



Universiteit  
Leiden  
The Netherlands

## Population dynamics

Dietz, A.J.; Veldhuizen, E.; Ruben, R.; Verhagen, A.

### Citation

Dietz, A. J., & Veldhuizen, E. (2004). Population dynamics. In R. Ruben & A. Verhagen (Eds.), *The impact of climate change on drylands, with a focus on West Africa* (pp. 79-82). Dordrecht/Boston/London: Kluwer Academic Publishers. Retrieved from <https://hdl.handle.net/1887/15491>

Version: Not Applicable (or Unknown)

License: [Leiden University Non-exclusive license](#)

Downloaded from: <https://hdl.handle.net/1887/15491>

**Note:** To cite this publication please use the final published version (if applicable).

Ton Dietz and Els Veldhuizen, 2004, Population Dynamics. In: A.J.Dietz, R. Ruben & A. Verhagen, eds, The Impact of Climate Change on Drylands, with a Focus on West Africa. Dordrecht/Boston/London: Kluwer Academic Publishers. Environment and Policy Series, Vol. 39, pp. 79-82.

## Chapter 8

### POPULATION DYNAMICS

#### *An important intervening variable*

Ton Dietz and Els Veldhuizen

*Abstract:*

*Changes in population densities for the period 1960-2000 are presented in this chapter*

Between 1960 and 2000 population increase in the West-African drylands belonged to the world's highest, close to 3% per annum, and in addition a considerable part of the population has migrated towards the southern coastal states while inter-continental migration, mainly to Europe, has started to become considerable. Deteriorating situations in the arid and semi-arid areas of Senegal, Mali, Burkina Faso and Niger (due to rainfall decrease, land degradation, and violence) have also resulted in a rapid intra-country migration southward, and in a swelling of the big cities like Dakar, Bamako, Ouagadougou, Niamey and Kano. Map 8.1 shows a comparison for Africa as a whole between 1960 and 1994 (UNEP/GRID, 1998). West Africa shows a mixed picture. For the arid frontier zones in Mauritania, Mali and Niger the data actually show a population decline. On the other hand, almost everywhere along the West African coasts the population increased more than four-fold. Increases between 250 and 400% are also visible in eastern Senegal, in a large area around Bamako, in Niamey and in mid-western Nigeria. However, major areas in Burkina Faso and northern and eastern Nigeria did not grow so fast: here the population less than doubled, a result of massive out-migration towards the south and to countries abroad. Estimates for Burkina Faso suggest that close to half of the adult population born there has moved, at least for part of the year, to coastal states like Ivory Coast and Ghana.

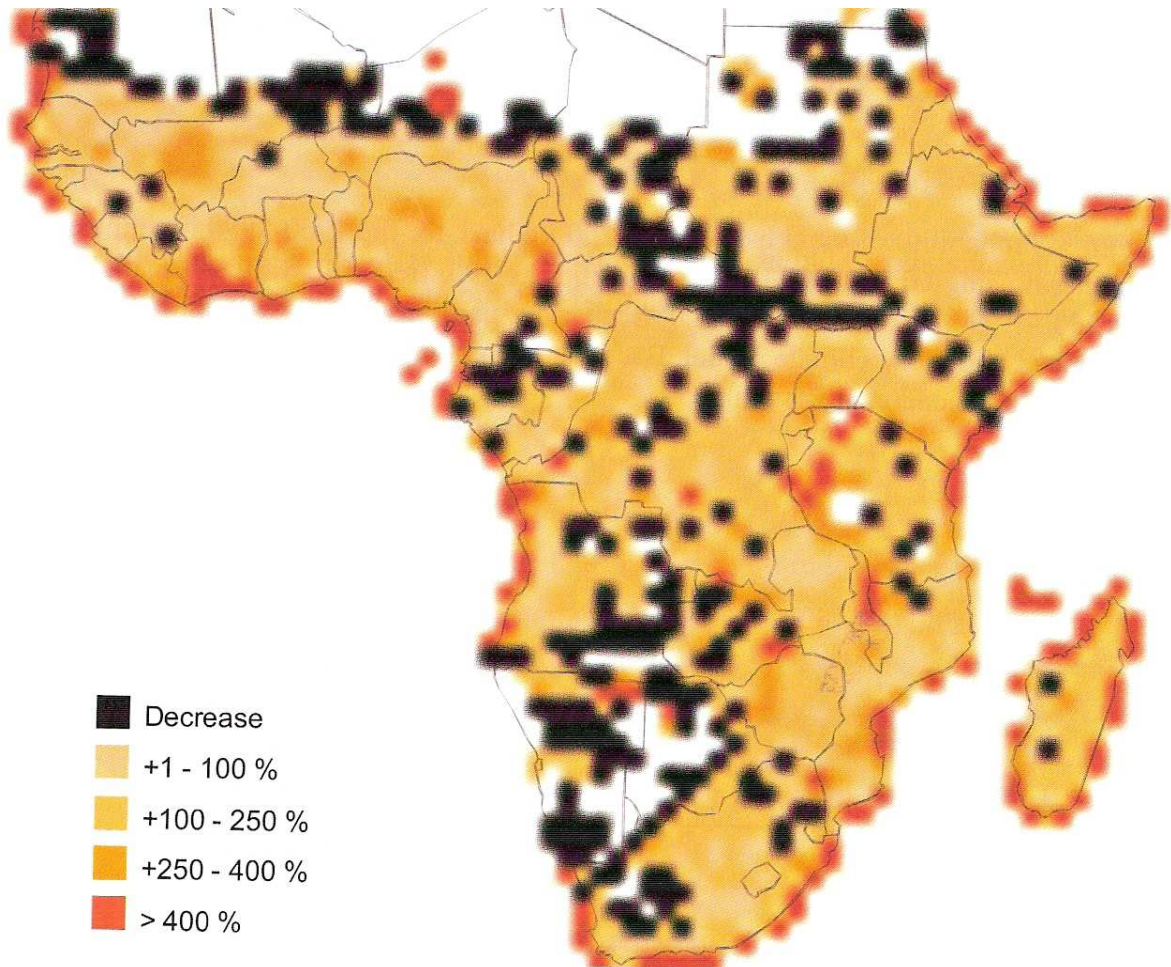
For the  $1^{\circ} \times 1^{\circ}$  dryland areas in West Africa a typology was made of population density and urbanisation for both 1960 and 1990/1994 (1990 for urbanisation; 1994 for population density). Table 8.1 gives the changes between the early 1960s and the early 1990s.

Further rapid population growth can be expected. For West African countries as a whole, the World Bank predicts an annual population growth of between 2.5% and 2.8% for 2000-2025 (World Bank, 1995), although recently long-term growth is thought to be lower, because of increasing urbanisation and the impact of HIV/AIDS. The West African Long Term Perspective Study, a multi-donor endeavour to look into West Africa's near future, predicted that "West Africa's population will almost certainly double over the next thirty years" (see: Club du Sahel, 1995, p. 14). It was also predicted that there would be a major (further) redistribution of the population. "In the year 2020, the urban population in West Africa will most likely be over 60 percent of the total population, compared with 40 percent today. The urban population will be more than three times greater than in 1990. However, the rural population will also have increased by 40 percent" (Ibid.). Population growth and urbanisation will require massive investments in infrastructure and social services (water being a particularly problematic challenge) and a major intensification and commoditisation of food production. Bad world market perspectives for the area's current major export crops, cotton and groundnuts, will also lead to a shift in favour of food crops, and a further increase in the shortage of foreign exchange.

For seven regional 'cells' in the ICCD research project the following assessment and tentative prediction can be given for the demographic and food needs situation in 1990 and 2050 respectively: see Table 8.2. Food needs are based on average energy needs of grain equivalents of  $225 \text{ kg a}^{-1}$  per capita. We also add the calculated necessary yield requirements of grain (equivalents), in  $\text{kg ha}^{-1}$ , if all

land would be cultivated and if all food needs would be provided by agricultural (grain) production in the regional cell itself. In many areas of dryland West Africa, the current actual land use for crop

*Map 8.1 Sub-Sahara Africa: Changes in population density (inh km<sup>-2</sup>) between 1960 and 1994 (in %).*



*Map for Africa as a whole in black and white*

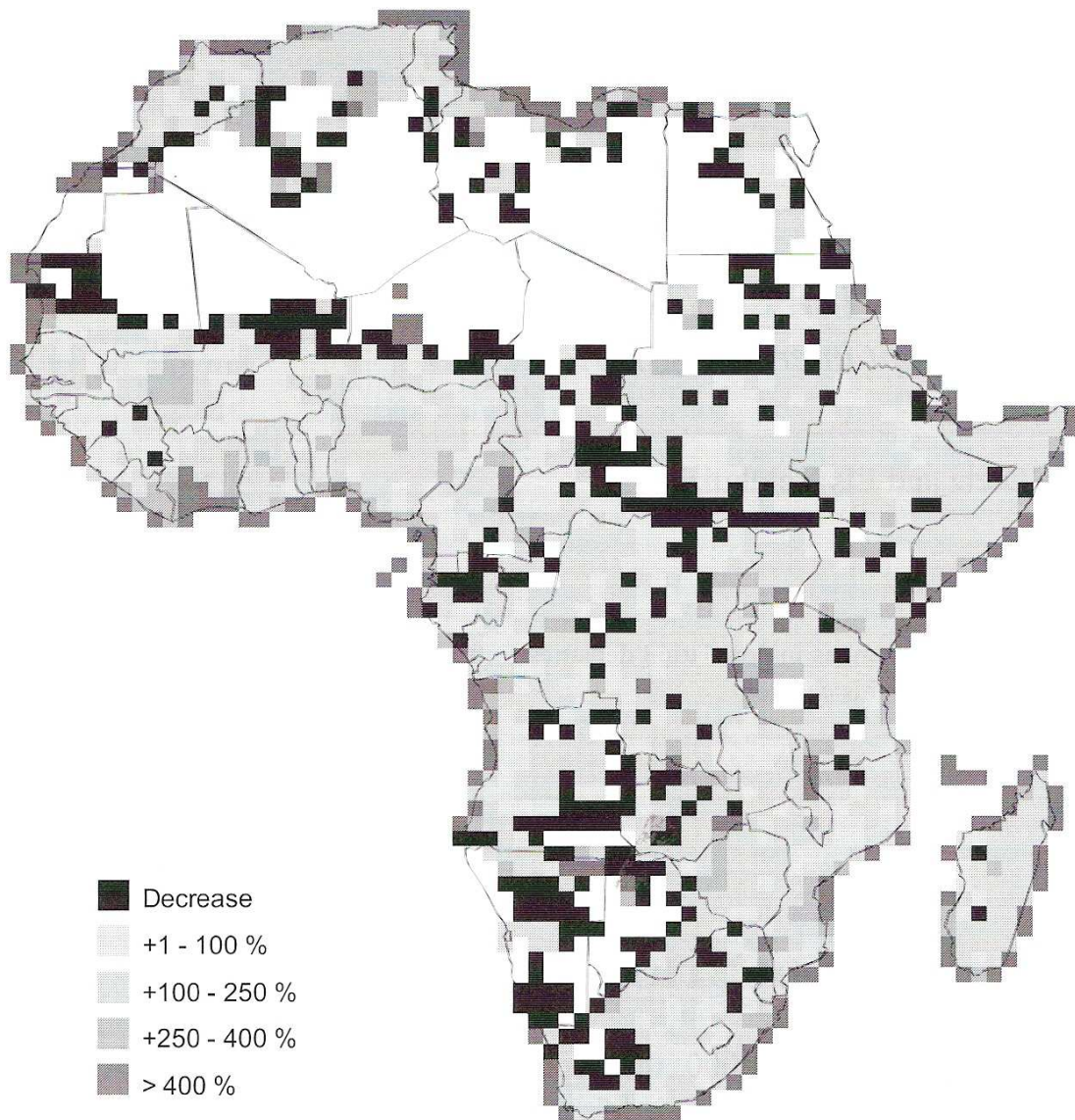


Table 8.1 Dryland West Africa: changes in population density and urbanisation, 1960 and 1990/1994.

|                                        | Semi arid cells                        |                                        |                                       |                                       |               | Sub-humid cells                        |                                        |                                       |                                       |               |
|----------------------------------------|----------------------------------------|----------------------------------------|---------------------------------------|---------------------------------------|---------------|----------------------------------------|----------------------------------------|---------------------------------------|---------------------------------------|---------------|
| high density in 1960 and urban in 1960 | 2                                      |                                        |                                       |                                       | 2             | 1                                      |                                        |                                       |                                       | 1             |
| high density in 1960 and rural in 1960 | 3                                      | 11                                     |                                       |                                       | 14            |                                        | 4                                      |                                       |                                       | 4             |
| low density in 1960 and urban in 1960  |                                        |                                        | 1                                     |                                       | 1             | 1                                      |                                        |                                       |                                       | 1             |
| low density in 1960 and rural in 1960  | 2                                      | 8                                      |                                       | 59                                    | 69            | 1                                      | 8                                      | 1                                     | 37                                    | 47            |
| total in 1990/1994                     | 7                                      | 19                                     | 1                                     | 59                                    | 86            | 3                                      | 12                                     | 1                                     | 37                                    | 53            |
|                                        | high density in 1994 and urban in 1990 | high density in 1994 and rural in 1990 | low density in 1994 and urban in 1990 | low density in 1994 and rural in 1990 | total in 1960 | high density in 1994 and urban in 1990 | high density in 1994 and rural in 1990 | low density in 1994 and urban in 1990 | low density in 1994 and rural in 1990 | total in 1960 |

production purposes is less than 20% and the current yield per cultivated hectare less than 600 kilograms of sorghum or millet per hectare, and in drought years considerably less. Optimal harvests are beyond 3000 kg ha<sup>-1</sup> though. Theoretically, in all study regions, local grain production could be sufficient to feed the predicted population in 2050. In practice, however, crop land expansion, yield intensification, higher cash value agriculture in exchange for grains from elsewhere, and non-agricultural income-earning activities in exchange for food from elsewhere, will all be needed to prepare for a major challenge.

Table 8.2 Demographic change 1990-2050, predicted food needs and necessary yields in grain equivalents in 2050; seven major NRP-ICCD study regions

| 1°×1° Cell<br>(B = Burkina Faso, 1990<br>M = Mali,<br>G = Ghana) | Inh km <sup>2</sup> | Total inh.<br>1990<br>(mill.) | Predicted<br>annual pop.<br>growth 1990-<br>2050 (%) | Predicted<br>population<br>density in 2050<br>(inh. km <sup>2</sup> ) | Predicted<br>population in<br>2050 (in mill.) | Predicted food<br>needs in 2050<br>(mill. kg grain<br>equivalents) | Necessary<br>yields in 2050<br>(kg ha <sup>-1</sup> ) |
|------------------------------------------------------------------|---------------------|-------------------------------|------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------|
| Ouagadougou (B)                                                  | 90                  | 1.1                           | 3.0                                                  | 540                                                                   | 6.5                                           | 1460                                                               | 1200                                                  |
| Kaya (B)                                                         | 40                  | 0.5                           | 2.0                                                  | 130                                                                   | 1.6                                           | 360                                                                | 300                                                   |
| Gorom Gorom (B)                                                  | 15                  | 0.2                           | 1.5                                                  | 40                                                                    | 0.4                                           | 100                                                                | 90                                                    |
| Bamako (M)                                                       | 70                  | 0.9                           | 3.5                                                  | 590                                                                   | 7.1                                           | 1600                                                               | 1300                                                  |
| Koutiala (M)                                                     | 20                  | 0.3                           | 3.3                                                  | 120                                                                   | 1.5                                           | 330                                                                | 300                                                   |
| Douentza (M)                                                     | 10                  | 0.1                           | 2.0                                                  | 30                                                                    | 0.4                                           | 90                                                                 | 70                                                    |
| Bolgatanga (G)                                                   | 60                  | 0.7                           | 2.6                                                  | 280                                                                   | 3.3                                           | 700                                                                | 600                                                   |