Cocoa Migrations, Climate Change, and Deforestation in West Africa. What does the past tell us about the future?

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How cocoa farmers, (mostly migrant farmers), interact with climatic factors and change?

- Is climate / climate change a major driver of (cocoa) migration?
- In turn, by replacing forest with cocoa farms, do migrants contribute to the drying of the climate?
- In that case, is this drying encouraging them to migrate and deforest further in pursuit of a suitable climate for their main crop? (Malthusian approach)

Finally, what does it tell us about the future and policies?

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Method

1. Rainfall and Agricultural statistics in different regions

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2. Farmers' surveys (Migration, Investment, decision making)

- at different periods of times, from the 1980s to the 2000s
- in different places, at different scales,
- - with migrants of various origins

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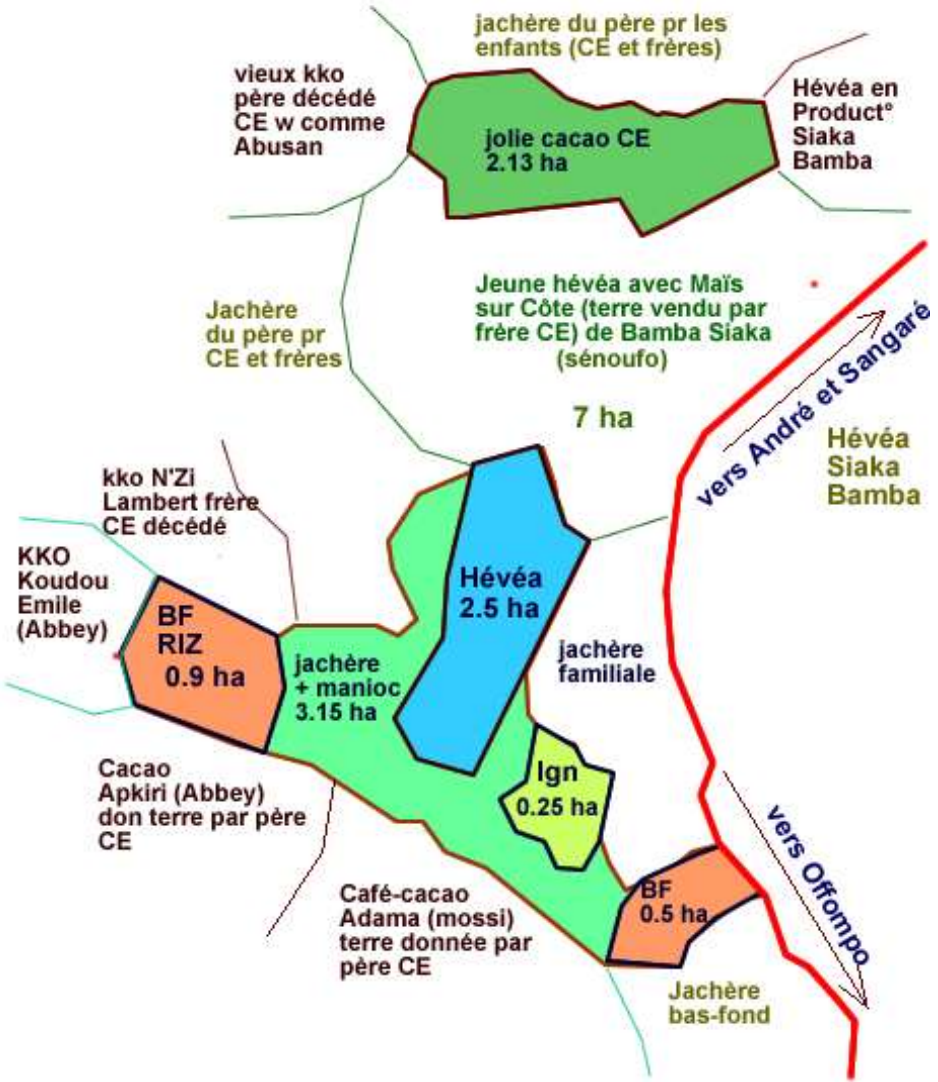

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Findings

Droughts as a driver of the cocoa migrations from Sahelian regions to forests?

* Frustration to be expected

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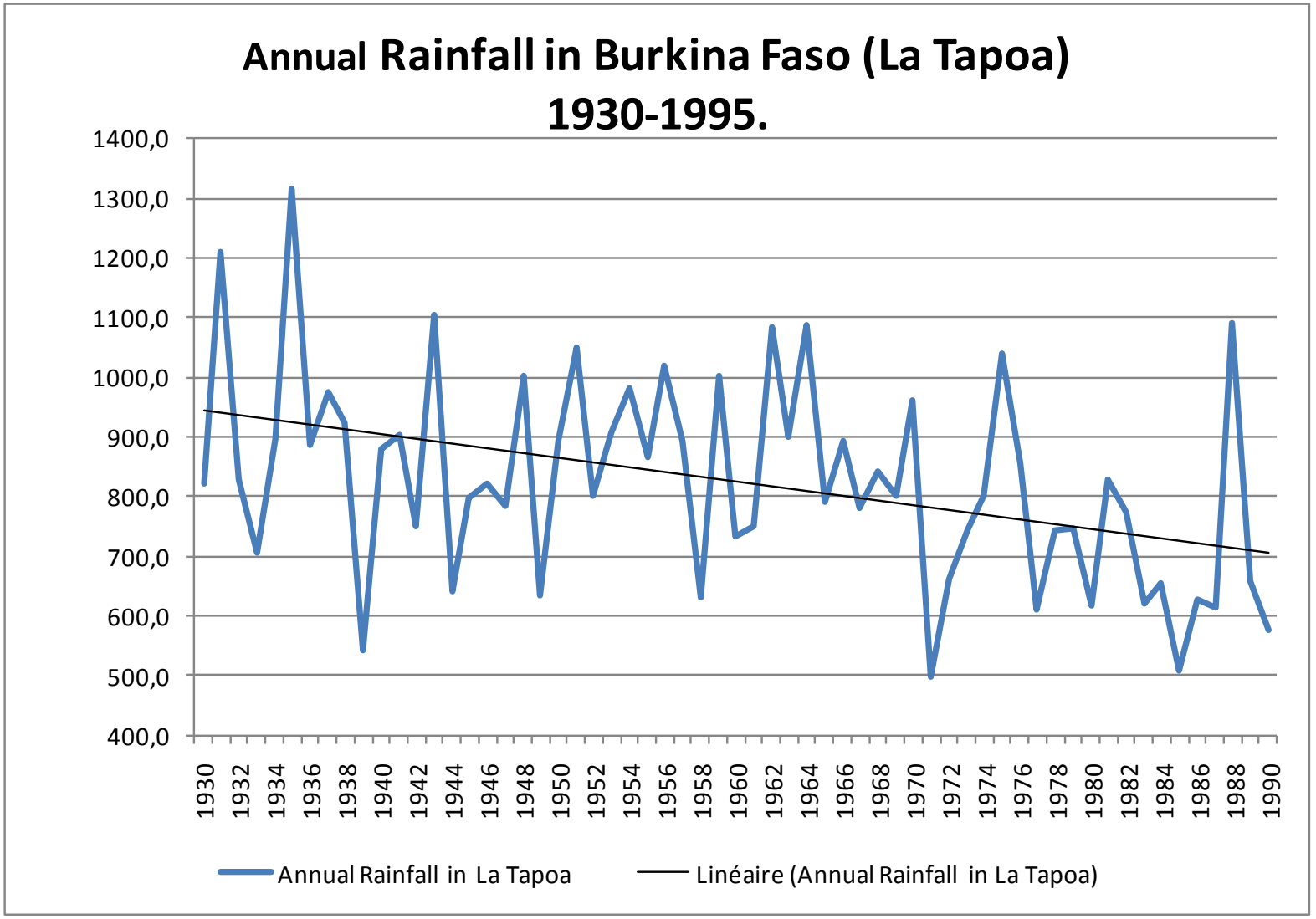
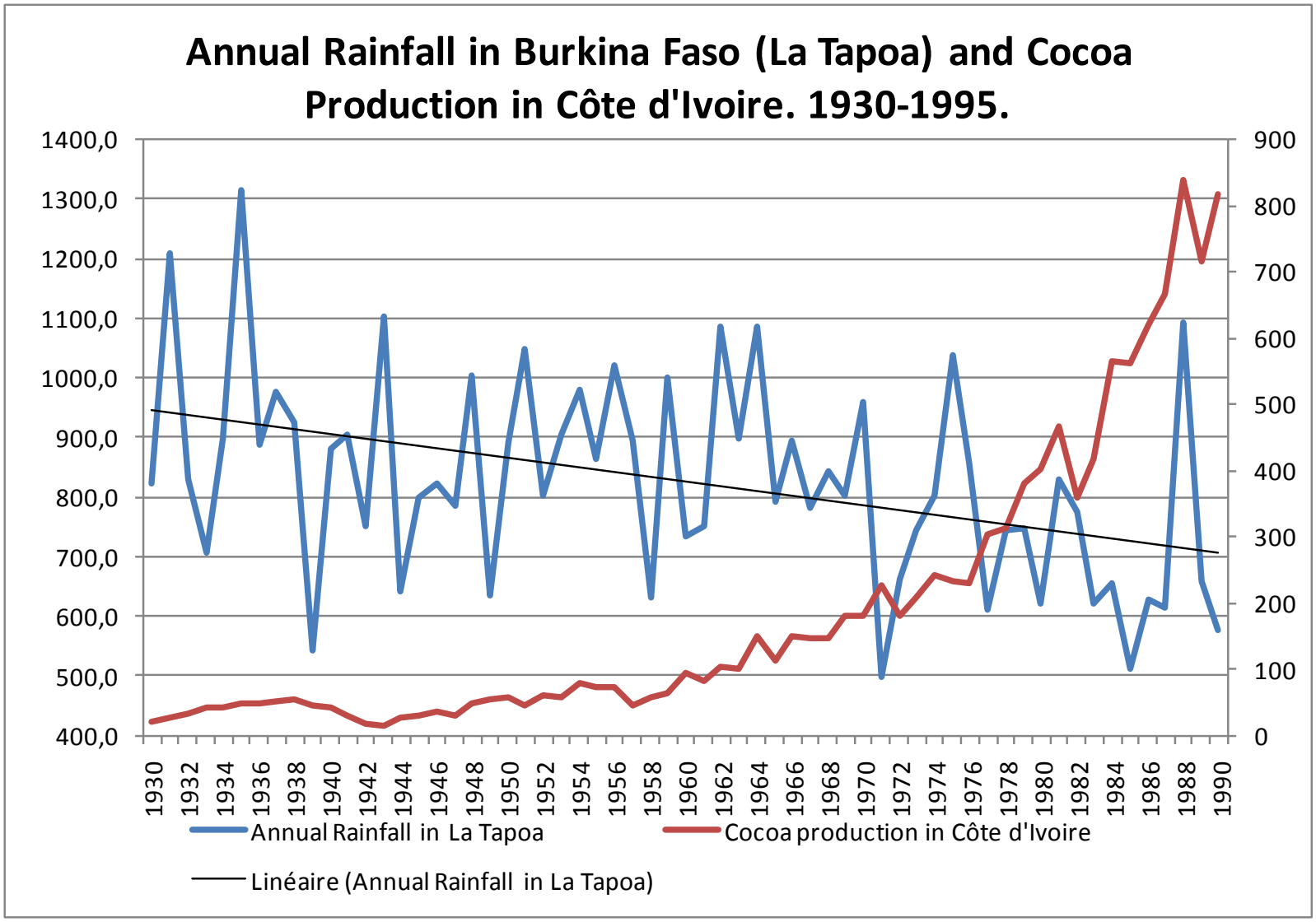
Does climate degradation trigger migration?




Annual Rainfall in Burkina Faso (La Tapoa) and Cocoa Production in Côte d'Ivoire. 1930-1995.
1400,0
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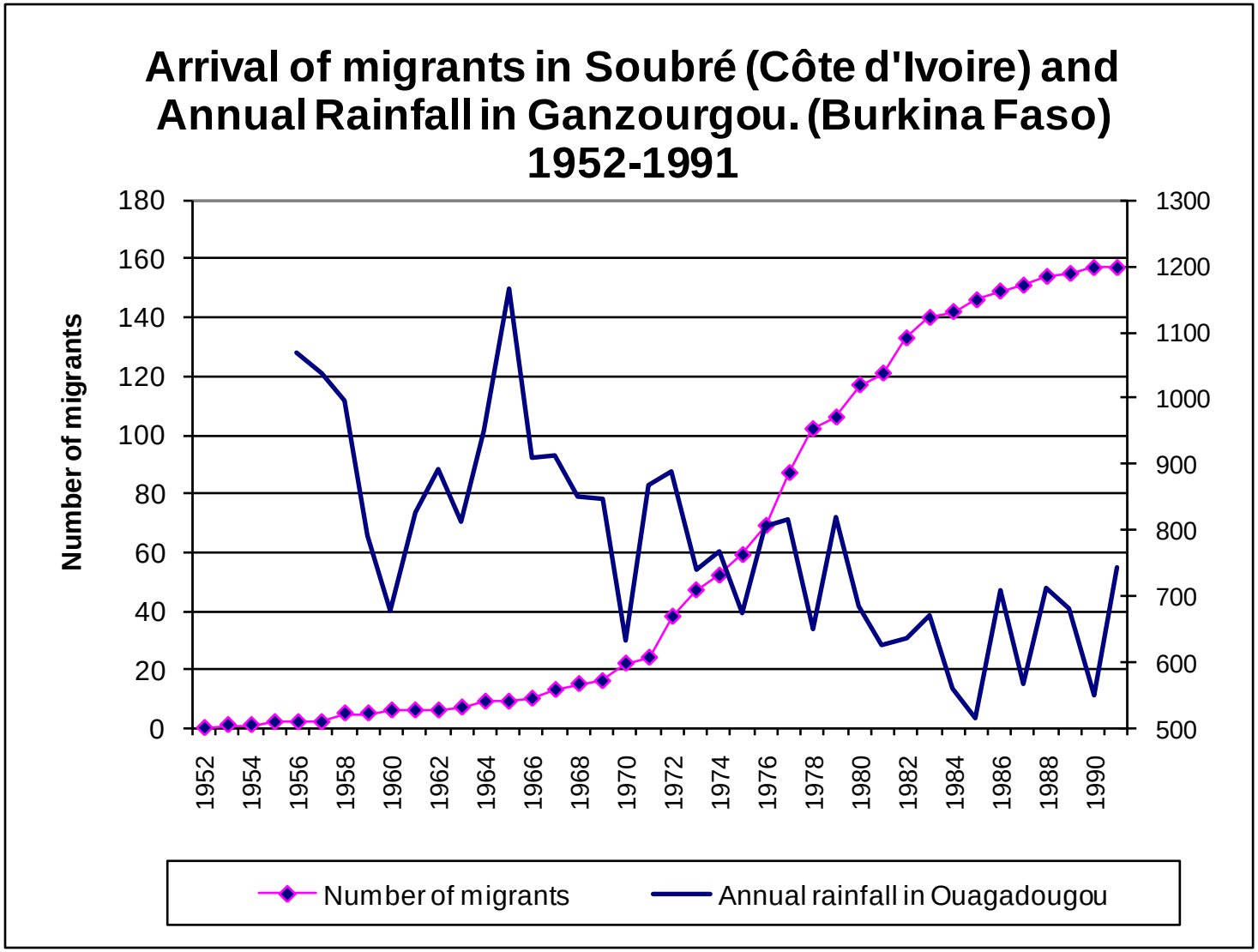
Annual Rainfall in La Tapoa
Cocoa production in Côte d'Ivoire
Linéaire (Annual Rainfall in La Tapoa)


Arrival of migrants in Soubré (Côte d'Ivoire) and Annual Rainfall in Ganzourgou. (Burkina Faso) 1952-1991
Number of migrants
180
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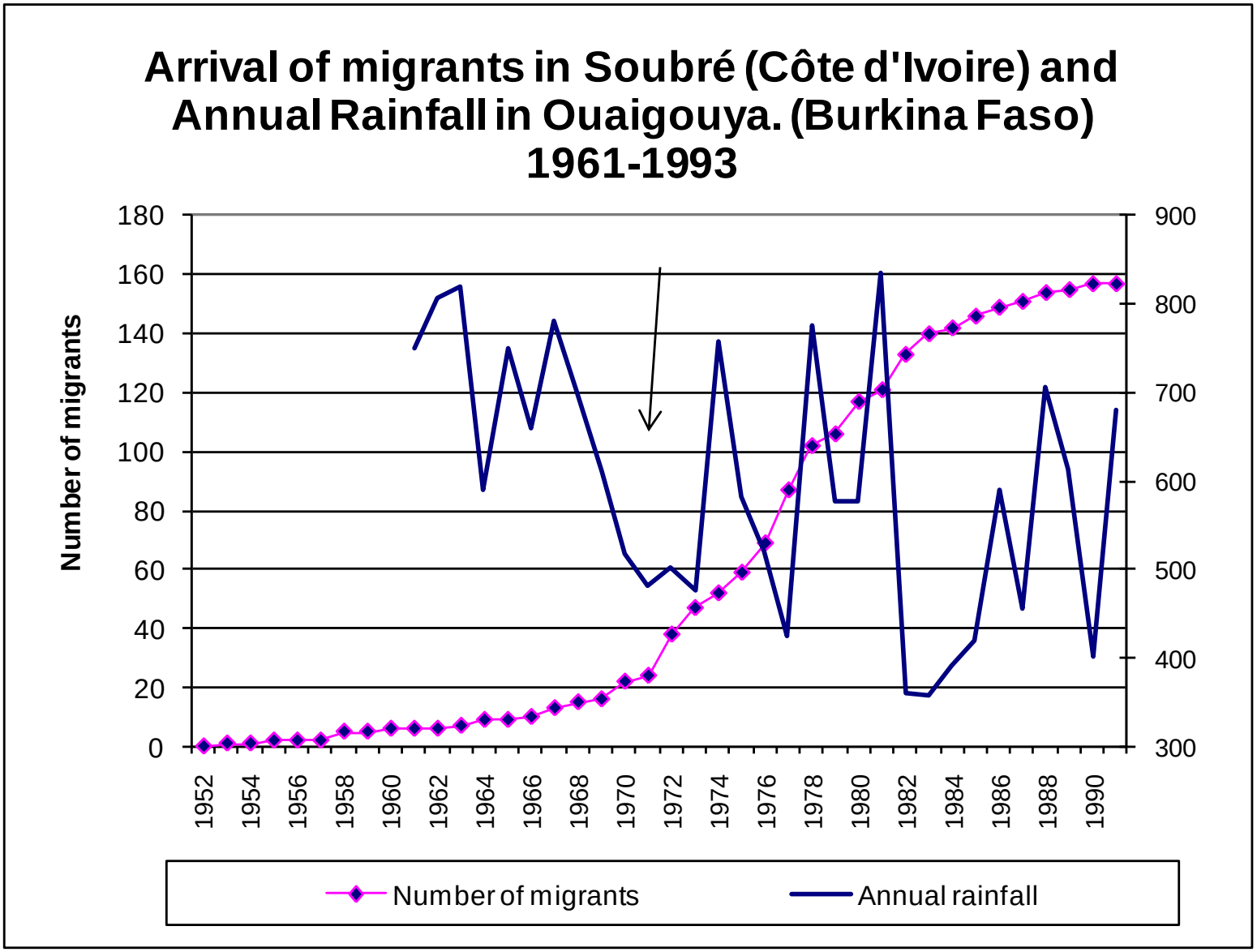
Number of migrants
Annual rainfall in Ouagadougou


Arrival of migrants in Soubré (Côte d'Ivoire) and Annual Rainfall in Ouaigouya. (Burkina Faso) 1961-1993
Number of migrants
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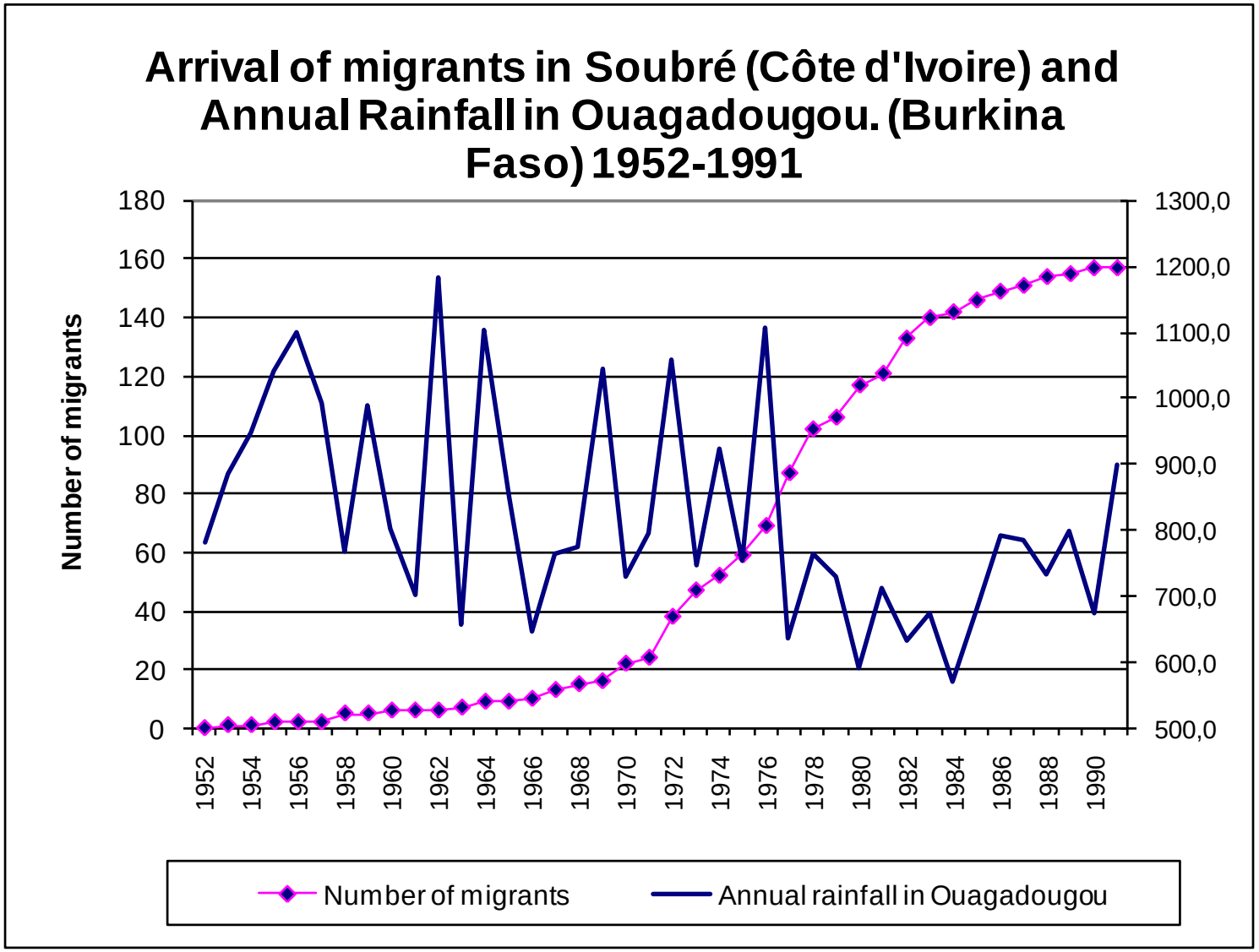
Number of migrants
Annual rainfall


Arrival of migrants in Soubré (Côte d'Ivoire) and Annual Rainfall in Ouagadougou. (Burkina Faso) 1952-1991
Number of migrants
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Number of migrants
Annual rainfall in Ouagadougou

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But non-climatic factors factors are sufficient to explain exponential migration rates

- the building of a bridge over the Sassandra in central Côte d'Ivoire in 1973 which opened up a vast area of almost uninhabited forest to immigrant cocoa farmers.

  (Pélissier 1998)

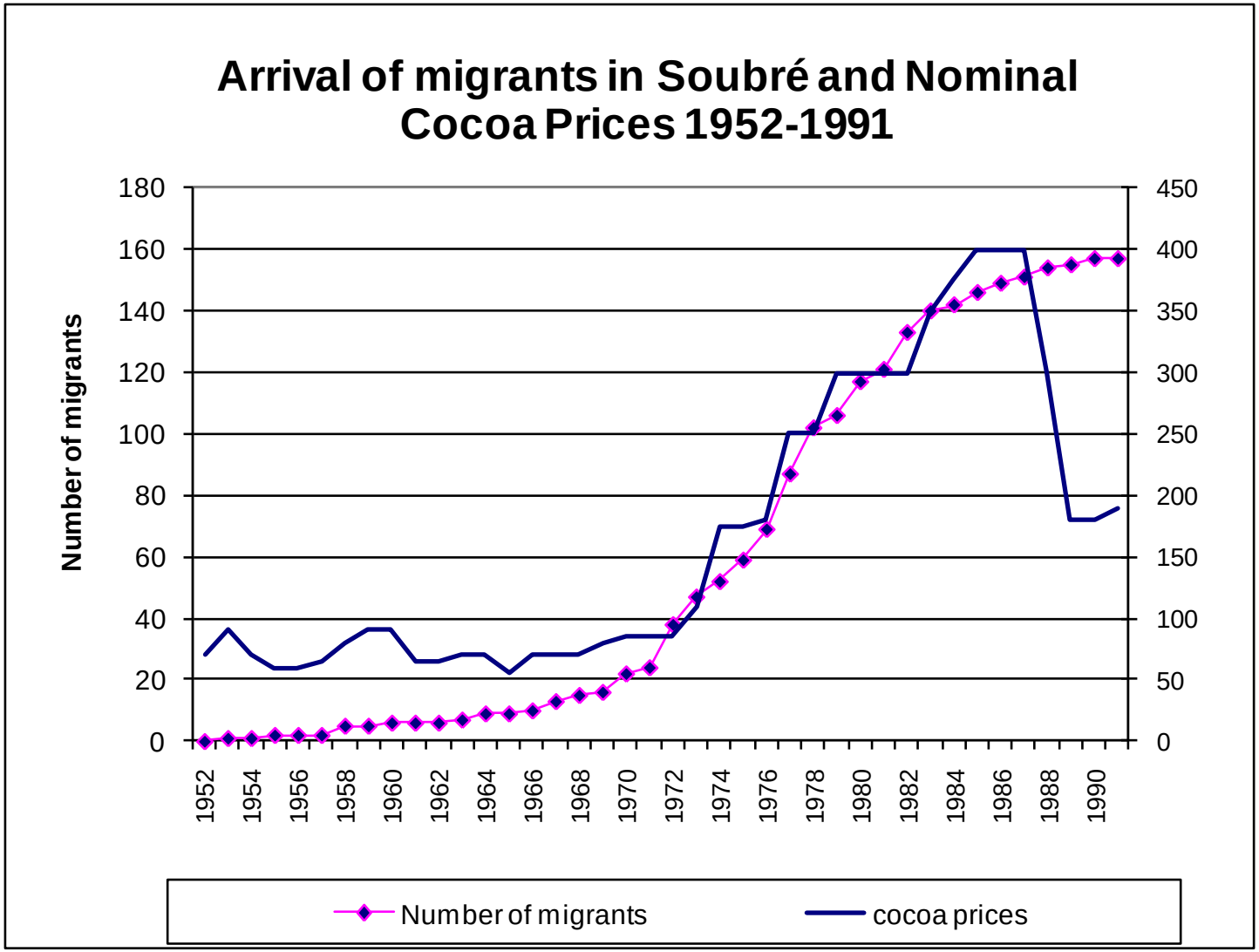
- The expanding network of logging roads through the forest also played a major role in this process

  (ORSTOM 1977, Léna 1979, Schwartz 1993).

- The informal and informational encouragement of immigration by the then-president, Felix Houphouet-Boigny, with the clear intention of increasing the cocoa output of the country (Chauveau & Léonard 1996).

- **a policy of stable producer prices**

- **Copying effect**


Arrival of migrants in Soubré and Nominal Cocoa Prices 1952-1991
Number of migrants
180
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1952
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1968
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1982
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1990
Number of migrants
cocoa prices

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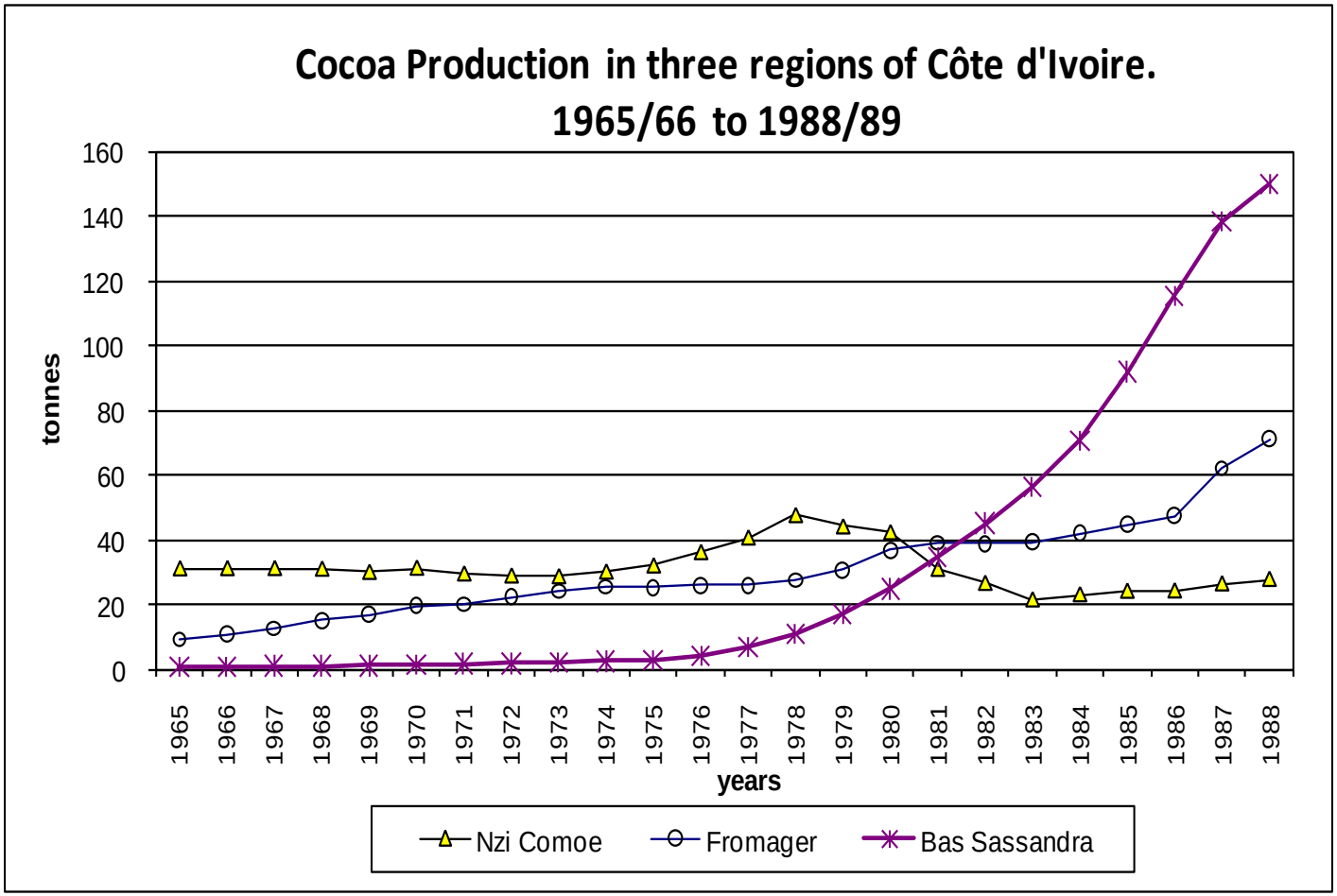
Within the cocoa regions

East-West Rainfall gradients


Cocoa Production in three regions of Côte d'Ivoire.
1965/66 to 1988/89
tonnes
160
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120
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Nzi Comoe
Fromager
Bas Sassandra

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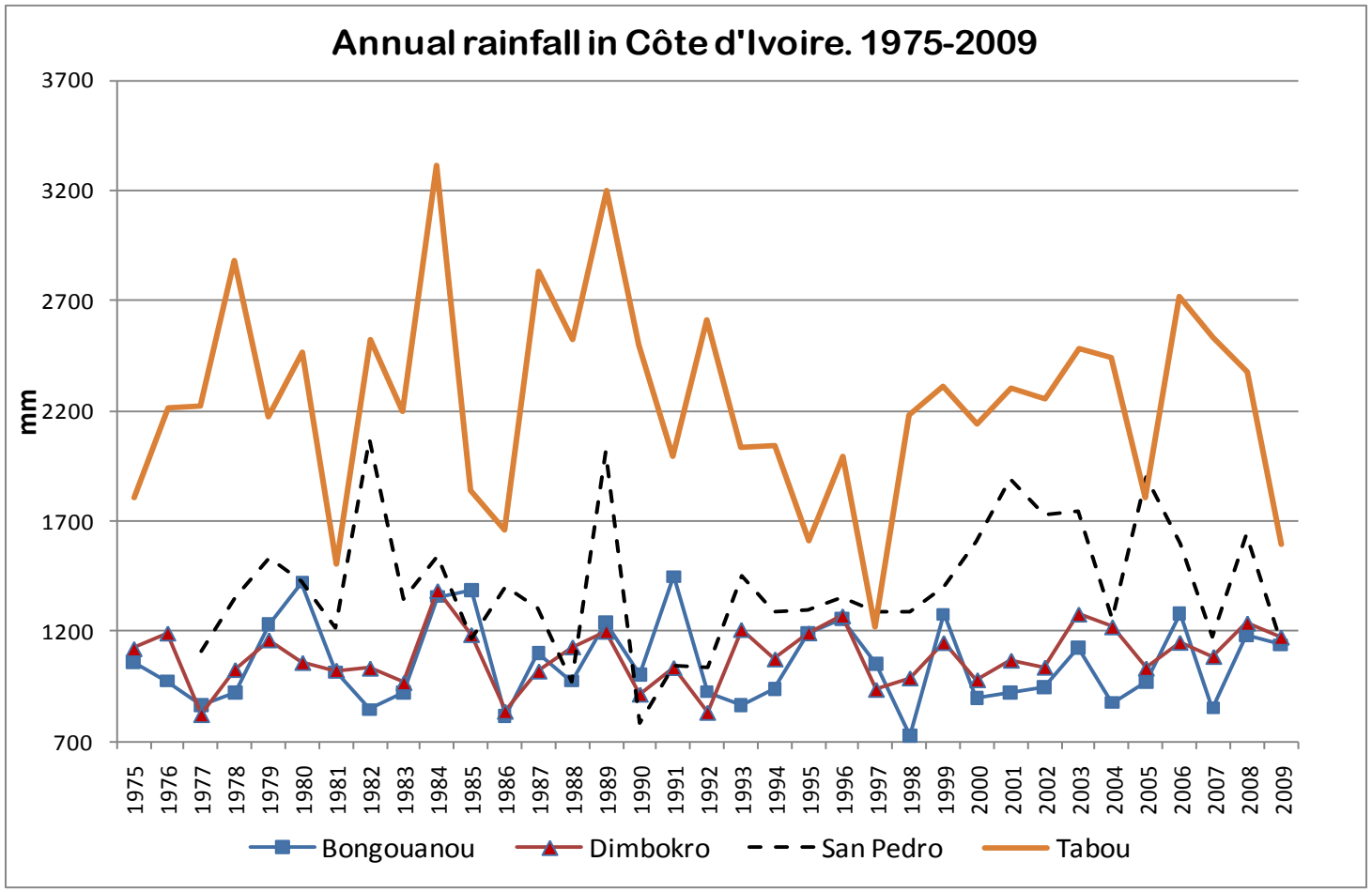

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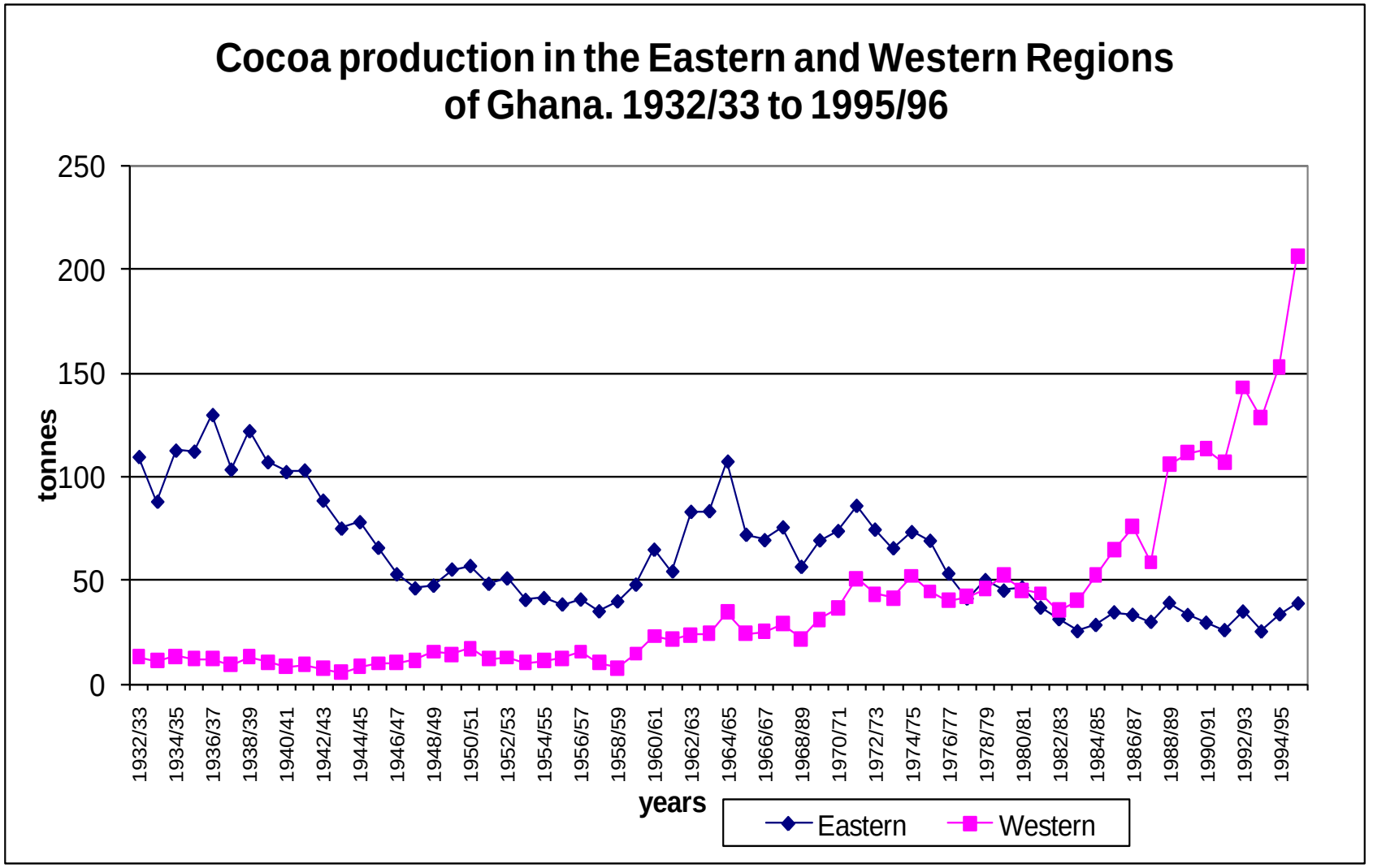

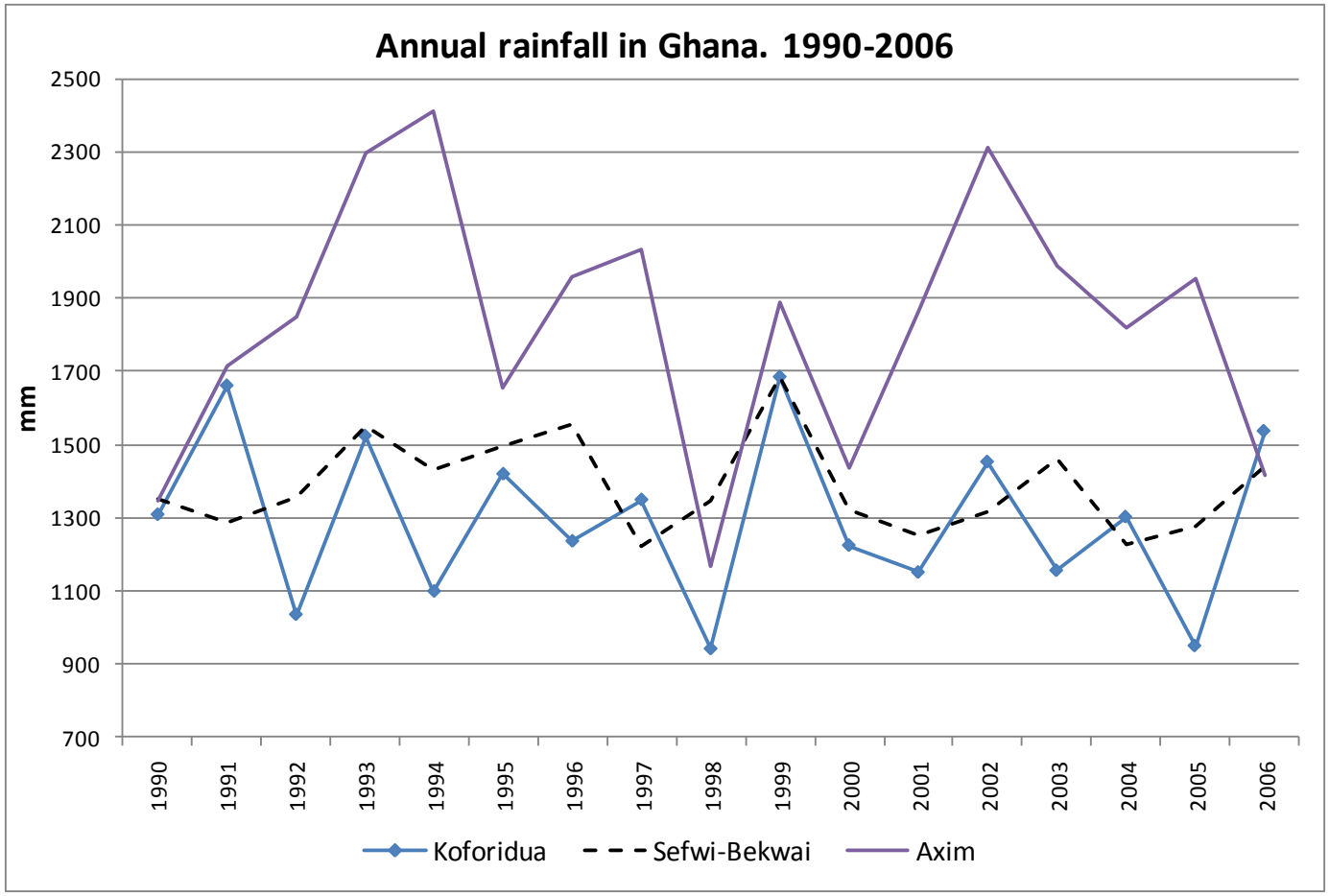
Annual rainfall in Ghana. 1990-2006
mm
2500
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1993
1994
1995
1996
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1998
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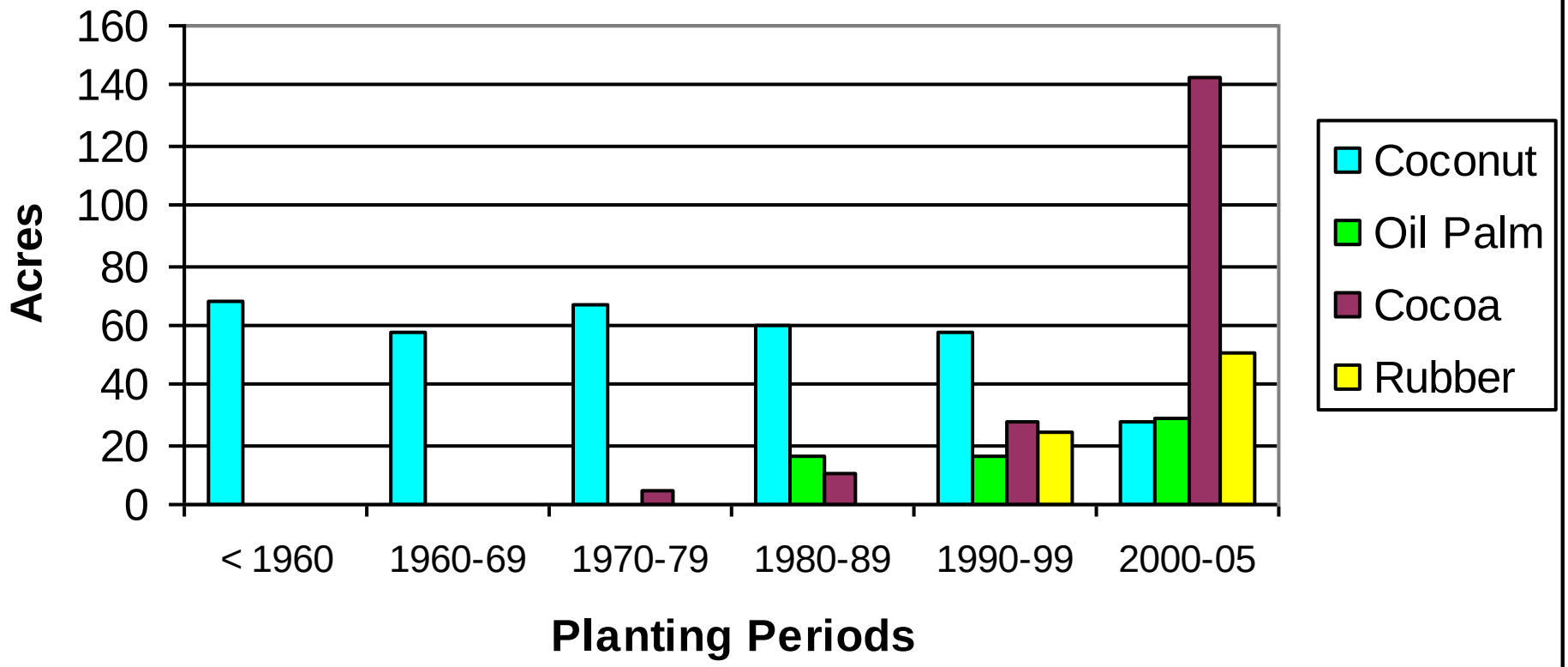
2002
2003
2004
2005
2006
Koforidua
Sefwi-Bekwai
Axim

One may raise the hypothesis of a partial impact of higher rainfall in the western regions of the two countries as a pulling factor of migration from East to West

However, one may also raise the question of the LATE move to the western regions. Cocoa farmers were NOT initially attracted by the very high rainfalls in the extreme far-western corner of both countries. For instance Axim was NOT a cocoa district until the 2000s.

Planting and cocoa hybrid adoption

Axim-Asasetre area. Western region, Ghana



This initial avoidance of the most humid parts of the two countries can be partially explained

- with the distance and difficult access,

- by too abundant rainfall which makes
  - drying and transportation of cocoa extremely difficult.
  - selling of mouldy cocoa difficult at the times of the **marketing board**

Their belated inclusion in the cocoa migration routes was favored by the introduction of **the more vigorous upper-amazon cocoa varieties** which better resisted the infertile soils of these high rainfall sites

in both countries, if the regional rainfall gradient within the forest regions played a role in the history of cocoa migrations, it was limited and with a strong interaction of technical and institutional factors.

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By replacing forests with farm land, did cocoa farmers contribute to the drying of the climate?

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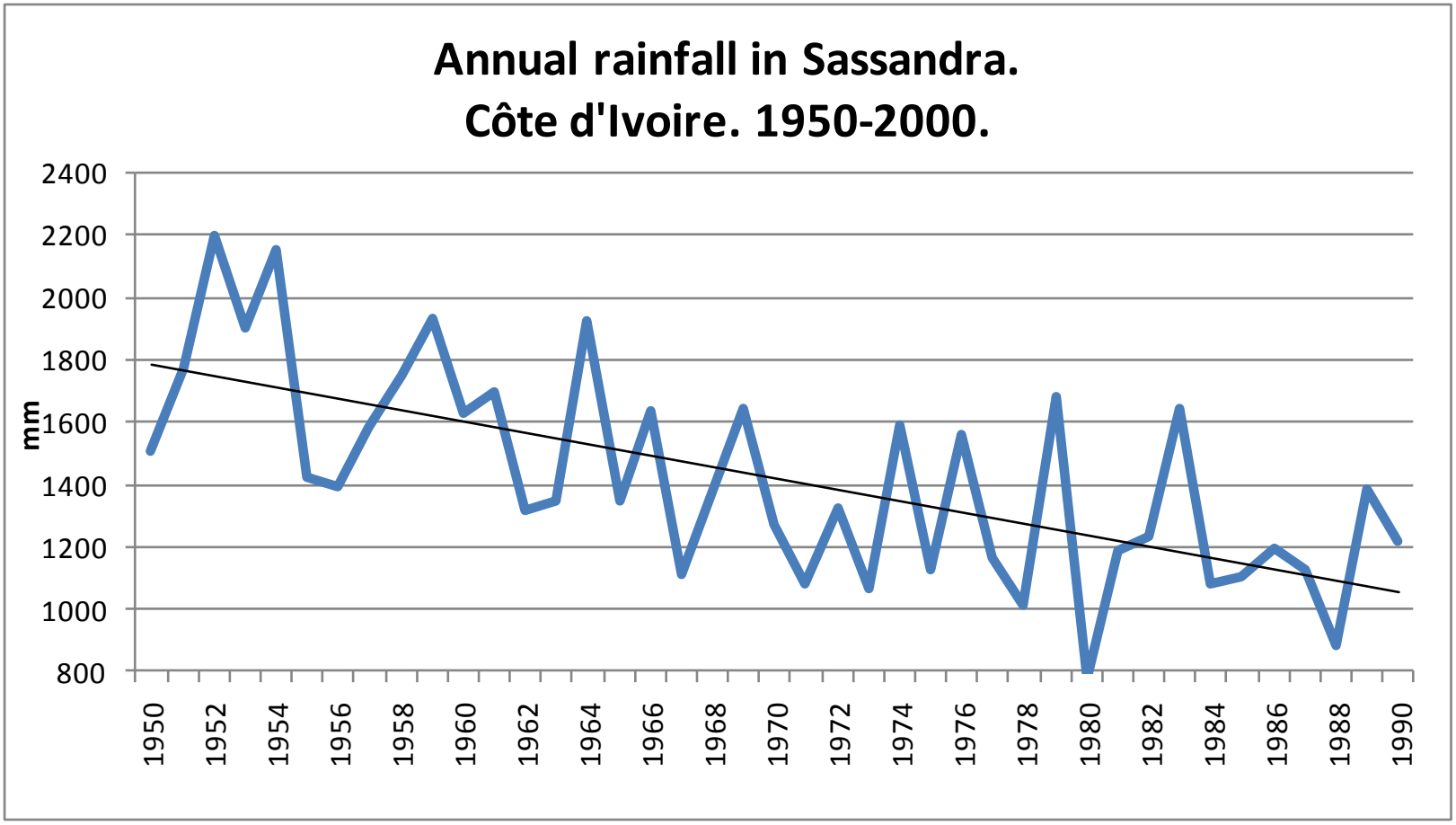
Does this process reproduce itself, 'further to the West' (following a kind of malthusian process?)



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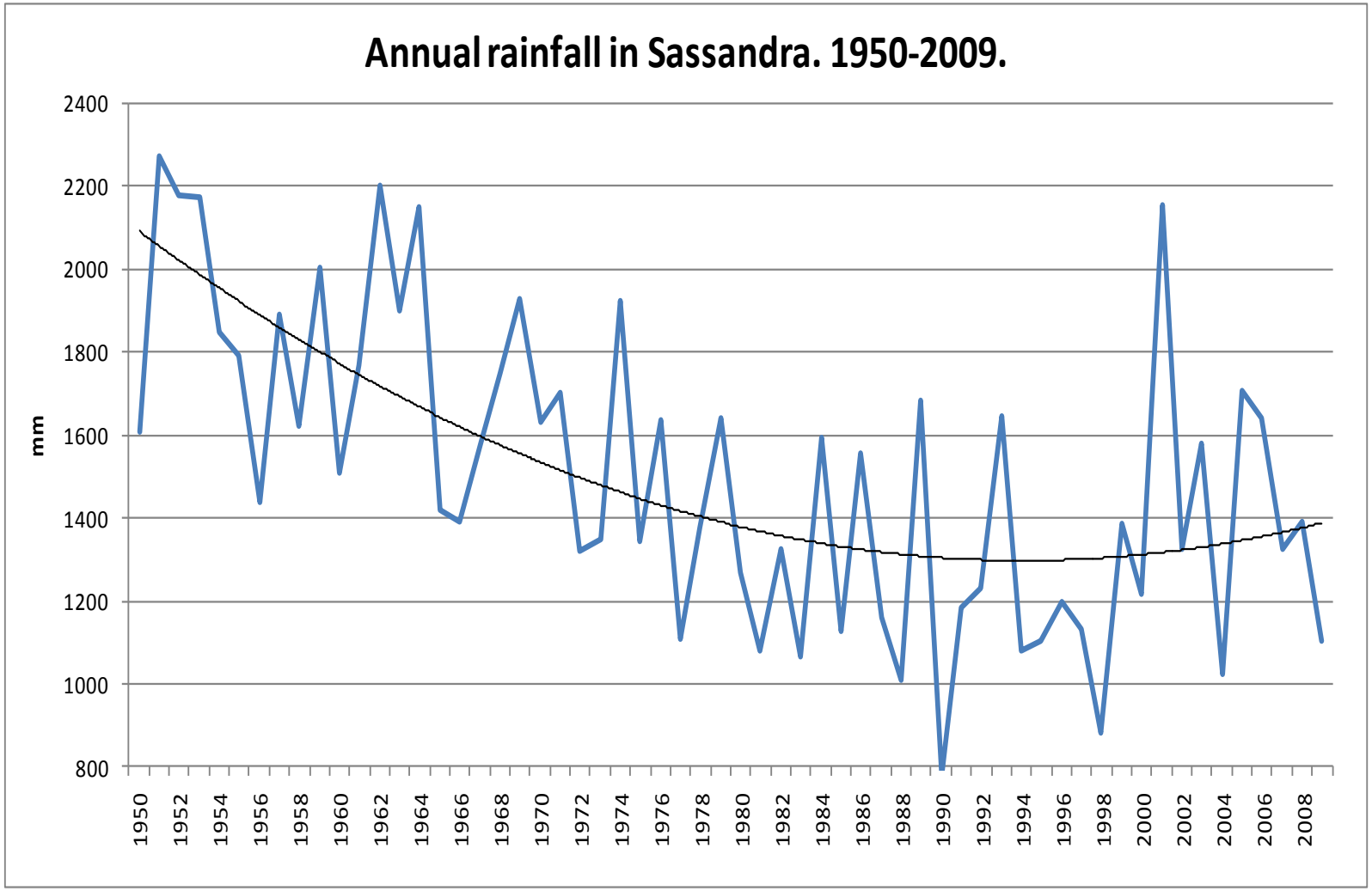
Less convincing when we integrate the 2000s



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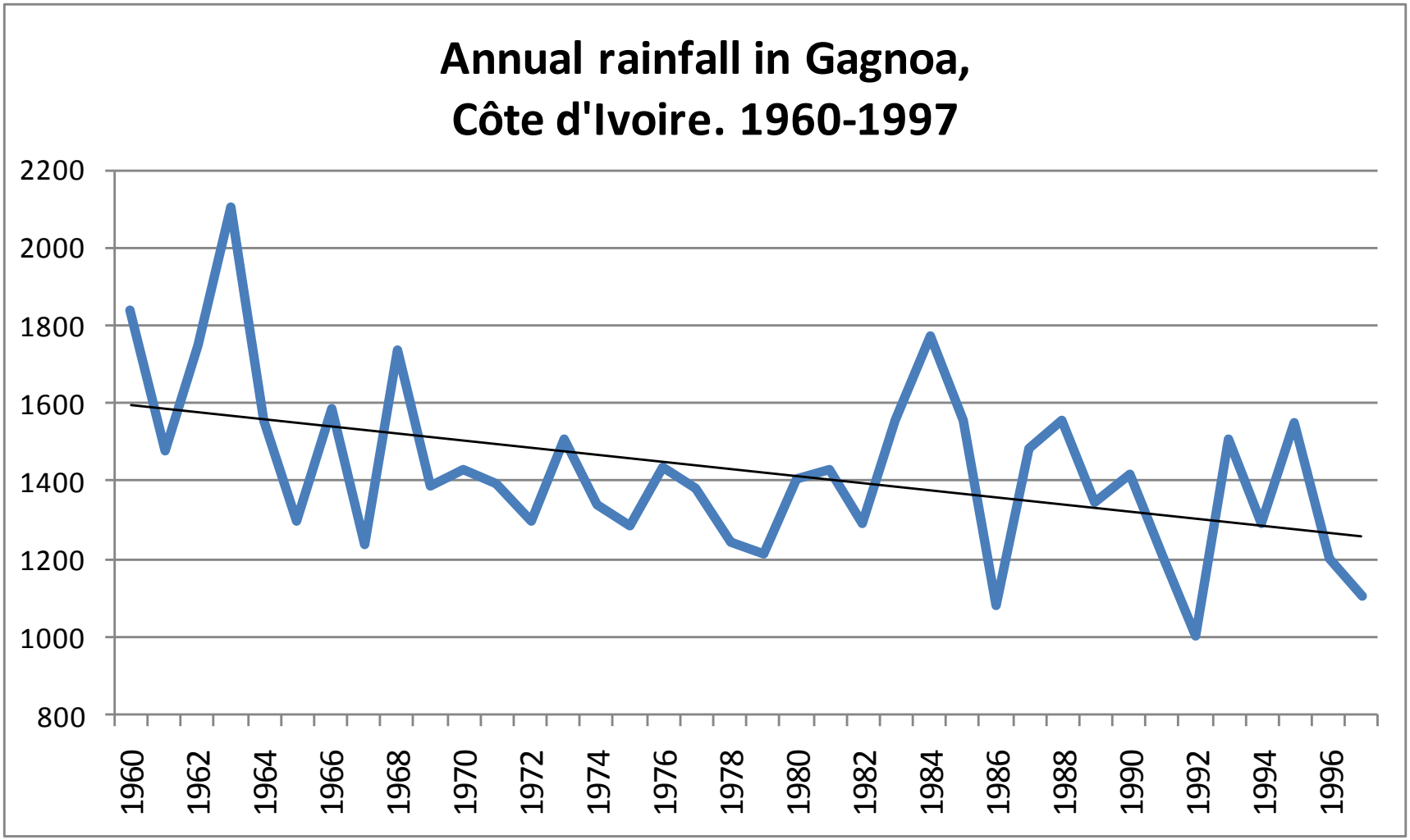
Does cocoa migration and deforestation contribute to a local drier climate?

(Léonard and Oswald, 1996)



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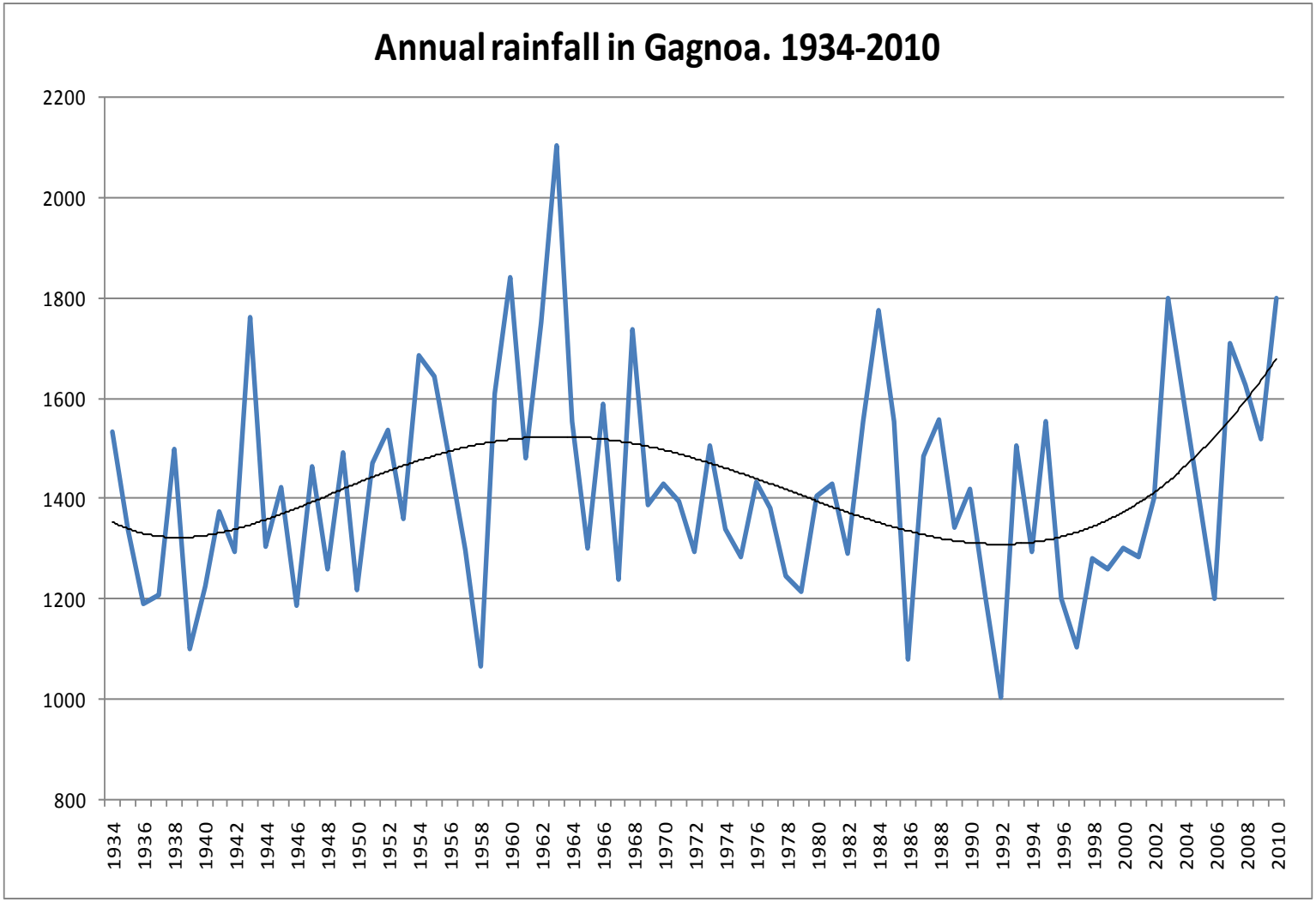
Here, if we integrate preceding periods, the argument looks refuted



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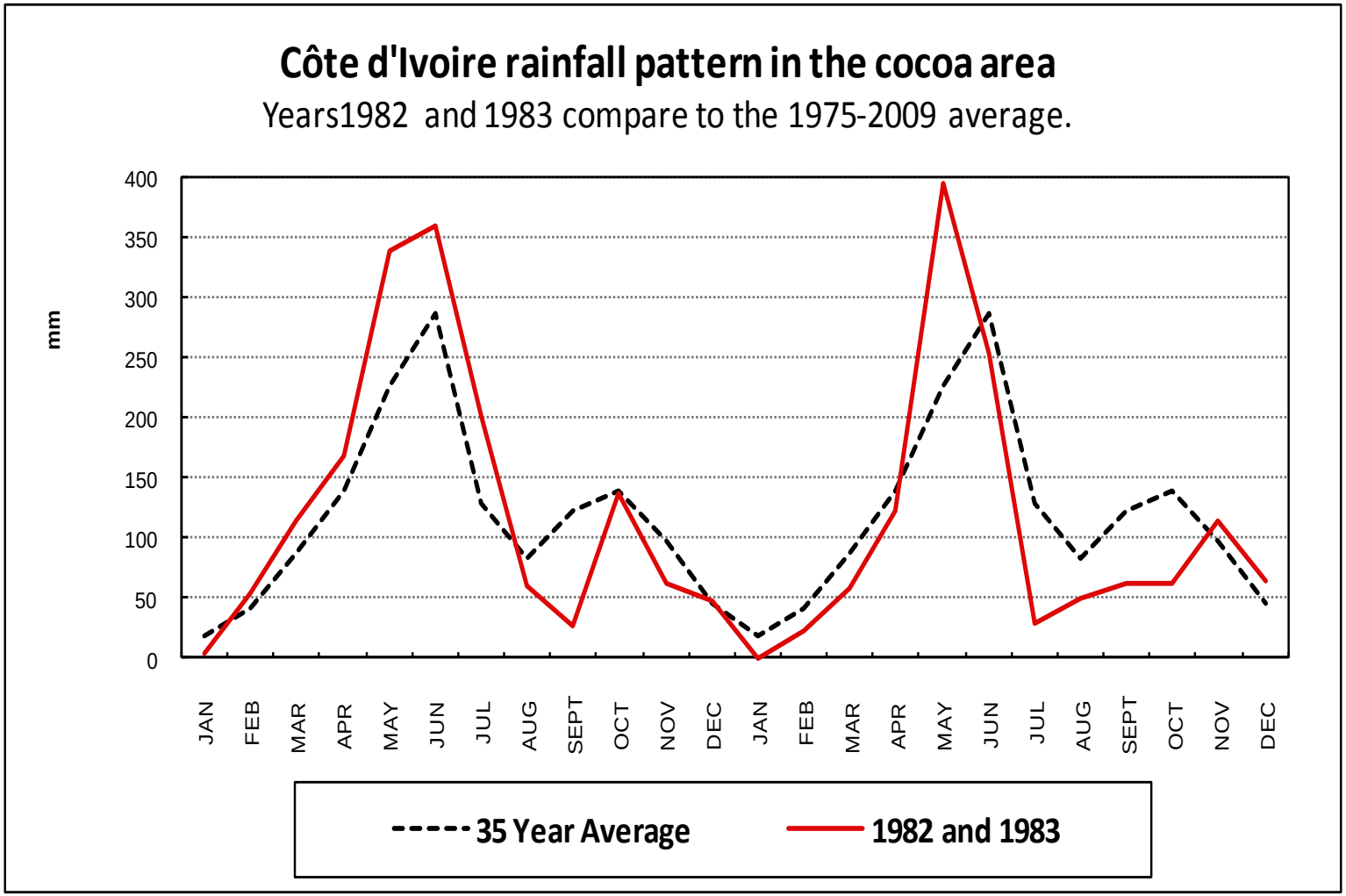
However, annual rainfall data are not sufficinet. For instance, the severe drought in the El Nino years 1982/3 is not apparent from annual rainfall data.

An unusual distribution of rainfall in both years, with more-than-average rainfall during the summer months (May to June/July) followed by severe drought periods that in 1983 lasted until November



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The 1982/83 drought effect

accidental / structural

‘With or without human influence’

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A clear negative impact of the drought on national production and yields in 1982/83 but the strength of the cocoa migration 'swallows' this effect within one year.

Table 1. Production and per-hectare yields of cocoa in Côte d'Ivoire. 1980/81 to 1985/86

Cocoa seasons	Production (thousands of tonnes)	Yield (Kg/ha)
1980/81	417	499
1981/82	465	516
1982/83	360 (-23%)	378 (-27%)
1983/84	411	432
1984/85	565	549
1985/86	555	505

Sources: RCI . Min Agric. 1986 Annuaire de statistiques agricoles.

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A differential impact.

The Bas Sassandra region in the southwest (Sassandra, Soubré, San Pedro), which at that time was still widely covered by forest and generally more humid than the other cocoa regions, was hardly affected by drought and fire.

An evidence of influence of cocoa farming aggravating the impact of droughts

Table 2. Frequency of cocoa and coffee farm plots partially or totally burnt during the 1982/3 drought based on interviews with 800 cocoa farmers in 2006

	Nzi Comoe	Moyen Comoe	Haut Sassandra Sud Bandama	Bas Sassandra	All
Never affected by fire	25 (63%)	149 (83%)	221 (91%)	379 (99%)	774 (92%)
Affected by fire	15 **(38%)**	31 (**17%**)	21 **(9%)**	4 (1%)	71 (8%)
Total	40	180	242	383	845 (100%)

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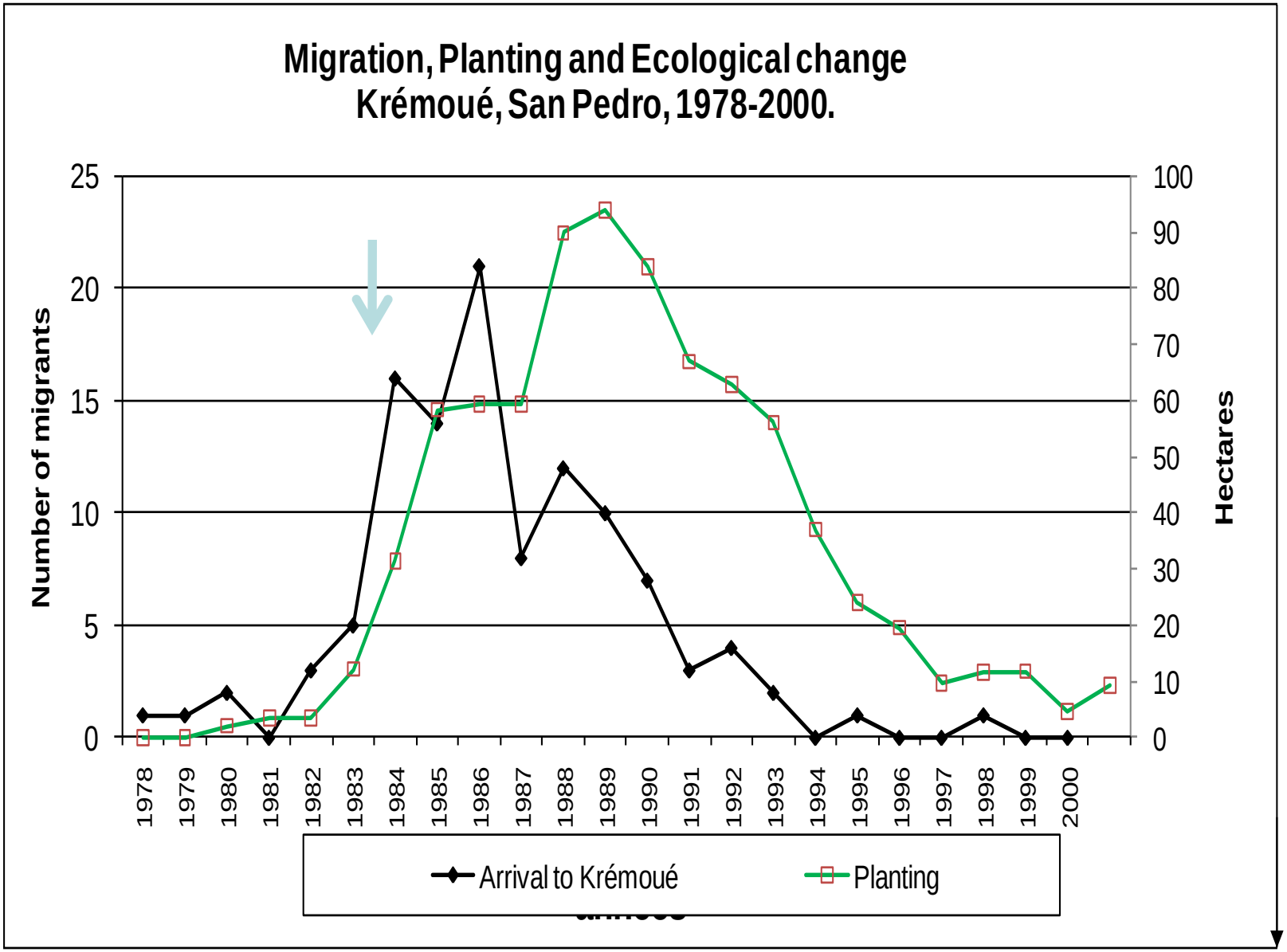
Unsurprisingly, many farmers who had been affected by the 1982/3 fires did migrate in 1983/85 (Côte d'Ivoire, South-West)



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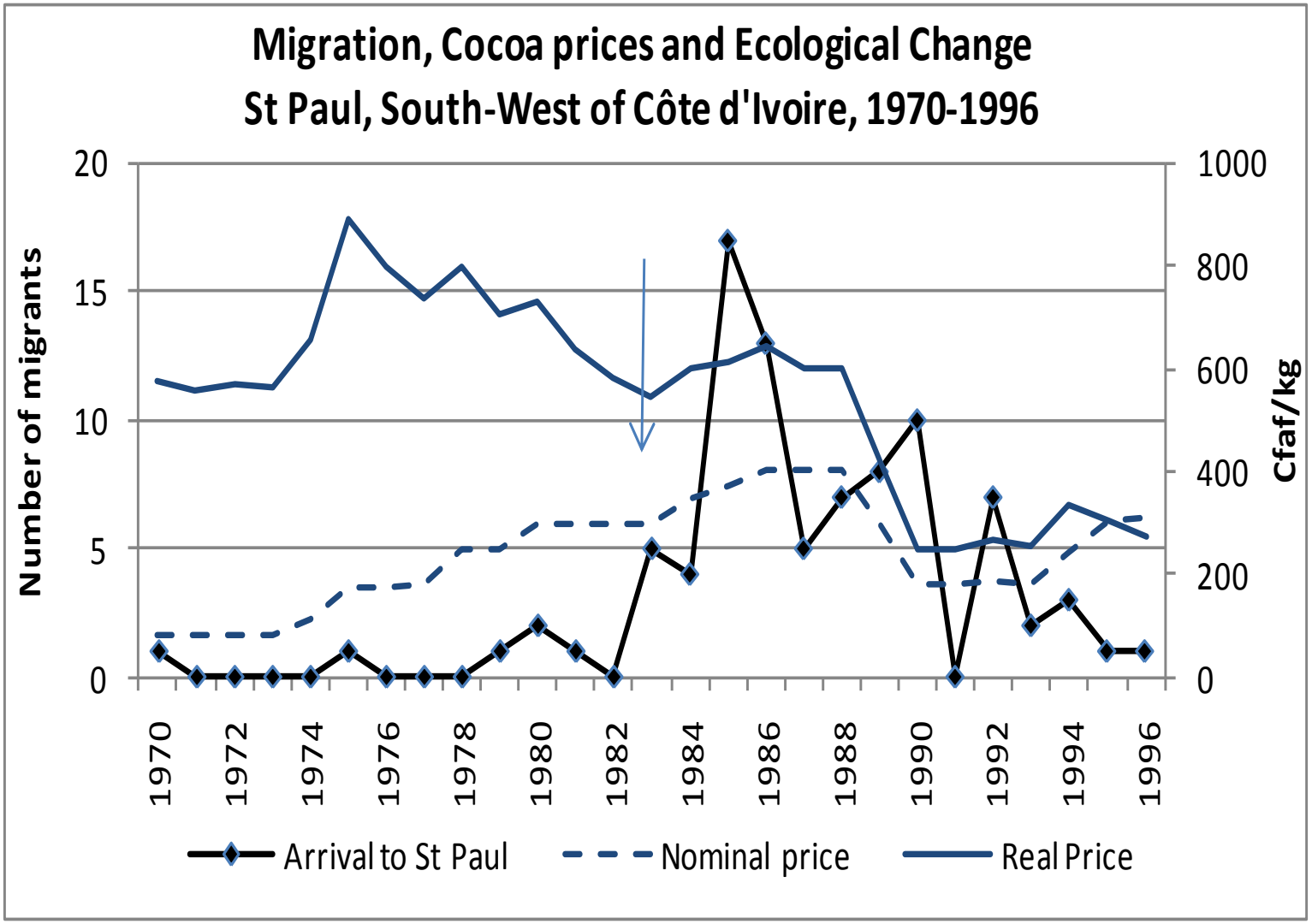
In Côte d'Ivoire, these migrations were also undertaken under conditions of a national policy that facilitated access to forest land for migrants and ensured stable producer prices until 1989



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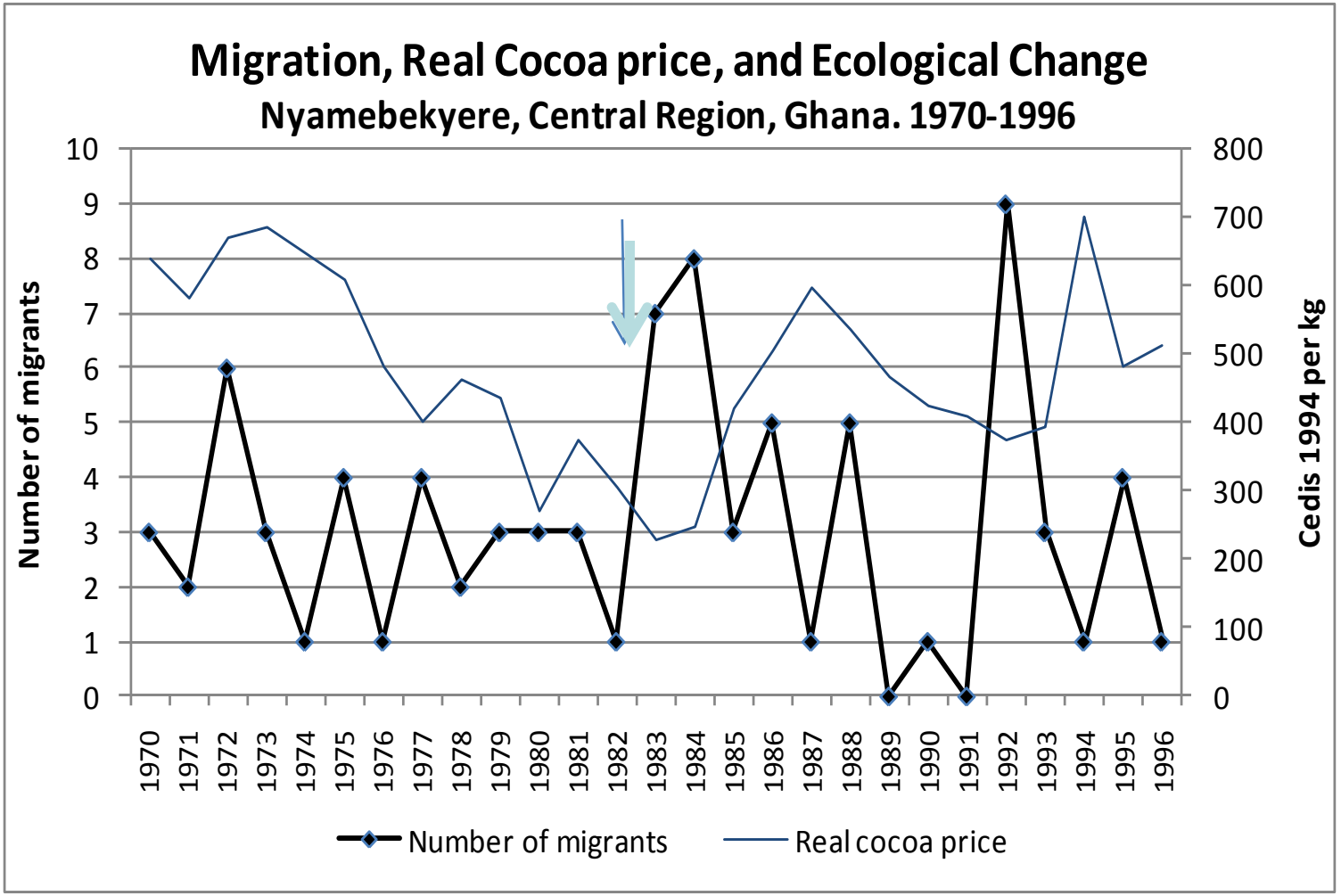
In Ghana,
the increase in migration during and shortly after **the 1982/83 drought is more visible**. It clearly preceded a government decision to increase the price paid to cocoa producers in 1985



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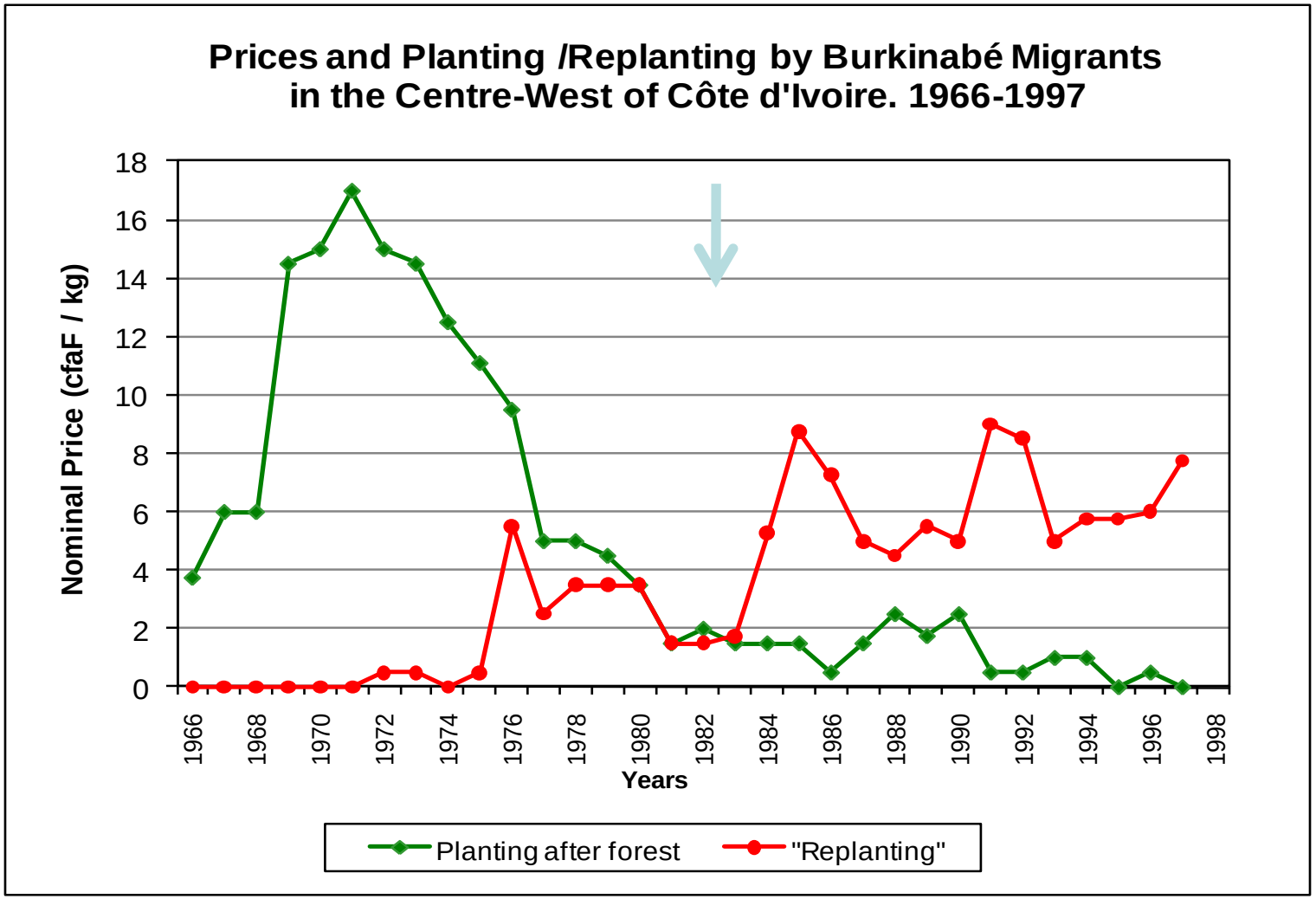
BUT … The 1982/3 drought that destroyed many cocoa plantations in the old cocoa belt also contributed to a **re-investment** and to a **"technology change"**: **REPLANTING (of cocoa)**



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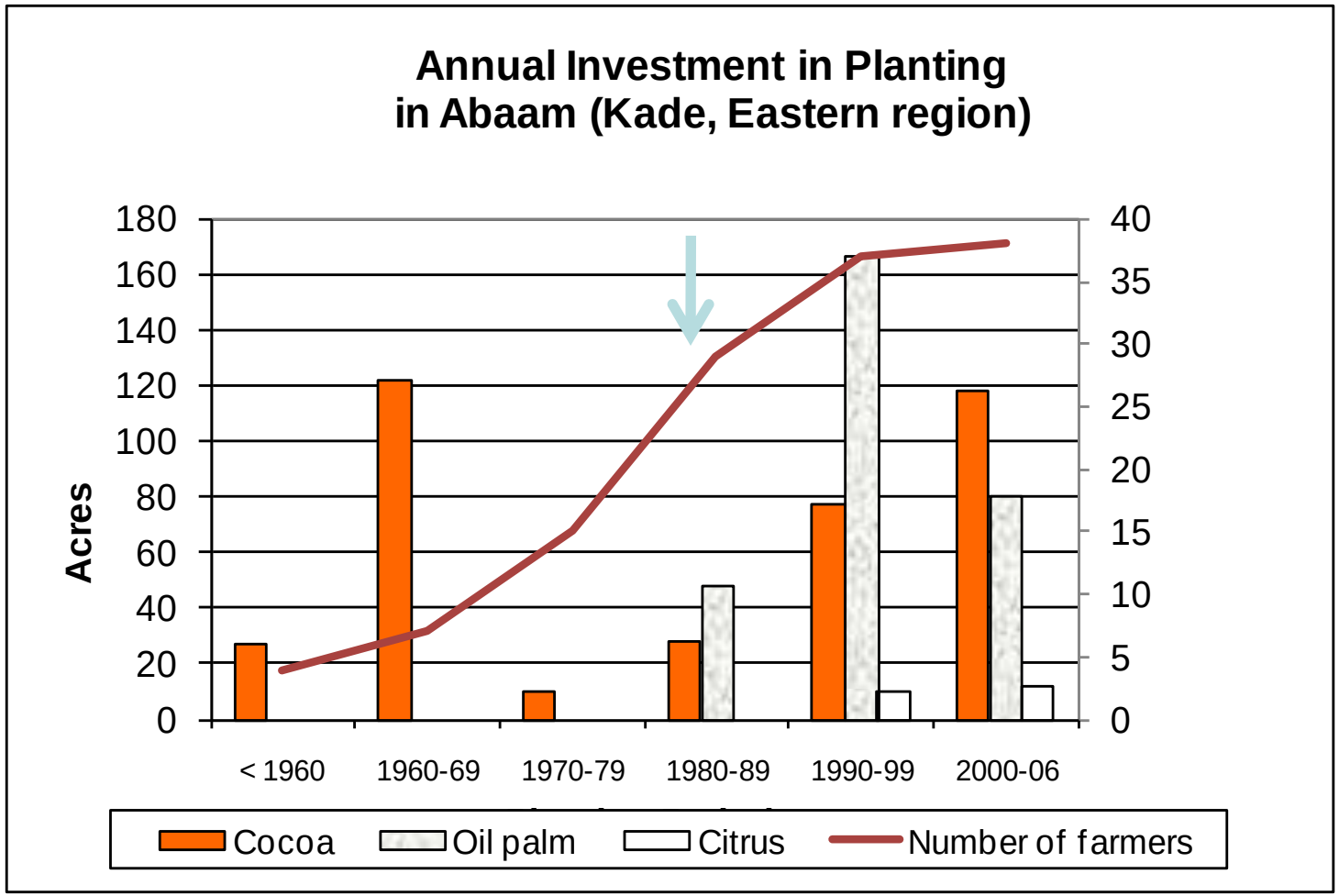
Drought and Fires (liberated some land) and also triggered Re-investment and innovation through diversification.

The 1983 events played a major role in the adoption **of hybrid oil palm** in all regions where oil palm contract farming developed .

The mid-to-late 1980s also saw an increasing interest among cocoa farmers in **rubber** and **cashew nut** and, to a less extent, in **teak** (relatively resistant to fire).



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Conclusion (1)

- Climate plays an important role in cocoa farming and has certainly influenced the decisions of West African cocoa farmers, including those to migrate.

- However, the influence of climate on cocoa farmers' decisions is intimately intertwined with that of other factors and is difficult to isolate

- Regional gradient. While a major direct influence of the east-west rainfall gradient in the forest belt of both Côte d'Ivoire and Ghana on the decision taken over the past half-century by hundreds of thousands of cocoa farmers to migrate westward and carve out a new cocoa farm from the forest is difficult to prove, it is equally difficult to refute

- The major drought of 1982/3 that destroyed many cocoa farms across the two countries has clearly triggered migrations to the wetter, western regions of both countries, but its influence was dwarfed by that of the availability and accessibility of forest land for planting.

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Conclusion (2)

In fact, our results suggest that the influence of climate, and by extension climate change, on cocoa migrations and deforestation should not be exaggerated.

More importantly, there is evidence that climate pressure in the form of the extreme drought of 1982/3 triggered innovation and technological change in a **Boserupian sense** (Boserup, 1965), by encouraging

- **replanting,**
- **Diversification (including 'timber' trees)**

Finally, climate change will likely lead to **technological adaptations** such as diversification, adoption of irrigation, of some specific fertilizers) than to substantial migrations towards wetter regions,

… unless farmers are given the impression that there is new forest land that is relatively easily available. Then we come back to Governance and political will … or lack of.