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Climate Change Impacts on Agricultural Production in Selected Revenue Villages in Madurai District of Tamil Nadu: An Economic Perspective

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Abstract
In the long run, the climate change could affect agriculture in several ways such as quantity and quality of crops in terms of productivity, growth rates, photosynthesis and transpiration rates, moisture availability etc. Climate change is likely to directly influence the food production across the globe. An increase in mean seasonal temperature is likely to shorten the duration of many crops and thus reduce yields. In areas where temperature is already close to the physiological maxima for crops, warming will impact yields more immediately (IPCC, 2007). With this context, an attempt is made to analyze the production trend of agricultural sector in the selected revenue villages in Madurai district of Tamil Nadu. In the year of 2006-2007 grain and Pulses production was high level. In 2007-08 Pulses production was very low. In the 9 revenue villages which we took for research but, only 3 parts are produced in sugar crops. In the 3 villages, pulses production is zero. Most of the Sugar crops have been produced in the year 2007-08. In the year of 2007-08 more fruits and vegetables were produced. But in 2013-14 the fruits and vegetables are much lower and in 2009-10 it is much less. Oil seed Crops production is have been equally, with small differences in all years. In the year of 2007-08, more Oil seeds crops were produced. In the year 2012-13 the lowest produced with Oil seeds crops.

Key words: Agriculture, Crop Production, Climate change, Adaptation

Introduction

In the long run, the climate change could affect agriculture in several ways such as quantity and quality of crops in terms of productivity, growth rates, photosynthesis and transpiration rates, moisture availability etc. climate change is likely to directly impact food production across the globe. An increase in mean seasonal temperature is likely to shorten the duration of many crops and thus reduce yields. In areas where temperature is already close to the physiological maxima for Crops, warming will impact yields more immediately (IPCC, 2007).When, environmental pollution is getting worse, health risks fall. About 50 per cent of our lands are losing energy.

In agriculture, adaptation will require cost-effective investments in water infrastructure, emergency preparation for extreme weather events and development of new crop varieties tolerant to temperature and precipitation stresses, and new or improved land use and land management practices. The numerous varieties of crops being in traditional agriculture, it should then make good quality seeds available to the villagers. Better field preparation an help with manuring, threshing sowing operations, crop management and with post-harvest storage will lead to better quality of crops as well as yields. In the year of 2006-2007 grain and Pulses production was high level. In 2007-08 Pulses production was very low. In the 9 revenue villages which we took for research but, only 3 parts are produced in sugar crops. In the 3 villages, pulses production is zero. Most of the Sugar crops have been produced in the year 2007-08. In the year of 2007-08 more fruits and vegetables were produced. But in 2013-14 the fruits and vegetables are much lower and in 2009-10 it is much less. Oil seed Crops production is have been equally, with small differences in all years. In the year of 2007-08, more Oil seeds crops were produced. In the year 2012-13 the lowest produced with Oil seeds crops.

Objectives

- To analyze the growth of food grain production in the selected revenue villages in Madurai district.
- To identify the causes of reduction of food grain production in Madurai district.

Methods and Materials

This study is mainly based on secondary sources of information. Secondary data was collected from G-returns of Madurai district from 2006 to 2014. For the analysis, the study was carried out using simple percentages in this paper.

Results and Discussion

Table 1 Cereals Production in 2006-07 to 2013-14

Revenue Village	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Alanganallur	148.400 (9.26)%	149.035 (9.49)%	167.750 (10.61)%	90.735 (7.44)%	78.665 (5.37)%	126.355 (8.65)%	8.830 (2.52)%	88.035 (11.78)%
Avaniyapuram	362.485 (22.62)%	367.245 (23.38)%	333.645 (21.10)%	231.105 (18.95)%	294.555 (20.10)%	224.080 (15.34)%	39.240 (11.18)%	98.145 (13.13)%
Kallikudi	221.705 (13.84)%	161.560 (10.29)%	231.585 (14.64)%	89.610 (7.35)%	136.320 (9.30)%	148.510 (10.16)%	75.565 (21.54)%	150.045 (20.07)%
Nilaiyur	270.450 (16.88)%	259.445 (16.52)%	254.360 (16.08)%	309.275 (25.36)%	347.790 (23.74)%	307.625 (21.05)%	16.935 (4.83)%	10.325 (1.38)%
Perungudi	129.405 (8.08)%	142.185 (9.05)%	194.560 (12.30)%	142.320 (11.67)%	116.210 (7.93)%	76.595 (5.24)%	4.310 (1.23)%	56.065 (7.50)%
Sedapatti	152.330 (9.51)%	120.300 (7.66)%	97.770 (6.18)%	68.645 (5.63)%	203.450 13.89)%	219.350 (15.01)%	128.030 (36.49)%	221.410 (29.49)%
T.Kallupatti	119.940 (7.48)%	177.385 (11.29)%	110.775 (7)%	107.915 (8.85)%	134.600 (9.19)%	205.175 (14.04)%	73.955 (21.08)%	93.405 (12.49)%
Thirumangalam	-	-	-	-	-	-	-	-
Thuruparankunram	197.695 (12.34)%	193.595 (12.33)%	191.125 (12.08)%	179.985 (14.76)%	153.520 (10.48)%	153.520 (10.51)%	3.965 (1.13)%	30.200 (4.04)%
Total	1602.41 (100)%	1570.75 (100)%	1581.57 (100)%	1219.59 (100)%	1465.11 (100)%	1461.21 (100)%	350.83 (100)%	747.63 (100)%

Source: G-Returns of Madurai district

The above table (1) indicates the total amount of Crops produced in the areas we surveyed for the year 2006 to 2014. In the year of 2006-2007 Crops production was high level. Continuous the year of 2008- 09 and 2007-08 Crops production has declined marginally in two and third places. But the quantity of grains produced during the 14th of 2013 has greatly down. But, this has increased slightly compared to 2012- 13.

Table 2 Pulses Production in 2006-07 to 2013-14

Revenue Village	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Alanganallur	5.630 (2.45)%	4.930 (6.94)%	-	-	-	-	-	0.365 (0.23)%
Avaniyapuram	-	-	-	-	-	-	-	-
Kallikudi	184.165 (80.22)%	44.825 (63.03)%	45.665 (57.57)%	54.500 (59.49)%	24.685 (22.72)%	39.215 (39.82)%	32.675 (42.96)%	41.155 (25.79)%
Nilaiyur	-	1.505 (2.12)%	-	-	-	-	-	-
Perungudi	4.530 (1.98)%	13.015 (18.30)%	16.790 (21.16)%	8.670 (9.46)%	5.340 (4.92)%	7.130 (7.24)%	7.005 (9.21)%	11.645 (7.29)%
Sedapatti	13.600 (5.92)%	0.725 (1.01)%	1.475 (1.86)%	2.670 (2.91)%	11.250 (10.36)%	23.500 (23.86)%	5.640 (7.24)%	28.110 (17.6)%
T.Kallupatti	20.665 (9)%	6.110 (8.60)%	15.385 (19.40)%	25.770 (28.13)%	67.350 (62)%	28.650 (29.09)%	30.740 (40.42)%	78.355 (49.09)%
Thirumangalam	-	-	-	-	-	-	-	-
Thuruparankunram	1.000 (0.44)%	-	-	-	-	-	-	-
Total	229.59 (100)%	71.11 (100)%	79.315 (100)%	91.61 (100)%	108.625 (100)%	98.495 (100)%	76.06 (100)%	159.63 (100)%

Source: G-Returns of Madurai district

As per the above table (2), the Pulses production has increased in the year of 2006-2007. The next place is in the year of 2013-14, then year of 2010-11, the production of pulses is on the decline. In 2007-08 Pulses production was very low. Only three years in Alanganallur have been produced in Pulses. Likewise, in Nilaiyur and Thuruparankunram, Pulses have been produced in only 1 year. But in Avaniyapuram and Thirumangalam, even in a year there is no Pulses were produced

Table 3 Sugar crops Production in 2006-07 to 2013-14

Revenue Village	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Alanganallur	88.640 (97.03)	89.060 (96.92)%	72.135 (97.12)%	57.935 (93.72)%	51.090 (96.63)%	54.855 (96.89)%	45.265 (93.89)%	49.410 (96)%
Avaniyapuram	-	-	-	-	-	-	-	-
Kallikudi	-	-	-	-	-	-	-	-
Nilaiyur	0.775 (0.85)%	0.775 (0.85)%	-	-	-	-	-	-
Perungudi	0.180 (0.19)%	0.180 (0.19)%	0.040 (0.06)%	0.155 (0.26)%	0.155 (0.3)%	0.165 (0.3)%	0.195 (0.41)%	0.020 (0.04)%
Sedapatti	1.600	1.880 (2.04)%	2.100 (2.83)%	3.730 (3.09)%	1.630 (3.08)%	1.600 (2.82)%	2.180 (4.53)%	2.010 (3.9)%
T.Kallupatti	-	-	-	-	-	-	0.575 (1.2)%	-
Thirumangalam	-	-	-	-	-	-	-	-
Thuruparankunram	0.160 (0.18)%	-	-	-	-	-	-	-
Total	91.355 (100)%	91.895 (100)%	74.275 (100)%	61.82 (100)%	52.875 (100)%	56.62 (100)%	48.215 (100)%	51.44 (100)%

Source: G-Returns of Madurai District

When looking at the above table (3) Sugar Crops production is very low. In the 9 revenue villages which we took for research but, only 3 parts are produced in Sugar Crops. In the 3 villages, Suga Crops production is zero. Most of the Sugar Crops have been produced in the year 2007-08. Likewise, in the year of 2006-07 of Sugar Crop production between small differences. In year of 2009 Sugar Crop Production declined.

Table 4 Fruits and vegetables Production in 2006-07 to 2013-14

Revenue Village	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Alanganallur	9.680 (9..76)%	79.660 (39.75)%	7.275 (6.94)%	15.175 (20.75)%	15.245 (13.79)%	7.960 (7.20)%	11.465 (12.06)%	19.210 (20.83)%
Avaniyapuram	2.260 (2.28)%	2.265 (1.13)%	5.070 (4.84)%	6.235 (8.52)%	6.115 (5.53)%	6.515 (5.90)%	20.080 (21.13)%	17.895 (19.40)%
Kallikudi	0.705 (0.71)%	1.215 (0.61)%	0.880 (0.84)%	1.280 (1.75)%	0.865 (0.78)%	1.255 (1.14)%	0.845 (0.89)%	0.945 (1.02)%
Nilaiyur	58.280 (58.74)%	75.965 (37.90)%	56.965 (54.37)%	15.060 (20.59)%	22.690 (20.52)%	29.820 (26.98)%	28.710 (30.21)%	38.310 (41.54)%
Perungudi	4.845 (4.88)%	13.260 (6.62)%	11.815 (11.28)%	17.425 (23.82)%	0.950 (0.86)%	11.025 (9.98)%	7.740 (8.14)%	5.240 (5.68)%
Sedapatti	4.340 (4.37)%	1.330 (0.66)%	2.300 (2.20)%	3.115 (4.26)%	33.600 (30.39)%	16.250 (14.70)%	3.525 (3.71)%	0.860 (0.93)%
T.Kallupatti	12.735 (12.84)%	22.370 (11.16)%	15.660 (14.95)%	12.135 (16.59)%	28.375 (25.66)%	34.965 (31.64)%	19.960 (21)%	6.915 (7.50)%
Thirumangalam	-	-	-	-	-	-	-	-
Thuruparankunram	6.375 (6.43)%	4.345 (2.17)%	4.815 (4.60)%	2.720 (3.72)%	2.720 (2.46)%	2.720 (2.46)%	2.720 (2.86)%	2.845 (3.09)%
Total	99.22 (100)%	200.41 (100)%	104.78 (100)%	73.145 (100)%	110.56 (100)%	110.51 (100)%	95.045 (100)%	92.22 (100)%

Source: G-Returns of Madurai district

The table (4) below illustrates the Fruits and Vegetables produced from year of 2006-07 to 2013-14. In the year of 2007-08 more Fruits and Vegetables were produced. Similarly, more fruits and vegetables were produced in 2011-12, 2010-11 and 2008- 09 in second, third and fourth place. But in 2013-14 the Fruits and Vegetables are much lower and in 2009-10 it is much less. In all the years taken for research, there are no fruits and vegetables produced in Thirumangalam Revenue Village.

Table 5 Oil seeds crops Production in 2006-07 to 2013-14

Revenue Village	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Alanganallur	52.460 (43.43)%	53.460 (42.38)%	51.620 (42.97)%	51.780 (42.49)%	53.065 (44.02)%	54.580 (49.30)%	52.255 (48.83)%	50.980 (45.51)%
Avaniyapuram	9.290 (7.69)%	10.420 (8.26)%	8.985 (7.48)%	8.985 (7.37)%	9.290 (7.71)%	9.290 (8.39)%	9.265 (8.66)%	9.285 (8.29)%
Kallikudi	13.560 (11.22)%	10.765 (8.53)%	12.995 (10.82)%	16.970 (13.93)%	13.950 (11.57)%	7.120 (6.43)%	0.550 (0.51)%	8.540 (7.62)%
Nilaiyur	2.800 (2.32)%	9.335 (7.40)%	0.910 (0.76)%	2.910 (2.39)%	2.900 (2.41)%	2.745 (2.48)%	2.260 (2.11)%	2.795 (2.49)%
Perungudi	13.260 (10.98)%	12.875 (10.21)%	13.710 (11.41)%	14.085 (11.56)%	13.295 (11.03)%	13.390 (12.09)%	17.355 (16.22)%	13.695 (12.22)%
Sedapatti	17.000 (14.07)%	18.775 (14.88)%	20.200 (16.82)%	16.440 (13.49)%	2.065 (1.71)%	1.845 (1.67)%	2.010 (1.88)%	2.170 (1.94)%

Thirumangalam	0.060 (0.05)%	0.030 (0.02)%	0.030 (0.02)%	0.030 (0.02)%	0.030 (0.02)%	-	-	-
Thuruparankunram	8.575 (7.10)%	6.485 (5.14)%	6.485 (5.14)%	6.115 (5.02)%	6.115 (5.07)%	-	5.915 (5.53)%	5.850 (5.22)%
Total	120.805 (100)%	126.135 (100)%	120.13 (100)%	121.865 (100)%	120.55 (100)%	110.715 (100)%	107.01 (100)%	112.025 (100)%

Source: G-Returns of Madurai district

Above (5) the table explanation is Oil seed Crops production is have been equally, with small differences in all years. In the year of 2007-08, more Oil seeds crops were produced. In the year 2012-13 the lowest produced with Oil seeds crops.

Conclusion

Climate change is the cause of "global warming". Now the effect is now beginning to show its effects all over the world. Climate is the primary determinant of agricultural productivity which directly impact on food production across the globe level. Agriculture sector is one of the most sensitive sectors to climate changes as the climate of a country determines the nature and characteristics of plants and crops. An increase in average seasonal temperature can shorten the duration of many crops and, therefore, it can reduce the final yield. An increase in average seasonal temperature shortens the duration of many crops. Therefore, it may reduce the final yield of crops. Every year, millions of hectares of land become fertile earth. Acid rains cause droplets with atmospheric pollutants causing chemical reactions. The gas emissions caused by petrol and coal causes the acidic rain. Important aspect of traditional agriculture was that of the scientific rotation system of Crop cultivation By this we see more than one crop occupying the same land at the same time, but it is apt to forget that this is really a phenomenon of rotation. Presently, mono cropping has been introduced which increases the productivity of the land and earns marketable surplus. The numerous varieties of Crops being grown in traditional agriculture, it should then make good quality seeds and yield available to the villagers. Better field preparation and help with manuring, sowing operations, Crop management and with post-harvest storage will lead to better quality of crops as well as crop yields. In the year of 2006-07, the total production of Crop was 2143.38 tones. The year of 2006-07, the total Crop production was 2143.38 tones. Like year of 2008-09 (2060.3) in Crop yield, then year of 2009-10 (1960.07) is equal to minor differences. The total Crop production of 2011-12 is estimated at 1837.55. This is only small differences (1857.72) in compared to year of 2010-11. In the year of 2011-12, cereals (1461.21) were produced in large quantities. But year of 2012-13 (677.16) and 2013-14 (112.025) the Crop production is very low.

Cropping with the impact of climate change on agriculture will require careful management of resources like soil, water and biodiversity. To Crop with the impact of climate change on agriculture and food production, India will need to act at the global, regional, national and local levels.

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