Journal of Agrometeorology 8(2) : 274 - 277 (Dec. 2006)

Short communication

Climate change and agriculture: A case study of Tumkur district in Karnataka state

PANDURANGA, B.T. RAVINDRABABU, H.L. GURUPRASANNA, N.A. JANARDHANAGOWDA and M.B. RAJEGOWDA

AICRP on Agrometeorology, University of Agricultural Sciences, GKVK, Bangalore – 560065

Climate has a vital role on biosphere of the earth. A slight change in the climate may lead to major changes in plant and animal life. Major climatic parameters are rainfall, temperature, sunshine hours, relative humidity, wind speed etc., of which rainfall has greater significance on agriculture, especially under Indian conditions. In view of this, a case study has been taken up to analyze the rainfall pattern in Karnataka state particularly in Tumkur district.

Rajegowda *et al* (1996) have showed that normal rainfall of the State is 1212mm . There is decline in rainfall in Coastal and hilly zones and increase in some interior zones. The increase in rainfall from 725 mm to 825 mm in the Eastern Dry zone was observed (Unpublished Annual Report of AICRP on Agrometeorology, UAS,GKVK, Bangalore 2003). The seasonal shift in the rainfall for Eastern ary zone and Southern Dry zone was reported by Rajegowda *et al* (2000).

Rajegowda (1992) showed the effect of variation in Forest area on Rainfall and temperature. Unpublished reports indicated an average raise in annual temperature by 1.3° C in the State of Karnataka during 1950 to 1990. Sastri and Urkurkar (1996) observed a decrease in pre-monsoon rainfall in some parts of Chhattisgarh region in the months of May and June which has detrimental effect on the pre-sowing operation of rice crops. Saseendran *et al* (2000) showed plausible climate change scenario for the Indian subcontinent as expected by the middle of the present century. Kumar *et al,* (2001) estimate the relationship between farm level net-revenue and climate variables in India using cross-sectional evidence.

Ramakrishnan (1998) showed that a potential impact of climate change in the south Asian context in general and the Indian subcontinent in particular is an increase in rainfall, in some areas up to 50 per cent. Sinha *et al* (1988) argued that food supplies in smaller nations would be affected more by climate change than those of larger nations. Drought monitoring cell, Government of Karnataka (2002) reported a decrease in state normal annul rainfall from 1212 mm to 1140 mm for the period from 1950 to 1985.

In view of projected climate change

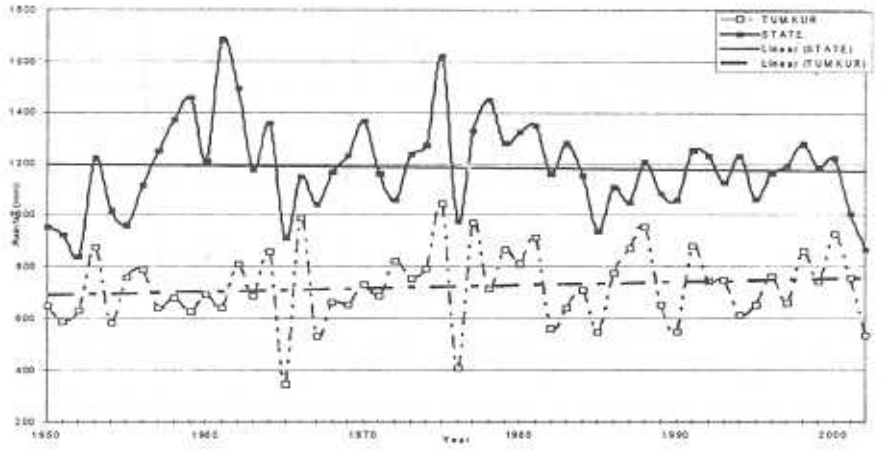

Fig.1: Annual rainfall of Karnataka state and Tumkur district.

over Karnataka state and its effect on growing area and production/productivity in the state, a case study of Tumkur district is discussed here.

The monthly rainfall data for the Karnataka state and also for Tumkur district for the period from 1950 to 2002 were collected. Annual rainfall was worked out. Similarly total food production of Tumkur district for the corresponding period was analyzed and compared with the rainfall data.

The state average annual rainfall for the past 50 years indicates a cycle of 16 year, wherein first 8 year show above normal trend followed by another 8 years of below normal with exception in 2 to 3 years. According to this, the state of Karnataka received below normal rainfall from 1996 to 2003.

Seasonal distribution of rainfall

Since the crop growth period in rainfed areas is between June and October, The performance of south-west monsoon decides the fate of agriculture in Karnataka. The rainfall shift in the Eastern Dry zone (Rajegowda *et al* 2000) during the period 1991 to 2000 compared to its early period showed changes in southwest monsoon rainfall pattern indicating a shift in rainfall pattern from July to August and September to October (peaks extending the period up to end of October month).

Impact on food production

Both changes in amount and distribution of rainfall have resulted in changes in cropped area and production in the State. Though total food production is increasing, the decreasing trend/changes in rainfall distribution pattern has become a major limiting factor in achieving the yield

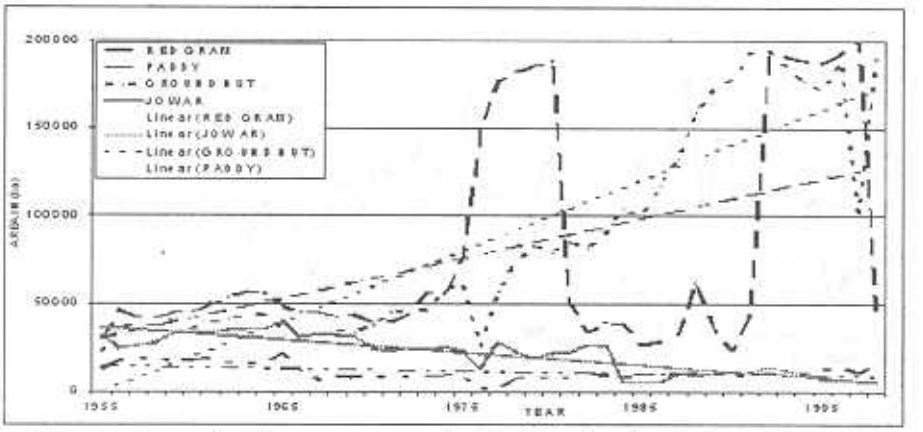

Fig. 2 : Area of major crops grown in Tumkur district during 1955 to 2000

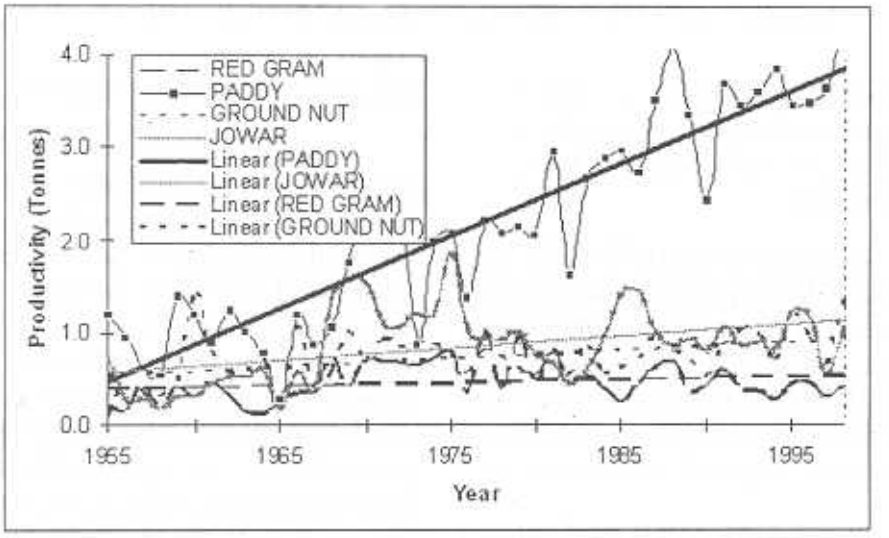

Fig. 3 : Productivity of various crops during the period 1955 to 2000

potential of the crops. In the State, area under crops such as Jowar declined from 26.7 lakh hectares to 18.5 lakh hectares. On the contrary area under crops like maize and paddy showed an increase 0.121 lakh hectares to 0.512 Lakh hectares and 8.782 lakh hectares to 14.27 lakh hectares respectively. Similarly production of crops such as maize and paddy increased in the entire State.

Case study

There is decreasing trend in the state annual rainfall and increasing trend in

Tumkur district annual rainfall.(Fig.1)

Tumkur is one of the major districts contributing both in area and production of the crops. Consequence of this change, there are changes in area production and productivity of individual crops. Groundnut and Paddy have shown increasing trend in area and Jowar and Redgram area a decrease (Fig.2). The groundnut area increased in Tumkur district from 0.79 Lakh ha. in 1955 to 1.78 Lakh ha. in 1990. The productivity of these crops during the period from 1955 to 2000 is also plotted in Fig.3.

The productivity of Paddy, Jowar and groundnut (t ha^{-1}) increased while that of redgram remained same. This indicates that there is a possibility of increasing the productivity of these crops in Tumkur district.

REFERENCES

Anonymous 2003. Drought-2002 in Karnataka State. Impact and Response. Drought Monitoring Cell. Govt. of Karnataka.

Anonymous 2003. AICRP on Agrometeorology, UAS, GKVK, Bangalore.

Kumar, K. S. Kavi, and Jyoti Parikh. 2001. Indian agriculture and climate sensitivity Global Environmental Change, Vol. 11, No. 2, July, pp. 147-154.

Rajegowda, M.B. 1992. Effect of variation in forest area on Rainfall and Temperature. Presented in"National Seminar on Radiation, Environment and Man (REM), Mysore University, Mysore

Rajegowda, M.B. and D.M. Gowda 1996. Rainfall Status: Karnataka State in South India. Drought Network News, USA. Vol.6, No. 3,

Rajegowda, M.B., Muralidhara, K.S., Murali, N.M and Ashok Kumar, T.N. 2000. Rainfall shift and its influence on crop sowing period. *J. Agrometeorol.*, 2(1), 89-92.

Ramakrishnan, P. S. 1998. Sustainable Development, Climate Change and Tropical Rain Forest Landscape, *Climatic Change*, 39, (2-3), July, 583-600.

Saseendran S. A., K.K. Singh, L.S. Rathore, S.V. Singh, and S.K. Sinha. 2000. Effects of climate change on rice production in the tropical humid climate of Kerala, India, *Climatic Change*, 44, (4), 459-514.

Sastri, A.S.R.A.S and Urkurkar, J.S., 1996. Climatic variability and crop productivity: A Case study for Chhattisgarh region of Central India. In: Climatic Variability and Agriculture (Eds. Y.P. Abroal, Sulochina Gadgil and G.B. Panth), Narosa Publishing House, New Delhi, 394-410.

Sinha S.K, Rao N.H, and Swaminathan M.S 1988. Food Security in the Changing Global Climate. *Climate Change Impacts: Food production.vol.* 10, (1), 1997.