

# Mapping Sovereignty: Cartographic Evidence in Resolving International Boundary Disputes

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## KEYWORDS

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## ABSTRACT

*This paper examines the role of cartographic evidence in resolving international boundary disputes and its efficacy in addressing the issue. Review of adjudicated cases from the ICJ, PCA, and UNCLOS tribunals, focusing on disputes where maps played a decisive role identified the patterns in map usages. Four cases settled down by ICJ is selected for the study which includes Preah Vihear case between Thailand and Cambodia, Aouzou strip case between Chad and Libya, boundary dispute between Burkina Faso and Mali, and the case of enclave between the Netherlands and Belgium. The study underscores the dual nature of maps as both technical tools and instruments of territorial claim-making, highlighting the need for standardized cartographic guidelines to mitigate historical discrepancies. The findings contribute to the discourse on conflict resolution by empirically validating the conditional effectiveness of cartographic evidence.*

## 1. INTRODUCTION

International boundary disputes remain a persistent challenge in global geopolitics, often rooted in historical uncertainties, colonial legacies, and competing territorial claims. Among the tools employed to resolve such conflicts, cartographic evidence occupies a unique position as a technical instrument for delimitation, demarcation, and management of boundaries (Blake, 1995). The relationship between maps and sovereignty has long been recognized in international relations (Branch, 2014), yet the conditions under which cartographic evidence effectively contributes

to dispute resolution remain underexplored. This paper addresses this gap by systematically analyzing the role of maps in adjudicated and negotiated boundary disputes.

The significance of cartography in boundary disputes is not only simple representation; maps often serve as active participants in territorial claim-making (Weissberg, 1963). For instance, historical maps have been instrumental in cases like the Northwest Passage dispute between US and Canada, where competing cartographic narratives expanded over conflicting sovereignty claims (Tsiouvalas & Solski, 2023). However, the reliability of such

evidence varies significantly across contexts. Maritime disputes, governed by frameworks like United Nations Convention on the Law of the Sea (UNCLOS), tend to resolve more predictably with cartographic input, whereas terrestrial conflicts-especially in post-colonial regions frequently resist with discrepancies between legal boundaries and lived realities (Saliternik, 2017). This divergence raises critical questions about the contextual efficacy of maps and the need for adaptive resolution mechanisms.

The role of cartographic evidence in international boundary disputes has been extensively examined through multiple disciplinary lenses, including international law, political geography, and conflict resolution studies (Saliternik, 2017). Early scholarship emphasized maps as passive representations of territorial claims, but contemporary research increasingly recognizes their active role in shaping geopolitical narratives (Blake, 1995). This shift reflects broader theoretical movements in critical cartography, which interrogate how maps construct rather than simply reflect spatial realities (Weissberg, 1963).

In legal contexts, the importance of maps varies significantly. While some tribunals, such as those under UNCLOS, have treated cartographic evidence as pivotal in maritime delimitation cases (Mboce *et al.*, 2025), others caution against overreliance on maps due to their exposure to political manipulation. The ICJ's legal philosophy often subordinates cartographic evidence to treaty texts, particularly in terrestrial disputes (Saliternik, 2017). This tension between cartographic fairness and political partiality underscores the need for methodological clarification in map analysis.

Cultural and historical factors further complicate map usage. Research on maritime

disputes highlights how national perceptions of sovereignty, influenced by power distance, affect the acceptability of arbitration outcomes where low power-distance countries like Australia and New Zealand have resolved boundary issues amicably through negotiation, whereas high power-distance states often reject unfavorable arbitration, as seen in the South China Sea arbitration between Philippines and China (Casetta, 2025).

Technological advancements have introduced new dimensions to cartographic evidence. Participatory GIS (PGIS) frameworks, such as the "butterfly model" for customary land conflict resolution, demonstrate how inclusive mapping can reconcile technical precision with community legitimacy (Gyamera *et al.*, 2017). While ICJ defines the value of maps depends on their technical reliability and the neutrality in relation to the dispute, international tribunals treats maps as important, significant evidence in determining boundary lines (Lee, 2005). In this context, 'base map' with physical geographic data with topography and natural features becomes the base for dispute resolution if the both parties in a dispute have confidence that the base map does not favor one side at the expense of other (Wood, 2000).

Unlike prior works that treat maps as either neutral tools or political instruments, this study identifies its role in resolving conflicts. While international law provides the structural framework for boundary determination, cartography supplies the visual language through which territorial claims acquire tangible form (Rajkovic, 2018). Large-scale maps assume evidentiary primacy in boundary demarcation cases due to their granular detail, as seen in the 2002 ICJ ruling on Cameroon v. Nigeria (ICJ, 2002; Merrills, 2003). Cases such as the Bangladesh v. India maritime boundary dispute were analyzed to understand how modern geospatial technologies, including bathymetric data and satellite-derived

baselines, influenced adjudication outcomes (Kałduński, 2015; PCA, 2014; Ramnath, 2022).

The remainder of this paper is organized as follows: Section 2 discuss about the methods adopted for this study. Section 3 dissect on the results of the study with discussion and section 4 concludes the paper.

## **2. STUDY DESIGN AND METHODS**

This study employs a multi-method approach to systematically analyze the role of cartographic evidence in international boundary dispute resolution. The research design integrates qualitative and comparative legal analysis with geospatial evaluation techniques, allowing for a nuanced examination of how maps function across different dispute contexts and resolution frameworks. The study focuses on adjudicated cases from primary sources of ICJ with other examples from PCA, and tribunals operating under the UNCLOS cases, with selection based on explicit references to cartographic evidence, ensuring that the analysis captures disputes where maps played a substantive role. Both maritime and terrestrial disputes were studied to enable comparative analysis. A qualitative content analysis was conducted to identify how maps are used and interpreted in boundary disputes.

## **3. RESULTS AND DISCUSSION**

The findings presented in this section emerge from a systematic analysis of cartographic evidence across adjudicated boundary disputes, revealing distinct patterns in map usage, and legal influence. These results highlight the conditional efficacy of maps in resolving conflicts, with notable variations between maritime and terrestrial contexts.

### **3.1. Overview of key findings**

The systematic review of cases from the ICJ, PCA, and UNCLOS tribunals reveals that cartographic evidence functions as a

double-edged sword in international boundary dispute resolution simultaneously facilitating impartial demarcation while also serving as an instrument of political disagreement. Clear legal framework governing maritime boundary particularly Article 15 and 74 of UNCLOS (UN, 1982) provide clearer standards for map evaluation than the often-ambiguous principles applied to land borders (Blake, 1995).

In the case between Eritrea vs. Yemen handled by PCA in 1998, bathymetric charts and equidistance calculations enabled precise maritime delimitation (UN, 2006), whereas terrestrial disputes such as the Indonesia-Malaysia conflict over Sipadan and Ligitan islands was hindered in competing historical map interpretations (Butcher, 2013). Differences in evidentiary weight of large-scale maps Vs. “sketch-like” maps are seen the boundary related cases as in the case between Nicaragua Vs. Colombia where ICJ rejected Spain’s 1825 Carta Esferica due to its sketch like nature despite Nicaragua’s insistence on its relevance. Conversely, modern technologies like the use of satellite imagery data receives instance acceptance if metadata on different parameters like projection system and accuracy are provided along with as in the case of Ghana and Cote d’Ivoire maritime dispute (ITLOS, 2017).

The results collectively demonstrate that while cartographic evidence has become indispensable in boundary dispute resolution, its effectiveness remains contingent on dispute type, technological modernity, and the degree to which mapping processes accommodate pluralistic territorial conceptions.

### **3.2. Case specific analysis of boundary disputes**

Four cases on international boundary dispute were analyzed where cartographic evidence played a pivotal role in shaping dispute resolution outcomes, revealing how maps



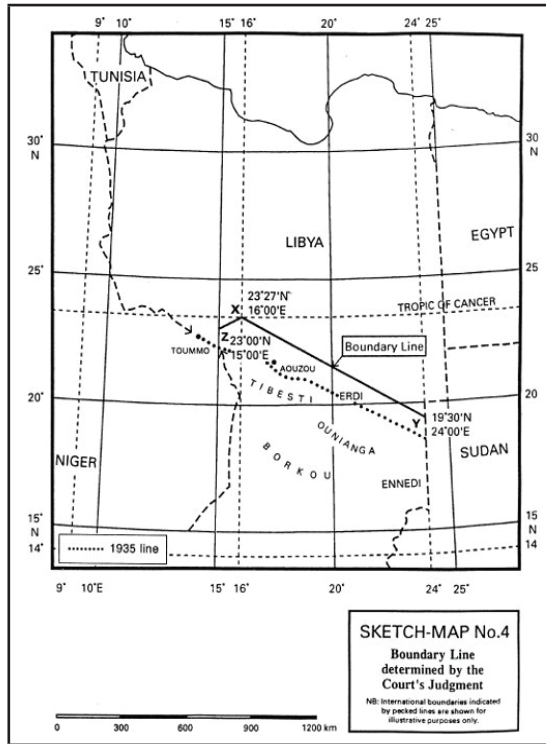


Figure 3: Sketch-Map no 4 by ICJ (Source: (Blake, 1994))

### 3.2.3. Case between Burkina Faso and Mali

The next case was the boundary dispute between Burkina Faso and Mali resolved by ICJ in 1986 using colonial-era administrative maps applying the principle of *uti possidetis juris* respecting existing colonial boundaries (Leigh, 1987). ICJ marked the line of frontier for illustrative purpose on the map of the scale 1:200000 which was also annexed to the same judgement (ICJ, 1986a).

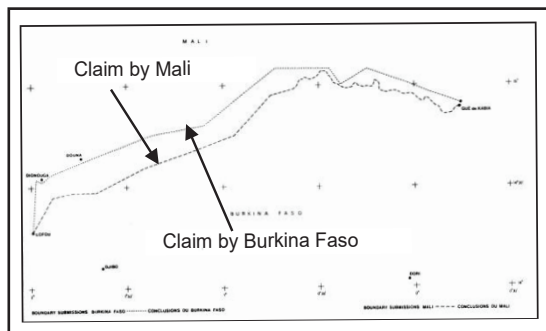


Figure 4: Boundary claim by Mali and Burkina Faso (Source: (ICJ, 1986b))

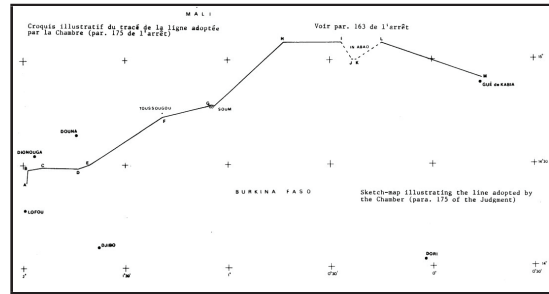


Figure 5: Boundary finalized by ICJ. (Source: (ICJ, 1986b))

The dispute between Burkina Faso and Mali is over 275 km long and 30 km wide Agacher strip of land along the border in northern Burkina Faso (Salliot, 2010), whose claim from both the countries are shown in Figure 4. Judgement of the chamber published in communique of ICJ dated 22 December 1986 shows the boundary claim of the Burkina Faso and Mali and the final decided boundary line (Figure 5) by ICJ (ICJ, 1986b).

According to clause 171 of case concerning frontier dispute, Mali submitted map of 1:1000000 scale published in 1927 showing its claim of boundary alignment and clause 172 clarifies that Burkina Faso submitted map of scale 1:200000 map published in 1969 showing its claim of the boundary (ICJ, 1986a). Looking at both the maps Chamber of the ICJ fixed the line of the frontier between the two countries which was agreed by both parties and the dispute was peacefully settled (ICJ, 1986b).

### 3.2.4. Case between Netherlands and Belgium

In 1959, the ICJ addressed territorial disputes on sovereignty over frontier land between Belgium and the Netherlands. The dispute was basically on the sovereignty over two plots of land as number of enclaves were formed by Belgian commune and Netherlands commune (ICJ, 1959b). A Communal Minute drafted between 1836 and 1841 assigned the plots to Baarle-Nassau, while a Descriptive Minute and accompanying map annexed to the 1843

Boundary Convention attributed them to Baerle-Duc (ICJ, 1959b). Belgium relied on the Descriptive Minute and the official maps annexed to the 1843 convention, which explicitly qualified the plots to the Belgian commune while Netherlands argued that the 1843 convention was intended only to maintain the status quo.

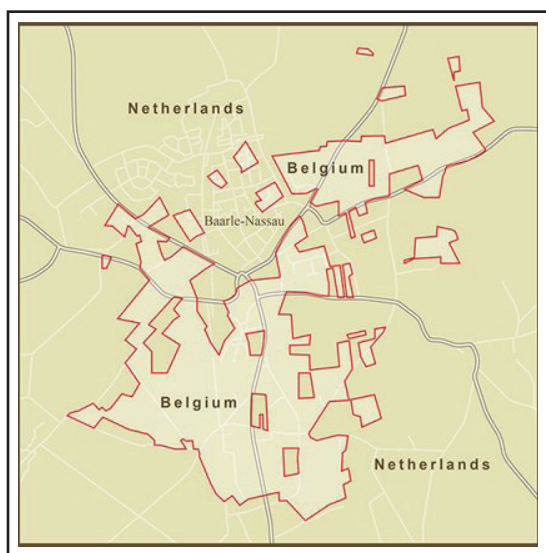


Figure 6: Enclaves of Netherlands and Belgium (Source: <https://amproehl.com/>)

After reviewing the evidence, ICJ found that the maps and Descriptive minute were integral part of the 1843 Treaty and carried out the same legal weight as the treaty and hence the Court concluded in its judgment of 20 June 1959 that sovereignty over the two disputed plots rested with Belgium (ICJ, 1959a).

### 3.3. International boundary of Nepal

Nepal shares its international boundary with China at the North and India at East, South and West. Sugauli treaty on 4<sup>th</sup> March 1816, supplementary treaty of Sugauli treaty on 11<sup>th</sup> December 1816, 1<sup>st</sup> November 1860 and 7 January 1875 defined the present-day boundary between Nepal and India (Baral, 2018). Nepal-China boundary agreement was signed on 21 March 1960 to scientifically demarcate the traditional boundary between the two countries. The boundary treaty was signed

on 5 October 1961 which also included maps of scale 1:500000 showing entire boundary line, and 1:50000 scale maps showing the location of temporary boundary markers to be erected. On the basis of the treaty, boundary delimitation was conducted and first boundary protocol between Nepal and China was signed on 20 January 1963 resolving all the issues between the two countries and defined the present-day boundary alignment between Nepal and China (Shrestha, 2013).

In the context of Nepal and India, the issue concerning the Kalapani–Limpiyadhura and Susta regions remain unresolved (Baral, 2018; Shrestha, 2013). Differences in views regarding the source of the Kali River gave rise to the Kalapani–Limpiyadhura dispute, with Nepal and India each presenting different sets of maps, which prevented the two sides from reaching an agreement (Shrestha, 2013).

In case of Susta region, change in course of the Narayani river is the main reason for the dispute where no pillars were constructed along the river course (Shrestha, 2013). Anticipating such difficulties, both sides agreed to apply the fixed-boundary principle in areas where rivers form the international boundary between Nepal and India, relying on the boundary lines indicated on the base maps jointly agreed upon and prepared after the Sugauli Treaty, while the two sides could not agree on the single base map in this case as well and hence the issue is still pending (Shrestha, 2013).

As the two sides were unable to reach a technical consensus, the Third Joint Commission (JC) meeting, led by the foreign ministers of both countries and held in Kathmandu, Nepal, from 25 to 27 July 2014, recorded the Susta and Limpiyadhura–Kalapani–Lipulekh issues as outstanding and directed a foreign secretary–level mechanism to address them, with technical inputs from the Boundary Working Group (BWG) comprising Director General–level officials from the Survey Departments of both sides.

As discussed in Section Three, and as demonstrated by the Nepal–China boundary case where maps annexed to the treaty facilitated the resolution of boundary disputes, the Nepal–India boundary could similarly have been settled had maps been attached to the treaty. Nonetheless, with the establishment of a permanent Boundary Working Group (BWG) mechanism and continued joint engagement by both sides in boundary activities, the issue may be resolved through appropriate dispute-resolution mechanisms.

#### 4. CONCLUSION

This study has examined the role of cartographic evidence in international boundary dispute resolution, revealing its conditional efficacy. The findings demonstrate that maps function not merely as technical tools but as dynamic instruments of territorial governance, with their legal weight contingent on dispute type, and technological modernity. While maritime disputes benefit from standardized frameworks under UNCLOS and the relative stability of hydrographic features, terrestrial conflicts remain hampered by historical cartographic ambiguities and the politicization of spatial representations.

Ubay (2011) argues that though maps are generally regarded as secondary evidence, they appear to be the most compelling form of documentary evidence in territorial sovereignty disputes. Further, Robertson (2013) too argues that, while maps offer clarity as to the location of boundary lines, their application in delimitation of boundary must be evaluated against established legal precedents governing evidence of sovereignty. Maps are a complex form of evidence, yet they hold significant potential in cases where recognized coordinates and boundary pillars are absent, as they are connected to the real world by depicting physical details and superimposing boundaries onto reference data (Srebro & Shoshany, 2013). Nevertheless, an examination of the cases studied clearly

demonstrates that maps can play a crucial role in resolving boundary disputes.

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