Influences in Africa - Part Four

By Fr. Bill Turnbull W.F.

This is the fourth part of a series of articles entitled 'Influences in Africa'. This section is a background to some of Africa's water resources and how they are effected by the climate and various problems found within the continent. We have a global look at the present situation and take a glimpse of what the future may hold, in this respect, for the people of Africa.

The first time I went to Africa was as a White Father student just over twenty years ago, from 1974 to 1976, and I returned to the UK in the 'drought' of 1976. I certainly was surprised to see how parched the countryside was but I had become accustomed to a lack of rain. The contrast between the dry and rainy seasons in Malawi, and having to rely on a shallow bore hole as our main water supply, made me a little cynical about what was happening at home.

Once again we are in a similar situation. Since the summer of 1995 the UK has seen a repeat of a country-wide 'drought' and we are continually reminded to take care of our water resources. The lack of rain, and various problems with the water companies, has depleted our reserves. The last two years have been the driest for two hundred years and the ground water * levels in some places are as low as they were in 1976. The situation is so severe in some areas that they are on a permanent 'stand-by' and one water company is even considering investing in desalination plants. At present some of our rivers are being bled almost dry to answer the increasing needs.

World Situation

At a quick glance the world would appear to have abundant water resources. The facts and figures which give a picture of the water situation are quite staggering, but they hide a basic truth which faces us all: our water resources are not limitless. There are about 1,400 million cubic kilometres of water on earth and all living things, including humans, share about 0.007% of it. Around 2.5% of this is fresh water, rather than salty, and 80% of it is frozen in glaciers and the polar ice caps. 95% of the remaining water is stored in various underground sources.

Our water resources are continually being replenished by rainfall. Overall each year enough rain falls to cover every country in the world to a depth of two and a half feet in water. This sounds marvellous and, in theory, should provide us with enough water for the needs of twice the world's present population - but there are several catches. Of this annual rainfall two-thirds evaporates; two-thirds of what remains runs away in floods and, finally, not all of the rain falls where the people are and where it is needed.

When the above facts are put together with the use of water, which has increased six fold this century, especially in agriculture and industry, then it is obvious that water resources are a global problem. The United Nations (UN) estimate that over the last fifty years the amount of water available has dropped by two-thirds in Asia, and by three-quarters in Africa and South America. This means that about two billion people, in eighty countries, suffer from a serious water shortage.

Dirty Water

One of the greatest problems which the world faces is that about 20% of its population, 1.4 billion people, don't have access to safe drinking water. The UN estimates that this figure rises to 40% of people in some cities. This means that they end up taking drinking water from polluted rivers and ponds. When there is a lack of clean water then there is often no basic sanitation - this affects about two billion people world wide - which can lead to a vicious circle of various types of waste getting into the water sources.

We have touched on the health problems associated with not having access to clean water in other articles - *such as 'Health at all costs!', issue no. 314, Feb.-March, 1994.* The UN estimates that dirty water causes 80% of diseases in developing countries and, indirectly, results in the deaths of ten million people each year. On a human and economic level it also means an annual loss of a tenth of an individual's productive time.

The effects of bad water sources are probably worse among children. World wide dirty water causes the death of 25,000 children a day, each year about four million children, under-five years of age, die from simple diarrhoea. Water borne bacteria and viruses cause repeated stomach upsets which lead to children becoming malnourished and weakened and so susceptible to other illnesses. In some parts of rural Africa it is common for children to be ill in this way for 140 days of each year. Those who survive may be damaged and suffer from stunting of their mental and physical growth. An added problem for very young children is when they are fed on powdered milk mixed with dirty water.

Climate and Ecology

In many parts of the world our water resources are being depleted and are not being replaced at a sufficient rate. Demand for clean water is always on the increase and we have to find a way to allow everyone access to such a basic essential for daily life.

'Global warming' is playing its part in the lack of rainfall and it is expected to aggravate the crisis in coming years. There is a global change in climate which is caused by the pollution of the atmosphere. This adds to the 'warming' and causes temperatures to rise everywhere, which leads to countries becoming hotter and there being less water in the form of rainfall and surface water. As a result, what water there is tends to get dirty and germs build up causing diseases. Because there is less water the pollutants within it become more concentrated and therefore do more damage.

Deforestation adds another angle to the problem, especially the 'slash and burn' method of farming which is practiced in many developing countries. When trees are gradually removed the whole ecosystem changes: rain is no longer attracted to the bare area; the trees are not there to trap water and allow it to trickle down to springs and underground sources; soil erosion sets in as the top soil is washed away. A vicious circle

* see the footnotes at the end of the article on page 12

Bath time for the boys down at the river - Burkina Faso

begins - deforestation means less rain, less rain means fewer trees and so on. Several examples of the acceleration of the process, such as in Malawi, Tanzania and Zaire, can be seen in areas which have had a sudden influx of refugees from Africa's various conflicts. Such circumstances, on top of a usually fragile ecology, hasten the deforestation and the subsequent change in landscape, climate and rainfall. Once the indigenous foliage has been destroyed it is virtually impossible to replace it.

In a continent the size of Africa there are vast differences in climate and vegetation - *see map on page 16*. The problem of desertification has been debated for many years and some experts even question that there is such a problem in Africa. Despite that it has to be admitted that there are many areas of the continent, such as the Sahel region, which are more susceptible than others to the gradual encroaching desert. In general Africa's climatic zones and vegetation are fairly uniform due to the continents position in the tropics, the oceans and the lack of mountain chains. The zones may be summarised as follows:

1 - Tropical rain forest zone: this is found in the middle of the continent and along the eastern coast of Madagascar. The average annual temperature is about 26.7° C (80° F), and the average annual rainfall is above 50 inches (ins.) (1,270 mm.). The vegetation is a floor covering of shrubs, ferns, and mosses, with a canopy of various types of evergreen and hardwood trees.

2 - Savanna zone: there are roughly three types of Savanna climate and vegetation zones around the central tropical one:

a - The Tropical Savanna climate zone, covering about a fifth of the continent, has a wet season in the summer months and a dry season during the winter. The total annual rainfall varies from 20 ins. (550 mm.) to more than 60 ins. (1,550 mm.).

b - The Savanna Woodland zone has an annual rainfall of 35 ins. (890 mm.) to 55 ins. (1,400 mm.). The vegetation consists of grass and shrubs amongst which grow deciduous and leguminous trees.

c - The Grassland Savanna zone has an annual rainfall of about 20 ins. (500 mm.) to 35 ins. (890 mm.) and is covered in low grasses, shrubs and small deciduous trees.

3 - Steppe/thornbush climate zone: further away from the equator the climate becomes drier with an average annual rainfall of between 10 ins. (250 mm.) and 20 ins. (500 mm.) which falls in a clearly defined rainy season. The vegetation is of a thinner grass covering with scattered succulent or semi-succulent trees.

4 - Semi-Arid/sub-desert scrub zone: has an annual rainfall of 5 ins. (130 mm.) to 12 ins. (300 mm.), is covered with grasses and low shrubs and runs into the desert areas of Africa.

5 - Arid/Desert climatic zone: these areas are found in the Sahara Desert, the Horn of Africa, the Kalahari Desert and Namib Desert - *see the desert table, on pages 16 and 17*. There is usually no vegetation in these areas.

6 - Mediterranean climate zones: these areas are on the northern coast of the continent and in the southwest. They have mild, wet winters and warm, dry summers.

7 - Mountain Forest climatic zone: these are found in the highlands of eastern Africa, and in mountainous and plateau parts of west and southern Africa. The rainfall is just less than that of the tropical rain forests and it is distributed throughout the year. The vegetation is made up of shrubs, hardwood trees, and conifers.

Africa's Rivers and Lakes

As with the global picture, at first glance, it would appear that Africa has plenty of surface water except in the desert and Sahel areas. The continent is largely supplied and drained by a huge web of rivers and lakes but the apparent abundance of surface water is deceptive. Certainly the rivers and lakes are there and they cover vast areas compared to those of Western Europe, but they are not always full and their water is not always potable.

Africa is a continent which is controlled and sculptured by its various climates. Many of the rivers and lakes are seasonal and are only filled with the rains of the rainy season. More and more rains fail to fall and, especially, the smaller rivers and pools remain dry for years. As a result the surface water is not replenished and the underground aquifers and water table diminish. In deforested areas there is the added danger of rain water just running off and taking much of the top soil with it. This increases the soil erosion and deprives the local area of vital minerals and nutrients which are necessary for the fertility of the area and for the support of a river's life. In many cases the water just rushes to the sea, or whatever outlet it goes, without benefiting any of the people where it falls.

The continent of Africa is drained by six major river networks all of which, except for that of the Lake Chad basin, find their way to the sea - *see the maps and tables on pages 16 and 17*. The various networks are as follows:

1 - The first is the Nile River which is the world's longest river and drains an area of 1,335,000 sq. mls. (3,458,000 sq. kms.) in the north-east of Africa and flows into the Mediterranean Sea. More than 2,000 miles (3,200 kms.) of the river are navigable. The complete length of the Nile is formed by the joining of the Blue Nile, 850 miles (1,370 kms.) in length, with its source at Lake Tana in Ethiopia, and the White Nile, which begins near Malakal, Sudan, and is about 500 miles (805 kms.) long - the name sometimes refers to the entire branch of the Nile that extends to the tributaries of Lake Victoria.

2 - The Congo/Zaire River drains most of the central part of Africa - which, with its tributaries, is an area of 1.6 million sq. mls. (4.1 million sq. kms.). It starts in Zambia, its main sources being the Lualaba and Luvua Rivers, and flows north, west, and south into the Atlantic Ocean where it discharges 1.2 million cu. ft. (34,000 cu. m.) of water a second at high water.

3 - The River Niger begins in the Fouta Djallon highlands of Guinea and flows north and east, draining much of western Africa on its way, before entering the Gulf of Guinea and the Atlantic Ocean. The Niger Delta covers 14,000 sq. mls. (36,300 sq. kms.) and has an estuary coastline of 120 miles (190 kms.).

4 - The Zambezi River starts its journey in Zambia and flows south and east entering the Indian Ocean in southern Mozambique. It drains an area of 502,000 sq. mls. (1,300,000 sq. kms.). Its main tributaries include the Chobe, Kabompo, Kafue, Lungwebungu and Shire rivers. Along its course are the Victoria Falls, Kariba and Cabora Bassa dams and lakes.

Irrigating the land with an imaginative contraption - Niger

5 - The Orange River drains southern Africa. It rises as the Vaal River in the Drakensberg Mountains and flows west into the Atlantic Ocean.
6 - Lake Chad has an average depth of about 4 ft. (1.2 m.) and is fed by the rivers in the area - *see below*.

There is also a series of lakes in the Great Rift Valley of eastern Africa. These lakes include the following: Lakes Tanganyika, Albert (Mobutu), Edward, Turkana (Rudolf), Kivu, Rukwa, Mweru, and Malawi (Nyasa).

Many of the rivers are fast flowing with rapids and high waterfalls, others are slow, wide and meandering. Together with their susceptibility to flooding and dependence on seasonal rainfall it makes it very difficult to harness them. It has been estimated that Africa has about 40% of the world's total hydroelectric potential. So far little of this has been utilised and where it has it is in massive projects which have brought their own additional problems.

The inconsistency of some of Africa's surface water is typified by Lake Chad, which is the fourth largest lake on the continent and is situated in west-central Africa. The Lake was probably an ancient sea which has divided into two basins, the northern and southern, that are separated by the 'Great Barrier' ridge. Because of this division the waters of each half do not circulate and the northern basin dries up completely on occasions. The level of the overall Lake also rises and falls according to the season. This means that its surface area can be as much as 10,000 sq. mls. (25,900 sq. kms.) in the rainy season, and as little as 4,000 sq. mls. (10,360 sq. kms.) in the dry season. The depth of the Lake also varies a great deal - from 13 ft. (4 m.) to 23 ft. (7 m.) deep in the northern basin and from 10 (3 m.) to 16 ft. (5 m.) deep in the southern basin.

Lake Chad is fed by several of West Africa's rivers but the major tributaries are the Logone, Komadugu Yobe and the Shari (Chari) rivers. It has no outlet but loses its water through underground seepage and evaporation. The latter is so intense that experts have speculated that the Lake may eventually disappear completely. The shores and numerous islands of the eastern shore are inhabited and the people depend on the Lake flooding for cultivation.

Water Conflicts

It has been said that lack of water is a problem which will spark off conflicts in many parts of the world in the next millennium - *see the table opposite for the present situation*. Possibly one of the first flash points will be the Middle East. The World Bank estimates that between 1960 and 2025 the supply per person will drop fivefold, eventually leading to a cause for conflict. This possible scenario is not fiction and it is not only something for the future, having already begun in to some degree in parts of Africa. It would appear that a common factor in most of these disputes is when one country wishes to harness a river's potential, for example by building a dam, which causes knock on effects which are felt in neighbouring states.

This is the case in north east Africa where there is tension between the countries which share the River Nile and its tributaries. The Aswan High Dam was completed in 1968 and since then has been used to supply electricity and water for irrigation. In recent years Egypt has taken a strong line with its neighbours for drawing too much water from the Nile upstream and so depriving the Dam of it's life blood. Seven countries share the Nile and its tributaries and also need the water. It is not easy to see how such a dispute can be resolved especially when some of the countries involved are a lot poorer than Egypt and cannot withstand the threats of military action - *see the article 'Crisis Over the Nile Waters' on pages 24 and 25.*

A similar situation is arising in the opposite corner of the continent in a dispute between

Country	[1] Renewable source per capita	[2] Annual freshwater withdrawl, 1970-94 Total (cu.km.)	% of total resources	per capita (cu.m.) Domestic	Other	[3] % Access to safe water	sani-tation	[4] Irrigated land as % of arable
Algeria	0.7	3.0	20.3	35	125	79	77	7.6
Angola	16.0	-	-	-	-	32	16	2.5
Benin	5.3	0.1	0.4	7	19	50	20	0.7
Botswana	0.8	0.1	0.6	5	94	93	55	0.5
Burkina Faso	2.9	0.2	0.5	5	13	78	18	0.6
Burundi	0.6	0.1	2.8	7	13	70	51	1.2
Cameroon	17.0	0.4	0.1	17	20	50	50	0.4
Cape Verde	-	-	-	-	-	-	-	7.0
C. African Rep.	44.4	0.1	0.0	5	20	18	45	-
Chad	6.6	0.2	0.4	6	29	24	-	0.4
Comoros	-	-	-	-	-	-	-	-
Congo	76.4	0.0	0.0	12	7	38	-	0.7
Djibouti	0.6	-	-	-	-	-	-	-
Egypt	0.1	56.4	97.1	67	889	80	50	-
Equat. Guinea	81.3	-	-	-	-	-	-	-
Eritrea/Ethiopia	2.1	2.2	2.0	6	45	25	19	1.6
Gabon	132.6	0.1	0.0	41	16	68	-	1.4
Gambia	3.3	0.0	0.3	2	27	48	38	8.3
Ghana	3.3	0.3	0.6	12	23	56	42	0.2
Guinea	37.0	0.7	0.3	14	126	55	21	15.2
Guinea-Bissau	30.8	0.0	0.0	3	8	53	21	5.7
Ivory Coast	5.7	0.7	0.9	15	52	72	54	2.8
Kenya	0.6	1.1	3.6	14	37	53	77	1.7
Lesotho	2.2	0.1	1.0	7	24	52	28	0.9
Liberia	84.3	-	-	-	-	46	30	1.5
Libya	0.1	-	-	-	-	97	98	25.9
Madagascar	3.1	16.3	4.8	16	1,568	29	3	42.1
Malawi	0.9	0.2	0.9	7	13	47	53	1.7
Mali	6.3	1.4	1.4	3	159	37	31	3.1
Mauritania	0.2	0.7	6.4	59	436	66	-	23.9
Mauritius	2.0	0.4	16.4	66	344	99	99	17.0
Morocco	1.1	10.9	36.2	23	404	55	41	13.6
Mozambique	3.9	0.8	0.4	13	42	33	20	4.0
Namibia	5.9	0.1	0.3	7	103	57	34	0.9
Niger	1.7	0.3	0.9	9	33	54	15	1.8
Nigeria	2.3	3.6	1.3	13	28	40	35	3.2
Reunion	-	-	-	-	-	-	-	-
Rwanda	0.8	0.2	2.4	6	18	66	58	0.5
São Tomé/Prin.	-	-	-	-	-	-	-	-
Senegal	3.0	1.4	3.5	10	191	52	58	3.0
Seychelles	-	-	-	-	-	-	-	-
Sierra Leone	36.6	0.4	0.2	7	92	34	11	6.0
Somalia	1.3	-	-	-	-	37	18	18.0
South Africa	1.3	14.7	29.3	47	348	70	-	10.3
Sudan	1.1	-	-	-	-	60	22	15.1
Swaziland	8.8	-	-	-	-	-	-	35.8
Tanzania	2.7	0.5	0.5	7	28	50	64	5.0
Togo	3.1	0.1	0.8	17	11	63	23	0.3
Tunisia	0.5	2.3	60.5	41	276	99	96	12.9
Uganda	3.5	0.2	0.3	7	14	34	57	0.2
Western Sahara	-	-	-	-	-	-	-	-
Zaire	25.6	-	-	-	-	27	23	0.1
Zambia	11.1	0.4	0.3	54	32	50	37	0.9
Zimbabwe	2.2	1.2	6.1	19	117	77	66	7.0

1 = 'Human Development Report 1996' (UNDP): internal renewable water resources in 1,000m^3 for 1992.
2 = 'World Development Report 1996' (World Bank): refers to any year between 1970-94.
3 = 'Human Development Report 1996' (UNDP): % of population with access, figures for 1990-95.
4 = 'Human Development Report 1996' (UNDP): irrigated land as a % of arable land area in 1993.

Angola, Botswana and Namibia over extracting water from the Okavango River system. Both Botswana and Namibia have been fighting over an island in the Chobe River, along the Caprivi Strip. Troops have been sent in and neighbouring heads of state have tried to mediate between the two while the problem has been put before the ICJ for adjudication over the right to draw water from the river.

Namibia's water resources are very low and the country is continually threatened with drought due to the added lack of rainfall which has been below average for the last ten years. It badly needs to develop other sources of water. Namibia wants to pump twenty million cubic metres of water a year, 700 litres a second, from the Okavango River system and to carry it by pipeline to Windhoek where it is needed. The project is estimated to cost a billion Rand and already the Chinese, in return for offshore fishing rights, have pledged to finance and construct it. Other countries and banks have also shown an interest in the project.

Despite Namibia's good record for recycling water in the mining industry the demand is still increasing due to urbanisation, industrial development and farming practices. At present about half of the country's water is ground water and surface water is used for irrigation schemes and urban use. The central part of Namibia is the most economically productive area of the country and is the worst hit by the drought. The dams which supply Windhoek were only 9% full earlier this year.

There are already internationally agreed amounts of water which Namibia draws from the Cunene and Orange rivers, but it looks as if Namibia is going to act unilaterally without reference to others over the new plan. OKACOM is a body in which Botswana, Angola and Namibia can discuss and agree on their water rights in the area and even this is being ignored. Experts say only half of Namibia's groundwater resources are being used at present and that there are reserves in the north of Tsumeb as an alternative source to the Okavango.

The Okavango Delta is in northern Botswana and is fed by the Okavango River. The river rises in southern Angola and runs along its border with Namibia down into Botswana. Here, in the Okavango Delta, the Kalahari Desert is turned into the world's largest wetlands covering 18,000 sq. kms. It forms a major ecosystem which supports a vast range of animals and plants and a population of 100,000 people. The Delta and all its inhabitants cannot survive without the water and it is already drying up due to years of drought and the water tables are at their lowest level for forty-six years.

The outcome of this dispute is unsure. What is certain is that if the Namibian plan goes ahead the area could turn into a centre of armed conflict and an ecological disaster. An environmental study will now look at the impact of drawing such amounts of water from the rivers but it is feared that the Namibian Parliament may authorise construction to begin before it is completed.

Cross-Border Co-operation

Even when there is co-operation between neighbouring countries all sorts of problems can arise. The Lesotho Highlands Water Project began in 1986 and will take decades to complete. The original project was estimated to cost $8bn. and to be built in five phases - comprising of six large dams and two HEP plants to be completed by 2025. The basic idea behind the project is to produce electricity and also for Lesotho to sell three billion litres of water a day to South Africa for industrial use which would earn $55m. a year.

The Katse dam, the highest in Africa, and 'phase 1a' of the project have been completed but, despite this, the future whole venture is in the balance. The World Bank, who signed the original agreement with Lesotho and the former South African government, is threatening to pull out. It will decide if it will finance the second phase by October after seeing the completion of phases 1a and 1b. All other major funders have also not committed themselves beyond this point.

Further complications have been caused by other factors: South Africa objects to many provisions in the original treaty and in 1996 there were strikes and six hundred men were laid off. Some of the workers even joined local villagers who had protested against the effects the dam's construction will have on their land and livelihoods. A 'Special Fund', of £55m. was set up to help the 25,000 people, 1,750 dispossessed families, who have been unsettled - lost homes, land or grazing areas - but little of the funds have reached them so far.

South Africa certainly needs the water for present usage and for further industrial development. In fact it can use more water than all that would be provided by the five phases of the scheme. The demand of Greater Johannesburg alone is expected to double in the next thirty years. So far South Africa has contributed more than anyone else, almost half the cost, with other funds from the World Bank, the EU and Britain.

Even if all the five phases of the project are completed there will still be problems to sort out: Lesotho has to find a way of getting the royalties due for the water which have been agreed in previous contracts; the social and environmental conditions of the treaty have to be carried out. Lastly there is the exercise of counting the environmental and human cost of such a project: damage to the river systems; the loss of valuable farm land, mountain meadows and wetlands; the amount of water which will be diverted from Lesotho's own needs.

The Future

The 1980s were designated as the 'International Drinking Water and Sanitation Decade' and a deadline of 1990 was given to provide the entire world's population with clean water. This goal was not attained and so it has been put back to the year 2000, and this too is not expected to be reached. Despite the failure it was not a complete waste of time. It made people more aware of the problems concerning safe water and sanitation and it did improve the situation for many people. Despite that, as we have seen, the future is probably even more insecure now than in the 1980s, not just for developing countries but for the whole world.

Vast amounts of money are being invested by the UK water companies in attempts to improve supplies for their customers. This

Kariba Dam - Zimbabwe

has meant an increase in water rates since privatisation, but we have water and sanitation at our finger tips. The amount which we pay for this privilege, per household, is about twice the annual income of an African subsistence farmer. What future then for the development of similar facilities in Africa? The expense in setting up water projects or even of maintaining existing bore holes etc. is beyond the resources of most African governments. There is no possibility of private finance being forthcoming for these utilities, as in the West, as there is no profit to be had - especially in rural areas. Where investment may be possible, as we have seen, is in the larger water projects for industrial use or HEP. These, in some respects, may benefit the ordinary people but not to the extent that it is needed.

Despite that there have been some marvellous bi-laterally funded water projects in various parts of the continent. Work done by organisations such as WaterAid has also helped to improve the lives of people by locating and tapping local water sources. Even if a shallow well or a harnessed spring is all that is available in a village it cuts out the danger of water borne diseases and lessens the work load of girls and women - who sometimes walk four or five hours a day carrying 20kg. water containers.

When the dual problems of safe water and sanitation have been solved perhaps other water projects, such as irrigation, may be tackled. Hopefully this will be the case and Africa will not fall further behind the West in access to the necessary basics of safe drinking water at least.

FOOTNOTES

Ground water usually begins life in the form of rain or snow and seeps below the surface of the earth to form natural subterranean reservoirs. These are found in places such as the spaces between layers of rock and are usually close to the surface. This water comes to the surface to supply wells, springs, lakes, streams and rivers. 'Ground water is usually quite pure after having been filtered through porous rock, gravel, sand etc. In some cases it can become polluted by domestic and agricultural waste, such as sewage, rubbish, fertilisers and pesticides, and this gives rise to concern about the methods used to dispose of such items and to where landfill sites should be situated. It is a most important source of water for rural domestic use and is a preferred source of drinking water.

Ground water which is found at a greater depth may have been held in there for many thousands of years and so contain various minerals and may even be saline - as a result of sea water being trapped. Usually ground water does not flow as much as surface water and only does so when suitable aquifers are present and then it may travel great distances from its source. In many places it is common to extract the ground water by drilling bore holes down to the reservoirs.

An aquifer is any natural material, such as porous rocks or fractures in rock, that contains water which can be harnessed by drilling and sinking bore hoes and wells. An artesian well taps water in an aquifer and brings the ground water, under its own pressure, to the surface. The name is derived from Artois, France, where such wells were bored during the Middle Ages.

Surface water is made up of all the water which is found in rivers, streams, lakes, ponds etc. It can often be polluted by various chemicals and waste products. In general fresh water is water that contains a low concentration of dissolved mineral solids.

Sea level is basicly where the ocean meets a landmass. This level is continually changing with the tides and because of the advance and retreat of glaciers - eustatic changes.

The water table is the level in the ground below which the spaces in the soil or rock are saturated with water. It is also known as the ground water table or the waterline.

MAIN SOURCES: 'The Gala Peace Atlas', Pan Books, 1988; 'Collins Atlas of the World', 1991; Encyclopedic Atlas of the World', New Burlington Books, 1991; 'The Times Atlas of the World', BCA, 1992; 'World Reference Atlas, Dorling Kindersley, 1994; 'Philip's Great World Atlas', George Philip Ltd., 1992; 'The 1995 Grolier Multimedia Encyclopedia'; 'Compton's Interactive Encyclopedia'; 'Microsoft Encarta 96 Encyclopedia'; 'The Independent', 'The Guardian', 'West Africa'; 'New African'.

Missionary Studies in a World at War

By Fr. Patrick Boyd W.F.

A Missionary Reminiscence of Life in White Father Houses in Wartime Britain

Although the Second World War was more than a year away, the White Father Philosophy students in Autreppe (Belgium) were being made to face difficult decisions. They were alerted by a British Embassy official in Brussels that war was not very far away and that Belgium would surely become once more a battlefield. He advised the students to speak to their superiors in Autreppe with a view to their immediate transfer to Britain. Thus was the scene set for a series of new openings of houses in England which allowed for the complete White Father training, from Junior Seminary right through to priesthood, to take place in Britain.

In June, 1939, the Philosophers left Autreppe to return to England. Negotiations had been completed to open a house of Philosophy in Rossington Hall near Doncaster. But even before the outbreak of hostilities, the army requisitioned our property at Rossington. New arrangements had now to be made to house our Philosophy students. It was agreed that they should go to Kerlois in Brittany (France) which our French confreres assured was completely safe from German intentions. The Philosophers assembled at Bishops Waltham, and towards the end of November the students set out in groups of four for Kerlois - it was thought that smallness of numbers would ensure greater safety. By December 8 all the students, 30 in all, gathered together with their 60 French counterparts to begin their studies. How were they to know that France would fall to Germany in early 1940 and they would be interned in France for the rest of the War!

Meanwhile, the senior students in North Africa, both Novices and Scholastics, were allowed to continue their training, but with some restrictions. All of them remained in North Africa until liberation in 1943.

Early in 1940 with the start of the Battle of Britain, war came to Bishops Waltham. The

Priory was located more or less in the flight path of the German bombers sent to destroy the two great southern England seaports: Southampton, with its large commercial centre, and Portsmouth, with its great naval dockyards. This made life very harsh for the staff and students at the Priory. Plans had to be made to safeguard the community. A long air-raid shelter was built into the raised ground above the top football pitch, running along the top fence and the stretch of drive from the farm to the cemetery. Almost every night the air-raid sirens would sound between 7 pm and 8 pm and students and staff would take to the trenches! The students sat on a long line of benches which ran almost the width of the football field. They wrapped themselves in blankets and waited. They could hear the regular drone of the planes and the occasional explosion of a bomb in the distance. Fortunately, no bombs fell on our property. With our regular routine to the air-raid dug-outs in the evenings, a change of program resulted. Normal studies and classes filled our mornings, but after lunch a siesta was enforced. Some study could be done in the late afternoon and after supper. Then, we waited for the wail of the siren! Naturally, sleep patterns were disturbed, nerves were affected, and there was always that nagging fear that one night we might just be hit by a bomb. The result was that at the beginning of June, all the students were sent home for their own safety. They were told to remain at home until word would be sent to them as regards their future. This was the first episode in a wartime period of disturbed studies.

The Priory was closed down and the Junior Seminarians took up residence at St. Columba's (St. Boswells) in September, 1940. The new Philosophy students did not fare so well: they were sent to the farm of St. Helens, next to St Columba's, under Frs. Egan, Lea and Taylor, with Brother Albert in charge of farm management. As the farm could not be adapted to the needs of a house of Studies, there ensued a year of spartan frugality, freezing in cramped dormitories and forced to study in damp classrooms. And so it remained until 1941. With the new intake of Philosophers in September 1941, a change of venue was necessary, and so a transfer was made to St. Columba's College. which was now shared by both Junior Seminarians and Philosophers, under Fr. Howell.

Problems were faced and overcome each year of the war with regard to the housing of new groups of students as their studies progressed.

The first group to complete their Philosophy studies had now to find a venue in which to pursue their theological training. The diocesan seminary of Oscott College in Birmingham was to be the destination of this group. They took up residence there in September, 1942. Early in 1943 a house was purchased at Sutton Coldfield, where the theologians took up their abode. They finished their first academic year commuting from Sutton Coldfield to Oscott each day by bike or bus. Fr. Egan was in charge of this new house.

In the first half of 1943, all the young ordained priests in North Africa, together with the Scholastics of the British Province were repatriated through the good offices of Fr. Gaffney WF, an army chaplain, who managed to arrange with the authorities their passage by boat to England. With their arrival new accommodation problems arose! The Scholastics were sent to St. Boswells: some time later, in June, the final year students were ordained in Edinburgh. And so it was that for a short time St. Boswells housed simultaneously Junior Seminarians, Philosophers and Scholastics! Meantime, the young priests were spread around the various houses of the province. Those first White Fathers to be ordained in Edinburgh were; A. Murphy, J. Barry, J. Tolmie, J. McSherry and G. Sweeney. The ordaining Bishop was Archbishop McDonald.

In the second half of this year, Rossington Hall was de-requisitioned and given back to the White Fathers: it now became the Scholasticate and the House of Philosophy. St. Columba's was now free to return to its original role of Junior Seminary. Life in Rossington Hall was not easy. There was no central heating and the huge house was freezing cold. The students foraged each day in the woods for firewood to give themselves a little heat in their rooms. Students were mostly housed together 3 or 4 to a room. Fr. Bernard “Johnny” Brown was the rector.

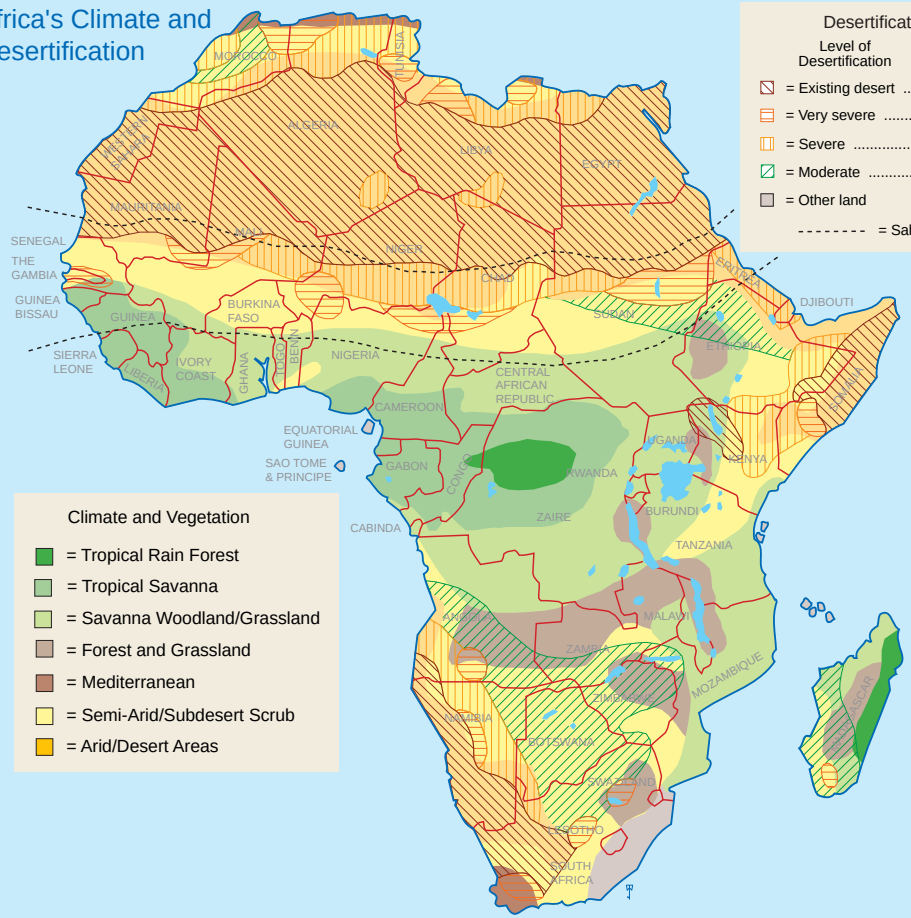
In 1944, the British Novitiate opened in Sutton Coldfield but the full Spiritual Year was not destined to be completed there. For this particular group the war had meant trooping from one place to another, opening new houses: an unsettling experience but not such a bad preparation for the missionary life! Their novitiate had been particularly stressful on account of the cramped conditions in Sutton and the unbending presence or the Novice Master, Fr. Egan, which ensured that a war of nerves was a permanent fixture.

That same summer, the last group returned home from France: these were the lads who had been interned in 1940 in Kerlois (Brittany). After some months at home, they were sent to St. Boswells towards the end of that year: this was where it was decided they would do their Novitiate. It was at this point that the Priory was reopened with Fr. Donnelly as the one in charge. During most of the war, the farm and property had been taken care of by three Brothers, Paddy, Modeste and Auber. Fr. Burridge, then later Fr. Morton, acted as Parish Priest. For a time, postulants from St. Helens were also trained at the Priory.

The group which had started their Novitiate at Sutton Coldfield spent the last months of their Spiritual Year at St. Boswells. The new group of Novices with their internment experience were always going to find Novitiate a tremendous change and so would the Novice Master! Fr. Egan began the year with these St. Denis students, but he became ill and Fr. Howell took his place. There were ordinations in 1946 from Rossington: Frs. M. Coughlan, F. Tryers, J. Rice, R. Dickson and W. Brennan. And again in 1947: Frs. J. Murphy, S. Collins and T. Kingston. In 1948, Rossington Hall was closed down and the Scholasticate moved to Monteviot House, where it would remain for the next ten years. That same year St. Boswells reopened as a Junior Seminary under Fr. Andy Murphy. It was during his time that the college was expanded and the chapel built.

A photograph taken at Rossington Hall in July, 1947, showing from left to right: back row - B. Duffy RIP, T. O’Donnell, G. Gerry RIP, J. O’Brien RIP, M. Poels RIP, K. Wiseman RIP, J. Rudd RIP, P. Walters, G. Onstenir RIP: centre row - J. Ogilvie, G. Taylor, T. Rathe, J. Fitzpatrick RIP, B. Griffen RIP, T. Dooley RIP, P. Boyd, F. Moody RIP, T. Conway, A. Toland RIP: front row - P. Donnelly RIP, W. Burridge, T. Kingston RIP, B. Brown RIP, R. Howell RIP, J. Murphy RIP, S. Collins, J. Cassidy.

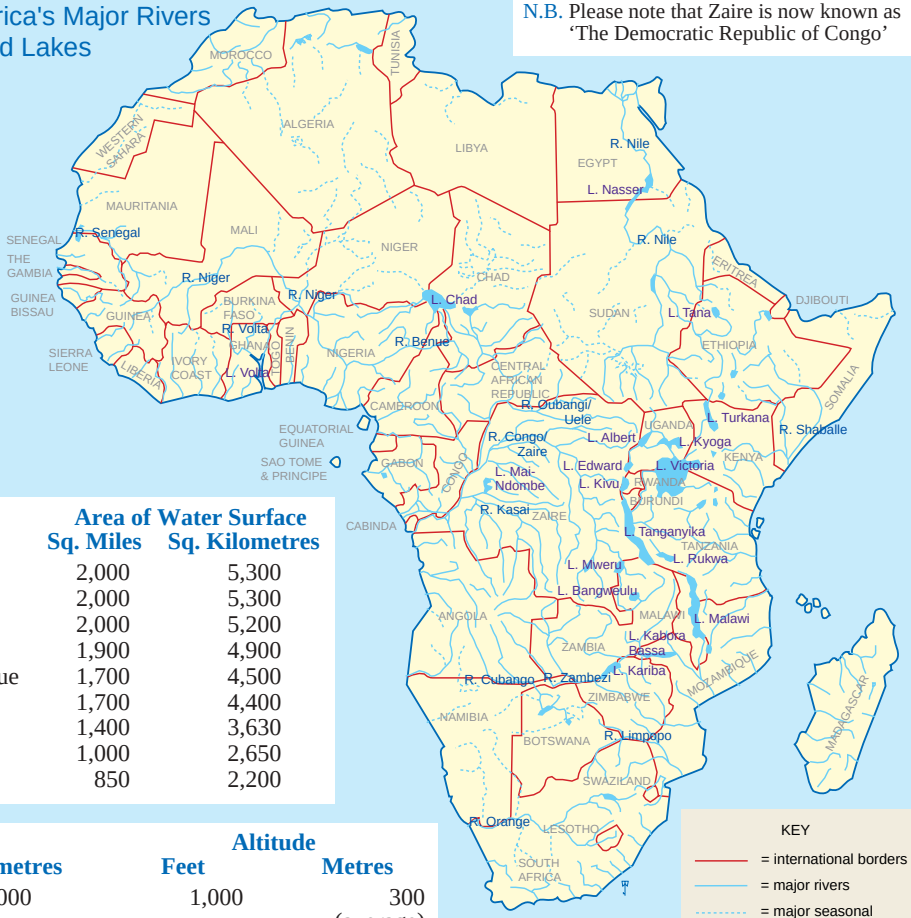
Africa's Climate and Desertification



Rivers	Flows from/through	Flows into	Miles	Kilometres
Nile	Burundi/Rwanda/Ethiopia/Uganda/Sudan/Egypt	Mediterranean	4,140	6,670
Zaire/Congo	Angola/CAR/Zambia/Cameroon/Zaire/Congo	Atlantic Ocean	2,900	4,670
Niger	Guinea/Mali/Niger/Nigeria/	Atlantic Ocean	2,595	4,180
Zambezi	Angola/Zambia/Botswana/Zimbabwe/Mozambique	Indian Ocean	1,700	2,740
Oubangi/Uele	CAR/Zaire/Congo	Zaire River	1,400	2,250
Kasai	Zaire	Zaire River	1,210	1,950
Shaballe	Ethiopia/Somalia/	Indian Ocean	1,200	1,930
Orange	Lesotho/S. Africa/Namibia	Atlantic Ocean	1,155	1,860
Cubango	Angola/Namibia/	Okavango Swamps	1,120	1,800
Limpopo	Botswana/Zambia/S. Africa/Mozambique	Indian Ocean	995	1,600
Senegal	Guinea/Mali/Senegal/Mauritania	Atlantic Ocean	995	1,600
Volta	Burkina Faso/Ghana	Atlantic Ocean	930	1,500
Benue	Chad/Cameroon/Nigeria	Niger River	840	1,350
Vaal	S. Africa	Orange River	750	1,210
Gambia	Guinea/Senegal/The Gambia	Atlantic Ocean	700	1,125

N.B. Please note that Zaire is now known as 'The Democratic Republic of Congo'

Africa's Major Rivers and Lakes



Lakes	Location	Area of Water Surface Sq. Miles	Sq. Kilometres	Lakes	Location	Area of Water Surface Sq. Miles	Sq. Kilometres
Victoria	Uganda/Kenya/Tanzania	26,000	68,000	Kariba	Zambia/Zimbabwe	2,000	5,300
Tanganyika	Zaire/Burundi/Tanzania/Zambia	13,000	33,000	Albert (Mobutu)	Zaire/Uganda	2,000	5,300
Malawi/Nyasa	Malawi/Tanzania/Mozambique	11,000	29,000	Nasser	Egypt/Sudan	2,000	5,200
Chad	Nigeria/Niger/Chad/Cameroon	9,700	25,000	Mweru	Zaire/Zambia	1,900	4,900
Turkana (Rudolf)	Ethiopia/Kenya	3,300	8,500	Cabora Bassa	Zambia/Mozambique	1,700	4,500
Volta	Ghana	3,300	8,500	Kyoga	Uganda	1,700	4,400
Bangweulu	Zambia	3,100	8,000	Tana	Ethiopia	1,400	3,630
Rukwa	Tanzania	2,700	7,000	Kivu	Zaire/Rwanda	1,000	2,650
Mai-Ndombe	Zaire	2,500	6,500	Edward	Zaire/Uganda	850	2,200

Deserts	Location	Temperature ˚C.	˚F.	Annual Rain Inches	Milimetres	Area Covered Sq. Miles	Sq. Kilometres	Altitude Feet	Metres
Sahara	Western Sahara/Mauritania/ Morocco/Algeria/Tunisia/Mali/ Niger/Chad/Libya/Egypt/Sudan	27	80	4 to 20	100 to 500	3,300,000	8,547,000	1,000	300 (average)
Libyan (Sahara)	Sudan/Egypt/Libya	43	100	5	125	750,000	1,950,000	-436 to 6,345	-133 to 1,934
Nubian (Sahara	Sudan			5	125	97,000	250,000	7,412	2,259 (highest)
Kalahari	Botswana/Namibia/S. Africa	47	117	6	153	275,000	712,250	3,000 to 4,000	915 to 1,220
Namib	Namibia/S. Africa	16	60	1	25	65,640	170,000	0 to 3,000	0 to 914