



KRISHI VIGYAN KENDRA, SIWAN

Bhagwanpur Hat- 841408

Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar)



Contingent Plan of Siwan District

Presenter-

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KVK Bhagwanpur Hat, Siwan

State: Bihar

Agriculture Contingency Plan for District: Siwan

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 or part thereof falling under the NARP Zone	(Saran, Siwan, Goplaganj, Muzaffarpur, E. Champaran, W. Champaran, Sitamarhi, Sheohar, Vaishali, Darbhanga, Madhubani, Samastipur)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		25 ° 53' to 26 ° 23'	84 ° 1' to 84 ° 47'	/ /m
	Name and address of the concerned ZRS/ ZARS/RARS/ RRS/ RRTTS	Dr Rajendra Prasad Central Agricultural University, Pusa, Samastipur		
	Mention the KVK located in the district	Krishi Vigyan Kendra, Bhagwanpur Hat, Siwan-841408		
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Dr Rajendra Prasad Central Agricultural University, Pusa, Samastipur			

1.2	Rainfall	Normal RF (mm)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	988.3	3 rd week of June	1 st week of October
	NE Monsoon (Oct-Dec)	16.1	2 nd week of October	-
	Winter (Jan- Feb)	52.9		
	Summer (Mar-May)	29.7		
	Annual	1087		

1.3 : Siwan District Land Utilization Pattern (2017-18)

(Area in '000 hectares)

District	Uncultivated land excluding fallow (5)		Fallow Land		Total Uncultivable Land (7) (2 to 6)	NSA (8)	GC A (9)	CI (Cropping Pattern)(10)
	Permanent Pastures	Tree Crops	Current Fallow	Other Fallow				
Siwan	0.2	9	6.8	1.4	60.1	164.4	226.1	1.4

Source : Directorate of Economics and Statistics, GoB

1.4	Major Soils	Area ('000 ha)	Percent (%)
	1. Sandy soils	25	12.6
	2. Sandy Loam soils	52	26.1
	3. Alkali Soils	9.5	4.8
	4. Diara Land	25.8	13.0
	5. other	86.6	43.5

1.5 : District-wise Area and Production of Important Fruits (2017-18 and 2018-19)

(Area in '000 hectare and Production in '000 tonnes)

District	Banana				Guava			
	2017-18		2018-19		2017-18		2018-19	
	Area	Production	Area	Production	Area	Production	Area	Production
Siwan	0.8	45.1	0.82	46.23	0.7	5.46	0.7	5.5

District	Litchi				Mango			
	2017-18		2018-19		2017-18		2018-19	
	Area	Production	Area	Production	Area	Production	Area	Production
Siwan	1.21	8.63	1.21	8.67	2.56	28.65	2.57	28.7

1.6 : District-wise Area and Production of Important Vegetables (2017-18 and 2018-19)

(Area in '000 hectare and Production in '000 tonnes)

District	Potato				Onion			
	2017-18		2018-19		2017-18		2018-19	
	Area	Production	Area	Production	Area	Production	Area	Production
Siwan	9.8	291.44	9.86	293.1	0.95	22.17	0.95	22.17

District	Brinjal				Cauliflower			
	2017-18		2018-19		2017-18		2018-19	
	Area	Production	Area	Production	Area	Production	Area	Production
Siwan	1.6	36	1.69	37.96	1.6	28.4	1.59	28.23

Source : Department of Horticulture, GoB

1.7 : District-wise Achievement for Livestock-Related Services (2017-18 and 2018-19)

(in lakh)

District	Animals Treated		Immunization		Artificial Insemination	
	2017-18	2018-19	2017-18	2018-19	2017-18	2018-19
Siwan	0.83	0.8	9.8	12.92	0.63	0.74

Source : Directorate of Animal Husbandry, GoB

1.8 : District-wise Production of Fish and Fish Seeds (2016-17 to 2018-19)

District	Fish Production ('000 tonnes)	Fish Seeds (Lakh)	Fish Production ('000 tonnes)	Fish Seeds (Lakh)	Fish Production ('000 tonnes)	Fish Seeds (Lakh)
	2016-17		2017-18		2018-19	
Siwan	6.22	20.00	7.27	21.02	7.21	30.00

Source : Department of Animal Husbandry and Fisheries Resources, GoB

1.9: District-wise Milk Production in Bihar (2018-19)

('000 tonnes)

District	Crossbred Cow	Local Cow	Total Cow	Buffalo	Total (Cow +Buffalo)	Goat	Total Production
Siwan	61.81	67.68	129.49	82.47	211.96	3.66	215.62

Source : Department of Animal Husbandry and Fisheries Resources, GoB

1.10 : District-wise Consumption of Fertilizers in Bihar (2018-19)

('000 tonnes)

District	Urea	DAP	SSP	MOP	Ammonium Sulphate	Complex	Sub Total	N	P	K	Total (NPK)	Grand Total
Siwan	27.29	8.50	0.03	1.27	0.00	3.50	40.58	14.74	4.67	0.85	20.26	60.85

Source : Department of Agriculture, GoB

1.11 : District-wise Number of Farm Implements (2018-19)

District	Farm Implements	Combine Harvester	Zero Tillage	Pumpset	Power Tiller	Manually Operated tools	Thresher
Siwan	1791	14	1	309	0	68	292

Source : Department of Agriculture, GoB

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Wheat	Pigeon pea	Maize	Sugarcane
	Kharif- Rainfed					
	Kharif-Irrigated	2 nd week of June to 3 rd week of July		3 rd week of August to 2 nd week of September	3 rd week of May to 4 th week of June	February to March
	Rabi- Rainfed					
	Rabi-Irrigated		2 nd week of November to 3 rd week of December			October to November

Source: District Profile

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	√		

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

Source: District Profile

Annexure I

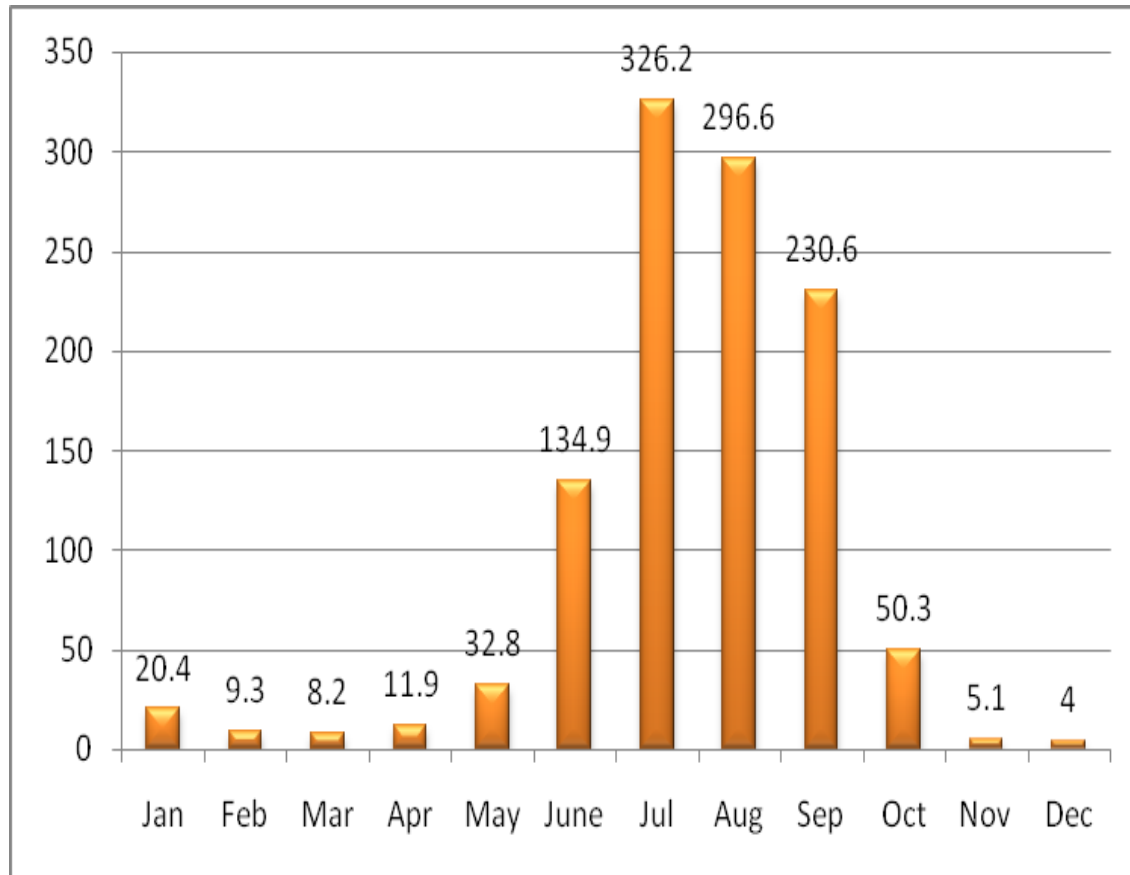
Agro climatic Zones of Bihar



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	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 2 weeks	Upland light textured soil	Pigeonpea + Blackgram Pigeonpea + Sesame	Pigeonpea + Blackgram/ Sesame Pigeonpea	No change	-
4 th week of June	Upland medium textured soil	Rice- oilseeds/ Pulses/ Vegetables Maize - pulses	Short duration Rice (R. Neelam)/ Maize- –Oilseeds / Pulses Rice- Prefer Long to medium duration varieties Kharif maize- Shaktiman-1,2,3,4,5 Suwan, Deoki, Ganga-11	<ul style="list-style-type: none"> • Adopt normal package of practices • Direct seeding of drought tolerant varieties (Sahbhagi) in dry soil in June/ 	

	Medium land	Rice- Wheat- Greengram Rice- potato- Greengram Rice- Maize	Rice- Wheat- Green gram Rice- Potato- Green gram Rice- Rabi Maize Rice- Prefer Long to medium duration varieties Rice - Rajendra Sweta (135- 140d), Rajendra Mahsuri (140-150 days), Rajendra Bhagawati (110-115 days) Rajendra Suwasini (115-120 days), Rajshree (140 days)	first week of July with pre- emergence herbicide application under sufficient soil moisture conditions.	
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	Lowland Shallow lowland-(upto 25cm stagnation of water)	Rice – Wheat	Rice – Wheat Rice- Rajshree, Rajendra Suwasini, Rajendra Sweta,		
	Lowland (upto 50cm stagnation of water)	Rice – Wheat	Long duration Rice-wheat Rice- Prefer Long to medium duration varieties Rice- Rajshree (140days), Rajendra Suwasini (115-120 days),Rajendra Sweta, ‘Swarna Sub-1, Swarna		

Condition	Major Farming situation	Normal Crop/croppingsystem	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 4 weeks 2 nd week of July	Upland light Textured soil	Pigeonpea +Blackgram Pigeonpea +Sesame	Pigeonpea+Blackgram Pigeonpea+Sesame Rice (Prabhat, Turanta, R. Bhagwati)	• Normal package of Practices	Seeds from Dr RPCAU, Pusa, NSC, TDC , BRBN etc.
			Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I		

	Upland medium textured soil	Rice- Oilseeds/ Pulses/Vegetables Maize- Oilseeds/ Pulses/Vegetables	Short duration Rice/ Maize -Oilseeds/ Pulses/ Vegetables Rice-Prefer Medium to short duration varieties like Birsa Dhan-201 (100-115d) Prabhat, Sahbhagi, Dhanlaxmi, R. Bhagwati Kharif Maize- Shaktiman-1,2,3,4 Suwan, Deoki, Ganga-11	<ul style="list-style-type: none"> • 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. 	
	Medium land	Rice – Wheat- GreengramRice- Maize	Rice-Wheat- GreengramRice- Maize Rice – Prabhat, Sahbhagi, RajendraBhagawati, Rajendra Suwasni	<ul style="list-style-type: none"> • 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 	
	Low land	Rice – Wheat- Greengram	Rice – Wheat-Greengram	<ul style="list-style-type: none"> • Use mat nursery/ dapog 	

	<p>Shallow land (upto 25 to 50 cm stagnation of water)</p>		<p>Direct sowing / 20 days old dapog seedlings with medium to short duration varieties – BR34, RajendraDhan- 201(130-135days), Rajendra Bhagwati</p>	<p>nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August in mid and low lands</p> <ul style="list-style-type: none"> • Raise staggered 	
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				<p>community nursery preferably with short duration varieties in mid and lowlands</p> <ul style="list-style-type: none">• Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing.• Para grass cultivation for fodder in low land• Timely interculture for weed control in direct seeded rice	
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Condition			Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system			
Delay by 6weeks 4 th week of July	Upland medium textured soil	Rice- Oilseeds/ Pulses/Vegetables Maize- Oilseeds/ Pulses/ Vegetables	Short duration Rice- Pulses/Oilseeds/ VegetablesMaize- Oilseeds/ Pulses Blackgram/ Finger millet-Wheat Blackgram- Pant U-31 , PantU-19 Finger millet- RAU 7&8 Rice- Prefer short (early matured) varieties	<input type="checkbox"/> Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions <input type="checkbox"/> Life saving irrigation	Seeds from Dr RPCAU, Pusa, NSC, TDC , BRBN etc.

			like Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi , Saroj (100-110d), Birsa Dhan-201 (100-115d)	
	Upland light textured soil	Pigeonpea – Greengram/Sesame	Blackgram/ Finger millet- Oilseeds/Vegetables Blackgram- Pant U-31 , Pant U-19 Finger millet- RAU 7 & 8	<ul style="list-style-type: none"> • Normal package and practices
	Medium land	Rice-Wheat- Greengram Rice- Maize	Rice – Wheat- Greengram Rice- Maize Rice – Prabhat, Sahbhagi, Dhanlaxmi, Saroj	<ul style="list-style-type: none"> • 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

	Low land	Rice-Wheat- Greengram Rice- Maize	Rice -Wheat- GreengramRice - Maize	<input type="checkbox"/> Direct seedling of Rice <input type="checkbox"/> Raise staggered community nursery preferably with medium duration varieties in mid and lowlands <input type="checkbox"/> Enhanced basal dose of NPK to boost the early vegetative growth <input type="checkbox"/> Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions <input type="checkbox"/> Life saving irrigation	
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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 8 weeks 2 nd week of August	Upland	Rice- Oilseeds/ Pulses/Vegetables Maize- Oilseeds/ Pulses/Vegetables	Rice- Prefer Early matured varieties like Turanta dhan (75d), Prabhat (90d), Birsa Dhan 105 (85-90d), Rajendra Bhagawati (early-upland and midland), Birsa Dhan-201 (100-115d)	<ul style="list-style-type: none"> • Moisture conservation • Inter cultivation Sowing of <i>rabi</i> crops (Sep- Oct.) such as Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17),	Seeds from Dr RPCAU, Pusa, NSC, TDC , BRBN etc

			Rabi Pigeonpea- Greengram/ Blackgram/Sesame Rabi Pigeonpea –Pusa-9, Sharad, Arhar-I	Linseed (Garima) and Vegetables	
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	Medium land	Rice-Wheat-Greengram	<p>Early duration Rice-wheat Sesame- Wheat/ Rabi Maize Rice- Prabhat, Sahbhagi, Rajendra Suwasani, Rajendra Bhagawati</p> <p>Tori,- RAUTS 17, Panchali, Bhawani</p> <p>Mustard- R. Sarso-1, Swarna</p> <p>Sesame – Krishna, Pragati</p> <hr/> <p>Mid duration Rice-Late Wheat Rice- Prabhat, Sahbhagi, Dhanlaxmi, Rajendra Suwasini, Rajendra Bhagawati</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August <input type="checkbox"/> Use of 20 days old dapog seedling in rice. <input type="checkbox"/> Enhanced basal dose of NPK in rice to boost early vegetative growth <input type="checkbox"/> 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 <input type="checkbox"/> Fodder varieties of Jowar, Maize, Bajra in combination with 	
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				legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts	
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	Lowland	Rice- Potato Rice-Wheat-Greengram	Early mid duration Rice- Potato Rice- Santosh , Rajendra Suwasini, Rajendra Bhagwati	<ul style="list-style-type: none"> • Double transplanting 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 initially for Rice and other crops. • Sowing of <i>rabi</i> crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, DR RPCAUTS17), 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 	
			Mid duration Rice-Late wheat Rice- Santosh , Rajendra Suwasini, Rajendra Bhagwati		

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 15-20days Dry spell after sowing leading to poor germination/ crop stand etc.	Upland medium textured soil	Short duration Rice/ Maize- Pulses/Oilseeds/ Vegetables Rice- Prabhat, Sahbhagi Dhanlaxmi, Kharif maize- Saktiman- 1,2,3, Suwan, Deoki, Ganga-11	<ul style="list-style-type: none"> • Gap filling of existingcrop • Thinning • Life saving irrigation 	<ul style="list-style-type: none"> • Inter cultivation • Mulching through mechanical weeding for moisture conservation • Conservation tillage 	Seeds from Dr RPCAU, Pusa, NSC, TDC , BRBN etc
	Upland light textured soil	Pigeonpea- Greengram/Sesame Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	<ul style="list-style-type: none"> • Gap filling of existingcrop • Thinning 		
	Medium land	Rice-Wheat/ Potato/ MaizeRice - Rajendra Bhagawati, Rajendra Suwasini Rajshree, Prabhat ,	<ul style="list-style-type: none"> • Life saving irrigation • Gap filling 		

	Lowland	Rice-Wheat- Greengram Rice- Maize Rice- Rajshree, Santosh , Sita, Rajendra Mahsuri, Rajendra Sweta,		
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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	Upland medium textured soil	Short duration Rice/ Maize- Pulses/Oilseeds/ Vegetables	<ul style="list-style-type: none"> • Gap filling of existing crop • Postponement of top Dressing 	<ul style="list-style-type: none"> • Inter cultivation • Mulching • Conservation tillage • Spray (1%) MOP on the crops • Life saving irrigation 	
	Upland light textured soil	Pigeonpea- Greengram /Sesame			
	Medium land	Rice-Wheat/Potato- Greengram Rice- Maize			
	Lowland	Rice-Wheat-Greengram			

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	Upland medium textured soil	Short duration Rice/ Maize- Pulses/Oilseeds/ Vegetables	<ul style="list-style-type: none"> Foliar spray with (1%)Urea Life saving irrigation, 	<ul style="list-style-type: none"> Inter cultivation Mulching Conservation tillage Spray (1%) MOP on the crops Life saving irrigation 	
	Upland light textured soil	Pigeonpea- Greengram /Sesame			
	Medium land	Rice-Wheat/Potato- Greengram Rice- Maize			
	Lowland	Rice- Wheat-Greengram			

Condition			Suggested Contingency measures		
Terminal Drought (Early withDrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation

	Upland medium textured soil	Short duration Rice/ Maize- Pulses/Oilseeds/ Vegetables	Life saving irrigation,	<ul style="list-style-type: none"> Open the furrow during evening and left furrow open overnight and plank in the next morning before sunrise for growing of early rabi 	Seeds from Dr RPCAU, Pusa, NSC, TDC , BRBN etc
	Upland light	Pigeonpea- Greengram /Sesame			

	textured soil			crops like wheat, Rabi Maize/Pulses /Oilseeds/ Vegetables
	Medium land	Rice-Wheat/Potato- Greengram Rice- Maize		
	Lowland	Rice-Wheat-Greengram		

2.1.2 Drought - Irrigated situation

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

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- Oilseeds Maize- Pulses Pigeonpea-Greengram Pigeonpea- Sesame	Short duration Rice/ Maize-Pulses/Oilseeds Pigeonpea- Greengram /Sesame	<ul style="list-style-type: none"> • Application of organic manure and vermicompost • Direct seedling of rice 	Seeds from Dr RPCAU, Pusa, NSC, TDC , BRBN etc

	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Medium Land	Rice-Wheat/Rabi Maize/Potato	Short duration of Rice- Wheat/Rabi Maize/Potato	<ul style="list-style-type: none"> • Dapog nursery for rice • Mulching • Life saving irrigation 	
	Lowland	Rice-Wheat/Maize/Potato/ Pulses/Oilseeds Makhana (in ponds) Var. local/ Improved	Medium to long duration Rice- Wheat/Maize/Potato/ Pulses/ Oilseeds		

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 Rice-Maize Maize- Wheat	Short duration Rice- Oilseeds/Pulses Pigeonpea- Greengram/Sesame	<ul style="list-style-type: none"> • Application of organic manure and vermicompost • Dapog nursery 	Seeds from Dr RPCAU, Pusa, NSC, TDC , BRBN etc

		Pigeonpea- Greengram/Sesamee		for rice • Direct seedling of rice • Mulching • Life saving irrigation	
	Medium Land	Rice-Wheat/Rabi Maize/Potato	Rice- Wheat/Potato/ Pulses/ Oilseeds		
	Lowland	Rice – Wheat/Maize/Potato/ Oilseeds	Rice- Wheat/Potato/ Pulses/Oilseeds Rice- Rajshree, Santosh , Sita, Rajendra Suwasni,		

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 water logging	Vegetative stage	Flowering stage	Crop maturity stage	Postharvest
Rice	<ul style="list-style-type: none"> • Drainage management • Re transplanting through Dapog nursery if needed 	<ul style="list-style-type: none"> • Drainage management • Subsequently crop if totally damaged i.e. 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged 	Storage at safer place
	<ul style="list-style-type: none"> • Gap filling • Re sowing through Drum seeder 	Toria	<ul style="list-style-type: none"> • Harvest at physiological maturity 	
Maize	<ul style="list-style-type: none"> • Drainage management • Gap filling • Re sowing, if completely damaged 	<ul style="list-style-type: none"> • Drainage management • Alternative maize or other rabi crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Subsequent if totally damaged • Harvest at physiological maturity 	Storage at safer place
Pigeonpea	<ul style="list-style-type: none"> • Drainage management • September sowing if Khrif Arhar is completely damaged • Gap filling if needed 	<ul style="list-style-type: none"> • Drainage management • Alternative maize or other rabi crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Subsequent if totally damaged • Harvest at physiological maturity 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Drainage management • Replanting if completely damaged • Gap filling 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management • Harvesting at proper maturity 	

Litchi	<ul style="list-style-type: none"> • Drainage management • Replanting, if completely damaged 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Spray and pasting of trunk 	
Banana	<ul style="list-style-type: none"> • Drainage management • Replanting, if completely damaged 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Spray and pasting of trunk 	
Papaya	<ul style="list-style-type: none"> • Drainage management • Replanting, if completely damaged 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Spray and pasting of trunk 	<ul style="list-style-type: none"> • Safe storage and transportation
Heavy rainfall with high speed winds in a short span²				
Rice	<ul style="list-style-type: none"> • Drainage management • Replanting if completely damaged • Gap filling if needed 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged i.e. Toria 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Re sowing If completely damaged • Gap filling if needed • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Alternative maize or other crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged 	Storage at safer place

Pigeonpea	<ul style="list-style-type: none"> • Re sowing If completely damaged • Gap filling if needed • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Alternative crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Alternative crop if totally damaged 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicides 	<ul style="list-style-type: none"> • Drainage management • Harvest at proper time 	
Litchi	<ul style="list-style-type: none"> ▪ Drainage management ▪ Gap filling 	Drainage management	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicide 	

Banana	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Staking 	<ul style="list-style-type: none"> • Drainage management • Harvest at proper time 	
Guava	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Drenching with copperfungicides 	<ul style="list-style-type: none"> • Drainage management • Harvest at proper time 	
Outbreak of pests and diseases due to unseasonal rains				
Rice	<ul style="list-style-type: none"> ❖ Seedling treatment with granular insecticide – Cartap hydrochloride or Phorate 10G or Carbofuran 3G. ❖ Maintain shallow water in nursery beds ❖ Providing good Drainage. 	<ul style="list-style-type: none"> ❖ Use copper fungicides against Bacterial leaf blight. ❖ Split application of N fertilizer (3-4 times) 	<ul style="list-style-type: none"> ❖ Harvest at physiological maturity 	Proper Drying and safe storage
Maize	<ul style="list-style-type: none"> ❖ 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 	<ul style="list-style-type: none"> ❖ 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) 	<ul style="list-style-type: none"> ❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity 	<ul style="list-style-type: none"> ❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage ❖ Proper drying
Pigeonpea	<ul style="list-style-type: none"> ❖ Provide Drainage ❖ Seed treatment with 1 g carbendazim + 2g thiram/kg seed. 	Provide Drainage	Provide Drainage	<ul style="list-style-type: none"> ❖ Proper drying • Storage at safe place and transportation

Horticulture				
Vegetables	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	
Mango	<p>Anthracnose:- The foliar infection can be controlled by spraying of Copper oxychloride (0.3%)</p> <p>Use bio control agent viz <i>Streptosporangium pseudovulgare</i></p> <p>Bacterial canker: Regular inspection of orchards, sanitation and seedling certification are recommended as preventive measures. 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.</p>	<p>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.</p> <p>Mango powdery mildew: Spray wettable sulphur (0.2%) & calixin or karathane (0.1%) during second week of December</p>	<p>Mango powdery mildew: Prune diseased leaves and malformed panicles harbouring the pathogen to reduce primary inoculum load.</p> <p>Spray wettable sulphur (0.2%) when panicles are 3-4" in size</p> <p>Spray dinocap (0.1%) 15-20 days after first spray. Spray tridemorph (0.1%) 15-20 days after second spray.</p> <p>Spraying at full bloom needs to be avoided. Mango bacterial canker: Three sprays of Streptocycline (200 ppm) at 10 days intervals reduce fruit infection.</p> <p>In severe infection, spraying of Streptocycline (300 ppm) or copper oxychloride (0.3%) is more effective.</p>	<p>Harvest at proper time</p> <p>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.</p> <p>Diseased leaves, twigs, and fruits, should be collected and burnt to avoid the spread for next season</p>
Litchi	<p>Fruit Fly: Monitor adult fruit flies emergence by using methyl eugenol or sex pheromone traps.</p>	<p>Fruit Fly: First Spray delta menthrin 0.0025% plus molasses 0.1% . after 10-12 days</p>	<p>Harvest at proper time</p>	<p>Fruit Fly: Collect all fallen infested fruits and put in a Drum covered with</p>

		spray fenthion 0.05% + molasses 0.1% followed by dimethoate 0.045% + molasses 0.1% if required		fine wire mesh. Harvest fully matured fruits one week earlier to escape egg laying
Banana	-	-	Harvest at proper time	
Guava	-	-	Harvest at proper time	

2.0 Floods

Condition	Suggested contingency measures			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/partial inundation¹				
Rice	<ul style="list-style-type: none"> • Provide Drainage • Re transplanting through Dapog nurseryseedlings • Gap filling 	<ul style="list-style-type: none"> • Provide Drainage • Gap filling • 40-45 days old seedlings maybe used • Kharuhan (double transplanting) mehod 	<ul style="list-style-type: none"> • Provide Drainage • Harvest at physiological maturity • Lentil as paira crop can betaken 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Provide Drainage • Re sowing • Gap filling 	<ul style="list-style-type: none"> • Provide Drainage 	<ul style="list-style-type: none"> • Provide Drainage • Harvest at physiological maturity 	Storage at safer place
Pigeon pea	<ul style="list-style-type: none"> • Provide Drainage • Re sowing • Gap filling if needed 	<ul style="list-style-type: none"> • Provide Drainage 	<ul style="list-style-type: none"> • Provide Drainage • Harvest at physiological maturity 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Re planting • Gap filling • Provide Drainage 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	

Litchi	<ul style="list-style-type: none"> • Gap filling • Replanting • Provide Drainage 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	
Banana	<ul style="list-style-type: none"> • Replanting • Gap filling • Provide Drainage 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	
Guava	<ul style="list-style-type: none"> • Replanting • Gap filling 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	<ul style="list-style-type: none"> • Drenching with copperfungicides • Provide Drainage 	
	<ul style="list-style-type: none"> • Provide Drainage 			
Continuous submergence for more than 2 days²				
Rice	<ul style="list-style-type: none"> • Gap filling, • Re sowing 	<ul style="list-style-type: none"> • Replanting through Kharuhan (double transplanting) method by 3-4 seedlings per hill • Short duration rice variety 	<ul style="list-style-type: none"> • Toria/Late wheat if completely damaged 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Re sowing 	<ul style="list-style-type: none"> • Re sowing or gap filling 	<ul style="list-style-type: none"> • Toria/Late wheat if completely damaged 	Storage at safer place
Pigeonpea	Re-sowing, if damaged after receding of floods	Gap filling	Toria/late wheat, if substantial damage	Storage at safe place
Wheat	Re-sowing, if damaged after recoding of floods	Gap filling	Toria/late wheat, if substantial damage	Storage at safe place
Horticulture				
Mango	<ul style="list-style-type: none"> • Provide Drainage 			
Guava	<ul style="list-style-type: none"> • Provide Drainage 			

Litchi	<ul style="list-style-type: none">• Provide Drainage			
Sea water intrusion	Not Applicable			

2.1 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				
Maize	Provide irrigation	Provide irrigation	Provide irrigation	
Pigeonpea	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		Provide irrigation, Mulching		
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		

2.0 Contingent strategies for Livestock, Poultry & Fisheries

2.0.1 Livestock

	Suggested contingency measures		
	Before the event*	During the event	After the event
Drought			
Floods			
Feed and fodder availability	<ol style="list-style-type: none"> 1. Cultivation of fodder tree 2. Storage of Improved Quality Fodder 3. Conservation & Storage of <ul style="list-style-type: none"> • Feed & Fodder • Hay & Silage: — <p style="text-align: center;">Preserve the fodder in the form of hay from Berseem & other grasses as well as silage from</p> <p>(a) Maize- harvesting at well-developed cob.</p> <p>(b) Sorghum - at flowering stage.</p> <p>(c) Oat</p> <p>(d) Hybrid Napier – 40-45 day old.</p> 	<ol style="list-style-type: none"> 1. Feeding of Complete Feed Block 2. Feeding of Urea-Molasses-Mineral-Block & Fodder 3. Feeding of stored Hay/Silage/Improved Quality Fodder 4. Feeding of Tree leaves some of which are as follows: <ol style="list-style-type: none"> 1. Bamboo leaves 2. Neem 3. Banyan 4. Peepal 5. Seesam 6. Subabul 	Production of forage crops <ol style="list-style-type: none"> 1. Balanced feeding of Animals supported with little higher concentrate mixture 2. Cultivation of fodder Rabi maize if water stagnated upto Nov/December 3. Jowar/Cowpea 4. Maize in September

	<p>(e) Water hyacinth mixing with Paddystraw in ratio of 4:1 with 70 kg molasses /ton of clean water hyacinth.</p> <p>(f) Potato leaves mixing with wheat straw in ratio of 7:1 and should be supplemented with 3% molasses. Hay: –</p> <ul style="list-style-type: none"> • Berseem/Lucerne and other grasses. • Bales of hay and other Dry fodders should be stored in Dry places at a height of last flood level and covered with asbestos sheet or polythene sheet. <p>4. Development & storage of: –</p> <p style="padding-left: 20px;">(a) Complete Feed Block (CFB)</p> <p style="padding-left: 20px;">(b) Urea-Molasses-Mineral-Block (U.M.M.B)</p> <p>5. Development of Fodder Bank</p>	<p><u>Use of unconventional feed stuff:</u></p> <p>(i) Aquatic Plants – water hyacinth</p> <p>(i) Lotus</p> <p>(ii) Aquatic weeds</p>	
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Drinking water			
Health and disease management	<p>Veterinary Preparedness with Medicines, Vaccines and provision formobile ambulatory van.</p> <ul style="list-style-type: none"> • Vaccination <p>During flood stress becomes an incriminating factor for the precipitation of diseases in livestock and poultry.</p> <p>So, necessary vaccination of livestock and poultry should be done against economically important contagious disease.</p> <p>This will be helpful not only to check epidemic in animals, but also to reduce the probability of zoonoses in human beings.</p> <p>Care should be taken for mass vaccination of livestock and poultry</p>	<p>Animal safety, Health camp and Treatment</p> <p>Important Suggestions for animal and Poultry safety</p> <p>During flood, all efforts should be made to rescue most of the livestock and poultry as carefully as possible.</p> <p>The people should be made conscious through announcement with the help of mikes or other means of communication, so that they may escape with their livestock and poultry to safe area.</p> <p>The fisherman or the people who knows swimming should be deputed for the rescue of Drowning and</p>	<p>Sanitation, deworming, treatment, health camps Culling of Sick animals and disposal of carcass</p> <p>Maintenance of Sanitation: 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 animals rehabilitated in sheds. Arrangements should be made accordingly.</p> <p>De-worming after the flood:</p>

	<p>with a view to covering 80% of livestock population in order to achieve herd immunity.</p> <p>Mass vaccination should be conducted by a team of Department staff with proper maintenance of detailed Inoculation Register.</p> <p>Pro-active steps should be taken to receive and stock the required doses of vaccines against different diseases for their use in face of Flood.</p>	<p>floating animals and birds.</p> <p>During flood do not leave halter or headstalls on animals.</p> <p>Do not tie animals together when releasing.</p> <p>Report the location, identification and disposition of livestock and poultry to authorities handling the disaster.</p> <p>Health camp and treatment</p> <p>Water borne diseases are one of the most common phenomena during the flood</p> <p>Diarrhoeal diseases outbreaks can Report the location, identification and disposition of livestock and poultry to authorities handling the disaster.</p> <p>Health camp and treatment</p>	<p>Immediately after flood, the animals like cattle, buffalo. Sheep, goat, pig, dog and poultry need to be dewormed with suitable broad spectrum anthelmintics. This will enable the animals to regain proper health.</p> <p>In water logged area, snails can be introduced as biological control measures against snails to protect livestock from parasitic disease.</p> <p>Treatment of sick animals: The Disposal of Carcass: the disposal of dead animals and birds are to be done by Animal Husbandry Department. Accordingly, necessary arrangement</p>
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		<p>Water borne diseases are one of the most common phenomena during the flood</p> <p>Diarrhoeal diseases outbreaks can occur after Drinking contaminated water.</p> <p>Diseases that can occur during flood should be given special attention and accordingly medicines should be available in the health camp for the following mentioned diseases.</p> <p>Salmonella spp.</p>	<p>should be made for prompt and easy disposal of carcasses during the Flood and Post-Flood period.</p> <p>Carcasses of animals affected by the disease are the chief source of soil infection. They harbour the germs in large numbers and liberate them from both artificial and natural body openings into the surrounding soil.</p> <p>Methods of Carcass disposal to be</p>
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		<p>Escherichia coli Giardiasis Amoebiasis Rotavirus Leptospirosis Scabies Black leg Malignant Edema Foot rot Anthrax Botulism Tetanus Red water Black disease Enterotoxemia Liver fluke Amphistomiasis Brooder pneumonia</p> <p>Treatment of Non infectious arrangement should be made for the treatment of Drowning and traumatic injuries, aspiration pneumonia, lameness and other surgical cases in the health camp.</p>	<p>adopted Burial Burning Composting Vulturing</p> <p>s. Health Camp after the flood: Protection of livestock from outbreaking and communicable diseases</p> <p>be made. Health camps are to be organised in Flood affected areas to restore the normal breeding capability of breedable population as well as to restore the normal health of livestock</p>
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		Disinfection of livestock premises and Poultry shed Disinfection of livestock premises and the temporary sheds should be done with the help of bleaching powder, phenol, carbolic acid etc	and poultry.
Cyclone			
Heat wave and cold wave			

* based on forewarning wherever available

2.0.2 Poultry

	Suggested contingency measures			Convergence/link ages with ongoing programs, if any
	Before the event ^a	During the event	After the event	
Drought				
Floods				

<p>Health and disease management</p>	<p>Vaccines to be used for different animals and Poultry</p> <p>Cattle and Buffalo Hemorrhagic Septicemia Vaccine Black Quarter Vaccine FMD Vaccine Anthrax Vaccine as per endemicity.</p> <p>Sheep and Goat Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxemia Vaccine Anthrax Vaccine as per endemicity</p> <p>Pigs Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxemia Vaccine Anthrax Vaccine as per endemicity.</p> <p>Dogs Rabies Vaccine</p>			
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	Poultry Mareks disease vaccine RDV (F ₁ & R ₂ B), FPV,			
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	<p>IBRV & IBDV (Annexure-1) • Medicines All Districts should be earmarked for flood.</p> <p>An inventory of required medicines to treat the affected livestock in case of eventualities should be made.</p> <p>The Govt. should take steps to procure sufficient quantity of essential life saving medicines. List of life saving Medicines Corticosteroids Nikethamide Antibloat ADrenaline Antihistaminic Antidotes for common poisoning Antisnake venom Broad spectrum antibiotics Anti-inflammatory Antipyretic and Analgesics Fluids and Electrolytes</p> <p>• Mobile Veterinary Clinics Mobile Veterinary Clinics should</p>			
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	<p>be kept ready at Veterinary Hospital or Veterinary Camps so that immediate treatment of injured and affected animals may be done.</p> <p>For this MVC must have adequate Drugs like antibiotic, analgesic, dewormer, ointment, anti snake venom and emergency health care facilities along with trained personnel.</p> <p>A good no. of mobile clinic teams should be planned consisting dedicated and</p>			
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	<p>experienced technical workers with allotment of area of operation.</p> <p>The teams should be kept in readiness having required stock of medicines and equipment to work in any adverse situation.</p> <p>A telephone directory should be maintained at the District level by collecting the telephone nos. of Vets, Para-Vets, NGOs / youth clubs / societies, volunteers etc. to collect feedback and plan the activities during the emergency.</p> <p>An emergency kit for poultry should be made ready well in advance. The Poultry kit should have Cage, mask, mash, pellet feed trough, waterers, detergents, poultry vaccines, Veterinary Drugs, workers protection uniform etc.</p>			
Cyclone				
Heat wave and cold wave				

^a based on forewarning wherever available

2.0.3

Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event^a	During the event	After the event
1) Drought			
A. Capture			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	(i) Thinning of population (ii) Arrangement of water supply from	(i) Partial harvesting (ii) Addition of water	(i) Maintenances of remaining stock till favorable condition
	external resource	(iii) Stocking of air breathing fishes	achieved (ii) If not feasible, total harvesting 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 (iii) Addition of water from external resource	(i) Arrangement of aeration. (ii) Addition of water a. Monitoring of water quality b. Reduction of manuring according to water level.	
2) Floods			
A. Capture			
B. Aquaculture			

(i) Inundation with flood water	(i) Elevation/ Renovation of pond dyke. (ii) Sale of Table/marketable size fishes (iii) construction of earthen nursery ponds in upland areas	Collection of naturally bred seeds (Spawn /fry /fingerling) from flooded water Stocking in nursery ponds for rearing	-Retain the water in pond immediately after flood through repairing of damaged dyke etc. -Netting of pond -Removal of unwanted, predatory/weed fishes -Sell of large size fishes
(ii) Water contamination and changes in water quality	Arrangement of regular water quality monitoring		
(iii) Health and diseases	(a) Use lime/ potassium permanganate (b) Arrangement of CIFAX and medicines & chemical stock		-Sampling of fishes and water for disease analysis - Liming, use of Drugs/ medicine if required in consultancy of fisheries experts
(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	Arrangement of advance size fingerling/ yearlings for stocking	Stocking of large size fingerlings carp 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 infrastructural facility.
3. Cyclone / Tsunami			
4. Heat wave and cold wave			

