bags	i Retain the water in pond immediately after flood through repairing of damaged dyke etc. Ii Netting of pond for removal of unwanted / predatory fishes Iv Sale of large size fishes
(ii) Water contamination and changes in water quality	Arrangement of regular water quality monitoring		Use of $Kmno_4$ as prophylactics
(iii) Health and diseases	(iv) (a) Use lime @ 200 kg/ ha / Potassium permanganate @ 2% (a) Arrangement of CIFAX and medicines & chemical stock	Use of Potassium permanganate as prophylactics	-Sampling of fishes and water for disease analysis - Liming, use of drugs/ medicine if required
(iv) Loss of stock and inputs (feed, chemicals etc)	Raising the height of dyke by fencing with net and bamboo poles to prevent loss of stock Removal of culture inputs from the site	Arrangement of advance size fingerling/ yearlings for stocking	Stocking of large size fingerlings of carps Restoration of fertilization of pond and regular feeding of fish Harvesting and sale of fish
(v) Infrastructure damage (pumps, aerators, huts etc)	Repairing/ arrangement of alternate safe place to keep pumps aerators etc.	A regular water on the flood and infrastructure facilities.	Re-establishment of the infra structural facility.
3. Cyclone / Tsunami			
4. Heat wave and cold wave			