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Studies

THE "EL NIÑO SOUTHERN OSCILLATION EVENT (ENSO)" AND ITS IMPACT ON COFFEE PRODUCTION

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intensified until it reaches a peak at around Christmas time, and disappearing only in May or June the following year. The cold waters off the Peruvian coast, which are rich in plankton under normal conditions, become warmer and the fish population declines. Although more detailed observations led to the collection of data during the first half of the century, it was only towards the end of the 1960s that scientists began to establish a link between El Niño and serious floods and droughts in various areas around the globe. The interaction between ocean and atmosphere particularly affects climate in Australia, Africa, south-east Asia and tropical regions in America.

I. EVOLUTION OF ENSO 1997/98 AND IMPACTS ON CLIMATE

4. The 1997/98 ENSO continues to have a considerable influence on world climatic conditions, causing heavy rains and violent storms in some regions and drought in others. Precipitation patterns continue to be disturbed. South-east Asia has been very dry while the north and south American coastal regions have been very wet. Rainfall in south-east Asia, Australia and Papua New Guinea has been 150 mm below normal whereas it has been at least 75 mm above normal along the South American Pacific coast.

5. The phenomenon has also had a marked effect in regions further from the tropics, notably in February 1998 when warm tropical air was drawn northwards, bringing above-average temperatures in North America, Europe and eastern Asia. On land, temperatures in the northern hemisphere were the highest recorded since 1950, making the 1997/98 El Niño event one of the most significant this century. The event has already reached a peak in certain regions (Australia and south-east Asia), where it is becoming weaker, but in other regions, particularly the west coast of North America, its influence is still making itself felt.

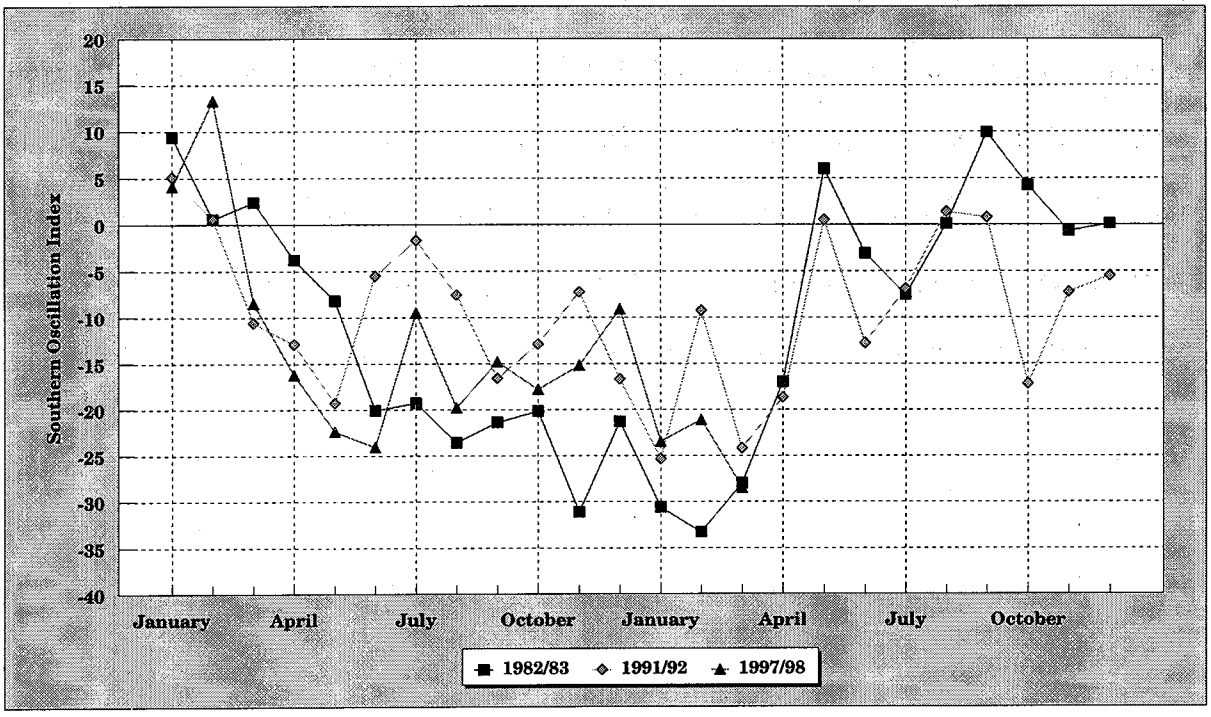
6. According to the World Meteorological Organization, El Niño contributed to the record high temperatures of 1997. Since June 1997, the phenomenon has become stronger in comparison with the 1982/83 event. The Sea Surface Temperature (SST) in the eastern

and central Pacific was 2 to 5° C above normal. In February 1998, the combined average of land and sea surface temperatures was 0.75° C above normal. The record for the biggest deviation from normal temperatures in the period 1961 to 1990 was broken for all months of the year. Overall, February 1998 was the hottest February on record. The year 1997 was also hotter than 1995 (+0.38° C) which was considered to be the hottest on record.

7. Graph 1 below shows the monthly evolution of the Southern Oscillation Index (SOI), an index based on the air pressure difference as measured between Tahiti (French Polynesia), where pressure is high under normal conditions, and Darwin (Australia) where pressure is normally low. A strong negative SOI indicates the strength of the El Niño event. A strongly positive reading indicates La Niña, an event which is the counterpart of El Niño, with above-average cooling in the eastern and central Pacific and above-average warming in the western Pacific (Indonesia and Australia). Index readings around zero indicate normal conditions in the Walker Circulation.

GRAPH 1

EVOLUTION OF SOI
EL NIÑO 1982/83, 1991/92 AND 1997/98



Note: The index used is the "Troup SOI " index calculated by the Australian Bureau of Meteorology

8. Graph 1 shows that the 1997/98 El Niño event developed very rapidly during the first half of 1997 reaching higher peaks than the 1982/83 El Niño, which was the strongest recorded. The June 1997 level is no longer the highest since the March 1998 level is -28.5 compared to -24.1 in June 1997. During the first six months of the current El Niño event (April-September) the average SOI was -17.8 compared to -16 in April-September 1982. Observations of world temperature and rainfall distribution show anomalies in nearly all regions of the globe.

Mexico, Central America and the Caribbean

9. Anomalies caused by the El Niño event in this region relate mainly to lack of rainfall. Since the phenomenon began, rainfall has been 50 mm below average in coffee producing areas. The region has also been very hot. Other effects are a decline in hurricane intensity in the Caribbean.

South America

10. In this region, the influence of the El Niño event manifests itself differently in three main areas. In western Ecuador, northern Peru and western Colombia heavy rainfall has continued, with levels of more than 150 mm above normal. In December 1997 and January 1998, rainfall in the area was between 350 and 775 mm, whereas normal annual rainfall in this period is between 20 and 60 mm. In northern South America, particularly in the remaining areas of Colombia, northern Brazil and Venezuela, rainfall was between 25 and 50 mm below average and temperatures were high. On the other hand, southern Brazil, Bolivia and Paraguay were very wet, with rainfall of between 25 and 50 mm above average.

Africa

11. In East Africa, heavy rains have replaced drought conditions since October 1997. Kenya has been seriously affected by flooding, with rainfall as high as 1,000 mm above

normal in certain regions. Since the end of January 1998, however, rains have become more intermittent in large parts of Ethiopia and in Kenya, Tanzania and Uganda. In West Africa rainfall has been slightly below average.

Asia/Pacific

12. This is the area most affected by the 1997/98 El Niño event. Drought has continued in Indonesia and the Philippines despite some rainfall in certain areas. With the normal dry period beginning in April, Indonesia will continue to experience a lack of rainfall in many areas for some time. There is continuing drought in Papua New Guinea and Australia. India is experiencing relative drought conditions because of the sporadic monsoon in certain regions.

Conclusion

13. The 1997/98 El Niño event, which has been developing since March 1997, has had the most direct and serious effects in the tropics with marked weather fluctuations in America, Africa, south-east Asia and the Pacific. Areas further from the tropics have had record high temperatures, particularly in much of North America and Europe. There is no need to describe the material and human damage caused by the current event since this has been widely reported in the press.

II. ENSO 1997/98 AND COFFEE PRODUCTION

14. Changes in world coffee production since 1994/95, based on preliminary estimates for crop year 1997/98, are shown in Table 1 below. Annual changes in world production since 1965 are shown in the previous study (document EB- 3657/980).

15. Initial production estimates for 1997/98 indicate a drop of 9.58 percent in world production compared with the previous crop year. It should be noted that if Brazilian production is taken into account, the fall in world production in 1982/83 was 16 percent (if Brazilian production is excluded, there was no change). Changes in world coffee production by region are more significant.

TABLE 1

ANNUAL CHANGES IN WORLD PRODUCTION 1994/95 TO 1997/98

(percentages)

Year	Including Brazil	Excluding Brazil
1994/95	5.96	3.90
1995/96	-10.03	6.63
1996/97	17.65	4.74
1997/98	-9.58	-1.30

Mexico and Central America

16. Table 2 below shows production changes in this region, in which the principal producing countries are Mexico, Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica.

TABLE 2

PRODUCTION CHANGES IN MEXICO AND CENTRAL AMERICA

(percentages)

	Total	Mexico	Guatemala	El Salvador	Costa Rica	Honduras	Nicaragua
1994/95	4.55	-2.85	7.10	-3.57	10.49	19.25	-3.12
1995/96	13.58	32.76	5.68	12.56	7.53	-12.47	44.01
1996/97	-4.28	-2.77	13.04	-2.01	-20.72	4.98	-19.49
1997/98	3.38	-6.96	-22.63	5.65	21.24	14.77	40.61

17. Total production in the region increased in 1997/98, although it fell in Mexico (-6.96 percent) and Guatemala (-22.63 percent). It would seem, therefore, that the two main producing countries in the region were affected by changes in weather conditions attributable to the 1997/98 El Niño event. Production increases were recorded in Nicaragua (+40.61 percent), Costa Rica (21.24 percent), Honduras (14.8 percent) and El Salvador (5.65 percent).

South America

18. Table 3 shows changes in coffee production in this region. Total production fell by 21.67 percent in 1997/98 with a 31.63 percent drop in Brazilian production, which was down from 27.6 million bags in 1996/97 to 18.9 million bags in 1997/98. In Colombia, where western areas experienced very wet conditions while the rest of the country was very dry, the 1997/98 crop was down by around 3.4 percent. In Ecuador, which was very wet, production fell by 12 percent in relation to 1996/97. Venezuelan production fell by 20.35 percent in 1997/98. In Peru, however, production increased by 4.9 percent.

TABLE 3

PRODUCTION CHANGES IN SOUTH AMERICA

(percentages)

	Total	Brazil	Colombia	Ecuador	Peru	Venezuela
1994/95	11.96	10.83	14.74	14.84	77.29	-29.15
1995/96	-28.30	-46.94	-0.85	-20.54	58.69	47.08
1996/97	28.74	75.11	-15.57	1.64	-5.72	1.40
1997/98	-21.67	-31.63	-3.43	-12.09	4.88	-20.35

Asia/Pacific

19. This is the region most seriously affected by weather anomalies attributable to the 1997/98 El Niño event. Despite early rains at the beginning of October 1997, rainfall continues to be well below average. Table 4 shows production changes in 1997/98 on the basis of initial estimates. For the region as a whole, production was down by 6 percent in relation to crop year 1996/97. Indonesia lost 17.2 percent of its crop, which fell from 8.2 million bags in 1996/97 to 6.8 million bags in 1997/98. Papua New Guinea, the second country most seriously affected by this climatic phenomenon, recorded a fall of 18.46 percent in its 1997/98 crop. In Vietnam production rose from 5.7 million bags in 1996/97 to

5.8 million bags in 1997/98, representing an increase of 2.24 percent. In India and the Philippines production increased by 9.54 and 5 percent respectively, while in Thailand there was a fall in production of 11.8 percent.

TABLE 4

PRODUCTION CHANGES IN ASIA/PACIFIC

(percentages)

	Total	Indonesia	PNG	Vietnam	India	Thailand	Philippines
1994/95	-3.62	-11.98	11.78	16.95	-16.07	9.73	0.23
1995/96	5.33	-0.42	-12.03	11.49	28.78	-5.86	-3.08
1996/97	21.06	28.36	8.68	44.87	-6.92	14.81	4.71
1997/98	-5.98	-17.21	-18.46	2.24	9.54	-11.84	5.06

Africa

20. In African coffee producing countries weather anomalies attributable to El Niño affected Kenya, Uganda and Madagascar. In West Africa rainfall was slightly below normal. Total African production increased by 2.3 percent in 1997/98. Production in Côte d'Ivoire increased by 3.13 percent in 1997/98 but there were production falls in Uganda (-6 percent), Kenya (-11.7 percent), Madagascar (-6 percent), Cameroon (-1 percent) and Tanzania (-16 percent). Estimates of Ethiopian production indicate an increase of 17.25 percent in 1997/98. Angola, which is in a special situation – having recently emerged from a prolonged period of civil war – increased its production by 83 percent. These changes are shown in Table 5 below.

TABLE 5

PRODUCTION CHANGES IN AFRICA

(percentages)

	Total	Côte d'Ivoire	Cameroon	Uganda	Kenya	Ethiopia	Madagascar	Angola
1994/95	1.22	31.14	-40.68	-23.84	25.23	-11.45	45.25	203.03
1995/96	4.14	-15.80	29.18	35.56	0.06	12.73	22.27	-38.00
1996/97	17.33	26.38	176.45	31.23	-25.12	14.34	12.74	14.52
1997/98	2.28	3.13	-1.05	-6.04	-11.72	17.25	-5.88	83.10

Conclusion

21. It should be noted that initial estimates, which are still preliminary, tend to confirm the main conclusion of the previous study concerning the absence of a stable relationship between the El Niño phenomenon and coffee production in many tropical areas affected by climatic variations.

III. CONCLUSIONS AND PROSPECTS

22. The current El Niño event has already had a very marked effect on rainfall distribution and temperature patterns in many coffee producing regions. **Even if the impact on overall production in 1997/98 proves to be relatively small, it is to be feared that weather anomalies will affect coffee yields and quality in crop year 1998/99.** Indeed, the total level and distribution of rainfall during the year are bound to affect coffee production. Atmospheric humidity has a very marked effect on coffee trees, particularly in the case of Robustas. Furthermore, the impact could also be closely linked to the flowering and berry formation cycle in countries affected by the 1997/98 El Niño event. Excessive humidity in some coffee producing areas could also encourage the development of certain diseases of the coffee tree.

23. The World Meteorological Organization predicts a weakening of the El Niño event between May and July 1998. Nevertheless, conditions will continue to be drier than normal in Indonesia, northern parts of South America and some parts of southern Africa. Wetter than normal conditions will continue in the central and eastern equatorial Pacific, along the coasts of Ecuador, and in northern Peru and south-eastern South America.

24. On the basis of the experience of past events, however, experts envisage three possible scenarios for the period May 1998 to April 1999: a return to normal conditions, the appearance of La Niña, or the continuation of El Niño. The first scenario, bringing a return to normal rainfall and temperatures, seems most likely and is considered to have a 50 percent probability. But since Indonesia has its dry season from April to October and drought conditions in the country persisted until the end of 1997, there is still a risk of drought and bush fires. The La Niña scenario, bringing precipitations in Indonesia and a substantial reduction in bush fires, has a 35 percent probability of occurring. Continuation of the current event has a 15 percent probability. The intensity and duration of El Niño events vary considerably and they may last from 14 to 22 months or less. They generally commence at the beginning of a year (March or April) and reach a peak between November and December, but the pattern of El Niño events tends to differ.

25. Researchers are trying to find possible links between El Niño events and global warming but it should be noted that climatic changes cannot be attributed solely to the El Niño phenomenon.