

State: KERALA

Agriculture Contingency Plan for District: KOZHIKODE

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone	Northern Midlands			
	Agro Ecological Sub Region (ICAR)	Konkan, Karnataka and Kerala Coastal plain, hot humid to perhumid eco-subregion (19 3)			
	Agro-Climatic Region (Planning Commission)	West Coast Plains And Ghat Region (XII)			
	Agro Climatic Zone (NARP)	Northern Zone (KE-1)			
	List all the districts or part thereof falling under the NARP Zone	Kasaragod, Kannur, Kozhikode			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		11° 15' 19.44"N	75° 46' 52.36" E	Below 20m to	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RARS Pilicode - 671353			
	Mention the KVK located in the district	KVK, Peruvannamuzhi, Calicut - 673001			
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	2745.4	107	June 1 st week	September 4 th week
	NE Monsoon(Oct-Dec):	393	29	October 3 rd week	November 4 th week
	Winter (Jan- Feb)	11.1	5		
	Summer (Apr-May)	562.3	23		
	Annual	3711.8	164		

1.3	Land use pattern of the district (latest statistics)	Geographical 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 ('000 ha)	234.6	41.8	26.8	0.03	2.0	0.2	1.1	1.7	0.8

Source: Farm guide 2010, Farm information bureau.

1.4	Major Soils (common names like shallow red soils etc.,)	Area ('000 ha)	Percent (%) of total
	Coastal alluvium soils	12.9	5.5
	Riverine alluvium soils	1.4	0.6
	Laterite soils	89.9	38.3
	Colluvial soils	1.4	0.75
	Wetland soils	8.6	3.6
	Soils of Western Ghat foothill	99.8	42.5
	Forest soils	20.5	8.75
	* Source : District soil survey office, Calicut		

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	158.8	130
	Area sown more than once	48.4	
	Gross cropped area	207.2	
	* Source: Farm guide 2010		

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	6.1		
	Gross irrigated area	8.3		
	Rainfed area	149.8		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		1.8	30
	Tanks	-	0.3	5
	Open wells	683291	3.1	50.5

Bore wells	-	0.1	1.6
Lift irrigation	5	0.1	1.32
Micro-irrigation	390	0.02	0.33
Other sources	-	0.7	11.25
Total Irrigated Area		6.1	
Pump sets	12995		
No. of Tractors	25		
* source: farm guide 2010			
Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	
Over exploited	1 (calicut)	3.4	
Critical	2 (Balusserry, Thuneri)	18.0	
Semi- critical	1 (Chelannur)	5.9	
Safe	8	73	
Wastewater availability and use	-	-	
Ground water quality	12 Good	100	
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%			
* Source: Central ground water board, Govt. of India			

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

1.7	Major Field Crops cultivated	Area ('000 ha)					
		<i>Kharif</i>		<i>Rabi</i>		Summer	Total
		<i>Irrigated</i>	<i>Rainfed</i>	<i>Irrigated</i>	<i>Rainfed</i>		
	Paddy	0.1	0.2	0.5	2.7	0.6	4.0
	Horticulture crops - Fruits	Total area					
	Jack	9.9					
	Mango	9.4					
	Banana	1.4					
	Plantain	2.8					
	Pineapple	0.2					

Papaya	1.9
Cashew	2.9
Others	0.6
Horticultural crops - Vegetables	Total area
Drumstick	1.7
Amaranthus	0.1
Bitter Gourd	0.2
Snack Gourd	0.01
Ladies Finger	0.03
Brinjal	0.01
Green Chillies	0.1
Little Gound (Kova)	0.01
Ash Gound (Kumbalam)	0.06
Pumpkin	0.2
Cucumber	0.1
Others	0.2
Total	2.6
Medicinal and Aromatic crops	-

Source: Farm guide 2010

Plantation crops and Spices	Total area
Spices	
Pepper	8.4
Ginger	0.1
Turmeric	0.3
Cardamom	0.2
Tamarind	0.6
Vanilla	0.1
Cloves	0.05
Cinnamon	0.06
Nutmeg	0.5
Plantation crops	-
Coconut	120.7
Arecanut	11.6

	Cocoa	0.8
	Rubber	19.9
	Tamarind	0.7
	Fodder crops	Total area
	Fodder Grass	0.1
	Total fodder crop area	-
	Tubers	Total area
	Tapioca	1.9
	Elephant Foot Yam	0.2
	Colocasia	0.6
	Yam (Kachil)	0.04
	Sweet Potato	0.02
	Other Tubers	0.1
	Grazing land	-
	Sericulture etc	0.01
	Others (Specify)	

Source: Farm guide 2010

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	-	-	62.8
	Crossbred cattle	-	-	100.5
	Non descriptive Buffaloes (local low yielding)	0.6	0.7	1.3
	Graded Buffaloes	-	-	-
	Goat	17.6	39.9	57.5
	Sheep	0.1	0.1	0.2
	Others (Camel, Pig, Yak etc.)	0.9	1.4	2.5
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial		754.8	
	Backyard			
	Fisheries			
	A. Capture			

1.10	i) Marine	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) **	
		Marine:103072; Marine(Active):21430 Inland:2729; Inland(Active):1735	Mechanised:630 Motorised:822	869	1452	Stake nets: 278	Cold store & Processing plant:2 Ice plant:30
	ii) Inland	No. Farmer owned ponds **		No. of Reservoirs **		No. of village tanks **	
		855 (70.1 ha)		3 (Kuttiyadi, Kakkayam, Peruvannamuzhi)		24 (Irrigation tanks)	
B. Culture							
		Water Spread Area (ha)***		Yield (t/ha)***		Production ('000 tons)***	
	i) Brackish water	46.5(73 farmers)		1		50.4	
	ii) Fresh water	60.3		2.5		172.5	
	Others Annual Fish production*	Inland: 2210 tonnes		Marine:92221 tonnes			

Source: Farm guide 2010 * Kerala state Fisheries- District profile 2005 (Statistical cell Directorate of Fisheries Thiruvananthapuram) **Pan Fish Book Kozhikode District 2001, Department of Fisheries Kerala ***Success story of Matsyakeralam 1st phase 2009 Department of Fisheries Kerala.

1.11 Production and Productivity of major crops (Average of last 5 years: 2004, 05, 06, 07, 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 to be identified based on total acreage)										
	Rice	0.3	1.3	4.3	1.3	1.2	1.8	5.8	1.8	-
Others	-	-	-	-	-	-	-	-	-	-
Major Horticultural crops (Crops to be identified based on total acreage)										
	Coconut	-	-	-	-	-	-	883 million nuts	7082 nuts	-
	Rubber	-	-	-	-	-	-	30.7	1583	-
	Arecanut	-	-	-	-	-	-	14.1	1216	-
	Pepper	-	-	-	-	-	-	1.1	112	-
	Banana	-	-	-	-	-	-	26.4	5918	-
	Cashew	-	-	-	-	-	-	1.3	441	-
	Cocoa	-	-	-	-	-	-	0.4	656	-
Others	-	-	-	-	-	-	-	-	-	-

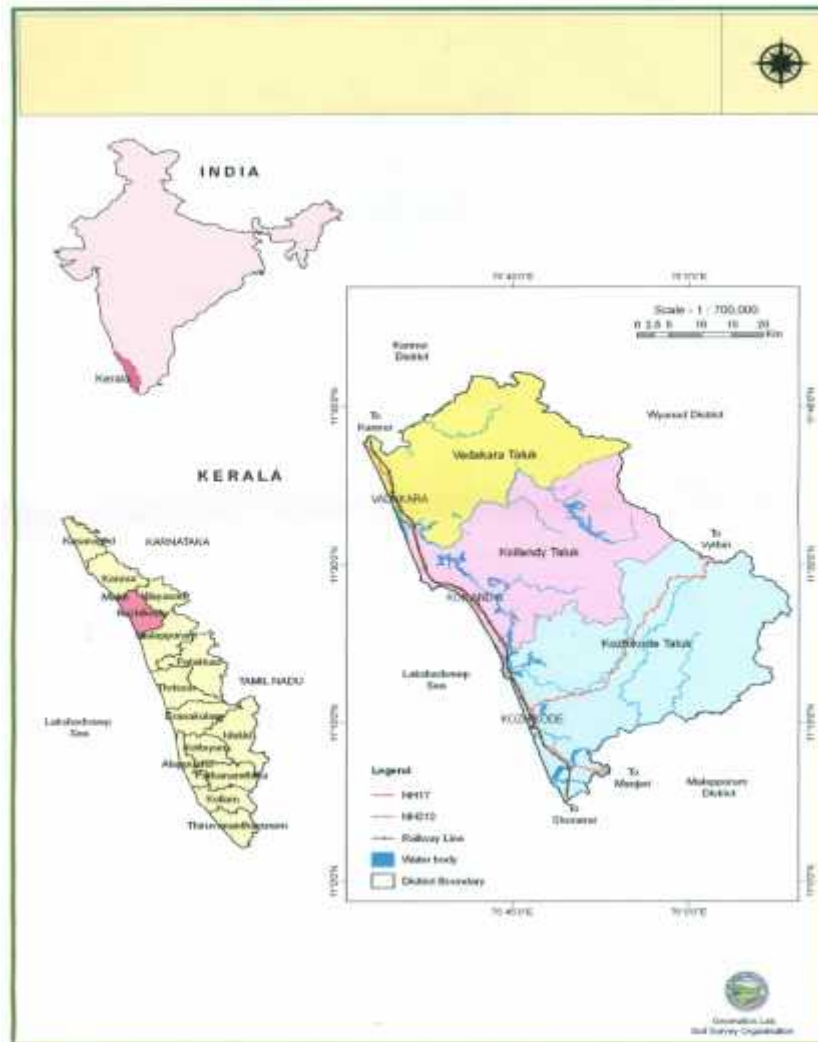
Source: Farm guide 2010

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Tapioca	Colocasia	Amorphophallus	Yams
	Kharif- Rainfed	April –May	May- June	May- June	Feb- March	March- April
	Kharif-Irrigated	-	-	-	-	-
	Rabi- Rainfed	September-October	September-October	-	-	-
	Rabi-Irrigated	September-October	February- April	-	-	-

1.13	What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)	Regular	Ocassional	None
	Drought		-	
	Flood		-	
	Cyclone	-	-	
	Hail storm	-	-	
	Heat wave	-	-	
	Cold wave	-	-	
	Frost	-	-	
	Sea water intrusion		-	
	Pests and diseases (specify): Bud rot of Coconut, Phytophthora foot rot of Black pepper, Pseudostem borer of Banana, Soft rot of Ginger, YLD of Arecanut, Mango fruit fly, Mahali of Arecanut. Stem bleeding of Coconut, Fruit fly of vegetables, Leaf spot of Banana Fruit and shoot borer of vegetables, Cowpea aphid, Tea mosquito of cashew, Leave spot of Amaranthus, Kokkan of Banana Banana root mealy bug& papaya mealy bug		-	-
	Man-animal conflict			

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 1: Location map of Kozhikode



Annexure 2: Soil map



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Low land (< 20M) Thikkodi series	Rice -fallow-Rice	Prefer short duration varieties like Hraswa(KAU)	Make dry nursery of rice, Adopt line sowing of sprouted seedlings soon after monsoon sets in	No scheme required
		Coconut, Arecanut intercropped with crops like Banana, Tapioca, Ginger, Turmeric, Nutmeg, Black pepper, vegetables etc in the homestead system	<p>Coconut & Arecanut: No change</p> <p>Tapioca: Prefer short duration varieties like Sree Jaya and Sree Vijaya(CTCRI)</p> <p>Ginger and Turmeric: cultivate short duration varieties like Varada, Rejatha and Mahima of Ginger and Suguna, Sudarsana of Turmeric(IISR)</p>	<p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Tapioca- Delayed planting, Mulching, Life saving irrigation</p> <p>Ginger and Turmeric- Provide thick mulch cover with green leaves, coirpith compost. Irrigate once in 10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade.</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coirpith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves.</p> <p>Nutmeg- Mulching with Coconut husk, coirpith local leaves etc,</p>	Micro irrigation schemes, RKVY

				shading of young trees/grafts, provide drip irrigation/hose irrigation once in a week.	
		Vegetables	-	Vegetables- Life saving irrigation, Mulching	
Midland (20-100M) Nanminda Kakkodi series	Rice-Rice- Vegetables		Rice- Prefer short duration varieties like Hraswa(KAU)	Rice- Make dry nursery of rice, Adopt line sowing of sprouted seedlings soon after monsoon sets in	Paddy mission of Govt. of Kerala
	Coconut, Arecanut, intercropped with spices(Pepper, Nutmeg, Ginger, Turmeric),Banana, Tubers(cassava) and vegetables		Tapioca: Prefer short duration varieties like Sree Jaya and Sree Vijaya(CTCRI) Ginger and Turmeric: Cultivate short duration varieties like Varada, Rejatha and Mahima of Ginger and Suguna, Sudarsana of Turmeric(IISR)	Tapioca- Delayed planting, Mulching, Life saving irrigation Ginger and Turmeric- Provide thick mulch cover with green leaves, coirpith compost, Irrigate once in 10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade. Black pepper- Mulch the basal parts Band interspaces with locally available leaves, coirpith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction., Reduce canopy, by removing some leaves. Nutmeg- Mulching with Coconut husk, coirpith local leaves etc, shading of young trees/grafts, provide drip irrigation/hose irrigation once in a week. Vegetables- Life saving irrigation Mulching	
Midupland (100-300M) Thiruvambadi Kunnamangalam series	Plantation crops (Rubber, Coconut, Arecanut,) forests	No change		Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn. Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation	NREGA

	Upland (300-600 m) Adivaram series	Rubber Coconut, Arecanut, Cocoa, Black pepper	No change	<p>Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn</p> <p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Cocoa Mulching, Sprinkler irrigation in /Cocoa, Preparation of water harvesting pits</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coirpith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves.</p> <p>Coffee Mulching, Sprinkler irrigation, preparation of water harvesting pits.</p>	NREGA/RKVY
	High land (600-1200M) Memmala Periya series	Coconut, Cocoa and Coffee, Black pepper and Rubber	No change	<p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Cocoa Mulching, Sprinkler irrigation/Cocoa, Preparation of water harvesting pits.</p> <p>Coffee Mulching, Sprinkler irrigation, preparation of water harvesting pits.</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coirpith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction, Reduce canopy,</p>	NREGA/RKVY/SHM

				by removing some leaves Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn	
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Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 4 weeks (July 1st wk)	Low land (< 20M) Thikkodi series	Rice -fallow-Rice	Prefer short duration varieties like Hraswa(KAU)	Make dry nursery of rice, Adopt line sowing of sprouted seedlings soon after monsoon sets in	No scheme required
		Coconut, Arecanut intercropped with crops like Banana, Tapioca, Ginger, Turmeric, Nutmeg, Black pepper, vegetables etc in the homestead system	Coconut & Arecanut: No change Tapioca: Prefer short duration varieties like Sree Jaya and Sree Vijaya(CTCRI) Ginger and Turmeric: cultivate short duration varieties like Varada, Rejatha and Mahima of Ginger and Suguna, Sudarsana of Turmeric(IISR)	Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation Tapioca- Delayed planting, Mulching, Life saving irrigation Ginger and Turmeric- Provide thick mulch cover with green leaves, coirpith compost. Irrigate once in 10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade. Black pepper- Mulch the basal parts and interspaces with locally available leaves, coirpith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves. Nutmeg- Mulching with Coconut husk, coirpith local leaves etc, shading of young trees/grfts, provide drip	Micro irrigation schemes, RKVY

				irrigation/hose irrigation once in a week.	
		Vegetables	-	Vegetables- Life saving irrigation, Mulching	
Midland (20-100M) Nanminda Kakkodi series	Rice-Rice-Vegetables	Rice- Prefer short duration varieties like Hraswa(KAU)		Rice- Make dry nursery of rice, Adopt line sowing of sprouted seedlings soon after monsoon sets in	Paddy mission of Govt. of Kerala
	Coconut, Arecanut, intercropped with spices (Pepper, Nutmeg, Ginger, Turmeric), Banana, Tubers (cassava) and vegetables	Tapioca: Prefer short duration varieties like Sree Jaya and Sree Vijaya(CTCRI) Ginger and Turmeric: Cultivate short duration varieties like Varada, Rejatha and Mahima of Ginger and Suguna, Sudarsana of Turmeric(IISR)		Tapioca- Delayed planting, Mulching, Life saving irrigation Ginger and Turmeric- Provide thick mulch cover with green leaves, coir pith compost, Irrigate once in 10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade. Black pepper- Mulch the basal parts Band interspaces with locally available leaves, coir pith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction, Reduce canopy, by removing some leaves. Nutmeg- Mulching with Coconut husk, coir pith local leaves etc, shading of young trees/grafts, provide drip irrigation/hose irrigation once in a week. Vegetables- Life saving irrigation Mulching	
Midupland (100-300M) Thiruvambadi Kunnamangalam series	Plantation crops (Rubber, Coconut, Arecanut,) forests	No change		Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn. Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation	NREGA
Upland(300-600M) Adivaram series	Rubber	No change		Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn	NREGA/RKVY
	Coconut, Arecanut, Cocoa, Black pepper				

				<p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Cocoa Mulching, Sprinkler irrigation in /Cocoa, Preparation of water harvesting pits</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coirpith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves.</p> <p>Coffee Mulching, Sprinkler irrigation, preparation of water harvesting pits.</p>	
	High land(600-1200M) Memmala Periya series	Coconut, Cocoa and Coffee, Black pepper and Rubber	No change	-do-	NREGA/RKVY/ SHM

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 6 weeks	NA				

	Midland (20-100M) Nanminda Kakkodi series	Rice-Rice-Vegetables	Rice Delay exceeding 3-4 weeks irrigate at 1-4 days after disappearance of ponded water.	do-	
		Coconut, Arecanut intercropped with crops like Banana, Tapioca, Ginger, Turmeric, Nutmeg, Black pepper, vegetables etc in the homestead system	<p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Tapioca- Delayed planting, Mulching, Life saving irrigation</p> <p>Ginger and Turmeric- Provide thick mulch cover with green leaves, coirpith compost. Irrigate once in 10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade.</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coirpith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction, Reduce canopy, by removing some leaves.</p> <p>Nutmeg- Mulching with Coconut husk, coirpith local leaves etc, shading of young trees/grafts, provide drip irrigation/hose irrigation once in a week.</p> <p>Vegetables- Life saving irrigation, Mulching</p>		

Condition			Suggested Contingency measures		Remarks on Implementation
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	

At vegetative stage	Low land (<20M) Thikkodi series	Rice-Rice-Vegetables	<p>Rice Supress weed growth, make shelter belts, spray potassium chloride , thinning of population to 33-50% ,Anti transpirant spray</p>	<p>Intermittent flooding, maintain sub-saturated condition Alternate wetting and drying Basal application of P and K fertilizers, split application of N in reduced doses, Bulky organic manure application Irrigation, Mulching</p>	NREG
		<p>Coconut, Arecanut intercropped with crops like Banana, Tapioca, Ginger, Turmeric, Nutmeg, Black pepper ,vegetables etc in the homestead system</p>	<p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Tapioca- Delayed planting, Mulching, Life saving irrigation</p> <p>Ginger and Turmeric- Provide thick mulch cover with green leaves, coir pith compost. Irrigate once in 10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade.</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves.</p> <p>Nutmeg- Mulching with Coconut husk, coir pith local leaves etc, shading of young trees/grafts, provide drip irrigation/hose irrigation once in a week.</p> <p>Vegetables- Life saving irrigation, Mulching</p>		

	Midland (20-100M)	Paddy-Paddy-fallow	<p>Rice Supress weed growth, make shelter belts, spray potassium chloride, thinning of population to 33-50% ,Anti transpirant spray etc., spray 1%lime/kaolinite solution on the leaves and stem to combat heat burn</p> <p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Tapioca- Delayed planting, Mulching, Life saving irrigation</p> <p>Ginger and Turmeric- Provide thick mulch cover with green leaves, coir pith compost. Irrigate once .in 10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade.</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves.</p> <p>Nutmeg- Mulching with Coconut husk, coirpith local leaves etc, shading of young trees/grafts, provide drip irrigation/hose irrigation once in a week.</p> <p>Vegetables- Life saving irrigation, Mulching</p>	<p>Intermittent flooding, maintain sub-saturated condition Alternate wetting and drying</p> <p>Basal application of P and K fertilizers, split application of N in reduced doses, Bulky organic manure application</p> <p>Irrigation, Mulching</p>	
	Nanminda Kakkodi series				

	<p>Midupland (100-300M) Thiruvambadi Kunnamangalam series</p>	<p>Plantation crops (Rubber, Coconut, Arecanut, Black pepper forests)</p>	<p>Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn.</p> <p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith etc., Spray 1% lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction, Reduce canopy, by removing some leaves.</p>		
	<p>Upland (300-600M) Adivaram series</p>	<p>Rubber, Coconut, Arecanut, Cocoa, Blackpepper, forest</p>	<p>Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn</p> <p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Cocoa Mulching, Sprinkler irrigation in/Cocoa, Preparation of water harvesting pits</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith etc., Spray 1% lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction, Reduce canopy, by removing some leaves.</p>		

	High land(600-1200 Memmala Periya series	Coconut, Cocoa, Coffee, Black pepper	<p>Coconut White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p>		
			<p>Cocoa Mulching, Sprinkler irrigation in Cocoa, Preparation of water harvesting pits. Coffee Mulching, Sprinkler irrigation, preparation of water harvesting pits Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith etc., Spray 1% lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction., Reduce canopy, by removing some leaves</p>		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementation
Mid season drought (long dry spell)					
At flowering/ fruiting stage	Low land (<20M) Thikkodi series	Rice-fallow-Rice	Formation of shelter belts, Spraying of anti transpirants	Rice Supress weed growth, make shelter belts, spray potassium chloride, thinning of population to 33-50% ,Anti transpirant spray	

		Coconut, Arecanut intercropped with crops like Banana, Tapioca, Ginger, Turmeric, Nutmeg, Black pepper, vegetables etc in the homestead system	Weed management, White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration	Coconut and Arecanut- mulching, wrapping trunk with dry leaves for young palms, Drip irrigation Mulching, Life saving irrigation	
			Black pepper- Provide shading of young vines on the west and S-W direction., Reduce canopy, by removing some leaves. Spray kaolinite solution to reduce transpiration and heat load. Nutmeg- shading of young trees/grafts	Ginger and Turmeric provide thick mulch cover with green leaves, coir pith compost,).Irrigate once in 10 days till monsoon sets in. Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith etc Mulching with Coconut husk, coir pith local leaves etc, shading of young trees/grafts, provide drip irrigation/hose irrigation once in a week. Vegetables- Life saving irrigation, Mulching	
Midland (20-100M) Nanminda Kakkodi series	Paddy-Paddy-fallow	Coconut, Arecanut intercropped with crops like Banana, Tapioca, Ginger, Turmeric, Nutmeg, Black pepper ,vegetables etc in the homestead system		Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation Tapioca- Delayed planting, Mulching, ,Life saving irrigation Ginger and Turmeric- Provide thick mulch cover with green leaves, coir pith compost. Irrigate once in	

				<p>10 days till monsoon sets in. Grow inter crops like perennial Redgram for shade.</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves.</p> <p>Nutmeg- Mulching with Coconut husk, coir pith local leaves etc, shading of young plants/grafts, provide drip irrigation/hose irrigation once in a week.</p> <p>Vegetables- Life saving irrigation, Mulching</p>	
	<p>Midupland (100-300M) Thiruvambadi Kunnamangalam series</p>	<p>Plantation crops (Rubber, Coconut, Arecanut,) Black pepper, forests</p>		<p>Rubber- Life saving irrigation ,mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn</p> <p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Cocoa Mulching, Sprinkler irrigation in /Cocoa, Preparation of water harvesting pits</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith etc., spray 1%lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction Reduce canopy, by removing some leaves.</p>	<p>NWDPRA</p>

	Upland (300-600M) Adivaram series	Rubber, Coconut, Arecanut, Cocoa, Blackpepper, forest	Grow leguminous cover crop, shading and mulching of young ones, terracing	Mulching and water harvesting pits	
	Highland (600-1200 M) Periya series	Coconut, Cocoa, Coffee, Black pepper	Mulching, Terracing, water harvesting pits	Sprinkler irrigation Mulching	NWDPR

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought	Low land (<20M) Thikkodi series	Rice-fallow-Rice Coconut, Arecanut intercropped with crops like Banana, Tapioca, Ginger, Turmeric, Nutmeg, Black pepper, vegetables etc in the homestead system	Terminate the irrigation 2 weeks before harvest. Harvesting at physiological maturity.	Maintain soil in sub-saturated condition Alternate wetting and drying	
	Midland (20-100M) Nanminda Kakkodi series	Rice-Rice-Vegetables	Terminate the irrigation 2 weeks before harvest. Harvesting at physiological maturity.	Maintain soil in sub-saturated condition Alternate wetting and drying	
		Coconut, Arecanut, Banana, Black pepper	Drip irrigation, Mulching, Use of coir pith, Shading	Sub surface storing of ground water, Less exploitation of ground water, Drip Irrigation, Husk burial	NWDPR
Midupland (100-300M) Thiruvambadi Kunnamangalam series	Plantation crops (Rubber, Coconut, Arecanut, Black pepper Forests)		Rubber- Life saving irrigation, mulching, shading of stem of young plants/kaolinite swabbing to combat sun burn		

				<p>Coconut and Arecanut- White washing the main stem, Cutting 2 mature leaves in the lower whorl of crown to reduce transpiration, mulching, wrapping trunk with dry leaves for young palms, Drip irrigation</p> <p>Cocoa Mulching, Sprinkler irrigation in /Cocoa, Preparation of water harvesting pits</p> <p>Black pepper- Mulch the basal parts and interspaces with locally available leaves, coir pith etc., Spray 1% lime/kaolinite solution on the leaves and stem to combat transpiration and heat load. Provide shading of young vines on the west and S-W direction. Reduce canopy, by removing some leaves.</p>	
	Upland (300-600M) Adivaram series	Coconut, Cocoa, Black pepper	Grow leguminous cover crop, shading and mulching of young ones, terracing	Mulching and water harvesting pits	
			Mulching/shading of young plants, spraying kaolinite	Mulching, Drip irrigation	
	High land (600-1200 M) Periya series	Coconut, Cocoa, Coffee, Black pepper	Grow leguminous cover crop. shading and mulching of young ones, terracing	Mulching and water harvesting pits	NWDPRA

2.1.2 Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Low land (<20M)	Rice-fallow-rice	Rice/ pulses	Rain water harvesting, Direct seeding, Mulching, Strip cropping Addition of bulky organic manure	
		Coconut and Arecanut based mixed/inter cropping with blackpepper Ginger, Turmeric, Nutmeg etc			
	Midland (20-100M)	Rice –Rice-vegetables Coconut, Arecanut based mixed/inter cropping with Banana, Ginger, Turmeric, Blackpepper, Nutmeg ,etc	Coconut Arecanut intercropped with Tubers like elephant foot yam, Tapioca, etc.	Husk burriyal, Mulching, drip irrigation, Raising of green manures in situ.	SHM

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Low land (<20M)	Rice fallow-Rice	Pulse- Rice	SRI + short duration rice variety, Rain water harvesting, Direct seeding, Mulching, Strip cropping + mulching with coir pith Life saving irrigation, Mulching	
		Rice- Vegetables	Pulse- Rice		
	Midland (20-100M)	Ginger and Turmeric, Tapioca in Coconut garden	Tubers and Banana as intercrops in Coconut and Arecanut gardens.		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Low land (<20M)	Rice-fallow-Rice	Pulse- fallow-Rice	SRI + short duration rice variety, Rain water harvesting, Direct seeding, Mulching, Strip cropping + mulching with coir pith Mulching, Life irrigation, Use of short duration varieties.	
		Rice- Vegetables	Pulse-Rice-Vegetable		
	Midland	Ginger, Turmeric, ,Banana, Blackpepper Tapioca Coconut garden	Tubers in Coconut garden		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Low land (<20M)	Rice- fallow-Rice	Pulse- rice-Pulse	SRI + short duration rice variety, Rain water harvesting, Direct seeding, Mulching, Strip cropping + mulching with coir pith	
		Rice- Vegetables	-do-		
	Midland (20-100M)	Ginger, Turmeric, Banana, Blackpepper, Tapioca in Coconut garden	Tubers in Coconut garden	Late planting ,use of short duration varieties, Mulching	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient	Low land	Paddy fallow-Vegetable	Pulse- rice-Pulse	SRI + short duration rice	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
groundwater recharge due to low rainfall	(<20M)			variety, Rain water harvesting, Direct seeding, Mulching, Strip cropping + mulching with coir pith	
		Rice- Vegetables	Tubers and pulses	Short duration varieties, mulching, water harvesting pits	
	Midland (20-100M)	Banana, Blackpepper Tapioca etc. in Coconut garden	Tubers, Pulses		

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Rice	Improve drainage facility	Improve drainage facility	Improve drainage facility, Harvest the crop at physiological maturity	Improve storage facility
Horticulture				
Ginger and Turmeric				
Black pepper				
Coconut, areca nut				
Banana	Improve drainage facility, Collection and conservation of rain water, mulching			
Heavy rainfall with high speed winds in a short span²				
Rice				Improve storage facility
	Improve drainage facility, alley cropping, providing wind breaks			
Horticulture	Improve drainage facility, Propping of Banana plants			

Ginger and Turmeric		
Black pepper		
Coconut, areca nut		
Banana		
Outbreak of pests and diseases due to unseasonal rains		
Rice	Cultivation of resistant varieties, Use of disease free healthy seeds, proper seed treatment, application of bio control agents, phytosanitation, balanced fertilizer application, adopt suitable cultural practices	Improve storage facility
Horticulture		
Ginger and Turmeric	Use of disease free healthy planting materials, proper seed treatment, provide proper drainage facility, mulching, application of bio control agents, use of plant protection chemicals	
Black pepper	Field sanitation, application of bio control agents, adopt suitable cultural practices like pruning of runner shoots or tying back to the vines, provide adequate drainage facility, shade regulation prophylactic spraying of plant protection chemicals.	
Coconut, areca nut	Avoid water stagnation in the garden by providing drainage facilities, prophylactic spray of 1% Bordeaux mixture, adopt phyto sanitation, cleaning of the crown,	
Banana	Use disease free healthy suckers, provide better drainage facility, prophylactic application of Bordeaux mixture, use of bio control agents, removal and destruction of inoculum from the field	

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Rice	Improve drainage facility, cultivate flood tolerant varieties, crop insurance			Harvest the crop at physiological maturity
Horticulture				
Ginger and Turmeric	Improve drainage			Harvesting before rotting
Black pepper	Plant grafted pepper			
Banana	Improve drainage			
Continuous submergence				

for more than 2 days			
Rice	Improve drainage facility, cultivate flood tolerant varieties, crop insurance		
Horticulture			
Ginger and Turmeric	Improve drainage		
Black pepper	Plant grafted pepper		
Banana	Improve drainage		
Sea water intrusion			
Rice	Grow salt tolerant variety like Vytilla - 6		

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

Condition	Suggested contingency measures
Heat wave	NA
Cold wave	NA
Frost	NA
Hailstorm	NA

Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	Feed storage and silage making	Enriched and preserved fodder can be used for feeding	With the onset of rains, fodder cultivation including legumes and trees can be taken up
Drinking water	Storage facilities for water	Utilization of stored water economically	Rain water harvesting
Health and disease management	Prophylactic measures like vaccination, tree planting around shed	Proper ventilation, cleanliness of the shed	Every day cleaning
Floods			

Feed and fodder availability	Air tight storage of feed	Feeding good quality fodder + concentrate	Drying fodder and feed under sun
Drinking water	Storage facilities for water	Provision of hot water for drinking	Digging well / storage of clean water
Health and disease management	Proper vaccination and balanced feed	Provide dry condition in the shed	Feed with mineral mixture should be given
Cyclone			
Feed and fodder availability	Storage of feed and fodder	Use preserved fodder	Balanced nutrition
Drinking water	Storage facilities for water	Provide clean water for drinking, constrn. of tanks	constrn. of tanks
Health and disease management	vaccination	Provide Balanced nutrition	Clean shed for animals
Heat wave and cold wave	Cold water spraying/ more light + full covering of shed		
Shelter/environment management	Shed with proper ventilation + trees around	Feed additives	Removal of dung from pits + clean surroundings
Health and disease management	Proper vaccination and balanced feed	Mineral mixture and feed additives	Proper feeding

^s based on forewarning wherever available

2.5.2 Poultry

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event	During the event	After the event	
Drought				
Storage of feed ingredients	Storing of feed and ingredients	Provide kitchen waste and feed additives vitamin mineral mixtures	Cultivation of maize and other feed ingredients	Can be linked with ATMA, NREGS, RKVY
Drinking water	Storage of clean drinking	Provide cold clean	Digging of bore wells for	

	water	water	drinking water	
Health and disease management	Vaccination of birds	Medicated water and Balanced feed should be given	Provide clean coops for shelter	
Floods				
Storage of feed ingredients	Storing of feed and ingredients	Provide balanced feed	Cultivation of maize and fodder	
Drinking water	Storage of clean drinking water	Provide clean water	Construction of tanks and wells	
Health and disease management	Vaccination of birds	Provide medicated water and feed additives	Provide clean coops for shelter	
Cyclone				
Storage of feed ingredients	Storing of feed and ingredients	Provide feed and clean water	Cultivation of maize and other fodder	
Drinking water	Storage of water	Provide clean feed and water	Construction of wells	
Health and disease management	Vaccination of birds	Medicated water and feed additives	Provide clean shelter	
Heat wave and cold wave				
Shelter/environment management	Planting of trees around shed. Exhaust fan should be fitted on the roof.	Put gunny bags dipped water in the direction of wind.	Provide proper ventilation	Can be linked with ATMA, NREGS, RKVY
Health and disease management	Vaccination of birds. Provide water and feed	Close the door and ventilation when cold wind comes, during day and night	Provide clean coops and balanced feed	

Fisheries

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	No change	No change	No change
Inland			
(i) Shallow water depth due to insufficient rains/inflow	<ol style="list-style-type: none"> 1. Rainwater harvesting 2. Providing trenches and artificial reefs for providing shelter for fishes to withstand increase in water temperature. 3. . Transferring of cage culture units to deeper areas 	<ol style="list-style-type: none"> 1. Setting up of artificial reefs for providing shelter for fishes to withstand increase in water temperature 2. Shallow areas of derlic water bodies can be used for pen culture of Indian major carps, pearl spot and freshwater prawns in area of 0.1-0.2 ha 	<ol style="list-style-type: none"> 1. Training on fish processing, value addition to fishermen. Setting up of marketing facilities with ice boxes and chill room to store large quantity of fish that will be harvested due to low water depth and drying up of ponds in low lying areas.2. <p>Linkage with schemes of fisheries dept to set up fish markets</p> <ol style="list-style-type: none"> 2. Replacement of cages
(ii) Changes in water quality	<ol style="list-style-type: none"> 1. Removal of decaying organic matter which may still lower the dissolved oxygen content in water during the drought 2. Ensure proper flushing of water at bar mouth with proper dredging. 3. Avoid entry of pollutants like industrial effluents, run off from agricultural land into rivers 	Avoid entry of fertilizers in to the water bodies which will lead to plankton blooms and lowering of dissolved oxygen at night	No change
(iii) Any other		Surveillance program to monitor disease out breaks, removal of diseased fishes	No change

B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	<ol style="list-style-type: none"> 1. Rainwater harvesting 2. Providing trenches (1m depth) and shelter for fishes to withstand increase in water temperature 3. Low stocking density (2000/ha in case of Indian Major Carps instead of usual stocking density of 5,000/ha 4. Culture of air breathing fishes like murrels and catfishes 	<ol style="list-style-type: none"> 1. Providing trenches and shelter(10 % of pond surface area) for fishes to withstand increase in water temperature 2. Stunting of IMC fingerlings to prevent feed wastage which may result in algal blooms 3. Shifting of fish brooder to indoor concrete tanks 4. Partial harvesting of fishes (large size) to reduce stocking density in ponds. 5. Promote ornamental fish culture to increase income of farmers. <p>Linkage with Fisheries Department and MPEDA.</p>	<ol style="list-style-type: none"> 1. Stocking of stunted fingerlings in ponds which has a better growth rate
(ii) Impact of salt load build up in ponds / change in water quality	Shrimp culture species: <i>Penaeus indicus</i> preferred to <i>P. monodon</i>	Shelter on pond surface to reduce transpiration rate	Removal of shelters
(iii) Any other	Quality of shrimp seed to be ensured: free from white spot syndrome virus and other slow growth viruses by PCR	<ol style="list-style-type: none"> 1. Use of probiotics and water remEDIATEORS to maintain water quality. 2. Adoption of twin pond system for shrimp culture. 3. Recirculatory of water system 4. Use of aerators or prevent thermal stratification in ponds 5. Surveillance program to monitor presence of WSSV and other diseases 	Linkage with fish farmers development agencies in fisheries department for seed, inputs and training.
2) Floods			
A. Capture			
Marine	1. Ensure strengthening of coastal belts by planting casuarina trees in	1. Avoid fishing when bad weather condition prevails. Warning	Compensation to be given. Linkage with Fisheries Department,

	marshy areas mangroves. 2. Training fishermen on spawning season of fishes and importance of selective gears.	signals to be given in radio and televisions. 2. To provide navigating equipments such as radar and safety gears such as life buoy, life jackets, radio bacon etc. Linkage with Fisheries Department (provide to selected fishermen after 2004 Tsunami). 3. Enquiry based on incidence report on loss of life, gears and accidents in sea.	Fishermen welfare fund board.
Inland			
(i) Average compensation paid due to loss of human life	Registration of fishermen under fishermen welfare fund board of Department of Fisheries	Enquiry based on incidence reports	Payment of compensation, as per the norms of the State Government and implemented by the State Fisheries Department and Revenue Department
(ii) No. of boats / nets/damaged	Registration of boats and fishing gears with Department of Fisheries	-do-	-do-
(iii) No.of houses damaged	Registration of houses	-do-	-do-
(iv) Loss of stock	Storing of clean water and feed for live stock.	-do-	-do-
(v) Changes in water quality	Strengthening of embankment prawn to soil erosion by trufing and terracing to avoid entry of water or over flow which may also lead to turbidity of water	No change	Stocking of fishes only after water quality analysis and after checking the presence of weed fishes
(vi) Health and diseases	Surveillance program to monitor disease out breaks, removal of diseased fishes	Surveillance prog ram to monitor disease out breaks, removal of diseased fishes especially ulcer, pox and EUS	No change
B. Aquaculture			
(i) Inundation with flood water	Keeping of buffer zone.	Opening of sluice or out let with net for protecting fish escape, If not	

	Construction of ponds based on the norms of Coastal aquaculture authority and MPEDA. Keeping of protective net fencing over bunds	possible harvest the fish immediately	
(ii) Water continuation and changes in water quality	Strengthening of pond embankment to reduce turbidity of water due to soil erosion	Measurement of water turbidity, pH and application of alum, agriculture lime accordingly	Application of lime to correct water pH
(iii) Health and diseases	Surveillance program to monitor health status of fish. Providing immunostimulants with feed	Surveillance program to monitor disease out breaks, removal of diseased fishes	Sampling to analyze the fish stock, species and entry of weed fishes. Drain and dry the pond before next crop
(iv) Loss of stock and inputs (feed, chemicals etc)	Storing of fish feed and chemicals in safer areas	No change	Quantify the feed requirement based on number of fishes in ponds
(v) Infrastructure damage (pumps, aerators, huts etc)	Removal of pumps and electrical equipments to safer areas	No change	Reinstallation of pumps and aerators
(vi) Any other	Start fish culture in advance		
3. Cyclone / Tsunami			
A. Capture			
Marine	Establishment of Tsunami warning center	No change	No change
(i) Average compensation paid due to loss of fishermen lives	Registration of fishermen under fishermen welfare fund board of Department of Fisheries	Enquiry based on incidence reports	Payment of compensation, based on report by Revenue, Fisheries department Rehabilitation activities: Starting of employment providing micro enterprises for the depended of diseased.
(ii) Avg. no. of boats / nets/damaged	Registration of boats and fishing gears with fishermen Department of Fisheries	Enquiry based on incidence reports	Payment of compensation, based on report by Revenue, Fisheries department
(iii) Avg. no. of houses damaged	Registration of houses	Enquiry based on incidence reports	Payment of compensation, based on

			report by Revenue department
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds	Keeping of buffer zone. Construction of ponds based on the norms of Coastal aquaculture authority and MPEDA.	Enquiry based on incidence reports	Payment of compensation, based on report by Revenue, Fisheries department Drying of pond before next crop Application of lime to correct pH
(ii) Changes in water quality (fresh water / brackish water ratio)	Strengthening of embankment prowl to soil erosion to reduce turbidity of water	No change	Payment of compensation, based on report by Revenue, Fisheries department
(iii) Health and diseases	No change	No change	Surveillance program to monitor health status of fish
(iv) Loss of stock and inputs (feed, chemicals etc)	Registering the farm and updating the culture practice with respective FFDA's(Fresh water fish farmers development agencies) Storing of feed, chemical, probiotics in separate room with proper ventilation and protection against rodents Linkage with FFDA, Fisheries Dept	Enquiry based on reports	Payment of compensation, based on report by Revenue, Fisheries department
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Starting of fish culture in advance in areas prone to flood. Removal of pumps and electrical equipments to safer areas based on alert	No change	Reinstallation of pumps and aerators
(vi) Any other	Cage culture technique can be adopted in areas prone to flood		
4. Heat wave and cold wave			
A. Capture			

Marine	No change	No change	Plankton analysis and alert if red tide or toxic algal bloom occurs
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)	No change	No change	No change
(ii) Health and Disease management	Incorporation of immunostimulants with feed	Surveillance program to monitor disease out breaks	Treatment based on diagnosis
(iii) Any other			

Annexure-I

Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75° 52' 15" E , Latitude 11° 17' 07" N , Altitude: 60m above MSL												
Daily Rainfall (mm/day)						Year: 2000						22
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	0.0	0.8	36.2	0.0	15.6	21.2	0.0	120.6
2	0.0	0.0	0.0	11.0	0.0	18.4	80.2	0.0	8.3	22.4	1.8	0.0
3	0.0	0.0	0.0	0.0	0.0	27.4	0.4	0.6	8.3	43.6	0.0	0.0
4	0.0	0.0	0.0	3.8	0.0	6.0	9.4	23.2	3.2	3.8	0.0	0.0
5	0.0	0.0	0.0	4.0	0.0	25.0	9.0	4.2	12.4	2.2	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	74.2	34.4	0.2	1.8	0.0	0.0	21.4
7	0.0	0.0	0.0	0.0	0.0	77.6	14.4	2.8	0.0	11.4	2.0	0.0
8	0.0	0.0	0.0	3.8	0.0	70.8	12.2	14.0	0.0	28.6	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	36.8	2.2	12.2	0.0	26.2	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	13.8	0.0	5.4	4.0	1.8	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	35.4	86.0	29.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	1.8	0.0	5.6	90.4	10.6	0.0	0.2	0.0	0.0
13	1.2	0.0	0.0	0.0	0.0	39.8	0.8	6.6	0.0	30.2	0.0	0.0
14	0.0	0.0	0.0	0.2	0.0	3.2	0.0	0.0	0.0	30.8	0.0	0.0
15	0.0	0.0	0.0	4.6	0.0	16.8	15.8	0.0	0.0	3.2	0.0	0.0
16	0.0	0.0	0.0	0.4	0.0	16.8	9.6	2.4	0.4	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	3.0	14.4	6.2	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	12.2	24.8	7.8	9.2	17.4	0.0	17.0	0.0	0.0

19	0.0	0.0	0.0	0.0	0.0	48.6	13.2	5.2	0.4	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	6.8	15.8	2.0	14.2	0.0	0.0	3.6	0.0
21	0.0	0.0	0.0	0.0	0.8	42.0	0.0	29.6	7.4	0.0	24.0	0.0
22	0.0	0.0	0.0	0.0	0.0	11.4	0.0	12.6	2.2	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	14.4	0.0	21.4	8.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.2	22.0	1.0	64.4	0.0
25	0.0	0.0	0.0	0.2	0.2	0.0	0.0	34.6	52.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	1.4	2.8	0.0	44.4	92.8	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	43.2	9.0	0.0	54.2	3.2	0.0	0.0	0.0
28	0.0	6.0	0.0	0.0	14.2	23.0	0.0	30.8	2.2	0.0	0.0	0.6
29	0.0	0.0	0.0	0.0	0.0	18.0	31.8	3.8	0.6	0.0	0.0	0.0
30	0.0		0.0	0.0	0.0	30.0	0.6	3.4	6.0	0.0	3.2	0.0
31	0.0		0.0		0.0		0.0	8.6		0.0		0.6
Total	1.2	6.0	Nil	42.0	94.4	705.6	464.0	434.6	250.8	243.6	99.0	143.2
	A.R:2000		2484.4mm									

Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL												
Daily Rainfall (mm/day)						Year: 2001						23
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	1.0	0.0	2.6	0.0	0.0	39.4	18.0	0.0
2	0.0	4.0	0.0	0.0	0.0	0.0	8.4	33.4	2.8	3.4	0.0	0.0

3	0.0	0.0	0.0	0.0	0.0	0.0	55.0	32.8	0.0	0.0	3.6	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	13.0	8.4	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	7.8	42.0	13.4	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	1.2	33.8	32.6	13.4	0.0	4.8	0.0	0.0
7	0.0	0.0	0.0	0.0	68.8	70.0	24.4	1.6	0.0	4.0	17.0	0.0
8	0.0	0.0	0.0	0.0	1.0	44.0	57.2	18.2	0.0	30.0	35.8	0.0
9	0.0	0.0	0.0	2.0	0.0	14.0	16.6	1.0	0.0	29.8	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	43.5	16.8	1.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	43.5	33.6	1.8	0.0	2.6	0.0	0.0
12	0.0	0.0	0.0	55.7	0.0	43.5	15.6	11.8	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	55.7	0.0	24.6	0.0	10.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	55.7	0.0	53.0	0.0	16.8	0.0	21.0	0.0	0.0
15	0.0	0.0	0.0	55.7	0.0	45.2	0.4	1.0	1.2	26.6	0.4	0.0
16	0.0	0.0	0.0	0.0	0.0	18.2	0.0	26.6	0.0	3.4	38.4	0.0
17	0.0	0.0	0.0	0.0	0.0	19.0	1.0	29.4	0.0	0.0	35.4	0.0
18	0.0	0.0	0.0	0.0	0.0	17.0	5.2	6.8	0.0	0.4	0.0	0.0
19	0.0	0.0	0.0	4.6	0.0	17.0	2.2	50.0	0.0	0.0	18.8	0.0
20	0.0	0.0	0.0	0.0	0.0	17.0	2.4	9.0	1.0	10.2	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	12.2	0.0	27.6	0.8	3.4	0.0	0.0
22	0.0	0.0	0.0	0.0	15.4	21.6	0.0	12.2	0.0	8.6	0.0	0.0
23	0.0	0.0	0.0	14.4	2.4	100.8	5.6	10.2	43.2	0.0	3.0	0.0
24	0.0	0.0	0.0	0.4	76.0	34.0	18.4	15.6	0.8	0.0	2.4	0.0
25	0.0	0.0	0.0	0.0	0.0	2.4	2.0	12.4	0.0	0.0	0.0	0.0

26	0.0	0.0	0.0	0.0	29.6	28.8	29.6	3.0	16.0	13.4	0.0	0.0
27	0.0	0.0	0.0	0.0	49.0	5.2	2.0	0.0	15.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	42.6	17.6	17.2	0.0	1.2	2.4	0.0	0.0
29	0.0		0.0	0.0	17.6	7.8	23.0	0.0	1.8	0.0	0.0	0.0
30	0.0		0.0	0.0	9.2	1.6	1.0	3.0	80.6	0.6	0.6	0.0
31	0.0		0.0		12.0		49.6	0.0		0.0		0.0
Total	Nil	4.0	Nil	244.2	325.8	743.1	477.4	370.4	164.4	204.0	173.4	Nil
	A.R:2001	2706.7mm										

Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL												
Daily Rainfall (mm/day)						Year: 2002						24
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	0.0	0.4	0.0	3.2	0.0	1.0	0.8	0.0
2	0.0	0.0	0.0	0.0	0.0	67.6	20.6	18.2	0.0	18.4	0.4	0.0
3	0.0	0.0	0.0	0.0	0.0	27.4	29.6	10.6	0.8	0.0	15.8	0.0
4	0.0	0.0	0.0	0.0	23.6	36.0	2.4	6.6	0.8	0.4	0.0	0.0
5	0.0	0.0	0.0	0.0	20.0	0.0	20.6	46.4	1.4	2.4	7.6	0.0
6	0.0	0.0	0.0	0.0	0.0	1.6	5.4	18.0	5.6	0.0	0.6	0.0
7	0.0	8.8	0.0	0.0	0.0	0.4	1.0	3.6	15.6	0.0	0.0	0.0

8	0.0	0.0	0.0	0.0	0.0	0.0	1.2	37.4	27.0	15.2	0.4	0.0
9	0.0	0.0	0.0	0.0	17.6	39.0	0.0	29.0	16.2	78.6	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	2.6	4.6	14.6	12.4	15.4	0.6	0.0
11	0.0	0.0	0.0	0.0	0.0	2.0	8.2	62.2	0.0	19.2	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	2.0	69.4	38.2	12.4	54.4	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	66.2	43.2	0.8	0.0	70.2	0.0	0.0
14	0.0	0.0	0.0	0.0	6.4	38.4	9.0	22.8	0.0	70.2	0.0	0.0
15	0.0	0.0	0.0	6.0	4.6	41.8	3.4	13.0	0.0	70.2	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	28.8	0.0	19.6	0.0	0.6	0.0	0.0
17	0.0	0.0	25.4	0.0	0.0	0.0	12.4	93.4	0.0	0.8	0.0	0.0
18	0.0	0.0	0.0	0.0	1.2	1.6	10.0	24.2	0.0	0.0	0.8	0.0
19	0.0	0.0	0.0	0.0	167.0	36.2	2.0	8.2	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	20.0	2.6	2.4	0.0	0.0	8.6	11.2	0.0
21	0.0	0.0	0.0	0.0	3.4	10.4	10.0	2.0	0.0	0.0	5.2	0.0
22	0.0	0.0	0.0	0.0	1.0	7.6	3.2	6.2	0.0	0.0	0.8	0.0
23	0.0	0.0	0.0	0.0	0.0	15.4	0.4	6.2	0.0	0.0	29.0	0.0
24	0.0	0.0	0.0	10.0	0.0	26.0	0.0	6.2	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	20.4	0.0	4.4	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	24.8	11.0	23.0	0.0	0.0	36.2	0.0	0.0

27	0.0	0.0	0.0	0.0	0.0	23.0	1.6	0.0	0.0	0.6	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	1.8	14.0	0.0	0.0	3.2	0.0	0.0
29	0.0		0.0	10.8	24.8	0.0	14.0	0.0	4.4	15.0	0.0	0.0
30	0.0		0.0	0.0	23.6	0.0	21.4	0.0	0.0	32.0	0.0	0.0
31	0.0		0.0		0.2		11.6	0.0		0.0		0.0
Total	Nil	8.8	25.4	26.8	338.2	510.2	344.6	495.0	96.6	512.6	73.2	Nil
	A.R:2002		2431.4mm									
Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL												
Daily Rainfall (mm/day)						Year: 2003						25
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	86.0	0.0	0.0	1.4
2	0.0	0.0	0.0	0.0	5.0	0.0	32.4	33.4	4.0	18.4	0.0	0.0
3	0.0	0.0	0.0	47.8	0.0	0.0	12.0	0.0	22.6	16.0	17.8	0.0
4	0.0	0.0	0.0	2.0	0.0	0.0	23.8	0.0	0.0	22.4	3.0	0.0
5	0.0	0.0	0.0	0.0	0.4	0.0	64.2	0.0	0.0	38.2	0.0	0.0
6	0.0	0.0	0.0	0.0	8.4	6.8	79.8	4.8	0.0	2.0	21.0	0.0
7	0.0	0.0	0.0	0.0	98.4	0.0	8.6	4.6	57.0	2.2	0.0	0.0

8	0.0	8.0	0.0	0.0	0.0	52.0	1.0	14.8	0.0	35.4	57.0	0.0
9	0.0	0.0	0.0	0.0	0.0	17.6	3.2	13.4	2.4	4.0	1.2	0.0
10	0.0	0.0	0.0	4.4	0.0	21.2	22.6	0.4	0.0	7.4	25.2	0.0
11	0.0	0.0	0.0	0.0	1.0	0.4	15.6	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	2.0	32.8	0.8	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	6.0	3.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	1.4	39.0	19.6	0.0	1.8	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	56.0	20.2	12.8	0.0	0.4	3.6	0.0
16	0.0	0.0	0.0	0.0	2.0	34.4	68.6	6.6	0.0	0.0	0.0	0.0
17	0.0	0.0	15.2	0.0	2.2	36.8	16.0	4.8	17.2	1.4	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	85.6	16.2	5.8	1.0	6.0	0.0	0.0
19	0.0	0.0	0.0	0.2	0.0	14.6	18.6	0.4	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.4	0.0	78.8	6.6	4.6	0.0	19.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	104.2	0.0	8.6	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	71.4	1.6	39.6	0.0	10.2	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	81.4	24.2	33.2	0.0	5.2	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	89.8	13.4	16.6	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	20.6	17.0	0.0	2.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	23.4	0.0	0.0	0.0	0.0	0.0

27	0.0	0.4	0.0	0.0	0.0	20.8	18.8	6.4	0.0	0.0	0.0	0.0
28	0.0	0.0	7.2	0.0	0.0	18.4	35.2	0.0	0.0	0.0	0.0	0.0
29	0.0		0.0	18.2	0.0	3.0	58.8	0.0	0.0	0.0	0.0	0.0
30	0.0		0.0	0.0	0.0	9.6	0.0	0.0	0.0	0.0	56.6	0.0
31	0.0		0.0		0.0		0.0	0.6		1.6		0.0
Total	Nil	8.4	22.4	73.0	118.8	849.8	664.4	229.2	192.0	191.8	185.4	1.4
	A.R : 2536.6mm											
Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL												
Daily Rainfall (mm/day)						Year: 2004						26
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	48.4	0.4	80.6	8.0	1.6	0.0	0.0	229.8	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	23.2	0.0	0.0	4.0	1.4	0.0
3	4.6	0.0	0.0	0.0	35.0	2.6	26.6	23.4	0.0	68.0	0.0	0.0
4	0.0	0.0	0.0	0.0	5.0	27.0	17.6	118.4	0.0	90.0	4.0	0.0
5	0.0	0.0	0.0	0.0	24.6	213.0	2.2	60.0	0.0	58.6	0.0	0.0
6	0.0	0.0	0.0	6.0	20.2	235.0	0.0	20.2	18.6	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	170.4	7.4	0.0	30.8	0.0	0.0	4.6	0.0

8	0.0	0.0	0.0	0.0	40.4	26.8	1.0	15.2	0.2	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	40.4	50.2	3.2	8.0	17.2	0.0	2.6	0.0
10	0.0	0.0	0.0	0.0	40.4	105.4	13.2	0.2	0.2	0.0	2.7	0.0
11	0.0	0.0	0.0	0.0	4.6	14.6	1.6	1.6	10.0	0.0	0.4	0.0
12	0.0	0.0	0.0	0.0	2.4	17.8	1.4	23.2	3.2	1.2	6.4	0.0
13	0.0	0.0	0.0	0.0	0.0	29.6	23.0	47.2	0.0	0.2	11.0	0.0
14	0.0	0.0	0.0	0.0	0.0	67.2	3.0	46.0	0.0	7.2	5.2	0.0
15	0.0	0.0	0.0	0.0	3.4	66.6	49.6	17.4	20.4	31.8	0.0	0.0
16	0.0	0.0	0.0	0.0	3.0	49.4	39.0	6.2	1.0	9.8	0.0	0.0
17	0.0	0.0	0.0	0.0	40.0	30.0	7.6	5.2	0.6	0.2	0.0	0.0
18	0.0	0.0	0.0	0.0	3.8	8.4	6.4	0.4	11.0	3.8	0.0	0.0
19	0.0	0.0	0.0	0.0	40.2	14.0	0.0	4.2	0.0	0.2	0.0	0.0
20	0.0	0.0	0.0	2.2	19.8	6.4	2.4	2.8	0.0	5.0	0.0	0.0
21	0.0	0.0	0.0	0.0	1.6	0.0	6.2	0.0	0.0	1.6	0.0	0.0
22	0.0	0.0	0.0	0.6	8.0	0.0	0.0	6.0	0.0	19.4	0.0	0.0
23	0.0	0.0	0.0	0.0	12.0	0.0	11.8	1.4	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	15.0	21.4	25.0	20.6	0.0	13.2	0.0	0.0	0.0
25	0.0	0.0	0.2	0.0	11.8	3.8	2.4	0.0	39.2	0.0	0.0	0.0
26	0.0	0.0	0.0	25.0	14.2	10.0	59.2	0.0	0.8	6.2	0.0	0.0

27	0.0	0.0	0.0	11.4	4.6	2.0	17.0	0.6	22.6	0.0	0.0	0.0
28	0.0	0.0	0.0	2.4	0.6	78.4	12.2	0.0	53.2	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	3.8	10.2	3.2	0.0	9.8	0.0	0.0	0.0
30	0.0		0.0	0.0	27.8	9.4	43.0	0.0	0.0	38.2	0.0	0.0
31	0.0		0.0		3.6		0.6	0.0		24.6		0.0
Total	4.6	Nil	0.2	111.0	603.4	1190.8	405.2	440.0	221.2	370.0	268.1	Nil
	A.R :	3614.5mm										
Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL												
Daily Rainfall (mm/day)							Year: 2005					27
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	6.8	0.0	0.0	0.0	49.2	85.6	21.0	21.0	0.0	34.0	0.0
2	0.0	0.0	0.0	0.0	0.0	6.0	34.0	28.0	16.4	0.0	0.2	0.0
3	0.0	0.0	0.0	0.0	0.0	1.4	45.2	21.8	11.4	0.0	5.6	0.0
4	0.0	0.0	0.0	19.0	0.0	0.0	20.4	14.0	1.2	0.0	0.0	0.8
5	0.0	0.0	0.0	0.4	0.0	0.8	94.6	17.8	15.2	21.4	16.0	0.0
6	0.0	0.0	0.0	78.0	0.0	45.0	26.0	1.8	7.6	0.0	13.6	0.0
7	0.0	0.0	0.0	36.0	0.0	2.0	111.0	0.0	5.6	0.0	0.0	0.0

8	0.0	0.0	0.0	0.8	0.0	0.0	19.8	5.6	35.4	1.0	0.2	0.0
9	0.0	0.0	0.0	0.8	0.0	30.8	21.0	23.8	5.4	0.0	19.0	0.0
10	0.0	0.0	0.0	0.0	0.0	26.0	59.8	22.6	6.2	47.8	2.4	0.0
11	0.0	0.0	0.0	9.8	0.0	1.2	20.0	10.8	70.4	2.4	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	3.6	5.2	44.4	8.0	1.2	0.0
13	0.0	0.0	0.0	5.2	2.4	5.2	4.2	0.0	26.6	41.2	35.6	36.6
14	0.0	0.0	0.0	0.0	0.0	6.8	6.2	8.0	17.2	9.0	23.8	14.6
15	0.0	0.0	0.0	0.0	0.0	0.0	0.8	5.8	37.0	1.8	0.0	0.8
16	0.0	0.0	0.0	6.8	0.0	23.4	0.0	11.4	3.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	125.0	18.0	6.6	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	8.8	41.4	3.2	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	49.2	2.0	0.0	0.0	0.4	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	64.0	31.8	0.0	14.4	0.0	0.0	0.0
21	0.0	0.0	0.0	0.4	0.0	157.8	6.4	0.0	64.0	6.2	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	62.4	30.6	0.0	17.2	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	16.8	12.8	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	1.6	0.0	5.8	19.8	0.4	0.0	53.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	20.6	11.2	0.0	0.0	1.4	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	38.2	22.2	0.0	0.0	0.0	0.0	0.0

27	0.0	0.0	0.0	0.0	46.4	12.2	9.4	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	40.0	36.4	2.4	0.0	9.6	26.8	0.0
29	0.0		0.0	0.0	8.0	17.0	16.4	0.0	0.0	0.8	0.2	0.0
30	8.4		0.0	0.0	38.2	42.0	48.2	0.0	0.0	9.4	0.0	0.0
31	0.4		0.0	0.0	0.2		38.6	0.0		2.8		0.0
Total	8.8	6.8	Nil	158.8	95.2	857.6	897.4	210.2	419.6	216.2	178.6	52.8
AN	3102	mm										
Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL												
Daily Rainfall (mm/day)						Year 2006						28
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	0.0	166.4	22.4	12.8	0.0	0.0	0.4	0.0
2	0.0	0.0	0.0	0.0	0.0	3.2	21.6	1.0	0.0	16.0	0.2	0.0
3	0.0	0.0	0.0	0.0	0.0	3.8	76.0	11.0	0.0	8.6	11.0	0.0
4	0.0	0.0	0.0	0.0	0.0	34.0	36.4	29.2	0.0	6.4	6.6	0.0
5	0.0	0.0	0.0	0.0	12.0	1.4	14.2	9.6	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	14.4	16.0	0.0	0.0	1.2	0.2	0.0
7	0.0	0.0	0.0	0.0	0.0	1.2	28.4	4.0	0.0	2.8	0.8	0.0

8	0.0	0.0	0.0	0.0	0.0	0.0	24.4	0.0	7.0	78.6	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.1	5.6	7.0	7.4	1.8	0.2	0.0
10	0.0	0.0	15.2	0.0	0.0	0.8	10.6	30.4	13.0	3.4	47.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	23.0	65.8	22.6	1.0	0.0	0.0
12	0.0	0.0	0.0	0.4	0.0	0.0	40.8	104.0	92.8	1.8	4.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	47.2	52.4	122.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	1.0	49.0	29.6	42.4	0.0	1.6	0.0
15	0.0	0.0	0.0	0.0	0.6	0.4	12.8	34.8	18.0	7.8	9.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.1	10.4	46.8	52.2	0.0	0.8	0.0
17	0.0	0.0	0.0	2.0	2.8	90.0	5.2	8.2	61.8	7.2	2.6	0.0
18	0.0	0.0	0.0	0.0	0.8	0.0	14.4	9.0	17.2	0.0	4.4	0.0
19	0.0	0.0	0.0	19.4	20.4	0.0	42.8	19.2	5.4	6.0	5.0	0.0
20	0.0	0.0	0.0	0.0	5.6	2.2	4.0	1.0	14.0	5.6	0.0	0.0
21	0.0	0.0	0.0	27.0	0.0	16.2	14.8	0.0	3.6	0.8	5.0	0.0
22	0.0	0.0	0.0	0.0	0.0	22.6	21.6	0.0	33.6	1.0	7.2	0.0
23	0.0	0.0	0.0	0.0	3.4	126.6	18.4	0.0	4.8	2.0	0.0	0.0
24	0.0	0.0	33.4	0.0	47.4	103.2	0.0	0.0	3.4	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	15.2	116.4	0.0	0.0	43.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	61.8	31.6	26.6	0.0	57.6	27.2	0.0	0.0

27	0.0	0.0	0.0	0.0	40.4	27.0	5.8	0.0	0.6	2.0	0.0	0.0
28	0.0	0.0	0.0	0.0	192.4	97.0	8.6	0.0	0.0	31.0	0.0	0.0
29	0.0		0.0	0.0	136.8	53.0	5.8	6.8	8.6	42.0	0.0	0.0
30	0.0		0.0	0.0	65.6	94.0	5.2	0.0	49.2	6.2	41.4	0.0
31	0.0		0.0		57.2		20.6	1.0		21.0		0.0
Total	0.0	0.0	48.6	48.8	662.4	1006.6	632.6	483.6	680.2	281.4	147.4	
AN	3991.6											
Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75° 52' 15" E , Latitude 11° 17' 07" N , Altitude: 60m above MSL (79 m from 25th March 2007)												
Daily Rainfall (mm/day)						Year 2007						29
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	1.4	0.0	0.2	51.2	2.6	25.8	30.0	0.0	az
2	0.0	0.0	0.0	0.0	18.2	0.0	51.2	47.4	23.0	5.4	14.6	0.0
3	0.0	0.0	0.0	0.0	4.6	0.0	122.2	51.0	23.0	0.0	1.2	0.0
4	0.0	0.0	0.0	0.0	16.0	0.0	136.8	31.4	0.0	0.0	3.8	0.0
5	0.0	0.0	0.0	0.0	0.0	0.3	23.2	64.1	26.8	0.1	0.0	0.0
6	0.0	0.0	0.0	0.0	4.0	0.2	27.8	64.1	30.2	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	80.0	1.8	35.6	37.6	22.4	0.0	58.4	0.0
8	0.0	0.0	0.0	0.0	0.0	10.8	20.0	47.0	8.0	3.2	0.0	0.0

9	0.0	0.0	0.0	0.0	0.0	11.6	75.0	42.6	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	36.4	3.2	96.2	81.2	80.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	18.4	65.6	10.0	28.2	0.0	0.0	0.0
12	0.0	0.0	0.0	0.8	0.0	86.0	46.4	10.0	18.4	19.2	0.0	0.0
13	0.0	0.0	0.0	14.4	0.0	62.2	68.4	11.0	0.0	19.2	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	64.6	37.0	0.0	20.8	0.0	0.0	0.0
15	0.0	0.0	0.0	35.0	0.0	27.2	37.0	0.0	9.8	0.0	0.0	0.0
16	0.0	0.0	0.0	2.4	0.0	23.6	38.0	0.0	11.6	1.6	0.0	0.0
17	0.0	0.0	0.0	24.4	0.0	33.0	142.4	0.0	60.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	33.0	103.6	0.0	78.8	0.8	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	76.6	5.8	0.0	1.8	40.4	0.0	0.4
20	0.0	0.0	0.0	0.0	0.0	62.0	10.0	1.2	22.8	50.0	0.0	0.0
21	0.0	0.0	0.0	29.4	0.0	56.6	57.8	7.2	10.0	18.0	0.0	0.0
22	0.0	0.0	0.0	16.2	0.0	60.0	10.4	25.2	11.0	4.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	140.8	10.4	20.2	15.7	19.4	0.0	0.0
24	0.0	0.0	0.0	3.4	0.0	37.0	0.0	0.2	15.7	1.8	0.0	0.0
25	0.0	0.0	0.0	0.0	6.0	37.0	50.4	23.0	117.4	6.4	0.0	0.0
26	0.0	0.0	0.0	0.0	7.2	13.6	5.0	0.0	33.8	1.2	0.0	0.0
27	0.0	0.0	0.0	21.0	38.6	27.8	16.0	0.0	0.6	30.0	0.0	0.0

28	0.4	0.0	0.0	7.2	38.6	29.4	16.0	30.0	5.0	40.0	0.0	0.0	
29	0.0		0.0	0.0	35.4	5.8	10.1	30.0	0.2	40.0	0.0	0.0	
30	0.0		0.0	0.0	16.4	14.2	10.1	32.0	10.8	2.2	0.2	0.0	
31	0.0		0.0		32.8		3.6	43.0		0.0		0.0	
Total	0.4	0.0	0.0	155.6	334.2	936.9	1383.2	712.0	711.6	332.9	78.2	0.4	
AN	4645.4												
Name of station:CWRDM Campus, Kottamparamba													
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL (79 m from 25th March 2008)													
Daily Rainfall (mm/day)							Year 2008						30
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1	0.0	0.0	0.0	0.0	0.0	0.0	34.4	10.2	32.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	15.8	18.6	10.2	1.6	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	5.2	1.8	0.0	7.0	0.2	0.0	0.0	1.8	
4	0.0	0.0	0.0	0.0	0.2	11.0	0.0	20.0	17.8	0.0	0.0	0.0	
5	0.0	0.0	0.0	0.0	0.0	22.6	1.6	4.6	41.2	0.0	0.0	0.0	
6	0.0	0.0	0.0	0.0	0.0	21.0	6.0	11.6	10.0	0.0	0.0	0.0	
7	0.0	0.0	0.0	0.0	0.0	55.4	6.0	2.8	10.0	0.0	0.0	0.0	
8	0.0	0.0	0.0	0.0	0.4	0.0	0.8	5.0	43.6	0.0	0.0	0.0	

9	0.0	0.0	0.0	0.0	2.6	105.0	19.6	35.3	55.6	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	33.4	2.8	35.3	29.0	0.4	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	25.2	23.2	35.4	27.0	0.0	0.0	0.0
12	0.0	3.8	0.0	0.0	1.6	71.4	0.0	34.6	27.0	58.6	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	47.4	0.0	48.2	26.0	0.0	0.0	0.0
14	0.0	0.0	21.4	0.0	0.0	19.0	3.4	9.0	26.0	7.8	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	19.0	0.0	10.0	26.0	12.8	0.0	0.0
16	0.0	0.0	8.6	9.0	0.0	19.0	196.0	13.0	11.6	37.2	0.0	0.0
17	0.0	0.0	3.2	0.0	0.0	47.4	0.0	0.0	0.0	7.0	1.6	0.0
18	0.0	0.0	0.0	0.0	0.0	39.0	0.0	0.0	2.6	0.6	0.0	0.0
19	0.0	0.0	1.4	0.0	0.0	48.0	8.0	0.0	0.0	15.0	0.0	0.0
20	0.0	0.0	36.2	0.0	0.0	0.8	0.0	0.0	53.2	14.0	0.0	0.0
21	0.0	0.0	36.2	0.0	3.6	0.0	3.4	0.0	0.0	27.4	27.8	0.0
22	0.0	0.0	37.0	0.0	25.8	10.0	0.0	0.0	0.0	5.0	8.6	0.0
23	0.0	0.0	10.4	0.0	4.2	17.8	0.0	0.0	0.0	23.4	0.0	0.0
24	0.0	0.0	10.4	0.0	1.8	1.4	3.6	0.0	0.0	142.2	0.0	0.0
25	0.0	0.0	0.0	19.8	0.0	18.2	21.0	0.0	0.0	127.4	0.0	0.0
26	0.0	0.0	0.0	2.0	7.4	10.0	41.0	0.0	0.0	99.6	0.0	0.0
27	0.0	0.0	0.0	16.2	0.0	22.2	44.0	0.8	0.8	1.4	0.0	0.0

28	0.0	0.0	0.0	39.4	0.0	32.6	45.0	0.0	0.0	0.0	0.0	0.0	
29	0.0	0.0	0.0	2.0	2.6	55.2	44.4	0.8	0.0	0.0	0.0	0.0	
30	0.0		0.0	0.0	10.4	58.2	36.4	0.0	0.0	0.0	0.0	0.0	
31	0.0		0.0		6.2		35.0	0.8		0.0			
Total	0.0	3.8	164.8	88.4	72.0	827.8	594.2	294.6	441.2	579.8	38.0	1.8	
Hy	827.8	594.2	294.6	441.2	579.8	38.0	1.8	17.0	78.5	259.6			
Name of station:CWRDM Campus, Kottamparamba													
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL (79 m from 25th March 2008)													
Daily Rainfall (mm/day)						Year 2009							30
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1	0.0	0.0	0.0	0.0	6.6	0.8	107.4	18.2	15.0	2.2	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.4	81.4	17.4	11.4	100.0	0.0	0.4	
3	0.0	0.0	0.0	0.0	0.0	0.0	83.0	2.0	15.0	138.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	28.6	8.0	15.0	48.2	13.0	0.0	
5	0.0	0.0	0.0	0.0	22.6	2.2	57.0	11.8	80.0	0.0	0.0	18.4	
6	0.0	0.0	0.0	0.0	0.0	106.0	56.0	4.4	20.0	1.8	3.2	0.0	
7	0.0	0.0	0.0	0.0	0.0	86.3	43.0	1.2	19.6	0.0	49.0	0.0	
8	0.0	0.0	0.0	0.0	0.8	40.3	30.4	5.8	5.6	0.2	55.2	0.0	

9	0.0	0.0	0.0	0.0	3.8	0.6	54.4	2.0	9.2	0.0	55.2	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	26.6	10.0	1.2	0.0	25.8	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	34.4	11.8	0.0	0.0	26.0	0.0
12	0.0	0.0	2.8	4.0	0.0	0.0	30.0	23.2	0.0	0.0	10.6	0.0
13	0.0	0.0	2.0	0.0	0.0	30.0	30.0	2.4	0.8	5.6	0.0	0.0
14	0.0	0.0	0.0	29.3	0.0	12.0	106.8	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	29.3	0.0	50.0	21.0	0.0	0.0	0.6	36.2	0.0
16	0.0	0.0	0.0	0.0	0.0	0.6	10.4	0.0	0.0	0.0	36.2	0.0
17	0.0	0.0	0.0	0.0	0.4	36.0	195.4	2.6	0.0	0.0	51.2	0.0
18	0.0	0.0	0.0	0.0	36.0	8.0	124.0	0.2	0.8	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.6	40.0	0.0	41.6	0.0	0.0	0.0
20	0.0	0.0	0.0	0.2	8.2	3.8	20.4	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	15.4	3.8	23.0	13.8	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.2	53.6	8.0	20.6	13.8	3.0	0.0	0.8	17.2
23	0.0	0.0	0.0	8.8	0.8	8.6	10.2	13.4	13.2	0.0	7.0	0.0
24	0.0	0.0	12.2	0.0	2.4	0.4	18.2	24.0	1.2	0.0	0.4	0.0
25	0.0	0.0	0.0	0.0	60.0	8.0	0.0	1.8	0.2	0.0	0.0	0.0
26	0.0	0.0	0.0	4.3	2.4	56.6	0.0	11.4	8.4	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	29.4	0.6	2.0	2.4	0.0	0.0	0.0	0.0

28	0.0	0.0	0.0	0.0	17.2	0.0	28.4	10.2	32.4	0.0	0.0	0.0
29	0.0		0.0	0.2	0.0	38.4	41.2	4.4	12.0	1.6	0.0	9.2
30	0.0		0.0	2.2	0.0	56.2	52.4	13.0	0.2	0.0	0.0	0.0
31	0.0		0.0		0.0		13.8	6.8		4.4		0.0
Total	0.0	0.0	17.0	78.5	259.6	558.2	1390.0	236.0	305.8	302.6	369.8	45.2
Hy	558.2	1390.0	236.0	305.8	302.6	369.8	45.2	2.4				
Name of station:CWRDM Campus, Kottamparamba												
Longitude: 75 ⁰ 52' 15" E , Latitude 11 ⁰ 17' 07" N , Altitude: 60m above MSL (79 m from 25th March 2008)												
Daily Rainfall (mm/day)						Year 2010						30
Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	1.4	0.0	0.0	0.0	1.6	0.4	28.6	10.8	0.0	7.2	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	33.0	5.0	0.4	12.0	34.4	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	29.8	18.0	5.8	21.0	0.0	3.0
4	0.0	0.0	0.0	0.0	0.0	0.0	26.2	75.6	8.2	1.6	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	2.8	68.0	4.2	0.0	0.0	1.8	0.0
6	0.0	0.0	0.0	0.0	0.0	3.4	20.0	7.0	3.0	3.0	2.0	0.0
7	0.0	0.0	0.0	0.0	0.2	20.6	4.4	16.8	1.4	16.0	0.0	0.0

8	0.0	0.0	0.0	0.0	0.0	38.6	1.6	25.0	25.2	0.4	0.0	0.0
9	0.0	0.0	0.0	2.2	6.0	87.0	0.4	8.0	26.8	5.0	0.0	0.0
10	0.0	0.0	0.0	3.8	0.0	30.4	0.0	2.0	30.6	1.0	56.0	0.0
11	1.0	0.0	0.0	0.0	2.8	39.0	0.0	0.4	42.0	1.0	14.0	0.0
12	0.0	0.0	0.0	0.0	0.0	197.0	0.2	1.6	0.0	0.0	82.8	0.0
13	0.0	0.0	0.0	0.0	0.0	71.4	19.2	0.0	5.4	8.8	0.0	0.0
14	0.0	0.0	0.0	0.4	0.0	66.2	0.0	0.0	9.6	5.8	1.6	0.0
15	0.0	0.0	0.0	0.0	0.0	68.0	1.0	0.0	28.0	33.2	22.0	0.0
16	0.0	0.0	0.0	0.0	0.0	3.6	43.8	29.8	13.2	22.4	23.5	0.0
17	0.0	0.0	0.0	14.8	0.0	14.0	92.4	19.0	0.2	0.0	37.0	22.8
18	0.0	0.0	0.0	35.4	14.2	19.2	10.4	3.2	3.6	0.0	58.4	1.2
19	0.0	0.0	0.0	0.0	0.0	23.2	24.0	0.8	1.0	0.0	0.1	0.0
20	0.0	0.0	0.0	0.0	0.8	0.2	39.8	0.0	0.0	38.6	15.4	0.0
21	0.0	0.0	0.0	0.0	8.2	1.8	19.6	1.2	0.0	4.4	23.0	0.0
22	0.0	0.0	0.0	0.0	5.0	6.0	27.4	1.4	32.4	140.0	4.4	0.0
23	0.0	0.0	0.0	0.0	0.0	24.8	2.0	0.0	3.4	28.0	0.4	0.0
24	0.0	0.0	0.0	3.6	10.4	63.4	12.2	3.6	0.2	0.0	0.6	0.0
25	0.0	0.0	0.0	2.2	0.4	30.8	12.8	30.0	0.0	0.0	10.4	0.0
26	0.0	0.0	0.0	0.0	38.4	18.8	19.0	10.0	5.0	0.0	0.0	0.0

27	0.0	0.0	0.0	4.0	3.4	40.0	10.0	6.6	1.6	53.4	23.0	0.0
28	0.0	0.0	0.0	5.0	27.4	15.6	75.2	4.0	37.8	18.2	0.4	0.0
29	0.0		0.0	0.0	1.4	92.2	25.4	12.0	12.8	0.0	3.0	0.0
30	0.0		0.0	0.0	1.0	35.8	103.8	11.2	0.0	0.8	0.0	0.0
31	0.0		0.0		17.4		13.8	17.4		8.8		0.0
Total	2.4	0.0	0.0	71.4	138.6	1014.2	764.0	324.6	297.6	430.6	414.2	27.0
Hydrologi	3.4					1014.2	764.0	324.6	297.6	430.6	414.2	27.0
cal year10-11												