

WORKING PAPER 331

THE CHANGING POPULATION GEOGRAPHY
OF WALES

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Abstract

The paper reviews the course of Welsh population history and analyses in particular the changes in the geographical distribution of the population of Wales revealed by the recent 1981 census.

1. Introduction

This paper provides a sketch of the population history of Wales, of the geographical distribution of its people, and reviews changes over the past decade revealed by recent statistics published from the 1981 Census.

Since the first British census in 1801, the population of Wales has grown from 587 thousands to 2.790 millions, nearly 5 times (Table 1). Most of this spectacular growth was accomplished by 1911, since when the population has grown only slowly, adding only 369 thousands to its 1911 level over the next 70 years.

2. The course of economic and population history, 1851-1939

A population lives and breathes within an economic environment, and we can only hope to understand Welsh culture by examining its economic history over the last century. From about 1860 to 1913 Wales experienced economic growth on the spectacular scale, first in iron and then in coal. This growth was concentrated in two regions - the South Wales coalfield and the North Wales coalfield, of which the former was much the more significant. Coal production in South Wales rose from 10 million tons in 1860 to 57 millions in 1913, when the industry employed 270,000 men. Nearly 37 millions of those tons were exported in that peak year: Welsh steam coal powered the navies and merchant marines of the world, Welsh anthracite stoked the boilers of a thousand factories across the globe, and Welsh bituminous coal supplied the gas grids of cities from the Levant to the Plate.

To man the ironworks and mines, however, required labour, and migrants poured into the coalfield during the latter part of the nineteenth and early portion of the twentieth century. The rural areas of Wales were the main contributors of migrants though some came from neighbouring English counties. The general picture of internal migration in Wales during these decades is presented in Table 2.

Table 1. Selected indicators for the population of Wales, 1801-1981

Year	Population (1000's)	Share of UK population	Average annual growth rate in period beginning in year (per 1000)	1801 value = 100
1801	587	5.09	13.7	100
1851	1,163	5.22	10.5	198
1891	1,771	5.17	15.6	302
1911	2,421	5.75	3.4	412
1931	2,593	5.63	0.1	442
1951	2,599	5.00	1.7	443
1961	2,644	5.02	3.2	450
1971	2,731	4.92	2.1	465
1981	2,790	5.01		475

Source: Extracted and Computed from OPCS (1981a), Table 2, p. 13.

Table 2. Migration balance, 1851-1911

	1851-61	1861-71	1871-81	1881-91
Welsh rural areas	-63,322	-58,967	-64,646	-106,087
Glamorgan-Monmouth colliery area	+39,627	+11,033	+12,213	+87,225
Wrexham colliery area	+2,661	-1,984	-1,122	-618
Llandudno and Rhyl area	+1,259	-2,268	+2,339	+2,190
Balance	-36,271	-63,005	-52,139	-17,794
	1891-1901	1901-1911		
Welsh rural areas	-57,413	-37,909		
Glamorgan-Monmouth colliery area	+40,326	+129,295		
Wrexham colliery area	-618	-2,875		
Llandudno and Rhyl area	+8,289	+5,715		
Balance	-9,350	+98,492		

Source: Thomas (1963)

bitterness of relations between the miners and owners that were the consequence of events such as these. South Wales has a long tradition of militancy in industrial relations, and the South Wales Miners Federation was the spearhead within the Mineworkers Federation of Great Britain, just as in turn the Miners Federation was the spearhead within the general trade union movement. This was the environment of struggle between "oppressed" and "oppressors" that formed the personality and drive of Aneurin Bevan, that arch-rebel of the British political scene until his untimely death in 1960.

With the Great Crash of 1929 on Wall Street heralding the onset of general depression there was no hope that the miners could win their struggle for social justice through industrial action. Yet they had long memories when it came time for the General Election of 1945 in which Churchill, the victorious leader of a united nation, was decisively rejected by the people he had led because they recalled his peacetime role as strike-breaker (Tonypandy 1911) and ally of the mineowners (General Strike 1926). The goal of nationalization of the mining industry was not achieved until 1948, but in the meantime Wales had experienced a massive outmigration (Table 3).

The volume of migration was higher in the 1920's when there were more job opportunities in England than in the following decade. The effect on the viability of Welsh culture was considerable : the country lost large numbers of Welsh speakers and their children, very few of whom were brought up to speak Welsh since their parents were most probably bilingual.

3. Post-war economic and population development, 1945-1981

The late 1940's, 1950's and 1960's can be viewed, in retrospect, as an era of unprecedented economic growth and low unemployment for the Western World in which Wales was able to participate as a result of, in part, the incentives and directives of regional policy. Whereas between 1921 and 1939 the net out-migration rate was circa 9.7 per 1000, it ranged between 0.3 and 2.4 per 1000 only in the four

Table 3. The migration balance in the interwar years

Area	1921-31	1931-39		1921-39
Rural areas	-30,337	-23,592	Loss by migration	450,000
Non-industrial areas	+6,896	+16,524	Natural increase	259,000
Industrial towns	-246,463	-174,002		
Wales	-269,904	-181,160	Net loss in population	191,000

Source: Thomas (1962)

Table 4. Components of growth, 1951-81

Years	Annual equivalent rates (per 1000 population)			Birth	Death
	Population change	Natural increase	Net migration		
1951-56	0.7	3.1	-2.4	15.6	12.5
1956-61	2.1	3.8	-1.8	16.3	12.5
1961-66	4.4	3.7	-0.3	17.4	12.7
1966-71	2.1	3.2	-1.1	16.1	12.8
1971-76	3.1	0.6	2.5	13.6	13.0
1976-81	1.6	-0.3	1.9	12.5	12.8

Source: Rees (1982) from Office of Population Censuses and Surveys' statistics

quinquennia after 1951 (Table 4). After 1971, despite showing economic growth in the nation as a whole and rising unemployment (spectacular after 1979), the net migration balance in the 1970's became positive (Table 4).

The graph of the component rates (Figure 1) shows that the natural increase rate for the Welsh population has fluctuated in the same way as the U.K. population over the post-war period, almost entirely as a result of fertility fluctuations. Gradually improving life expectancy (estimates from Rees, 1979) shown in Figure 3 has been compensated for by an ageing population, resulting in a very slight increase in the crude death rate (Table 4) over the 1951-81 period. Of the fall in natural increase rates from 1961-66 to 1976-81 of 5.0 per thousand, increased death rates contribute only 0.1 per thousand. There was a gradual rise in the 1950's and peak natural increase rates were achieved in the early 1960's (Figure 1). The TPF_R or total period fertility rate (the number of children a woman will have over her reproductive age span) in 1965 stood at 2.8, substantially above the level 2.1, at which the population just replaces itself in the long run. Fertility rates (Figure 2) have subsequently fallen dramatically, reaching a minimum of 1.68 TPF_R in England and Wales in 1977, recovering to 1.90 in 1980 but falling back to around 1.82 in 1981 (figures estimated from OPCS (1981c), Table 10).

Overall population change in the U.K. fell in the 1970's to virtually zero : only 156 thousands were added to the 1971 population by 1981, an increase of a mere 0.28 of one per cent. Wales, however, added 59 thousands (2.16 per cent). Declining natural increase was counterbalanced by shift in the migration balance from negative to positive. Note, however, that this net migration balance is the marginal difference between much larger volumes of in- and out-migration. The annual equivalent in-migration rate of 20.6 per thousand is balanced by an out-migration rate of 21.4 per thousand in the 1966-71 period (figures computed from OPCS (1978)). Figures from the National Health Service Central Register (NHSCR) for transfers into and out of Wales, as reported in Ogilvy (1982), show that the

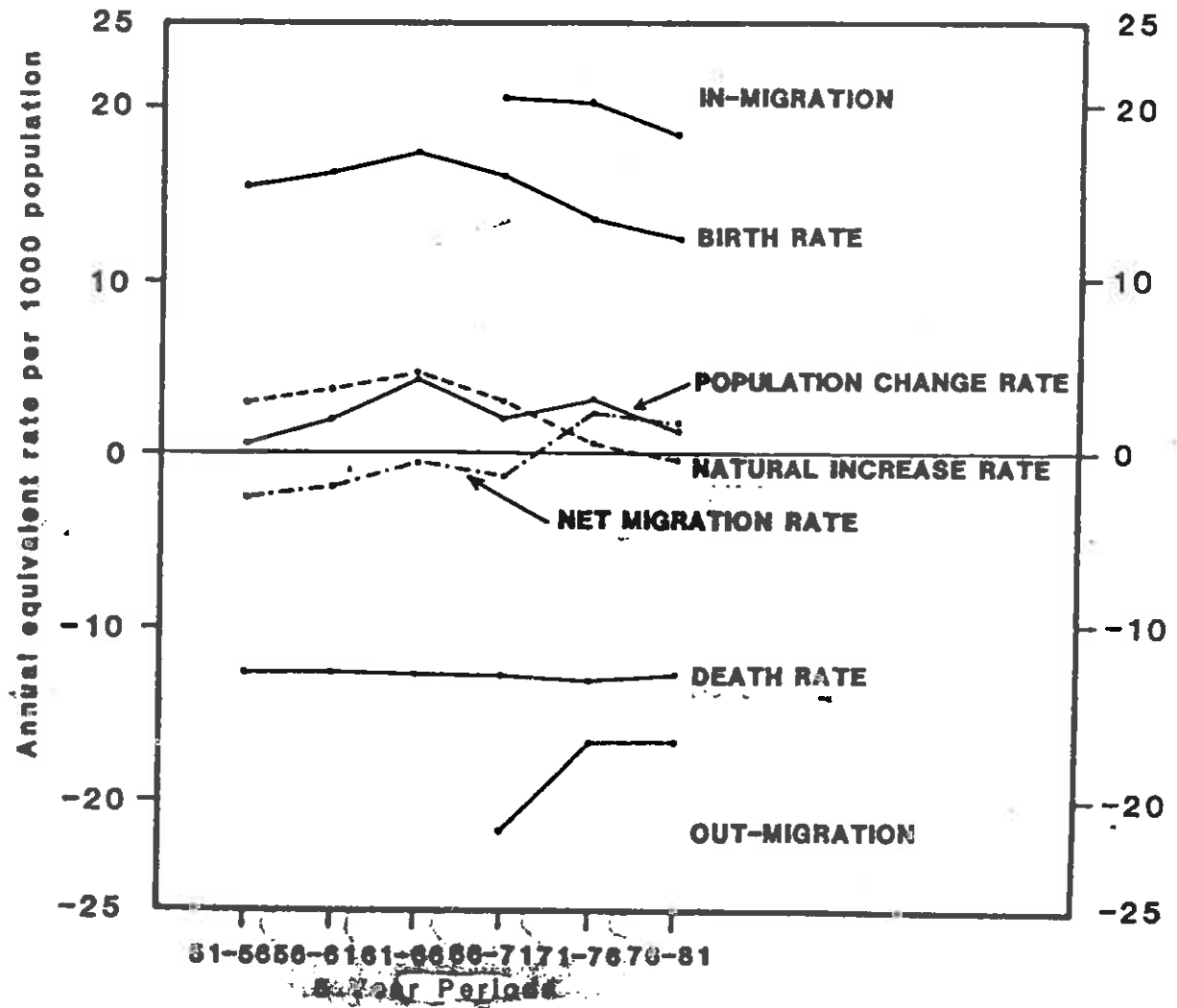
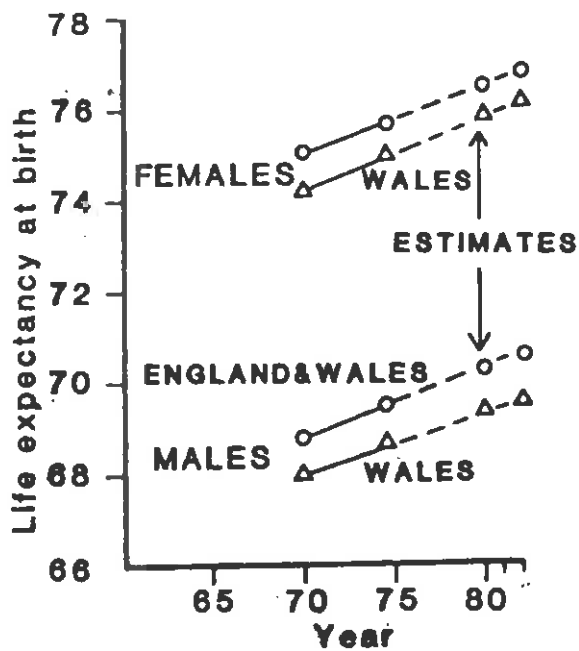
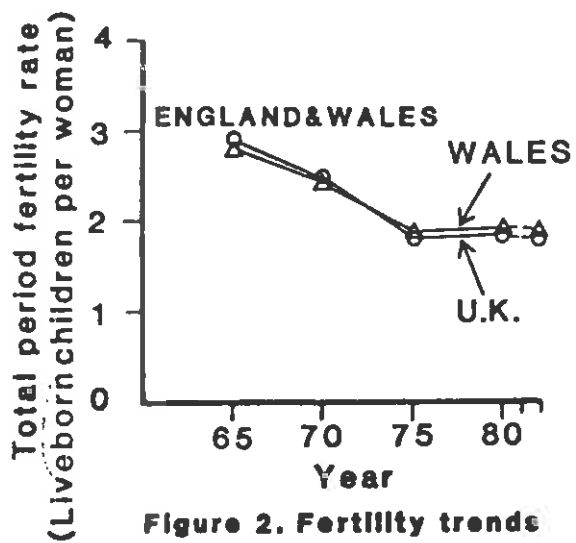


Figure 1. Components of growth for the Welsh population, 1951-1981



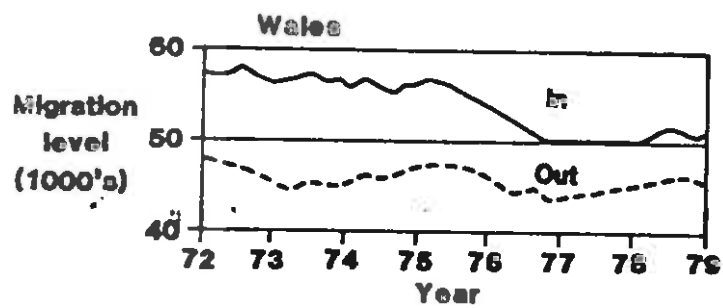
net migration balance for the 1971-79 period has been positive (into Wales) although smaller in size in the second half of the period than in the first. An approximate estimation of the annual equivalent migration rate (plotted on Figure 1 for the 1971-76 and 1976-81 periods) suggests that both in-migration and out-migration rates have fallen substantially since 1966-71, but that the latter have fallen more, thus creating the net inward balance. Wales has in the 1970's been retaining more of its migrants than in any other decade since the First World War.

However, these all-Wales statistics obscure a variety of interesting developments in the geographical distribution of population within Wales, to which we now turn.

4. Changes in the geographical distribution of population, 1961-1981

The uneven distribution of population within Wales with its concentration of population in the coastal and industrial towns of North East Wales, and in the coalfield settlements and coastal towns of South Wales is probably familiar to most people (see for example Figure 6.8 in Carter (1957)). This familiar map has, however, been changing as the population figures in Table 5 attest. Industrial South Wales has been losing part (almost 2%) of its majority share of the Welsh population in both the 1961-71 and 1971-81 periods. The county of Clwyd, containing most of the larger North Wales towns, has gained steadily in both decades. The rural areas of Wales (counties of Dyfed, Gwynedd and Powys) lost shares of the Welsh population in the 1961-71 period but regained shares in the subsequent intercensal period.

Within each of the broad geographical regions of Wales, there has, of course, been considerable variation from place to place in the direction and volume of population change. Table 6 sets out the percentage population changes for all the districts (as defined post-1974) in Wales, and Figures 5 and 6 map the percentage population change in intercensal decades 1961-71 and 1971-81 respectively. A graphical comparison of rates of change is presented in Figure 7, and the districts are grouped into sets with similar locational or functional characteristics in Figure 8. Some of the variation is due to the use of counties to build our three broad regions.



Source: Oglivy (1982) Figure 3

Figure 4. Annual equivalent number of MISCR transfers into and out of Wales (two year moving average by quarter)

Table 5. The population shares of the counties of Wales, 1961-1981

County	Population share			Change in share	
	1961	1971	1981	1961-71	1971-81
Clwyd ^a	12.2	13.1	14.0	0.9	0.9
Dyfed ^b	11.9	11.6	11.8	-0.3	0.2
Gwent ^c	16.0	16.2	15.8	0.2	-0.4
Gwynedd ^b	8.1	8.1	8.3	0.0	0.2
Mid-Glamorgan ^c	19.6	19.5	19.3	-0.1	-0.2
Powys ^b	3.9	3.6	4.0	-0.3	0.4
South Glamorgan ^c	14.4	14.3	13.8	-0.1	-0.5
West Glamorgan ^c	13.9	13.7	13.2	-0.2	-0.7
Total, Wales	100.0	100.0	100.0	0.0	0.0
Population, Wales	2,644,023	2,731,204	2,790,462		
^a Industrial/resort					
North Wales	12.2	13.1	14.0	0.9	0.9
^b Industrial/urban					
South Wales	63.9	63.7	62.1	-0.2	-1.6
^c Rural Wales	23.9	23.3	24.1	-0.6	0.8

Source: Computed from Table 4, pp. 24-25 in OPCS (1981a)

Table 6. Percentage population change, 1961-71 and 1971-81, counties and districts of Wales

County or district	Percentage change* 1961-71	Percentage change* 1971-81	% shift	County or district	Percentage change* 1961-71	Percentage change* 1971-81	% shift
CLWYD	11.3	8.8	-2.5	MID-GLAMORGAN	2.3	1.2	-1.1
Alyn & Deeside	26.2	9.9	-16.3	Cynon Valley	-4.1	-3.4	0.7
Colwyn	16.2	7.7	-8.5	Merthyr Tydfil	-5.5	-4.2	1.3
Delyn	12.2	14.5	2.3	Ogwr	11.4	5.0	-6.4
Glyndŵr	-1.8	7.0	8.8	Rhondda	-11.3	-8.2	3.1
Rhuddlan	13.2	10.1	-3.1	Rhymney Valley	7.8	3.8	-4.0
Wrexham Maelor	5.4	5.6	0.2	Taff-Ely	13.7	10.2	-3.5
DYFED	0.2	4.3	4.1	POWYS	-3.0	11.4	14.4
Carmarthen	-1.5	4.4	5.9	Brecknock	-4.7	7.7	12.4
Ceredigion	2.3	4.5	2.2	Montgomery	-2.4	11.8	14.2
Dinefwr	-6.8	1.4	8.2	Radnor	-0.1	18.0	18.1
Llanelli	-2.6	-2.0	0.6				
Preseli	2.5	10.4	6.9	SOUTH GLAMORGAN	2.6	-1.4	-4.0
South Pems.	10.2	9.4	-0.8				
GWENT	4.1	-0.4	-4.5	Cardiff	-0.8	-4.8	-4.0
				Vale of Glamorgan	13.6	7.9	-5.7
Blaenau Gwent	-9.4	-7.5	1.9	WEST GLAMORGAN	1.9	-1.6	-3.5
Islwyn	1.3	-2.3	-3.6				
Monmouth	18.9	11.1	-7.8	Afon	-2.2	-7.9	-5.7
Newport	6.4	-2.3	-8.7	Lliw Valley	1.1	6.1	5.0
Torfaen	8.7	2.1	-6.6	Neath	-3.2	-1.7	1.5
GWYNEDD	3.2	4.5	1.3	Swansea	5.5	-1.9	-7.4
Aberconwy	5.3	3.2	-2.1				
Arfon	1.8	-0.5	-2.3				
Dwyfor	-6.7	1.9	8.6				
Meirionnydd	-8.4	1.8	10.2				
Ynys Môn	15.6	12.7	-2.9				

Source: Computed from Table 4, pp. 24-25 in OPCS (1981a)

*Percentage change = $100 \times \frac{[(\text{population } (t+10)) - \text{population } (t)]}{\text{population } (t)}$

For example, the Glyndwr district of Clwyd belongs more properly to the Rural Wales region given its pattern of population change; the Llanelli district is part of urban-industrial South Wales; the Ynys Môn (Anglesey) and Aberconwy districts of Gwynedd should perhaps be classified with industrial and resort North Wales.

What are the broad patterns of change over the two decades - both those that persist and those that alter?

(1) The districts of the South Wales coalfield

Most of the districts of the bituminous part of the South Wales coalfield containing mining or (increasingly) ex-mining settlements and industrial towns all show population decline in both decades, although the rate of decline was slower in the 1971-81 period. The Blaenau Gwent, Rhondda, Cynon Valley, Afan and Neath Valley districts fall in this group, and the Islwyn district of Gwent can be added for the second period. The economic base of the districts has shown sustained declines : the closure and amalgamation of collieries has continued; the steel plant at Ebbw Vale has closed; the manufacturing concerns of the area (e.g. Hoover Ltd. at Merthyr Tydfil) have suffered in the current depression. In the period 1966-71 all these districts suffered overall net migration losses, losses of young people (15-29) and older persons (55+) (see Edwards and Wilson (1979)). Quite close in population change pattern to these South Wales districts is the district of Arfon in Gwynedd. Arfon contains three of the four principal slate quarries of North Wales (Penrhyn, Dinowric, and Nantlle) and employment in these has continued to decrease.

(2) The South Wales cities

The largest coastal towns in South Wales - Llanelli, Cardiff, Newport, Swansea - have also suffered decline with all four showing population losses in the 1971-81 decade, and the first two also exhibiting loss in the 1961-71 period. This change is in some measure due to a loss of economic base, but in greater part probably due to the sub-urban decentralization of employment, residences and people, identified in detail for the whole of Britain in the Urban Change Project (Department of the Environment, 1975).

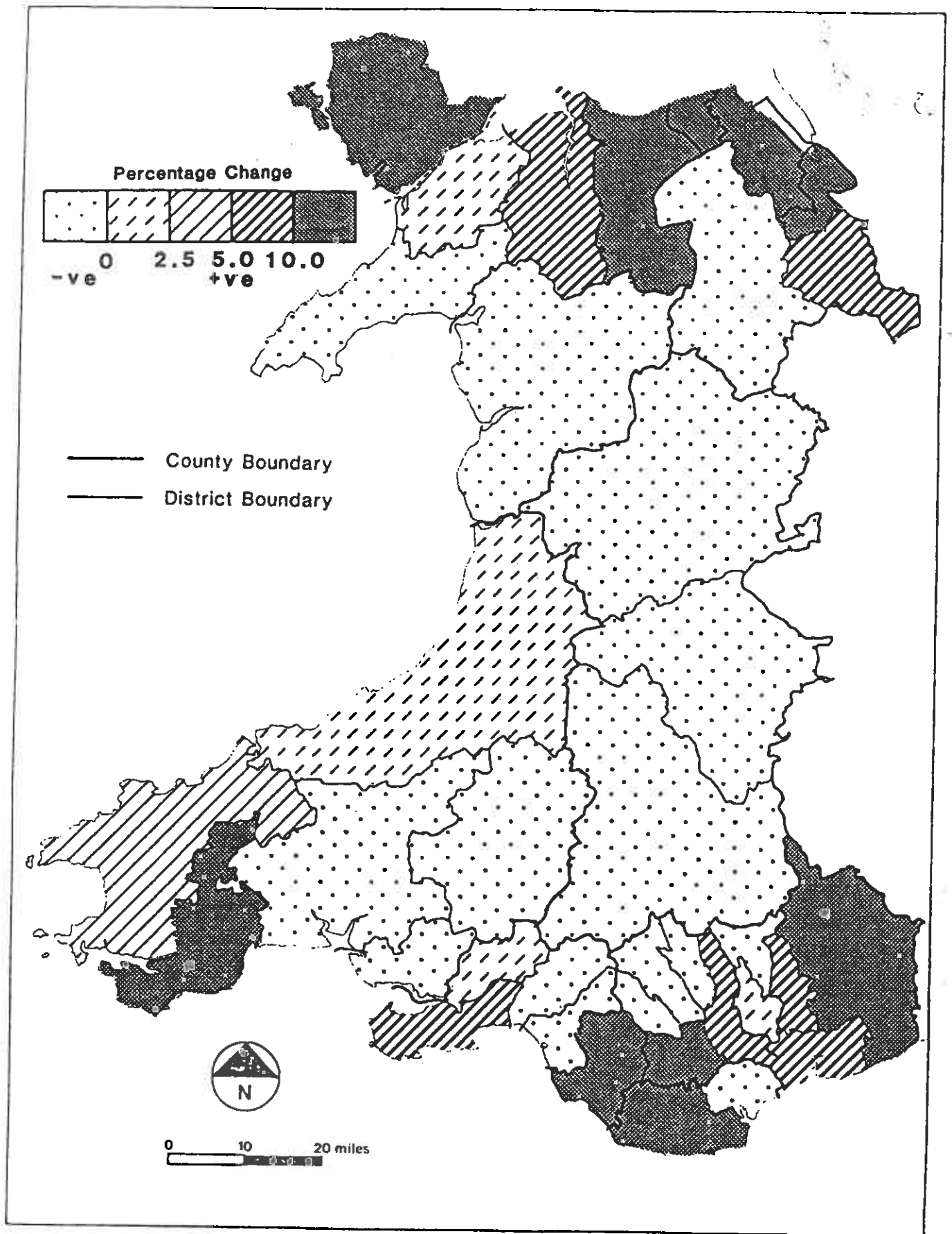


Figure 5. Percentage population change 1961-1971

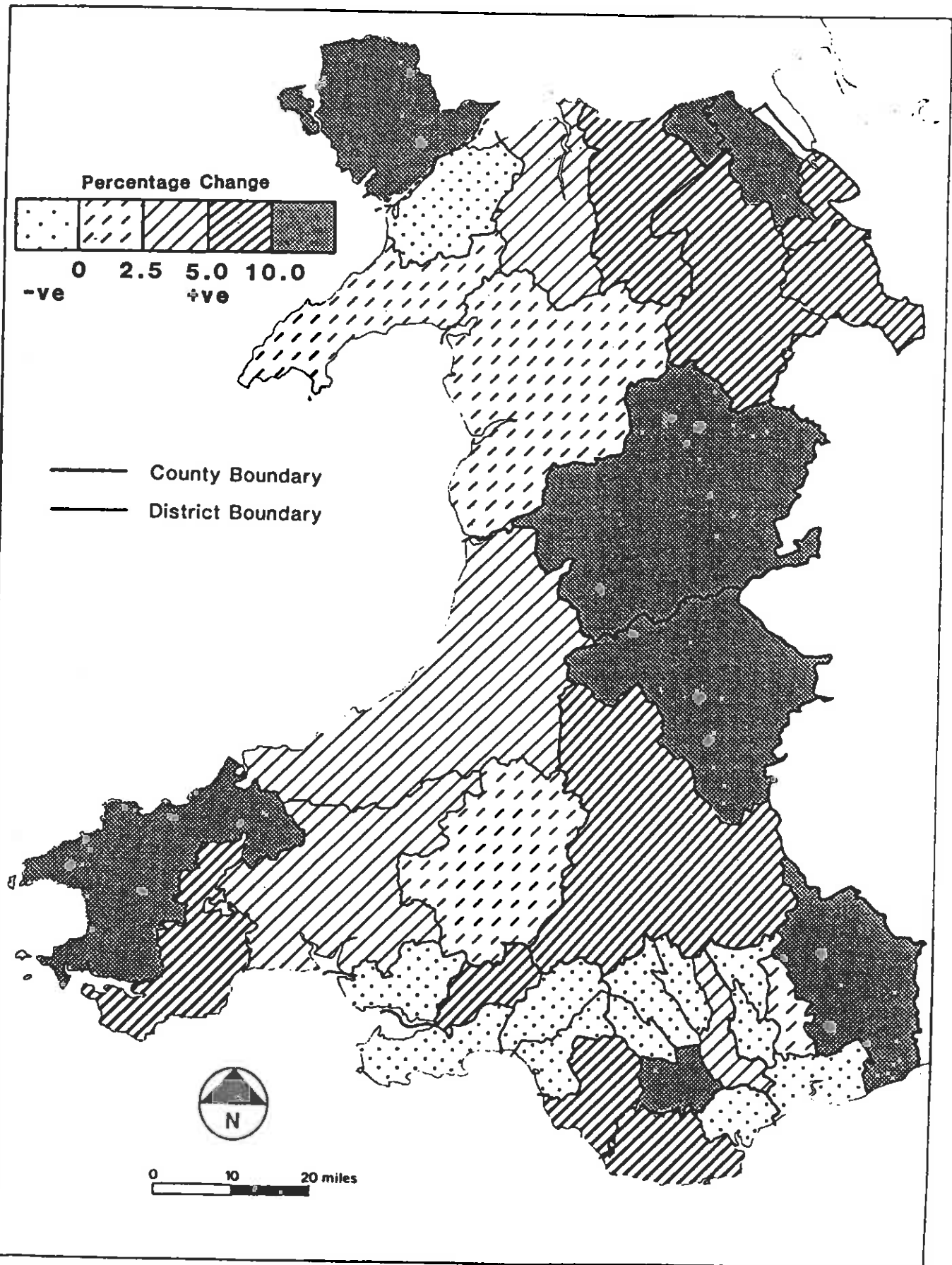


Figure 6. Percentage population change 1971-1981

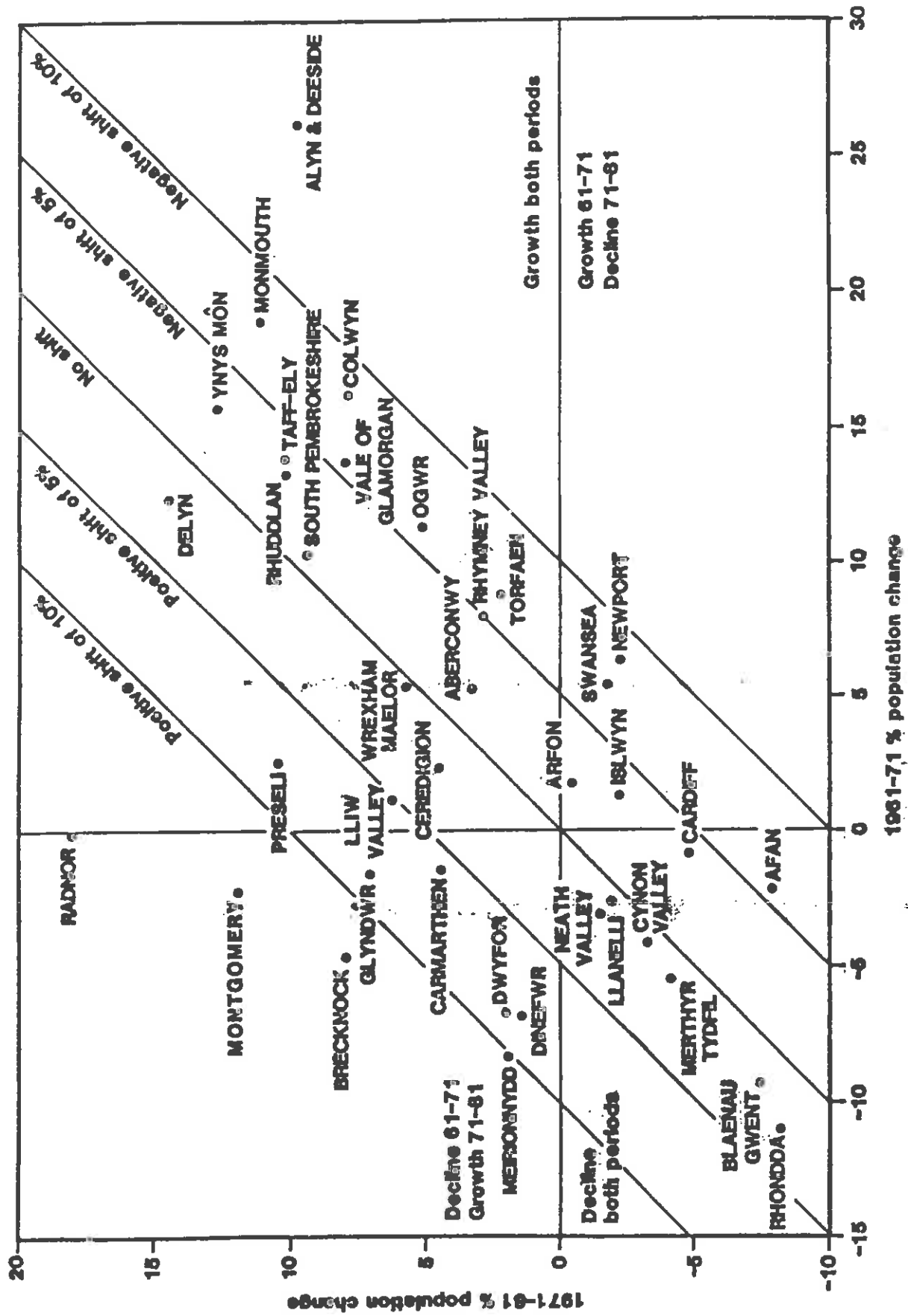


Figure 2. A comparison of 1961-71 & 1971-81 population changes

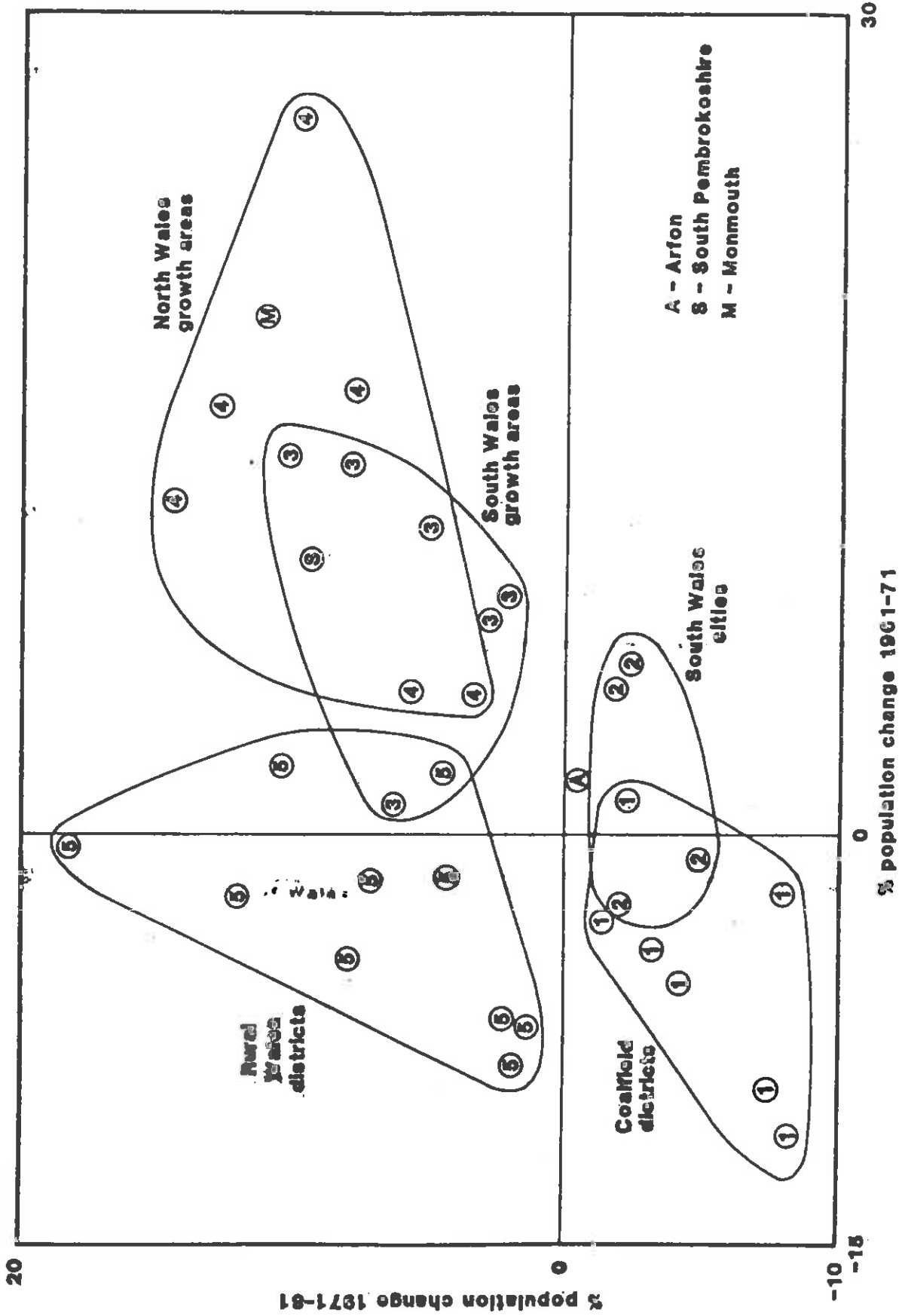


Figure 8. A classification of districts

(3) The South Wales growth districts

Thus, many districts adjacent to the principal urban areas show population gains over both decades - Lliw Valley, north of Swansea; Vale of Glamorgan, Taff-Ely and Rhymney Valley around Cardiff; and Torfaen north of Newport, in this latter case due to the location of nationally directly growth at Cwmbran newtown. These areas all gained by migration in the 1966-71 period (Edwards and Wilson, 1979), particularly at the young working ages (15-29 years) (see Map 4 in Edwards and Wilson, 1979).

The one major growth area in South Wales not associated with "suburban expansion" is Ogwr district with Bridgend as its principal focus. New industry has been attracted, in part with government financial aid, to industrial estates around Bridgend, the most notable being an engine manufacturing plant for the Ford Motor Company. Bridgend has thus formed a new growth point in the Welsh economy and hence population map.

(4) The North Wales growth districts

Also gaining population in both decades were the North Wales districts of Wrexham Maelor, Alyn and Deeside, Delyn, Rhuddlan, Ynys Môn, Colwyn and Aber Conwy. The migration gains in 1966-71 were over all age ranges in the Clwyd districts indicating that migration for employment reasons and retirement reasons were both important. The Gwynedd districts gained principally through retirement migration and suffered net losses of younger persons (Edwards and Wilson, 1979). Industrial growth on Deeside was important in the 1960's and early 1970's. Tourism grew through most of the period. In all these respects, growth on the North Wales coast could be regarded as a "spill-over" from the North West region : Clwyd in 1966-71 recorded a net in-migration rate of 44 per 1000; the other counties of Wales recorded rate of between 5 and -20 per 1000 (Edwards and Wilson, 1979, Table 8, p.8).

A district similar to those in this North Wales group is South Pembrokeshire, which benefitted both from growth in the tourism and from growth in oil refining and associated chemicals along Milford Haven.

(5) The districts of rural Wales

The final set of districts that can be distinguished are those having low or negative growth of population during the 1961-71 decade, but which have experienced positive growth in the 1971-81 period. They have all experienced positive shifts (increases in the rate of growth) between decades, with one exception, above 5 per cent. These districts are Radnor, Montgomery, and Brecknock in Powys, Preseli; Dinefwr, Carmarthen and Ceredigion in Dyfed; Meirionnydd and Dwyfor in Gwynedd, and Glyndŵr in Clwyd. In fact, these districts stand out on the national map of shifts in population change (Map 2 in Census Division OPCS, 1981).

5. The rural revival

Geographers in North America and in Europe have devoted a good deal of attention in the recent past to the reversal of population decline in rural areas. Long (1981) provides a summary of the United States picture. The Census Division of OPCS (1981) has summarized the pattern of population change in England and Wales by type of district. Table 7 rearranges the source statistics used in their analysis.

Some observers have suggested that the rural revival is a result merely of further extension of the commuting fields of large cities, a continuation of the long observed deconcentration of urban population densities (see Rees, 1971). Table 7 suggests that in England and Wales this may have been the case in the 1961-71 decade when the category of district labelled "other urban, mixed urban-rural and more accessible rural districts" recorded gains of circa 22 per cent. However, "remoter, largely rural districts" recorded gains of 9.7 per cent in the 1961-71 period, and increased this to 10.3 per cent in the 1971-81 decade, whereas the increase rates for the less rural more accessible districts fell back to 6.7-8.8 per cent. These figures clearly imply a population movement to remoter, rural areas, including those in Wales, though confirmation will have to await the construction of associated components of growth tables and the publication of the Census 1981 migration tables.

Table 7. Population change for different types of district

Types of district	1971-81 % change	1961-71 % change
Inner London boroughs	-17.7	-13.2
The principal cities*	-10.0	-8.4
Large cities (>175,000)	-5.1	-1.4
Outer London boroughs	-5.0	-1.8
Smaller cities	-3.2	2.2
Other metropolitan districts	-2.0	5.5
Industrial districts (a)**	1.3	3.7
Resort and seaside retirement districts	4.9	12.2
Industrial districts (b)***	5.0	12.1
Other urban, mixed urban-rural and more accessible rural districts		
- in South East	6.7	22.1
- Outside South East	8.8	21.9
Remoter, largely rural, districts	10.3	9.7
Districts that include new towns	15.1	21.8

Source: Rearranged from Table B, p. 5 in OPCS (1981a)

*Birmingham, Leeds, Liverpool, Manchester, Newcastle upon Tyne and Sheffield

**Wales and three northern regions of England

***Rest of England

A second suggestion that has been made is that the shifts of population to rural areas have been mainly to the urban centres in these areas rather than to the rural countryside. Although the classification of urban and rural district (pre-1974 definitions) is not ideal in British census reports, the figures assembled in OPCS (1981b) and arranged in Table 8 for Welsh counties show that even in largely rural counties (Dyfed, Gwynedd and Powys) the rural areas grew substantially faster in 1971-81 than in the previous decade, and grew much faster than urban areas in 1971-81 in Dyfed and Gwynedd. The situation in Powys, where urban growth, 1971-1981, was some 19.2 per cent and rural growth only 7.1 per cent, is a result of the location of a newtown in Montgomery district. Table 9 arranges the population figures so as to separate out Newtown Newtown (!) from the other urban areas of Montgomery district. Some 60 per cent of the 1971-81 population growth of Montgomery district is due to the newtown expansion, 26 per cent to the growth of the rural population and 14 per cent to the growth of the other urban areas' population. Clearly, the rural revival has a substantial rural component in the Welsh rural counties. The extent to which this rural revival is dependent on a return to the land, on the establishment of industrial enterprises in rural areas or on retirement migration must, however, await publication of the county and migration reports of the 1981 Census.

6. The future

What will the population map of Wales look like in say 40 years time? According to national projections (OPCS, 1981d) the population of Wales is likely to grow, assuming fertility recovers in the 1980s to replacement level, to 3.061 millions by 2016, when it will make up 5.13% of the U.K. population. This projection assumes gains to Wales from the rest of the U.K. through migration. Since these gains have only appeared in the last decade against a background of falling migration levels and of severe and sustained recession since 1979, they may well prove to be ephemeral.

What of the spatial shifts over the past two decades that we have identified? There are good reasons for supposing that population deconcentration will continue. Improved telecommunications and road transport will make transactions with the global economy easier in

Table 8. The growth of urban and rural populations, counties of Wales, 1961-71 and 1971-81

County	Percentage population change		Total
	Towns	Rural areas	
<u>1961-71</u>			
Clwyd	16.1	6.5	11.3
Dyfed	-0.3	0.6	0.2
Gwent	1.7	21.8	4.1
Gwynedd	4.3	1.9	3.2
Mid-Glamorgan	-3.5	31.7	2.3
Powys	4.7	-6.8	-3.0
South Glamorgan	0.2	35.6	2.6
West Glamorgan	1.5	3.1	1.9
WALES	1.5	7.8	3.3
<u>1971-81</u>			
Clwyd	7.7	10.0	8.8
Dyfed	-2.0	8.8	4.3
Gwent	-2.7	13.2	-0.4
Gwynedd	0.2	9.4	4.5
Mid-Glamorgan	-2.5	14.7	1.2
Powys	19.2	7.1	11.4
South Glamorgan	-3.6	19.7	-1.4
West Glamorgan	-3.3	4.2	-1.6
WALES	-1.3	10.2	2.2

Source: Table 5 in OPCS (1981b)

Town's = county boroughs, urban districts, and municipal boroughs (pre-1974 definitions)

Rural areas = rural districts

Table 9. Population change in Montgomery district, 1961-71
and 1971-81

Type of area	Populations			Change	
	1961	1971	1981	1961-71	1971-81
Towns*	11,431	11,950	12,664	519	714
Newtown Newtown	5,021	5,616	8,660	595	3,044
Rural areas	27,713	25,553	26,877	-1,114	1,324
Total	44,165	43,119	48,201	-1,046	5,082

Type of area	Percentage change		Shift
	1961-71	1971-81	
Towns*	4.5	6.0	1.5
Newtown Newtown	11.9	54.2	42.3
Rural areas	-7.8	5.2	13.0
Total	-2.4	11.8	14.2

*Towns = pre-1974 defined urban districts excluding area designated as Newtown Newtown

= Llanfyllin, Welshpool, Montgomery, part of Newtown and Llanlleuchaiarn, Llanidloes.

Source: Tables 5 and 6 in OPCS (1981b).

remote rural areas, and their environments will continue to prove attractive. But many of the shifts of the past two decades are dependent on a growing and relatively healthy economy. Will the retirement to a coastal resort continue to be feasible for persons in the future? If the number of newly created jobs continues to shrink, how will employment growth in "suburban" South Wales or on the North Wales coast be sustained in a Britain where only the southern regions of England maintain their current prosperity?

References

OPCS = Office of Population Censuses and Surveys

- Carter, H. (1957) Population. Chapter IX-I in Bowen, E. (ed.) *Wales*. Methuen, London.
- Census Division OPCS (1981) The first results of the 1981 Census of England and Wales. *Population Trends* 25, 21-29.
- Department of the Environment (1975) British cities : urban population and employment trends, 1951-1971. Research Report 10, Department of the Environment, London.
- Edwards, S.L. and Wilson, B.J.M. (1979) Migration into, out of and within Wales in the 1966-71 period/Mudo i Gymru, o Gymru ac oddi mewn i Gymru yu ystod y cyfnod 1966-71. Welsh Office Occasional Paper No.4/Papur Achlyswol Rhif 4 y Swyddfa Gymreig.
- Long, J.R. (1981) *Population deconcentration in the United States*, Special Demographic Analyses - CDS 81-1, Bureau of the Census, U.S. Department of Commerce, Washington, D.C.
- Ogilvy, A.A. (1982) Population migration between the regions of Great Britain, 1971-9. *Regional Studies*, 16, 65-73.
- OPCS (1978) *Census 1971. Great Britain. Migration Tables (10% Sample)*. HMSO, London.
- OPCS (1981a) *Census 1981. Preliminary report. England and Wales. Series CEN 81 PR (1)*. HMSO, London.
- OPCS (1981b) *Census 1981. Preliminary report for towns, urban and rural population. England and Wales. Series CEN 81 PPR (2)*. HMSO, London.
- OPCS (1981c) *Population trends 26. Winter 1981*. HMSO, London.
- OPCS (1981d) *Population projections No.11. 1979-2016. Series PP2. No.11*. HMSO, London.
- Rees, P.H. (1970) The urban envelope patterns and dynamics of population density. In Berry, B.J.L. and Horton, F.E. (ed.) *Geographic perspectives on urban systems*. Prentice Hall, Englewood Cliffs, N.J.
- Rees, P.H. (1982) Revision of "Migration and settlement in the United Kingdom". Paper in preparation.
- Thomas, B. (ed.) (1962) *The Welsh economy - studies in expansion*. The University of Wales Press, Cardiff.