6-1-1998

# No Droughts over India Following Very Strong El Niño Episodes

R. H. Kripalani
*Indian Institute of Tropical Meteorology*

Ashwini Kulkarni
*Indian Institute of Tropical Meteorology*

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One of the external factors responsible for the interannual variability of Indian summer monsoon rainfall (ISMR—June through September) is the El Niño phenomenon. About half of the droughts over India have been related to this phenomenon. Other external factors, such as the Eurasian snow, also affect the year-to-year variability of the ISMR. It is believed that in such cases, the ISMR becomes locked into its own internal dynamics.

An examination of very strong El Niño cases after 1870 reveals that most of these cases have resulted in severe droughts over India. However, it is interesting to note that following a strong El Niño, India has never experienced a drought. Table 1 clarifies this point. The strong El Niño cases have been determined using Quinn et al. (1987), updated from *Climate Diagnostic Bulletins* published by NOAA/NWS/NCEP. The ISMR is taken from Parthasarathy et al. (1994). The long-term mean ISMR is 852 mm, with a standard deviation of 84 mm. Normally, the ISMR is considered deficient (drought) when it is at least one standard deviation below the long-term mean.

| Serial No. | *Strong El Niño:* | | *Following Year:* | |
|---|---|---|---|---|
| | Year | ISMR | Year | ISMR |
| 1 | 1877 | 604 | 1878 | 976 |
| 2 | 1884 | 933 | 1885 | 847 |
| 3 | 1891 | 793 | 1892 | 992 |
| 4 | 1899 | 629 | 1900 | 890 |
| 5 | 1911 | 737 | 1912 | 806 |
| 6 | 1918 | 651 | 1919 | 885 |
| 7 | 1925 | 804 | 1926 | 903 |
| 8 | 1941 | 728 | 1942 | 958 |
| 9 | 1957 | 789 | 1958 | 889 |
| 10 | 1972 | 653 | 1973 | 913 |
| 11 | 1982 | 735 | 1983 | 956 |
| 12 | 1987 | 697 | 1988 | 961 |
| 13 | 1997 | ~870 | 1998 | **?** |

**Table 1. Years of very strong El Niño cases and ISMR (in mm).**

The mean ISMR for the strong El Niño cases is 740 mm, while the mean ISMR following the strong El Niño cases is 915 mm. The t-statistic for testing the difference between these two means is 5.47. This is highly significant. Thus there seem to be no droughts over India following very strong El Niño episodes. Whether the serial number 13 (Table 1) proves to be lucky or unlucky for India will be determined by the 1998 monsoon.

**R. H. Kripalani and Ashwini Kulkarni**
**Indian Institute of Tropical Meteorology**
**Pashan, Pune 411008**
**India**
**e-mail: rhksup@tropmet.ernet.in**

**References**

Parthasarathy, B.; A. A. Munot; and D. R. Kothawale. 1994. "All-India monthly and seasonal rainfall series 1871–1993." *Theoretical and Applied Climatology* 49:217–24.

Quinn, W. H.; V. T. Neal; E. Santiago; and A. De Mayolo. 1987. "El Niño occurrences over the past four and a half centuries." *Journal of Geophysical Research* 92, No. C13, pp. 14,449–61.