



Paradox of the Moving Boundary: Legal Heredity of River Accretion and Avulsion

John W. Donaldson

Department of Geography, Durham University, Durham, UK; w.donaldson@durham.ac.uk

ABSTRACT: International boundaries – the divisions between state jurisdictions – are characterised in law by their inherent rigidity. Yet recent research has revealed that well over one-third of the total length of international boundaries follow rivers or streams that are inherently dynamic natural features. The tension between legal staticity and fluid dynamism manifests along international river boundaries both in terms of the problematic definition of the line itself and the disparity in water management regulations. The actions of accretion and avulsion have been used to resolve disputes over river boundary movement since Roman times, but they contain an inherent paradox. Tracing the heredity of these two legal mechanisms, this paper will expose that paradox by focusing on the relationship between boundary and water. State practice will reveal how the continued application of these mechanisms is reinforcing a land bias in international law that becomes problematic when addressing a dynamic fluid resource that is concurrently divided and shared. Rather than emphasising the rigidity of jurisdictional division, this paper will suggest that deterring the risks inherent in the definition of river boundaries requires challenging some of the foundational legal tenets of territorial sovereignty; tenets that continue to influence the development of international water law.

KEYWORDS: International boundaries, accretion, avulsion, adjudication

The Ancients report, that the river Achelous keeping no constant stedly course, but one while dividing itself into several branches, another while running here and there in a violent cross stream,... was the occasion of frequent wars between the Etolians and Acarnanians about the adjacent land, 'til Hercules confined it to its proper banks; and for the important service, had the honour of marrying the daughter of Oeneus, king of the Ætolians (Grotius, 1715).

RIVERS AND BOUNDARIES

In northern Thailand, just east of the city of Mae Sai, the international boundary with Myanmar takes a curious course. The boundary was originally defined along the Mae Sai river¹ but is now marked on the ground by pillars following a twisting course that snakes from one side of the river to the other. From the new Mae Sai bridge, an observer can watch farmers from Myanmar cultivating lands on the south/Thai side of the river but on the Myanmar side of the demarcated boundary (see figures 1 and 2). Similarly, there are portions of Thai land on the Myanmar side of the Mae Sai river. Until the new Mae Sai bridge was opened in 2007, farmers from both sides either had to travel several kilometres (km) to the nearest border crossing point and double back to their fields, or make a hazardous attempt to cross the swiftly moving Mae Sai. The boundary pillars mark an older course of the Mae Sai which the two governments agreed was the last conclusive definition of the boundary even though the river itself has long since shifted from this course.

¹ For the Anglo-Siamese agreements from 1931 to 1940 related to the Mae Sai, see Prescott, 1975.

Figure 1. Boundary pillars along old course of the Mae Sai river, Myanmar-Thailand boundary (Photo courtesy of IBRU, taken November 2006).



Figure 2. Map of Myanmar-Thailand boundary at the new Mae Sai bridge, location of figure 1 is highlighted (Photo courtesy of IBRU, taken November 2006).



The situation of the Myanmar-Thailand boundary along the Mae Sai river is not unique as many neighbouring states have attempted to 'fix' their river boundaries in an effort to establish a permanent and static limit to their respective territories. The canalisation of the Rio Grande river by the US in the 1930s around El Paso/Juarez into concrete banks was an effort both to control flooding and to limit the possible movement of the boundary with Mexico (Boggs, 1940; IBWC, 1933). Less expensive and more recent methodologies using global positioning systems (GPS) have seen states running a series of

coordinates along a river boundary at a certain time and agreeing that series of coordinates as the boundary. While not physically fixing the river itself, cementing a river boundary line through a series of coordinates effectively unlinks the boundary from the river, a trend that needs to be assessed more critically in order to expose some of the core inconsistencies in the relationship between international law and water.

River boundary disputes

Recent research has shown that over a third of the total length of international land boundaries worldwide follow rivers or streams (Donaldson, 2009). This is a total of over 72,000 km (IRBD, 2008; Donaldson, 2009) of rivers or streams that form sections of international land boundaries, from the few metres of the Zambezi river that forms the (notional) boundary between Namibia and Zimbabwe (IRBD, 2008), to the 2020 km of boundary between Mexico and the United States formed by the Rio Grande. Rivers have been chosen as boundaries of empires, politico-territorial entities and individual private properties throughout history for a variety of reasons, including their defensive capabilities, their apparently clear cartographic representation and presumed ease of identification on the physical landscape (Donaldson, 2009). Whatever the reasoning behind the choice of a river as a boundary, either as an impediment to military movement or providing the desired visibility (on the ground and/or in cartographic imagination), it is the water present in a river that has always made it a popular choice for a politico-jurisdictional boundary throughout history.

Yet it is the presence of water that makes river boundaries perhaps the most egregious and uncomfortable fusion of law and nature, whereby law seeks to be identified by a fixed and defined line, while a river continues as a dynamic feature of the physical landscape. The relationship between fixed, neighbouring legal jurisdictions and a dynamic natural resource, at the same time divided and shared by two parties, poses serious problems both in terms of defining the line and sharing the surface water resource. Arguably, disputes over the shifting of a river boundary may not provoke current large-scale interstate conflict² but they do continue to cause diplomatic controversy. After years of negotiation, Canada and the US still contest the position of the boundary along a section of Hall's Stream (Arsenault, 2006). Similarly, Croatia and Serbia dispute a section of their boundary along the Danube river which has shifted westward since a demarcation agreement in 1945. Croatia currently claims that the boundary should be shifted to an older (in some cases now dry) bed of the river, thus placing some 11,000 acres of fertile land within Croatia. Serbia insists that the original choice of the Danube as the boundary was to allow both sides equal access to navigation and therefore the boundary should remain in the thalweg of the river itself.

Questions over definition of the boundary line within a river are just part of the possible problems that can arise when a transboundary water body is subject to inconsistent regulatory arrangements. Other possible disputes can arise in relation to water apportionment, water quality, navigation, infrastructural development, irrigation and flood warning/control. Examining the role law has played historically in resolving disputes over the definition of river boundary lines provides a unique insight into the those extenuating water management problems that emanate from this uneasy relationship between law and water. Drawing on Roman private property law and continuing through medieval and modern legal practice, common law jurisprudence and legal scholarship developed a distinction between the two processes of 'accretion' and 'avulsion' in order to mediate problems over a shifting river boundary. Although originally in relation to domestic property disputes, these processes have been subject to much debate in numerous interstate boundary decisions of the US Supreme Court and are described by many international legal and boundary scholars as general principles or rules of international law. However, looking at the legal heredity of accretion and avulsion, this paper will begin

² It could be argued that the dispute over the boundary in the Shatt al Arab river was one of the catalysts in the Iran-Iraq conflict of the 1980s. See Kaikobad, 1988.

by challenging the traditional presumption that these two processes have developed into accepted rules of public international law. In doing so, it will highlight the inherent paradox imbedded in the legal arguments that distinguish the two processes by examining the very different roles played by water in each.

These legal mechanisms of accretion and avulsion underpin an inherent risk that any activity along the banks of a boundary river or stream could prompt a change of legal jurisdiction. The risk of a shifting boundary has prompted neighbouring states to undertake measures that seek to prevent this eventuality; measures that in some cases have caused extreme environmental damage or which may simply exacerbate further disputes as rivers stray from the 'fixed' boundary. This chapter will suggest alternative ways of thinking about accretion and avulsion to encourage a reassessment of the legal relationship between river and boundary. In doing so, it will reveal how that tenuous relationship between river and boundary exposes an inherent 'territorial' bias rooted in the common law traditions that remains at the very heart of current debates in the development of international water law.

LEGAL HEREDITY OF ACCRETION AND AVULSION

In 1892, the US Supreme Court ruled on a boundary dispute between the neighbouring states of Iowa and Nebraska. The intra-state boundary was defined along the twisting Missouri river just outside Nebraska's main city of Omaha and both states disputed an area of land created by the movement of the river. The case centred on whether the action of the river should be deemed accretion or avulsion, and how those processes affected the position of the state boundary. In its decision, the Court was adamant that the two processes of accretion and avulsion were

universally recognized as correct where the boundaries of private property touch on streams, are in like manner recognized where the boundaries between states or nations are, by prescription or treaty, found in running water. Accretion, no matter to which side it adds ground, leaves the boundary still the center of the channel. Avulsion has no effect on the boundary, but leaves it in the center of the old channel (US, 1892).

Within its decision, the Supreme Court took great pains to explain the process of accretion and in its conclusion clearly stated that "the law of accretion controls on the Missouri river as elsewhere" and "the boundary, therefore, between Iowa and Nebraska is a varying line so far as affected by these changes of diminution and accretion in the mere washing of the waters of the stream" (US, 1892). However, the Supreme Court followed this lengthy discussion on accretion by ruling that in 1877 the Missouri river cut the 'neck' of an ox-bow/scroll bend in the river, effectively breaking off a point-bar from one river bank through what it considered to be an act of avulsion. Consequently, "by this selection of a new channel, the boundary was not changed, and it remained, as it was prior to the avulsion, the center line of the old channel" (US, 1892). The US Supreme Court has reiterated its understanding of the distinction between accretion and avulsion in numerous boundary cases between neighbouring US states, many of which share river boundaries. In the 1918 *Arkansas v. Tennessee* case, the Court again stipulated

[w]here running streams are the boundaries between states, the same rule applies as between private proprietors – namely that, when the bed and channel are changed by the natural and gradual processes known as erosion and accretion, the boundary follows the varying course of the stream; while if the stream, from any cause, natural or artificial, suddenly leaves its old bed and forms a new one by the process known as avulsion, the resulting change of channel works no change of boundary, which remains in the middle of the old channel, although no water may be flowing in it and irrespective of subsequent changes to the new channel (US, 1918).

Alluvio/accretion

Rooted in the Roman property law of alluvio/alluvion whereby "what the river adds to your field by alluvion, becomes yours by the law of nations", the process of accretion effectively shifts land/property/territory through what is often described as the 'natural' movement of alluvial material (Woolrych, 1853). The Roman legal tenet of alluvio/alluvion "or the imperceptible increase of one's land by the action of water" (Burdick, 2004) has echoed through European medieval jurisprudence and legal scholarship. The 13th century English jurist Henri de Bracton held that a river could add to one's land as a result of alluvion if that increase could not be perceived (Bracton, 1883); what the famed English common law treatise *Fleta* (probably based on Bracton's writings) at the time described as "the silent increase" (cited in Woolrych, 1853).

In the 1715 edition of his famed work *Of the Rights of War and Peace*, Hugo Grotius held that rivers used as jurisdictional boundaries between nations were within the category of 'Arcifinious' boundaries, described as "fit to keep the Enemy out, that is, Natural Boundaries" (Grotius, 1715). As a military buffer or barrier similar to mountains, Grotius describes this category of boundaries as:

such lands as are occupied or possessed, either as being vacant, or else by the power of the sword... in arcifinious lands, the river, by gradually altering its course, does also alter the borders of the territory; and whatsoever the river casts up to the opposite side, shall be under his jurisdiction, to whom the augmentation is made (Grotius, 1715).

Grotius recognised that there was a distinction between the boundaries of 'kingdoms' and those of private lands, but he argued that because a people chose their lands (property) to extend up to a river then the Roman rules of alluvion should apply (Grotius, 1715).

In his *Droit des Gens* of 1758, Emerich de Vattel (1787) followed Grotius' theories on rivers as the limits of state territory: "[i]f the country which borders on a river has no other limits than the river itself, it is in the number of territories that have natural or indetermined limits (*territoria arcifinia*)". Vattel also provides a similar description of the process of alluvion (accretion):³

[a]s soon as it is established that a river separates two territories, whether it remains common to the inhabitants on each of its banks, or whether each shares half of it; or whether, in short, it belongs entirely to one of them; their rights with respect to the river are no ways changed by the alluvion. If it happens then that by a natural effect of the current, one of the two territories receives an increase, while the river gains by little and little on the opposite bank; the river remains the natural boundary of the two territories, and each preserves the same rights upon it notwithstanding its gradually changing bed; so that, for instance, if it be divided in the middle, between the persons on each bank, that middle, though it changes place, will continue to be the line of separation between the two neighbours (Vattel, 1787).

Both Vattel and Grotius directly transferred the concept of alluvion/accretion as a concept for private property matters into the realm of territorial boundaries between neighbouring states/jurisdictions, based on their conception of rivers as part of 'arcifinious' or 'natural' military frontier zones that are "indetermined", natural, and flexible based on the application of force.

By the mid-19th century, the same description of alluvion (sometimes labelled accretion) appeared as standard in works on international law. In the Spanish jurist Don Antonio Riquélme's 1849 work *Elementos de Derecho Público Internacional* he described the process of alluvion as:

a change (that) is not total, but progressive only – that is to say, when the river does not abandon either state, but only gradually shifts its course by accretions – then it continues to still be the boundary, and the

³ It is unclear at exactly what point the original Latin term *alluvion* was superseded by accretion, but their respective definitions are functionally equivalent.

augmentation of territory which one country gains at the expense of the other is to be held by it as a new acquisition of property (1849).⁴

When Mexico and the US were drafting a new boundary treaty in 1856, the US Secretary of the Interior, Caleb Cushing (described as an "authority on international law"), commented that "the Rio Grande retained its function of an international boundary, notwithstanding changes brought about by accretion to one bank and the degradation of the other bank" (IBC, 1911). Secretary Cushing's comments proved highly influential in the 1911 Chamizal arbitration (examined in more detail below) and suggest that by the middle of the 19th century the concept of alluvion/accretion was recognised as a "well-known principle of international law" (IBC, 1911).

Within this juridical thinking, the validity of alluvion/accretion for causing a legal change of title or tenure is based on the slowness and imperceptibility of the change. All of the above descriptions emphasise terms such as 'gradual' or 'slow' or 'imperceptible'. Angell (1854) traced this key element of accretion at great length through English Common Law and the early decisions of the US Supreme Court. The Supreme Court itself distinguished explicitly this characteristic of accretion in the 1890 *Jefferis v. East Omaha Land Company* ruling (that was quoted at length in the 1892 *Nebraska v. Missouri* case) and refers to English common law jurisprudence:

[t]he doctrine of the English cases is that accretion is the addition to land coterminous with the water, which is formed so slowly that its progress cannot be perceived, and does not admit of the view that, in order to be accretion, the formation must be one not discernible by comparison at two distant points of time (US, 1890; 1892).

This was further reinforced in 1892 *Nebraska v. Missouri* by a quote from an even earlier Supreme Court decision in the 1875 *St. Clair v. Lovington* case "The test as to what is gradual and imperceptible in the sense of the rule is that, though the witness may see from time to time that progress has been made, they could not perceive it when the process was going on" (US, 1875; 1892). More recent legal scholars have described accretion as a 'lateral' movement, but still attribute the movement to the "gradual and continuous" action of the river (Bouchez, 1963; Prescott and Triggs, 2008).

Avulsion

If the movement of a river boundary (and the subsequent transfer of territory) through alluvion/accretion is due to its gradual and imperceptible nature, the opposing process of avulsion is defined as a sudden or perceptible change in a river's course. In the 13th century, Henri de Bracton wrote:

whatever a river has added to your land by alluvion, is acquired for you by the right of nations. But alluvion is a latent increase, and that is said to be added by alluvion, whatever is so added by degrees, that it cannot be perceived at what moment of time it is added for although you fix your eyesight upon it for a whole day, the infirmity of sight cannot appreciate such subtle increments... But if the increment is not latent, but apparent, the contrary will result; as for instance, the force of the stream has carried off some part of your meadow and joined it to the meadow of your neighbour, it is certain that it remains yours (Bracton, 1883).

Legal definitions of alluvion/accretion have always been matched by descriptions of avulsion as the exception, or the opposite. Dating from the mid-500s AD, the *Justinian Institutes*, that catalogued Roman legal tenets, remarked:

20. The law of all peoples makes yours any alluvial accretion which a river adds to your land. An alluvial accretion is one which goes on so gradually that you cannot tell at any one moment what is being added.

⁴ «Pero cuando el cambio no es total sino progresivo, es decir, cuando el rio no abandona el estado, sino que muda progresivamente su albeo á alguna distancia, entónces continúa conservándose como límite, y el aumento de territorio que lleva á uno con perjuicio del otro, no puede menos de conservarse como una nueva adquisición de propiedad.»

21. If the river's current rips away a piece of your land and carries it down to your neighbour, it clearly remains yours (Birks and McLeod, 1987).

Similarly, following his discourse on alluvion/accretion, Grotius (1715) concluded:

But this will only take place where the river has not changed its *channel*; for a river that separates governments, is not to be considered barely as water, but as water confined in such and such banks, and running in such and such a channel. Wherefore a little Addition, diminution, or alteration, does not at all change the thing itself, provided the *whole river* taken together remains usual. But if the *Looks* of the whole be intirely altered, 'tis then a quite different thing: and therefore as when any river is damm'd up above, and a passage made to convey the waters another way, 'tis no more the *same*, but a *new* river. So in case a river should force its way through some unusual passage, and entirely forsake its former channel, it is no more the river that it was before, but a *new* one.

Completing the partial quote from his commentary on the 1856 Mexico-US draft boundary treaty mentioned above, Cushing:

reported that the Rio Grande retained its function of an international boundary, notwithstanding changes brought about by accretion to one bank and the degradation of the other bank, but that, on the other hand, if the river deserted its original bed and forced for itself a new channel in another direction, then the nation through whose territory the river thus broke its way did not lose the land so separated; the international boundary in that case remaining in the middle of the deserted river bed (IBC, 1911).⁵

Avulsion is distinguished from accretion because it is an event that is sudden and causes a change that is perceptible, suggesting that it has both a temporal and spatial element. While older definitions tended to emphasise the perceptibility of the shift in avulsion (spatial), more recent definitions of avulsion tend to emphasise its rapidity (temporal). Representative of numerous 20th century international legal textbooks, O'Connell (1970) concludes quite succinctly: "[a] distinction is drawn between accretion and avulsion, the former being the slow and gradual deposit of soil by alluvion so as to modify the river channel imperceptibly, the latter being a sudden and violent shift in the channel so as to leave the old riverbed dry". In boundary studies, Prescott and Triggs (2008) indicate that "sovereignty will remain as it was if the change arises rapidly by an avulsion. Avulsion refers to the violent change in territory through a flood or creation of new islands".⁶ For an event to be avulsion, and therefore not affect the boundary, it must be sudden and involve an area of land that has visibly changed from one side of the river to the other.

ARE ACCRETION AND AVULSION PRINCIPLES OF INTERNATIONAL LAW?

As a non-constitutional arrangement, international law develops very slowly from a number of sources, outlined perhaps most clearly in Article 38 of the Statue of the International Court of Justice (ICJ). Major international treaties and conventions provide the most explicit source of law that is binding on States who are parties. However, the wording of these conventions is usually kept fairly general or ambiguous given the large number of competing interests involved. International law also develops from 'customary' law that is created by distinct patterns of state practice that emerge consistently within individual bilateral/multilateral treaties. Customary international law has a strict set of parameters, requiring near universal practice within interstate agreements and the element of *opinion juris*, or the notion implied by the parties that they believed the provisions of an agreement reflected their legal obligations. These are considered the two main sources from which international law develops.

⁵ Cushing's comments greatly influenced the decision in the Chamizal arbitration and subsequent decisions of the US Supreme Court.

⁶ The reference to the creation of new islands is in relation to the formation of new islands in maritime areas through volcanic activity, rather than directly in relation to river islands.

The Statute of the ICJ also specifies a third major source of international law as "general principles of law, recognised by civilised nations". Shaw (2003) notes that this controversial source is of "fairly limited scope" and was inserted effectively to deal with any gaps in the two main sources of international law, international conventions and customary law. According to Brownlie (1998)⁷, the 'general principles' clause allows international courts to bring in elements of domestic jurisprudence largely to deal with procedural elements (for courts and tribunals) that have not been explicitly defined in the two primary sources. This clause also effectively overlaps with the first of two subsidiary sources of international law, domestic legislation/practice and the comments from preeminent scholars.⁸ In this regard, it is certainly possible for the reasoning of the US Supreme Court on accretion and avulsion, as well as their common appearance in so many international legal textbooks, to influence the development of international law.

However, these sources are clearly secondary in nature and are more likely to meet the requirements of international law only if they affected a multilateral convention or subsequent customary practice. Plus, it is curious to note that the US Supreme Court has applied accretion and avulsion because it assumed these practices *a posteriori* to be accepted as general principles of international law. The best barometer for understanding if accretion and avulsion have been accepted as principles of international law, as so widely noted in secondary sources, is international jurisprudence. While the decisions of international courts and tribunals do not create international law, they are indicative of what practices have met the high threshold for becoming international law.

The 1911 Chamizal arbitration

The decisions of the US Supreme Court and contemporary international legal and boundary scholars may have long described the actions of accretion and avulsion as accepted principles of international law,⁹ but the validity of this claim may not be as clear-cut as it seems. It is obvious that the legal heredity is drawn almost exclusively from domestic jurisprudence, which Bouchez (1963) advises: "Although decisions of national courts with regard to internal boundaries are not always irrelevant for international boundary rivers, there is no doubt that these decisions as such cannot be considered as standards for the practice of States concerning international boundaries". The only international arbitral award or adjudicated judgment ever to comment in any depth on the two processes was the 1911 Mexico-US Chamizal arbitration concerning a disputed area of land formed by the movement of the Rio Grande. The tribunal established to resolve the dispute was a quasi-judicial body made up of the two existing commissioners on the Mexico-US International Boundary Commission (IBC) with the addition of a Canadian appointee who effectively acted as the deciding arbitrator.¹⁰

In its 1911 decision, the tribunal referred to accretion and avulsion as "well known principles of international law", but was only able to cite domestic US case law. Intriguingly, both Mexico and the US in the Chamizal case agreed that the legal actions of accretions and avulsion were "well-known principles of international law" because the Rio Grande was chosen as an "arcifinious" boundary (IBC, 1911). In this explanation of the decision, the tribunal made a direct link with Grotius' arguments in *Of the Rights of War and Peace*. Although the tribunal made no specific reference to Grotius' texts, it outlined precisely the same distinction made by Grotius between the boundaries of arcifinious lands and those lands "established by fixed measurements" (IBC, 1911). A seemingly minor point, but as the only

⁷ In a subject such as the acquisition of territory (which would include accretion and avulsion), Brownlie (1998) indicates that the decisions of international tribunals "tend not to reflect domestic derivatives on the subject" suggesting that such a practice has done "more harm than good in this sphere".

⁸ Article 38, paragraph d. Statute of the ICJ.

⁹ Shaw (2003) refers to accretion as a "special" and "general rule" of international law. Among many other possible citations included are Cukwurah, 1967 and Sinh, 2009.

¹⁰ It was not an 'arbitration' in the classic sense of two states appointing a formal tribunal of ad hoc judges, nor was it an adjudication by a sitting international court. For more information see IBC, 1911.

international case to remark directly on accretion and avulsion, the 1911 Chamizal decision established the link from Roman property practice to 'presumed' international law through Grotius directly.

More recent international jurisprudence

River boundaries have formed part of numerous disputed boundary cases submitted to international adjudication or arbitration, but modern international courts and tribunals (post-1945) have carefully avoided making any substantive comment on the legality of accretion and avulsion. Even in the two recent cases relating directly to river boundary definition, Botswana/Namibia and Benin/Niger, the International Court of Justice (ICJ) made no direct mention of accretion or avulsion in its decisions. Since the Chamizal arbitration, the closest any international court or tribunal has come to voicing an opinion on accretion and avulsion was the Chamber of the ICJ's 1992 and 2003 decisions in relation to the Land and Maritime boundary case between El Salvador and Honduras. Concerning the western extremity of the boundary, El Salvador originally claimed that the boundary had been unaffected by an avulsion event on the Goascoran river in 1821 and therefore remained fixed in an older bed of the river. In its initial 1992 decision, the Chamber found that El Salvador had not produced evidence to specify the exact date and event when the avulsion took place and avoided drawing any conclusions about the legal validity of accretion and avulsion by using ambiguous language:

were the Chamber satisfied that the river's course was earlier so radically different from its present one, then an avulsion might reasonably be inferred. While the area is low and swampy, so that different channels might well receive different proportions of the total run-off at different times, there does not seem to be a possibility of the change having occurred slowly by erosion and accretion, to which, as El Salvador concedes, different legal rules may apply (ICJ, 1992).

The Chamber also adjudged that as the alleged avulsion took place in 1821 (prior to both states' independence) its effect on the boundary would be governed by Spanish colonial law rather than international law. Again, the Chamber deftly avoided any comment on the validity of avulsion in international law:

On this basis, what international law may have to say, on the question of the shifting of rivers which form frontiers, becomes irrelevant: the problem is mainly one of Spanish colonial law. In fact the alleged rule originated in Roman law as a rule applicable to private property, not as a rule relating to rivers as boundaries of jurisdiction and administration. Furthermore, whatever its status in international law – a matter to be determined, if necessary, by the Chamber, on the basis of the principle of *jura novit curia* – its possible application to the boundaries of Spanish colonial provinces would require to be proved (ICJ, 1992).

Ten years later, El Salvador asked the Chamber to revise its decision, claiming to possess new evidence that pinpointed the exact date of avulsion. Discounting the application for revision, the Chamber again dodged the issue of avulsion by rejecting the new evidence and indicating that its original decision had not been made on the avulsion argument in the first place: "Even if avulsion were now proved, and even if its legal consequences were those inferred by El Salvador, findings to that effect would provide no basis for calling into question the decision taken by the Chamber in 1992 on wholly different grounds" (ICJ, 2003). The careful wording of both decisions indicates that the ICJ will deal with the possible legal validity of avulsion on a case-by-case basis thereby eroding any notion that avulsion is an accepted and mandatory principle of international law. Instead it is a rule that may or may not be applied by respective courts or tribunals at their discretion.

In some boundary cases, international courts and tribunals have actively ignored the complexities of defining a fixed line in complex river systems. In its 2003 Demarcation instructions, the Eritrea-Ethiopia Boundary Commission (EEBC) did specify that it would define the boundary along the 'middle of the main channel' of several river sections and specified that the boundary "will move in accordance with any change in position of the middle of the main channel" (EEBC, 2003). From the special section

dedicated to river boundary sections within its original 2002 decision, the EEBC indicated that it had specified the 'moveable' nature of the river boundary sections due to comments and consensus from the two parties. The EEBC had not made this explicit as an application of a general legal principle (EEBC, 2002). Due to later intransigence from both parties the EEBC was never able to demarcate the boundary on the ground and instead resorted to 'demarcating' the boundary on large scale orthophoto maps by pinpointing the position of boundary pillars. However, in this highly precise 'virtual demarcation' the EEBC failed to define the main channel in any of the riverine sections and instead left it to the neighbouring states to define where the boundary would run in the respective rivers.¹¹

In the 2005 Benin-Niger case, the Chamber of the ICJ simply defined the boundary through sections of the Niger and Mekrou rivers along a line defined by fixed coordinates. It made no comment on what would happen when those rivers move from this prescribed list of fixed coordinates. The two states had asked the Chamber to define their boundary through the two rivers as they existed at their respective dates of independence (August 1960). The ICJ Chamber recognised that the courses of the Niger and Mekrou may have changed on the ground since that time but noted that the banks of the Niger in particular had remained relatively stable over the course of three surveys from 1926 to 1975 (ICJ, 2005). Nevertheless, in reviewing the decision, Spadi (2005) concluded "The judgement suggests that the line existing at the time of independence would have prevailed (and indeed the Chamber seemed to have applied exactly this criterion to determine the status of the island of Dolé Barou)".

State practice and customary international law

Prescott and Triggs (2008) believe that the ICJ has been intentionally ambiguous in its treatment of river boundaries "so that, as the relative importance of the river, its navigability and resource potential become available, more precise delineations can be made by the riparian states". Given that there is no international convention including the practices of accretion and avulsion, and the current international jurisprudence has remained ambiguous, customary state practice is the last source that would indicate if they can be considered general principles or rules of international law.¹² While the Chamizal Award defined them as accepted principles of international law, quite incongruously it also indicated that there was very little consistency in the actual boundary treaties/agreements between states instructing governments on what happens to the boundary when a river shifts (IBC, 1911).

Some agreements, like the Chamizal Award, specify that the boundary would conform to the principles of accretion and avulsion. Others specify that a boundary remains fixed at a specific moment in time irrespective of subsequent river movement caused by either accretion or avulsion.¹³ Still others specify that the boundary remains with the river whether its course is affected in the future by accretion or avulsion (Lauterpacht, 1960).¹⁴ However, the majority of international boundary treaties (particularly older and often colonial boundary treaties) are silent on what should happen to the boundary when a river moves. This inconsistency of state practice and the ambiguity of international jurisprudence do not suggest that the processes of accretion or avulsion should not be conveyed as accepted principles of international law. Certainly, as mechanisms that have been used within domestic

¹¹ Given the continued acrimony between the two states it is highly unlikely that the two governments will agree on the boundary through the river sections in the near future.

¹² There may be a legal distinction between 'general principles' and 'rules' of law, but it is likely that many policy makers would interpret the two terms as interchangeable.

¹³ See for example, Article VIII of the 4 October 1960 Burma-China boundary treaty (reproduced in Prescott, 1975).

¹⁴ See also 1843 Belgium-Netherlands boundary agreement on the river Meuse and the 1934 Anglo-Siam boundary treaty that defined a section of the Burma-Thailand boundary along "the deep water channel of the River Pakchan, wherever it might be, should always be accepted as the boundary". This is a volte-face from the current 'fixed line' approach taken by Myanmar and Thailand on the Mae Sai river section of their boundary, albeit the fact that the two rivers have different geographic situations. See also the 1911 Anglo-Italian boundary agreement on the mouth of the Juba river and the 1921 Denmark-Germany boundary agreement.

jurisprudence, they may be considered by neighbouring states as one option that has been used historically for addressing the movement of river boundaries and could be applied through agreement. However, without being defined in international convention or consistently used in state practice, accretion and avulsion clearly have not achieved the high threshold for becoming mandatory rules of international law.

RELATIONSHIP BETWEEN LAW AND WATER IN ACCRETION/AVULSION: PARADOXICAL LOGIC

By simply defining the actions of accretion and avulsion and accepting them as general principles of international law with little justification, legal and political scholars have not critically assessed their underlying core concepts that remain unchanged from the Roman legal code as interpreted by Grotius. The distinction between the two in their effects on river boundaries presents a unique perspective on the larger relationship between international law and water. Any action of a boundary river that cannot be visually perceived is considered 'natural' under the law, while any event that causes a visually perceptible change in the river course prompts a complete change in the legal status of the river. Working imperceptibly under the process of accretion, the water in a boundary river is held to be working in its 'normal' state; collecting and depositing alluvium. The assumption imbedded in the alluvio/accretion principle has been that alluvium is taken from one bank and deposited on the other, which is why 'accretion' is listed in most international law texts as a method for states to legally acquire sovereignty over territory.¹⁵ In this respect, water serves, quite literally, as a vehicle through which the material of state territorial sovereignty (land itself) is transferred. Indeed, Grotius justifies the process of accretion by emphasising the 'naturalness' of a river. In choosing a river, it was the intention of the two neighbouring states "that this river being in the middle between 'em, should, as a *natural boundary*, part'em from one another" (Grotius, 1715). The emphasis on the 'naturalness' of alluvion/accretion was also echoed by Vattel (1787): "The one loses, 'tis true, while the other gains; but nature alone produces this change".

Yet when it comes to avulsion, the water in a boundary river is effectively discounted and the boundary remains fixed to the 'original' bed of the river even if this is now dry. Although it may be caused by 'natural' forces such as flooding, the event of avulsion is held by Grotius to create a 'new' river under the law, with the old bed of the river retaining the boundary line. The implication being that water in the river behaves 'unnaturally' in an event of avulsion, as opposed to the 'naturalness' of accretion. The legal arguments describing accretion and avulsion seem completely incongruous. Bouchez (1963) describes both accretion and avulsion as lateral movements of a river, but he specifies that avulsion is "non-continuous as regards space and instantaneous as regards time". Aside from the sheer size of the land being transferred and the speed of the bed shift, both processes are usually caused by the natural movement of water; albeit often influenced by man-made infrastructure. It seems odd that while a sweeping river meander may be created by accretion, gradually moving a boundary up to several kilometres on the physical landscape, the 'perceptible' and rapid action of the river cutting through the 'neck' of the meander is held to be completely different under law.

The core concepts justifying accretion seem logically sound while it is the event of avulsion that causes such a dramatic change in the legal relationship between river and boundary. Vattel (1787) made it clear that avulsion must be considered "an accident merely natural". However, the logic behind the legal consequences of accretion as being 'natural' suggests that the opposite (avulsion) is inherently 'unnatural' because it is an event that occurs quickly and involves a discernible portion of land. From the perspective of the 'losing' property owner or state, it would be traumatic to watch a significant tract of land that one may have farmed for generations being divided suddenly by a river and placed in a

¹⁵ Interestingly, river modelling suggests that in some river patterns alluvium is actually eroded from one bank and deposited downstream along that same bank. In this case, accretion is not taking land from one side to give to the other, but is instead simply rearranging the territory of the riparian states on their respective banks (Dietrich, 1987).

neighbouring jurisdiction. For state governments, the 'loss' of a sizeable piece of territory may cause a deep nationalist reaction that can place greater political value to the tract of land than it may have had previously.¹⁶ This has been raised in critiques of the Botswana-Namibia case before the ICJ over the Kasikili/Sedudu island in the Chobe river (Gathii, 2002).

One way to re-conceive avulsion in the context of river boundary definition is to specify more clearly the element of its 'unnaturalness'. While some forms of flooding have sudden and visually perceptible effects on the bed of a river, they are still natural functions of a river in the physical landscape. An event of avulsion may be abnormal or remarkable, but it cannot always be construed as 'unnatural'. What are more clearly 'unnatural' effects on a river are any man-made actions that might alter the river flow. Dams or unilateral projects for erosion control (e.g. enforcement of banks, etc) can have both a perceptible and/or imperceptible effect on the movement of a river through the natural landscape. Unilateral acts of erosion control have been the catalyst for disputes. In 2005-06, India and Bangladesh undertook tit-for-tat efforts to reinforce their respective banks of a boundary river, with each side accusing the other of attempting to acquire land through forced accretion (Hindustan Times, 2005, 2006; Sharma, 2005).

In many ways, revising the notion of avulsion to apply only to movements of the river through man-made events, would return the debate to the heart theories of Grotius and Vattel about the 'naturalness' of arcifinous boundaries. If accretion was deemed to cover all natural movements of a river system, irrespective of the speed of change or size of land involved, it would conform more easily to the agreed selection of a natural feature as a territorial boundary providing both neighbouring states with a physical marker for the boundary as well as joint access to the river as a shared resource. This is by no means an easy proposition considering that there are very few rivers around the world not subject to some form of man-made intervention. Likewise, legally defining what constitutes an exclusively 'natural' effect on a river system with pre-existing artificial infrastructure would be extremely difficult to determine. Perhaps worthy of further discourse, this difficulty itself highlights that underlying paradox of drawing a rigid legal distinction between naturalness and unnaturalness in river movement.

'FIXING' A RIVER BOUNDARY

Without accretion and avulsion being determinist rules of international law, neighbouring states are able to decide appropriate mechanisms to deal with the risk of river boundary movement as they see fit. Nevertheless, the reference to accretion and avulsion in so many influential texts as general rules or principles of international law may have influenced, and continue to influence, state practice. Accretion and avulsion pose a balance of risks for neighbouring states when it comes to river boundaries. By erring towards accretion, neighbouring states risk losing land territory (boundary) but ensure continuous access to the water resource (river). By erring towards avulsion, neighbouring states indicate that the risk of losing territory is greater than the risk of losing access to the water. There is significant state practice that suggests many states have been more influenced by fears of the latter.

Almost a century after the 1892 decision, Iowa and Nebraska returned to the US Supreme Court in 1972 again with a dispute over their boundary in the Missouri river. The two states had tried to fix the boundary in an artificially "stabilized channel" in the 1940s which they justified in a 1940 interstate agreement (or compact) by stating:

the fickle Missouri river... refused to be bound by the Supreme Court decree (of 1892). In the past thirty-five years, the river has changed its course so often that it has proved impossible to apply the court

¹⁶ While land may be perceived to have been 'lost', it is certainly possible for states to arrange for the retention of property rights within the new state jurisdiction.

decision in all cases, since it is difficult to determine whether the channel of the river has changed by 'the law of accretion' or 'that of avulsion' (cited in US, 1972).

International state practice has also shown several efforts to physically 'fix' a river boundary in confined banks. After the 1911 Chamizal Award, Mexico and the USA undertook a monumental engineering project to 'canalize' the Rio Grande in the vicinity of El Paso/Juarez during the 1930s, confining the river to a concrete-lined channel. The canalisation of the Rio Grande has had significant environmental impacts that have negatively affected downstream flow, particularly in dry years. Recently, Guatemala and Mexico have made numerous failed attempts to reinforce the banks of the Suchiate river so it would coincide with a defined boundary line (series of coordinates) irrespective of the movement of the river.

The ease and affordability of current GPS survey techniques have also made it possible to 'fix' a river boundary simply through a defined set of coordinates. It has already been mentioned that the ICJ used this method in its Benin/Niger decision, simply identifying the boundary along a series of fixed points in the Niger river section. In a joint survey of the Chobe river boundary following the 1999 ICJ decision in the dispute over Kasikili/Sedudu island, technicians from Botswana and Namibia ran a course of GPS 'way-points' along what they agreed to be the main channel (Van Langenhove, 2008). This produced a long list of coordinates which were submitted to the respective governments and ratified as defining the 'boundary' irrespective of future river movements (Van Langenhove, 2008). Through personal correspondence with boundary commissioners and survey officials around the world, the author knows of many other initiatives to survey and fix international river boundaries using the same methodology. While these sets of surveyed points provide a strong degree of legal and geographic clarity in defining the boundary line at a fixed moment in time, it is inevitable that the boundary river will stray from the line created by fixed coordinates and all too often boundary treaties fail to include provisions for periodic resurvey of river sections.

More fundamentally, like the legal definition of avulsion, these attempts to 'fix' a river boundary, either by physically confining the riverbed or defining a boundary through a series of fixed coordinates, are both efforts to effectively remove water from the border landscape. They indicate that the presence of water makes a boundary river unstable, forceful and risky; incompatible with the legal fiction of a fixed boundary line that would prefer the stability of land over the dynamism of water. Within the lengthy legal heredity of accretion and avulsion, the 'fixing' of a permanent river boundary line is totally incongruous with the spirit of accretion and instead suggests that current state practice gives pre-eminence to avulsion. O'Connell (1970) points to the US Supreme Court decision in the 1940 boundary case between Arkansas and Tennessee which made it clear that within US federal law, the movement of the boundary by accretion "yields to the doctrine that a boundary is unaltered by an avulsion".

RIVER AND BOUNDARY, WATER AND LAW: FUNDAMENTAL PROBLEMS

In his still-influential guidebook on international boundary-making, the American geographer Stephen Jones gave the traditional descriptions of accretion and avulsion. However, he was clearly uncomfortable with them and concluded:

the doctrine that the boundary follows only accretionary changes is not always a good one. A meandering river on a flood plain will, given time, shift avulsively in every part of its course, unless restrained by engineering works. If the boundary remains unchanged, ultimately it will lose all relationship to the actual river (Jones, 1945).

Breaking that bond between river and boundary clearly exposes the core 'land bias' that remains at the heart of international law. As much as interstate disputes appear to concern the position of a boundary within a river or stream, the true subject of the dispute is often land territory, in the form of river

islands or areas of land 'created', 'eroded' or 'shifted' by the movement of the river. In the two most recent international cases concerning river boundary disputes brought before the ICJ, Botswana/Namibia in 1999 and Benin/Niger in 2005, the primary dispute concerned islands within the boundary rivers, rather than any division of the water itself. Botswana and Namibia asked the ICJ to decide which of the two channels of the Chobe river running to the north and to the south of Kasikili/Sedudu island was referred to in the 1890 Anglo-German boundary agreement as the 'main channel' (ICJ, 1999). So while the question referred to the ICJ concerned the boundary in the river, the real dispute was over the land territory of Kasikili/Sedudu island. The Benin/Niger case involved delimitation of the full length of their boundary within the Mekrou and Niger rivers but the core of the dispute involved several islands within the Niger river, particularly Lété island (ICJ, 2005). Three recent cases brought before the ICJ have dealt with other issues of transboundary water management in boundary rivers, including the Argentina-Uruguay Pulp Mills case (ICJ, 2010), the Costa Rica-Nicaragua case concerning Navigation in the San Jose river (ICJ, 2009) and the Hungary-Slovakia Gabčíkovo-Nagymaros Project case (ICJ, 1997). However, these cases have centred on existing commitments made by riparian states under specific treaties and likewise the decisions have made no appreciable contribution to the general development of international transboundary water law.¹⁷

Preferring the risk of losing territory over the risk of losing access to transboundary water, 'fixing' a river boundary reinforces the irrelevance of water as a transboundary responsibility, promoting a Hegelian sense of exclusive rights over shared responsibilities, and again illustrates a 'land bias' inherent within international law. Beyond river boundary definition, these underlying characteristics of international law can be seen to be stymieing the development of transboundary water law. The 1997 UN Convention on the Law of Non-Navigational Uses of International Watercourses (UN Watercourses Convention) is at the vanguard of this development although not yet in force due to an insufficient number of states having ratified it (Rieu-Clarke and Rocha Loures, 2009). While the Convention provides some degree of clarification of the rather nebulous 'equitable usage/significant harm' balance that has emerged as the key aspect of transboundary water law, it has been criticised for offering "little practical guidelines for (water) allocations – the heart of most water conflicts" (Priscoli and Wolf, 2009). More practically, while encouraging states to cooperate on the usage of transboundary waters, the Convention indicates in Article 8(1) that this should be undertaken "on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse". Under the UN Watercourses Convention, states may have – at a minimum – an obligation to share transboundary water in an equitable and reasonable manner, but the first two caveats in Article 8(1) recall international law's fundamental land-bias.

While they may not have achieved the status of international law, the processes of accretion and avulsion are clearly influencing state practice in attempting to 'fix' river boundaries. They provoke suspicion of water in boundary rivers as a risk to the stability of fixed territory. The paradox rooted in their legal heredity is illustrative of the centuries' old problematic relationship between law and water in Western legal traditions that can be seen in this slow development of international water law, effectively kicking the complex issues of transboundary water management into the political sphere. Turning transboundary water management into a political rather than a legal issue can be beneficial, as it provides state governments with more flexibility in dealing with the different contexts of their transboundary water bodies. However, it also makes such initiatives totally subject to the political will of neighbouring states, which by turnabout makes them subject again to territorial integrity. Perhaps by

¹⁷ In the Gabčíkovo-Nagymaros Project case which centred on existing treaty commitments, the ICJ "essentially told the parties (Hungary and Slovakia) that they each had committed errors and they needed to negotiate outside of the court among themselves for resolution" (Delli Priscoli and Wolf, 2009). In the Argentina v. Uruguay case, Argentina argued that under a 1975 treaty, both Argentina and Uruguay had to approve any projects that could "cause significant damage" to water quality on the Uruguay river and felt that Uruguay's two new pulp mills had violated their agreed obligations under the treaty. The ICJ ruled that there was no significant damage to the river that could be directly attributed to the mills and therefore it was found to be a violation of Uruguay's substantive obligations under the 1975 treaty (ICJ, 2010).

rethinking the element of 'naturalness' in the relationship between a river and its accompanying boundary line is simply one very small step towards opening up more critical dialogue about the relationship between law and water.

ACKNOWLEDGEMENTS

Many thanks to Martin Pratt, Stuart Elden and the two anonymous referees for their comments.

REFERENCES

- Angell, J.K. 1854. *A treatise on the law of watercourses, Fifth edition*. Boston: Little, Brown and Co.
- Arsenault, A. 2006. Canada/United States International Boundary Commission. Paper presented at International Symposium on Land and River Boundaries Demarcation and Maintenance in Support of Borderland Development, Bangkok, Thailand, 7-11 November 2006.
- Birks, P. and McLeod, G. (Trans). 1987. *Justinian's institutes, Book II*. London: Duckworth.
- Boggs, S.W. 1940. *International boundaries: A study of boundary functions and problems*. New York: Columbia University Press.
- Bouchez, L.J. 1963. The fixing of boundaries in international boundary rivers. *International and Comparative Law Quarterly* 12(3): 789-817.
- Bracton, H. de. 1883. *Legibus et Consuetudinibus Angliae*. Edited by T. Twiss. London: Longman & Co.
- Brownlie, I. 1998. *Principles of public international law Fifth edition*. Oxford: Oxford University Press.
- Burdick, W.L. 2004. *The principles of Roman law and their relation to modern law*. Clark, NJ: The Lawbook Exchange.
- Cukwurah, A.O. 1967. *The settlement of boundary disputes in international law*. Manchester: Manchester University Press.
- Delli Priscoli, J. and Wolf, A. 2009. *Managing and transforming water conflicts*. Cambridge: Cambridge University Press.
- Dietrich, W.E. 1987. Mechanics of flow and sediment transport in river bends. In Richards, K. (Ed), *River channels: Environment and process*, pp. 179-228. Oxford: Basil Blackwell.
- Donaldson, J.W. 2009. Where rivers and boundaries meet: Building the international river boundaries database. *Water Policy* 11(5): 629-644.
- EEBC (Eritrea-Ethiopia Boundary Commission). 2003. *Demarcation instructions of 22 August 2003*. www.pca-cpa.org/showpage.asp?pag_id=1150 (accessed 23 May 2011)
- EEBC. 2002. *Decision on delimitation of the border between Eritrea and Ethiopia of 13 April 2002*. Chapter 7. www.pca-cpa.org/showpage.asp?pag_id=1150 (accessed 23 May 2011)
- Gathii, J.T. 2002. Geographical Hegelianism in territorial disputes involving non-European land relations: An analysis of the case concerning Kasikili/Sedudu. *Leiden Journal of International Law* 15: 581-622.
- Grotius, H. 1715. *Of the rights of war and peace (three volumes)*. London: Printed for D. Brown, T. Ward and W. Meares. Available online at: Gale, Eighteenth Century Collections Online <http://find.galegroup.com/ecco/> (accessed 23 May 2011)
- Hindustan Times. 2005. *India to resume embankment construction on Bangladesh border*. 22 August 2005. www.hindustantimes.com (via Factiva)
- Hindustan Times. 2006. *Border skirmish casts shadow on Khaleda visit*. 23 March 2006. www.hindustantimes.com (via Factiva)
- IBC (International Boundary Commission). 1911. Award before the International Boundary Commission, enlarged by the Convention between the United States and Mexico of June 24, 1910, In the matter of the international title to the Chamizal tract – section Fixed Line Theory. *American Journal of International Law* 5(3): 791-805. Hereafter 'Chamizal Award'.
- IBWC (International Boundaries and Water Commission). 1933. Convention on between the United States of America and Mexico concerning Rectification of the Rio Grande, 1 February 1933. www.ibwc.gov (accessed 23 May 2011)
- ICJ (International Court of Justice). 1992. Case concerning the land, island and maritime frontier dispute (El Salvador/Honduras, Nicaragua intervening) judgment of 11 September 1992. General List No. 75: 351.

- ICJ. 1997. Case concerning the Gabčíkovo-Nagymaros Project (Hungary/Slovakia) Judgment of 25 September 1997. ICJ Reports 1997.
- ICJ. 1999. Case concerning Kasikili/Sedudu island (Botswana/Namibia) Judgment of 13 December 1999. ICJ Reports 1999.
- ICJ. 2003. Application for revision of the judgment of 11 September 1992 in the Case concerning the Land, Island and Maritime frontier dispute (El Salvador/Honduras, Nicaragua intervening) (El Salvador v. Nicaragua) judgment of 18 December 2003. ICJ Reports 2003.
- ICJ. 2005. Case concerning the frontier dispute (Benin/Niger) judgment of 12 July 2005. ICJ Reports 2005.
- ICJ. 2009. Case concerning the dispute regarding navigational and related rights (Costa Rica v. Nicaragua) judgment of 13 July 2009. General List No. 133.
- ICJ. 2010. Case concerning pulp mills on the river Uruguay (Argentina v. Uruguay) Judgment of 20 April 2010. General List No. 135.
- IRBD (International River Boundaries Database), 2008. International Boundaries Research Unit, Durham University, www.dur.ac.uk/ibru/resources/irbd/boundary/?boundary_id=266 (accessed 23 May 2011)
- Jones, S.B. 1945. *Boundary-making: A guidebook for statesmen, treaty editors and boundary commissioners*. Washington: Carnegie Endowment for International Peace.
- Kaikobad, K.H. 1988. *The Shatt-al-Arab boundary question: A legal reappraisal*. Oxford: Clarendon Press.
- Lauterpacht, E. 1960. River boundaries: Legal aspects of the Shatt-al-Arab frontier. *The International and Comparative Law Quarterly* 9(2): 208-236.
- O'Connell, D.P. 1970. *International law, second edition volume I*. London: Stevens and Sons.
- Prescott, J.R.V. 1975. *Map of mainland Asia by treaty*. Melbourne: Melbourne University Press.
- Prescott, J.R.V. and Triggs, G. 2008. *International frontiers and boundaries: Law, politics and geography*. The Hague: Martinus Nijhoff Publishers.
- Rieu-Clarke, A. and Rocha Loures, F. 2009. Still not in force: Should states support the 1997 UN Watercourses Convention? *Review of European Community & International Environmental Law* 18(2): 185-197.
- Riquélme, A. 1849. *Elementos de derecho público internacional tomo I*. Madrid: Imprenta de D. Santiago Saunaque.
- Sharma, A. 2005. *India, Bangladesh border guards fire across shifting river border for second straight day* (19 August 2005). New Delhi: Associated Press Newswires.
- Shaw, M.N. 2003. *International law fifth edition*. Cambridge: Cambridge University Press.
- Sinh, S.A. 2009. River boundary delimitation and the resolution of the Sir Creek dispute between Pakistan and India. *Vermont Law Review* 34(2): 357-413.
- Spadi, F. 2005. The ICJ judgment in the Benin-Niger border dispute: The interplay of titles and 'effectivites' under the uti possidetis juris principle. *Leiden Journal of International Law* 18(4): 777-794.
- US (United States). 1875. County of St. Clair v. Lovington. 90 US (23 Wall). 46.
- US. 1890. Jefferis v. East Omaha Land Company. 134 US 178-198.
- US. 1892. Nebraska v. Iowa. 143 U.S. 359-370.
- US. 1918. Arkansas v. Tennessee. 246 U.S. 158-177.
- US. 1972. Nebraska v. Iowa. 406 US 117-126.
- Van Langenhove, G. 2008. Delimitation of the Botswana-Namibia boundary in the Chobe river. Paper presented at International Boundaries Research Unit Workshop No. 35, River boundaries: Practicalities and solutions, Durham, UK, 7-9 July 2008.
- Vattel, E. de. 1787. *Law of nations: or Principles of the Law of Nature: applied to the Conduct and Affairs of Nations and Sovereigns, Book I*. translated from French. Dublin: Printed for Messrs. Baerry and Rogers. Available online at: Gale, Eighteenth Century Collections Online <http://find.galegroup.com/ecco/> (accessed 23 May 2011)
- Woolrych, H.W. 1853. *A treatise of the law of waters; including the law relating to rights in the sea*. Philadelphia: T. & J.W. Johnson.

THIS ARTICLE IS DISTRIBUTED UNDER THE TERMS OF THE CREATIVE COMMONS ATTRIBUTION-NONCOMMERCIAL-SHAREALIKE LICENSE WHICH PERMITS ANY NON COMMERCIAL USE, DISTRIBUTION, AND REPRODUCTION IN ANY MEDIUM, PROVIDED THE ORIGINAL AUTHOR(S) AND SOURCE ARE CREDITED. SEE [HTTP://creativecommons.org/licenses/by-nc-sa/3.0/legalcode](http://creativecommons.org/licenses/by-nc-sa/3.0/legalcode)