# The Depiction of International Boundaries on Topographic Maps

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## Introduction

International boundary lines are of great significance to states; they not only represent the limits of jurisdiction and define ownership of resources, but they also have immense psychological and political significance. Thus international boundaries shown on maps and charts have to be mapped with extreme care and sensitivity. Inaccurately-drawn maps have even been the cause of armed conflict, and are frequently the subject of protests at the diplomatic level. The International Boundaries Research Unit in Durham has dealt with a number of requests for advice about maps and charts of varying scales depicting unacceptable boundaries.

Land, sea, and air boundaries have different characteristics. Land boundaries can usually be picked out on the ground; they are frequently demarcated, and the human geography of whole borderland regions may reflect the influence of the boundary. Maritime boundaries between adjacent states begin from the land boundary terminus on the coast. Unlike land boundaries which delimit absolute state sovereignty, maritime boundaries do not, with the exception of those internal waters which lie inside straight baselines which may be drawn across the mouths of bays and estuaries or along deeply indented or island-fringed coasts. Landlocked states of course have no maritime boundaries, and most island states have no land boundaries. The majority of the world's states however, possess land, sea, and air boundaries. Air boundaries follow the land boundaries of the state, and extend to the outer limit of the territorial sea (12 nautical miles). It hardly needs to be said therefore that there is considerable scope for mapping international boundaries incorrectly, whether on topographic maps, nautical charts, or air pilotage charts. In practice there are a whole series of lines of critical importance to air navigators in addition to international boundaries, such as air exclusion zones.

A glance at the world map reveals the prominence of international land boundaries, outlined usually very boldly and confidently in red. There are some 308 land boundaries today with a total length of 386,000kms, (IBRU database 1995). The total number is of course changing all the time as the state system evolves. The breakup of the Soviet empire has created more than 30 new boundaries in three or four years. Russia's 'new' borders total some 60,000km, which is 14,000km more than the old Soviet borders, (Galeotti, 1995). The broad outline of the map we recognise today is largely the product of European activity over little more than 100-150 years. The world map a century from now may be almost unrecognisable to us. It seems likely that international boundary lines will be mapped with increasing precision, and will continue to be the accepted device for outlining the limits of state control, but precise lines are a European concept which many indigenous cultures find alien. Many traditional forms of political division are more akin to frontiers, or zones of transition, than boundary lines.

## The role of maps in boundary making

Most of the international boundaries which feature on topographic maps of scales 1:100,000 and below have been formally agreed. Where no agreement exists, map-makers are generally reluctant to show any international boundary, at least without some indication that it is not agreed. Nearly all large-scale maps carry a disclaimer that they are not be be regarded as authoritative in respect of international boundaries. The process of reaching boundary agreements can be long and complex. Although the history of each boundary is different, four stages are generally identified; allocation, delimitation, demarcation, and management. In each of these stages maps have a fundamental role to play.

### *Allocation*

This stage is often the responsibility of soldiers, statesmen, and diplomats who agree in broad terms where they would like to see a national boundary in place. During the period of colonial expansion in nineteenth century Africa the parties generally agreed very crudely on their broad spheres of influence in an attempt to avoid armed conflict in the scramble for territory. In those days the imperial decision-makers made use of what maps and charts were available, which was often not very much. This is graphically illustrated by the

testimony of Sir Claude Macdonald who described the early delimitation of the Nigeria-Cameroon boundary (1889-90) to a meeting of the Royal Geographical Society on 9 March 1914 thus:

> *"In those days (1889) we just took a blue pencil and a rule, and we put it down at Old Calabar, and drew that blue line up to Yola, and that is the boundary... The following year I was sent to Berlin to endeavour to get from the German authorities some sort of modification or rectification of the blue line, and the instructions which I received on that occasion...were...to grab as much as I could. I was also provided at that time with the only map - the same map on which we had drawn the blue line. That was nothing more or less than a naval chart! It had all the soundings of the sea very carefully marked out, but the whole of the rest of the sheet was white! There was certainly one thing there, and that was a beautiful river called the Akpayaff, which started near the Calabar river and meandered for about 800 miles on the map. It was about the size of the Amazon, and the idea was that that was to be the boundary - the Germans one side and the English the other. When we came to close quarters with the Akpayaff river we found there was no such river. There was a river, but so far from being 700 miles long it was only about three and a half.*
> (Nugent, 1914: 630-51).

More recently, even at the stage of allocation of territory, maps have been extremely important sources of information, and the politicians may be supported in their negotiations by teams of advisors (lawyers, historians, economists etc) and technical experts (in cartography, geography, geodesy, computer science etc). Adler has described the politicians and their advisors as *"boundary architects"*. and the technical specialists as *"boundary engineers"* (Adler, 1995). Once the general alignment of a new boundary has been agreed, the boundary engineers, including cartographers, become the key players.

*Delimitation*

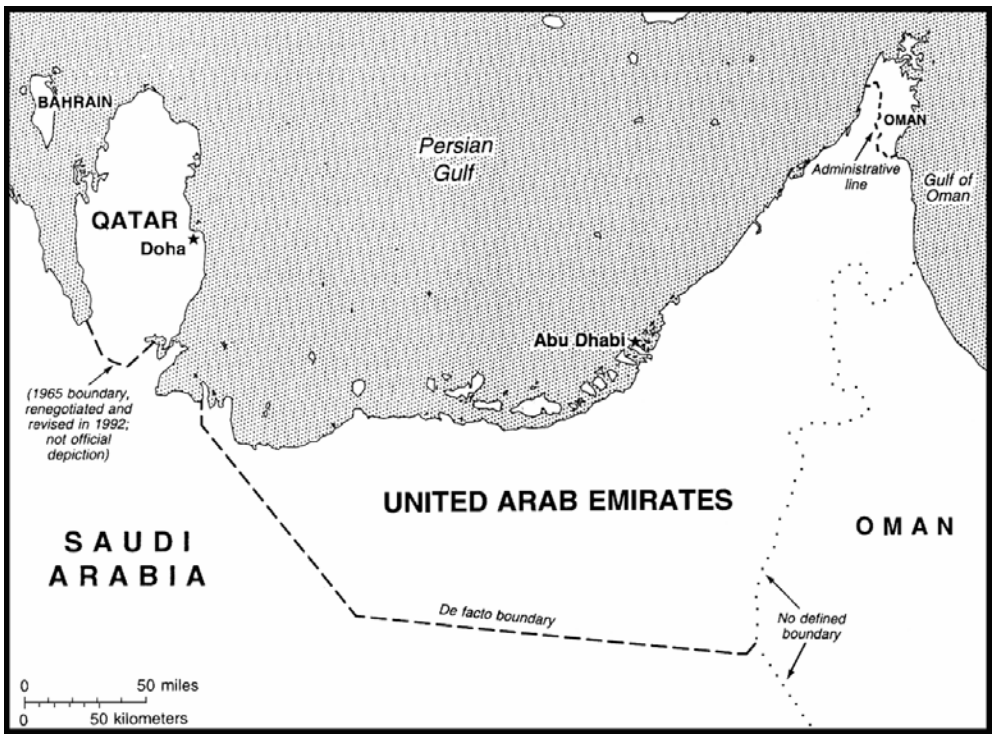
Allocated territory must now be divided precisely between the parties, and a boundary line agreed on the ground. This is the critical phase of boundary-making, and it requires painstaking and accurate work. Sometimes poor delimitation may result which causes friction at a later date. The problem is often associated with inadequate attention to technical aspects of the surveying and mapping of the agreed boundary. Most delimitations are undertaken by a joint commission in the field, who have to turn the wishes of the statesmen into a workable boundary acceptable to both sides. Boundary commissions are usually given authority to vary the allocated boundary in accordance with the terrain and the human geography of the borderlands. In many of the early commissions in Africa and elsewhere, the boundary commissioners had to conduct their own crude surveys of the region adjacent to the boundary to fix key points in relation to prominent physical features. For this reason Royal Engineer officers were often engaged in boundary surveys in which Britain was involved.

Boundary delimitation today is made easier by advances in technology including notably satellite imagery which can give up-to-date information about the landscape, and the Global Positioning System (GPS) which is usually a simple and speedy method of positioning to within an accuracy of two metres or less if done with top quality equipment. GPS has truly revolutionised the process of boundary delimitation. Its prime use is in the location of demarcation sites after delimitation, and producing a set of boundary coordinates to be used for treaty purposes. GPS clearly enables interested parties to test the accuracy of past boundaries where these were delimited by coordinates in a treaty, and marked out on the ground in accordance with those coordinates. Some surprising results may be revealed, but demarcation, if undertaken jointly by the parties, is regarded as having precedence over the agreement even if deviations have occurred (Adler, 1994). Nevertheless there are examples of both land and maritime boundaries being adjusted by consent of the parties when they were proved to be in the wrong place on the ground. The Egypt-Israel boundary in Sinai for example was adjusted in several places in 1988 when locations fixed in 1906 were scrutinised by a joint commission.

*Demarcation*

Following the delimitation of the boundary, a treaty text is produced, which may be an extremely elaborate document. The text is invariably accompanued by sketches and maps as supporting documentation, but these only have legal validity if incorporated into the treaty itself. Some agreements, surprisingly, have no accompanying maps, preferring to rely on a comprehensive legal description of the agreed boundary. In others, maps may have been produced but are not made public, much to the frustration of map-makers. The exact nature of the 1974 Saudi Arabia - United Arab

Figure 1




*Source: US Department of State*

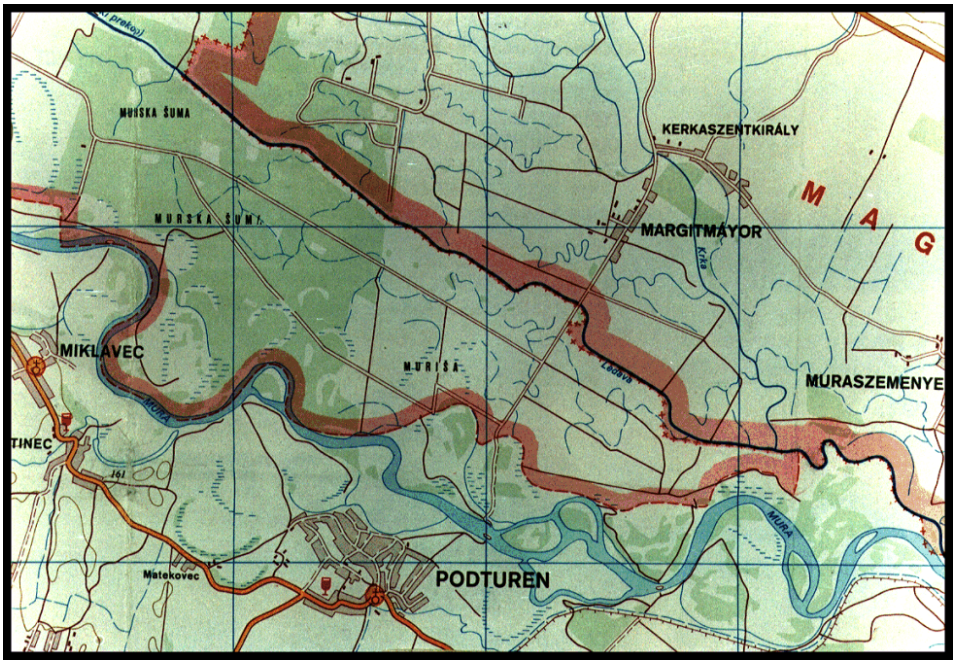
Emirates boundary agreement (which had the effect of giving the Saudis a useful stretch of coastline) was not revealed for 20 years, and many inaccurate and speculative maps were published in the meantime. (Figure 1).

Many boundary agreements specify the nature and extent of the demarcation to take place, and even the types of post and pillar to be used. Agreements are however perfectly valid without demarcation. Physical conditions, such as sandy deserts or moving glaciers clearly do not lend themselves to demarcation. There are also likely to be stretches of boundary which follow a physical feature such as a river, stream, or wadi-bed, which may not need demarcation. It is worth noting however that physical features are not necessarily ideal markers for international boundaries. Rivers meander (Figure 2), and river islands shift their location; the Unites States - Mexico boundary on the Rio Grande is a classic case of the former, whilst the Zaire river is an example of the latter which has become a bone of contention between Zaire and Angola in recent years, because the navigation channel agreed on as the boundary in 1891 has shifted, thus apparently changing the ownership of several islands.

Another celebrated dispute as a result of well-intentioned reference to physical features was the Argentina-Chile agreement of 1881 which assumed that the highest peaks and the watershed in the Andes would coincide. In reality they do not, and a long-running dispute was finally settled by British arbitration in 1967.

Boundary demarcation has to take account of the fact that international boundaries have no width, and reference points used in the treaty have no magnitude. This characteristic is sometimes forgotten; many international boundaries are associated with a system of ditches and fences and nomansland which can be tens or even hundred of metres wide creating an intimidating frontier landscape, but the legal boundary line has no width (Figure 3). Map-makers on the other hand often depict international boundaries as thick lines equivalent to considerable distances on the ground. The use of a thick blue pencil to delimit the Israel-Jordan armistice line in 1949 gave rise to subsequent problems on the ground, because it had a width equivalent to 250 metres, covering villages, roads, and orchards (Brawer, 1990).

Figure 2




*Source: Geodetski Zavod, Ljubliana 1987 (1:50,000 Cakovec sheet) showing parts of Hungary, Slovenia and Croatia.*

The demarcation process involves careful surveying, recording, and mapping of the demarcated boundary. Demarcation records will incorporate much material in addition to maps, such as sketches, photographs, and bearings of key features from each boundary pillar. The idea is to prevent disputes should a boundary post disappear. One of the causes of the Iraq-Kuwait boundary dispute over many years was the disappearance of a marker, and subsequent arguments as to where it was supposed to be. Unfortunately the relevant treaty was unhelpful because it included ambiguous descriptions about the location of the boundary. Subsequently equally confusing efforts were made to fix it, for example in relation to *"the most southerly date palms at Safwan"* (Schofield, 1993).

The distance between boundary markers depends on local topographic conditions, the overall length of the boundary, and of course on budget. It used to be a principle that markers should be "intervisible" and many demarcated boundaries conform to this principle. It is regrettable that cartographers rarely, if ever, show the boundary markers of properly agreed and demarcated boundaries, or even the key turning points where straight line boundaries are involved. There may be good reason for this, but it would be a welcome addition to the information on offer on large scale maps.

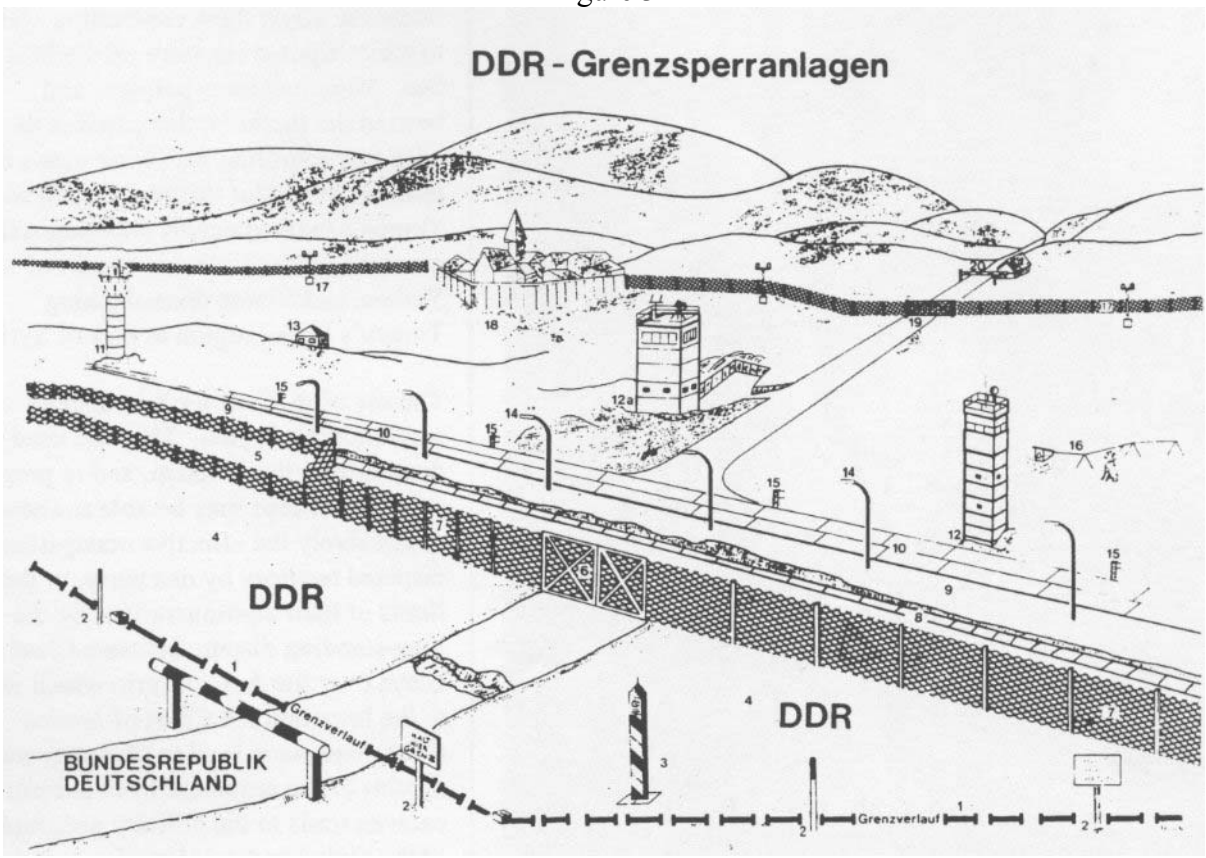
*Management*

Once established, boundaries have to be managed and administered. In may parts of the world they may also have to be patrolled and defended. Maps are clearly one of the essential tools in boundary administration, whether peaceful boundaries or those subject to stress and tension. The cost of boundary management for large states with long boundaries is clearly considerable, especially where relations with neighbours are poor, as in India and China. If good topographic maps are not available for border regions it is a considerable handicap to those involved in border administration and protection. One of the most important tasks along troubled borders is the recording of boundary-related incidents on large scale maps.

**Maps and International Boundary Disputes**

Boundary disputes are generally of three kinds: territorial, positional, and functional (Prescott, 1987). **Territorial disputes** occur when large tracts of land are contested as between Morocco and Western Sahara, or Saudi Arabia and Yemen. No boundary has been allocated, and the dispute is conducted at a political level. **Positional disputes**

Figure 3




*The former East-West German boundary showing the elaborate East German defence system lying beyond the international boundary ("grenzverlauf") in the foreground.*

may follow boundary allocation (but before delimitation) or frequently they arise after delimitation. The boundary alignment is not in question, but its precise location has been lost, or has become confused for example as a result of river meander. **Functional disputes** are about the everyday management and operation of the boundary, often with reference to the allocation of resources such as water or hydrocarbons. In all these, maps have an important role to play, which may be constructive or destructive. The use of maps to promote particular points of view has been superbly analysed in a provocative book by Denis Wood, and anybody concerned with the role of maps in boundary disputes would be well advised to read it (Wood, 1994). Maps are important in international boundary disputes in four major ways:

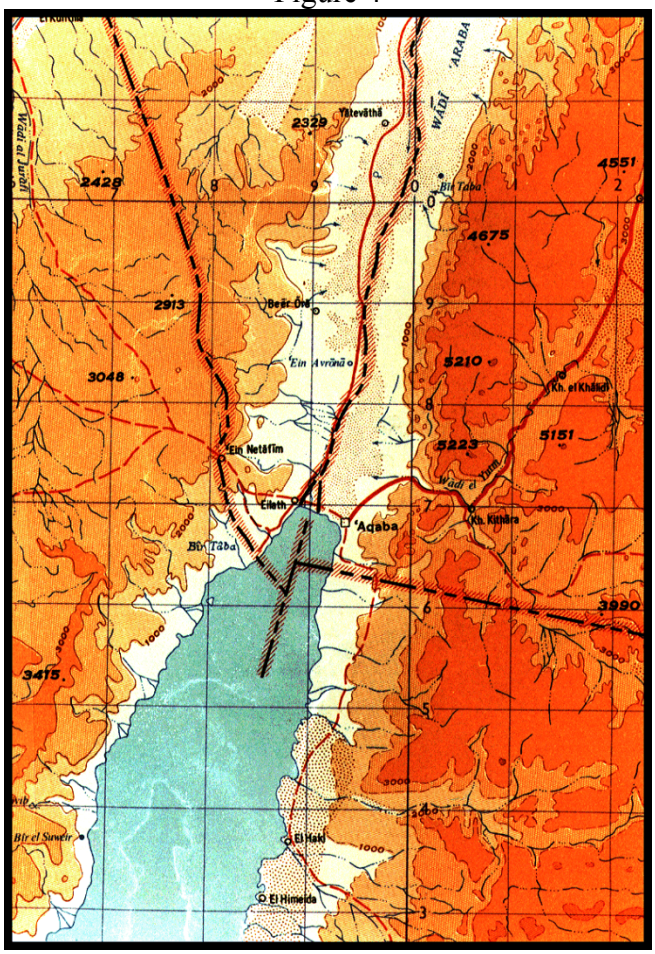
First, they may be contributory factors, or even causes of the dispute; second, they may be used by the parties to promote their own position in a dispute; third, they are frequently among the most useful tools in dispute resolution; and, fourth, they may be used to illustrate the judgement of mediation or arbitration.

Maps have sometimes been instrumental in creating boundary disputes, usually as a result of the use of poor maps, (or no maps) in the past.

There are numerous examples of maps being used to assert the position of one of the parties to a dispute. Such maps are in a sense 'propoganda maps', but this is misleading. Most maps in this category are largescale, properly surveyed editions, quite unlike crude propoganda. For years for example Bahrain appeared in the Iranian 1:50,000 map series because Iran claimed the island. Egyptian and Sudanese maps show contrasting claims to their disputed territory on the Red Sea. More insidious perhaps, and beyond the theme of this paper is the use of maps promoting particular views of territory in school textbooks, such as Yemen's texts allegedly showing Asir province of Saudi Arabia as part of Yemen, and Syrian texts showing Turkey's Hatay region as part of Syria.

The use of maps as tools in dispute resolution are legion. They are used to demonstrate the problem, and to propose solutions. Maps may be able to show conclusively the effective occupation of disputed territory by one party, or the limits of their

Figure 4




*Source: War Office, Series 1404, 1960 (1:500,000, sheet 4476) showing parts of Egypt, Israel, Jordan and Saudi Arabia at the head of the Gulf of Aqaba.*

administration. In the long-standing dispute between Chad and Libya over the Aouzou strip which went to the International Court of Justice (ICJ) maps were used to illustrate many aspects of the argument from ancient caravan trails to the military geography of the region today. Historic maps may also be used to demonstrate the shift in political spheres through long periods of time. Nor is the use of high quality maps confined to land disputes. Maritime disputes such as Libya-Malta and Libya-Tunisia which also went to the ICJ involved the use of many sophisticated maps in the memorials submitted by the parties. Finally, maps are essential instruments in setting out the findings of arbitration, and in making the final boundary as laid down available for public information, and for use by administrators.

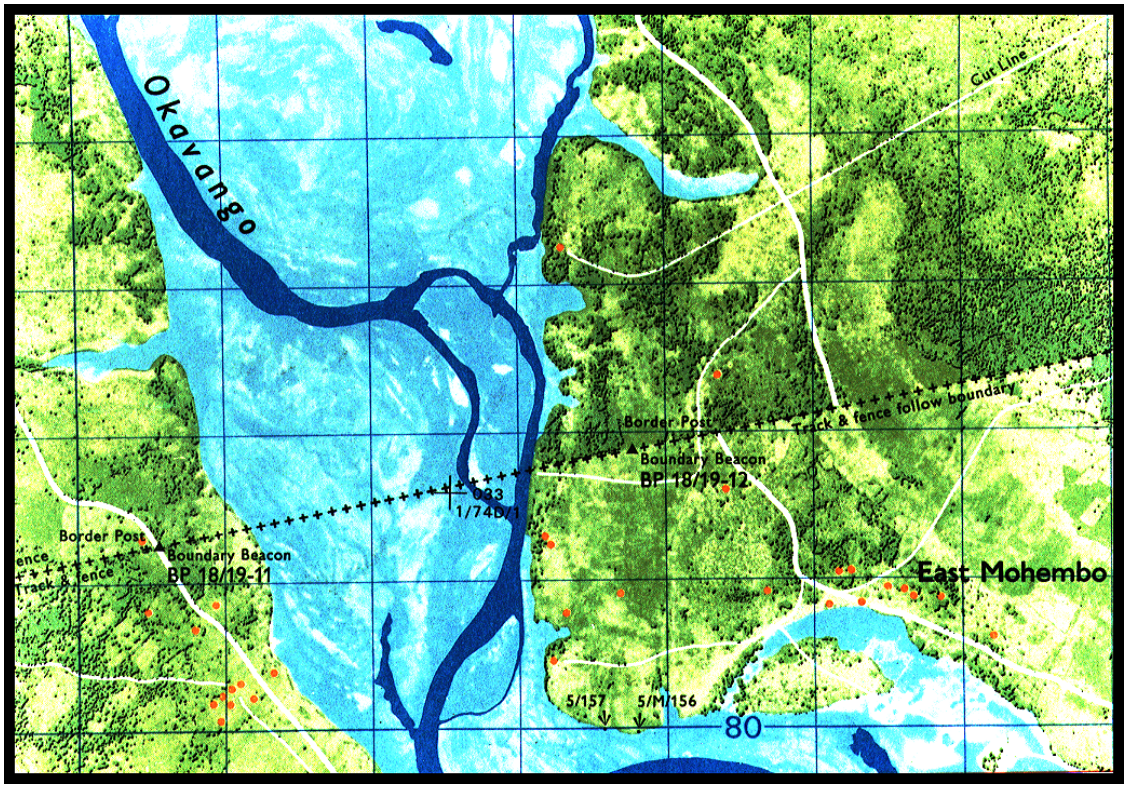
**Depiction of International Boundaries on Maps**

First, it should be noted that seriously disputed boundaries are rarely shown on reputable large-scale maps, especially those published by national surveys. To do so might provoke the neighbours, or provide material which could be used as evidence against the national interest in litigation. If an indication of a boundary line is given, it will be clearly labelled as *"not agreed"* or *"in dispute"* or *"unsettled"*. Often no boundary is shown at all. Figure 4 is an example of a sadly mistaken attempt to show offshore boundaries which were inaccurate and misleading.

Where the boundary is agreed, largescale maps will show the line, but with the usual disclaimer at the bottom of the map. Techniques vary considerably in the colours and conventions used. The most satisfactory method would be the use of a continuous thin black line, overprinted boldly to stress the importance of the feature, and to make it distinctive. Crosses and broken lines can result in uncertainty especially where boundaries twist and turn. Figure 5 shows part of the China-Hong Kong boundary at 1:10,000 scale using rather crude black crosses which are not a very precise guide to the location of the boundary. In practice there is no problem finding the boundary on the ground. International boundaries are often complex features of the human landscape and deserve to be given detailed treatment on maps, at least showing boundary pillars on the larger-scale maps. Figure 6 is a fine example of what can be done; the map shows border posts, and offers additional notes about the boundary line. The detail will of course diminish as scale decreases. Much thought needs to be given to the amount of detail carried forward to larger scales; there is a great tendency in atlases and wall maps to show all international boundaries in the world as having the same status, whether they exist or not, and whether they are delimited or demarcated. This is highly misleading. There is also a tendency for map publishers to lag behind in showing boundary changes.

There are a number of sources which can be consulted to check on the latest boundary adjustments and agreements. They are by no means infallible, but provide invaluable backup. The United Nations Treaty Series and the United Nations Office of the Law of the Sea's *Law of the Sea Bulletin* between them give details of land and maritime boundary treaties as they occur. The US Department of State office of the Geographer has ceased publication of its invaluable *Limits in the Seas* and *International Boundary Studies* series but publishes an excellent quarterly *Geographic and Global Issues* with informaiton on boundary changes, but without essential detail such as co-ordinates. The former series remain the best comprehensive set of accurate maps of agreed

Figure 5




*Source: Directorate of Oversaes Survey, 1977 (1:50,000, sheet 1821) showing the Botswana-Namibia boundary.*

boundaries yet published. The Ordnance Survey's international map library in Southampton is extremely helpful in answering queries about international boundaries. In addition, the International Boundaries Research Unit at Durham is pleased to try to answer queries from its boundary database, but as yet cannot supply reliable maps of every boundary in question. In the past, *Cartactual* published in Budapest was another invaluable source for cartographers, but it ceased publication in 1993. For most purposes the *Times Atlas of the World* is safe because boundary aspects are carefully researched, and the USAF Air Pilotage charts cover many international boundaries at 1:100,000 scale.

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