

Impact case study (REF3)

Institution: University of Nottingham		
Unit of Assessment: 14 Geography and Environmental Studies		
Title of case study: Applying Geographical Science to settle a 160 year-old border dispute and clarify international environmental law: <i>Costa Rica v Nicaragua</i> , International Court of Justice		
Period when the underpinning research was undertaken: 2002 - 2015		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Colin R. Thorne	Role(s) (e.g. job title): Professor of Physical Geography	Period(s) employed by submitting HEI: 1990-present
Period when the claimed impact occurred: 2015-2018		
Is this case study continued from a case study submitted in 2014? N		
<p>1. Summary of the impact</p> <p>Professor Thorne's research provided crucial evidence that underpinned rulings by the International Court of Justice (ICJ), leading to peaceful resolution of a 160-year border dispute along the largest river in Central America. Thorne was nominated by Costa Rica as an independent expert witness in their border dispute with Nicaragua and his research (Research 4-7 (R4-7)) was delivered as critically important evidence in publicly-accessible, sole-authored reports and oral testimony under cross-examination. Resolution of the dispute ensures the future security of Costa Rica's northern border. The ICJ ruling also demonstrated the capacity of nations to protect their sovereign territory by rule of law, rather than force of arms. The case, supported by Thorne's research, set a precedent in International Law. It was the first case in the history of the ICJ in which damages were awarded to a nation state in restitution of the environmental harm inflicted by another nation state; Costa Rica was awarded USD378,890.59.</p>		
<p>2. Underpinning research</p> <p>Professor Colin Thorne was nominated by Costa Rica and accepted by the ICJ as an independent expert witness in the border dispute between Costa Rica and Nicaragua owing to his international reputation as a globally-leading physical geographer and fluvial geomorphologist, and as a result of his record of research and consultancy studies of large rivers on six continents (R1-3). Thorne was appointed to establish the technical and scientific validity of allegations made by both countries in relation to geographical issues within the border dispute and to evaluate evidence provided by other expert witnesses. The research that prompted Thorne's nomination as an expert witness was undertaken prior to 2011 (R1-3). The research undertaken in his role as an expert witness for the ICJ was carried out between 2011 and 2015 (R4-7).</p> <p>In October 2010, Nicaragua's army occupied part of Costa Rica and oversaw work intended to change the course of the Río San Juan, which marks the border. The occupation relates to a border dispute dating back to the <i>Treaty of Limits</i> signed in 1858. The area occupied is part of the <i>Humedal Caribe Noreste</i> (Northeast Caribbean Wetland), which is designated as a wetland of international importance under the Ramsar Convention (1996) and supports species of plants and animals that are vulnerable to, or under threat of, extinction. Costa Rica is one of the top 20 richest countries in terms of biodiversity when considering species density, and 25% of the country is protected natural territory. Nicaragua's activities in the occupied area therefore had global as well as regional and local implications for the protection of wetland environments and biodiversity.</p> <p>Costa Rica did not have the option of regaining control of the occupied territory by force because it disbanded its army in 1948 and currently has only border police, whilst Nicaragua has a well-equipped army. In November 2010, Costa Rica filed a case at the ICJ in the Hague, 'Certain Activities carried out by Nicaragua in the Border Area' (<i>Costa Rica v. Nicaragua</i>) and cited nine points of International Law that Nicaragua had breached. Five of these points hinged on geographical issues related to cartography, fluvial geomorphology and environmental science. Costa Rica alleged that Nicaragua had breached its obligations not to occupy and damage Costa Rican territory, dredge or change the course of the Río San Juan or aggravate and extend the dispute by adopting measures that would infringe Costa Rica's territorial integrity.</p> <p>In December 2011, Nicaragua instituted counter-proceedings against Costa Rica in 'Construction of a Road in Costa Rica along the Río San Juan' (<i>Nicaragua v. Costa Rica</i>), accusing Costa Rica</p>		

of “violations of Nicaraguan sovereignty and major environmental damages on its territory”. The two cases were joined by the ICJ, and the merits of both cases were considered in oral hearings in April 2015. Both sides put forward expert witnesses to assist the Court in understanding the facts, two witnesses (including Thorne) by Costa Rica and eleven witnesses by Nicaragua.

The purpose of Thorne’s research (R4-7) was to collect and analyse the data necessary to establish whether accusations made by both countries in both cases were technically correct and scientifically valid. Thorne composed a scientific research programme to inform the Court on cartographic, fluvial and environmental issues underpinning the legality and impacts of Nicaragua’s and Costa Rica’s actions in both cases. The programme included reconstructing the geological and geomorphological histories of the contested region using maps, satellite images, photographs (aerial and ground) and texts. He oversaw a team of Costa Rican technical specialists tasked with collecting and collating technical and scientific data such as remotely-sensed images, carried out six-weeks of fieldwork along the Río San Juan, directed longer-term field monitoring and data collection activities, and supervised a wide range of computer-based geospatial analyses and modelling. In addition, he compiled contextual information needed to assess the veracity of all materials supplied to the ICJ as evidence by all the expert witnesses. He was solely responsible for his interpretations of this research, which were supplied to the court as written evidence in his independent reports. These reports were appended to documents submitted to the Court by Costa Rica in 2011 (155 pages, R4), 2013 (132 pages, R5) and 2015 (168 pages, R6). Thorne also scrutinised and evaluated research in Nicaragua’s reports to the ICJ (submitted in 2012, 2014 and 2015) and, where appropriate, he contested it in his own reports of 2013 and 2015 (R5 and R6).

In April 2015, Thorne gave oral evidence based on his research reports (R7) in both cases, being subject to cross-examination and re-examination by the parties’ legal teams, and intensive questioning by several of the sixteen ICJ judges on the bench.

In *Costa Rica v. Nicaragua*, Thorne’s research:

- Confirmed that the border had not changed measurably since 1858, and demonstrated that Nicaragua did occupy Costa Rica’s sovereign territory (R4, pp. 355-356, points 4-7; R4, p. 362, I.4.3), this was subsequently accepted by the Court in its judgement (R8, para. 76, 92);
- Established that Nicaragua seriously damaged the environment in Costa Rican territory by clearing rainforest and excavating protected wetland areas (R4, pp. 364-372, 451-454);
- Showed that Nicaragua attempted to artificially change the course of the Río San Juan (R4, pp. 355-356, points 4-7, pp. 385-389, I.6);
- Demonstrated that Nicaragua’s dredging of the Río San Juan had not caused damage to Costa Rican territory (R4, p. 448, II.6.2; R8, paras. 105, 119), but that the risk of damage to Costa Rica was such that Nicaragua’s dredging programme should not be expanded (R4, pp. 389-395, I.7; R4, p. 448, II.6.2);
- Found that, contrary to Provisional Measures imposed by the Court in 2010, Nicaragua aggravated and extended the dispute by further attempts to divert the Río San Juan through dredging of artificial channels in the disputed area in September 2013 (R8, paras. 125-127).

In *Nicaragua v. Costa Rica*, Thorne’s research established that construction of the border road:

- Did not violate Nicaragua’s territorial integrity or result in a need for additional dredging of the Río San Juan (R5, 8.61, p. 231, 12.5; R6, 8.6; R8, paras. 193-196, 205-207);
- Did not damage the geomorphology, ecology or environment of the Río San Juan in any way (R5, 12.1-12.7; R6, 8.10; R8, paras. 211-213).

3. References to the research (R)

1. **Thorne, C R**, Evans, E & Penning-Rowsell, E (editors) (2007) Future Flooding and Coastal Erosion Risks, Thomas Telford, London, ISBN 978-0-7277-3449-5, 514 p. Book.
2. **Thorne, C R** (2002) “Geomorphic analysis of large alluvial rivers”, Geomorphology, 44(3-4), pp 203-220. Refereed Journal paper. DOI:[10.1016/S0169-555X\(01\)00175-1](https://doi.org/10.1016/S0169-555X(01)00175-1)
3. Sear, D A, Newson, M D and **Thorne, C R** (2010) Guidebook of Applied Fluvial Geomorphology, Thomas Telford, London, ISBN 978-0-7277-3484-6, 257 p. Book.
4. International Court of Justice (2011) ‘*Certain activities carried out by Nicaragua in the border area*’, Written Documents: Memorial of Costa Rica, Volume I, Appendix 1, pages 307-470:

Assessment of the physical impact of works carried out by Nicaragua since 2010 on the geomorphology, hydrology, and sediment dynamics of the San Juan River and the environmental impacts on Costa Rica, by **Colin Thorne**. All Written Documents are at: <https://www.icj-cij.org/en/case/150/written-proceedings>. C R Memorial is accessed via: <https://www.icj-cij.org/public/files/case-related/150/18512.pdf> (Or available on request)

5. International Court of Justice (2013) '*Dispute concerning the construction of a road in Costa Rica along the San Juan River*', Written Documents: Counter-memorial of Costa Rica Vol. I, Appendix A, pages 145-276: *Assessment of the Impact of the Construction of the Border Road in Costa Rica on the San Juan River* by **Colin Thorne**. All case documents are at: <https://www.icj-cij.org/en/case/152/written-proceedings> C R Counter Memorial download via: <https://www.icj-cij.org/public/files/case-related/152/18520.pdf> (Or available on request)
6. International Court of Justice (2015) '*Dispute concerning the construction of a road in Costa Rica along the San Juan River*' Rejoinder of Costa Rica Vol. I, Appendix A, pages 143-309: *Assessment of the Impact of the Construction of the Border Road in Costa Rica on the San Juan River: Reply Report* by **Colin Thorne**: <https://www.icj-cij.org/public/files/case-related/152/18538.pdf> (Or available on request)
7. International Court of Justice (2015) '*Certain activities carried out by Nicaragua in the border area*', Oral Proceedings: <https://www.icj-cij.org/en/case/150/oral-proceedings> and Thorne's evidence at pages 21-44 in <https://www.icj-cij.org/public/files/case-related/150/150-20150414-ORA-02-00-BI.pdf> (Or available on request)
8. International Court of Justice (2015) '*Certain activities carried out by Nicaragua in the border area*', Judgments: <https://www.icj-cij.org/en/case/150/judgments> (Or available on request)

Grants and commissioned research

1. Awarded to: University of Nottingham. Title: '*Costa Rica v Nicaragua*'. Sponsor: Government of Costa Rica. Period: 2011-2012. Value: USD60,000.(Consultancy)
2. Awarded to: C. Thorne, University of Nottingham. Title: '*Costa Rica v. Nicaragua*' & '*Nicaragua v. Costa Rica*'. Sponsor: Gov. Costa Rica. Period: 2012-2015. Value: USD45,900. .(Consultancy)

Awards received by Professor Colin Thorne following the ICJ cases

1. Back Award from the Royal Geographical Society (2016) for contributions to the scientific study of rivers and shaping of national and international policy on river and flood risk management.
2. Vice-Chancellor's Medal from Professor Sir David Greenaway (2017) for outstanding contributions to the study of rivers that have substantively moved forward river science and helped shape national and international policy on river and flood management.

4. Details of the impact

Border dispute resolution: Thorne's research (R4) as an expert witness provided crucial evidence to permanently settle a 160-year border dispute that had soured relations between Costa Rica and Nicaragua for decades (Impact a (Ia), R8). An ICJ Judge wrote in his testimonial, "*By assisting the Court in reaching its conclusions and giving its judgment, his [Thorne's] evidence helped to bring what appears to be an end to a border dispute which has been a source of acrimony for well over a century and which was the subject of five cases between Costa Rica and Nicaragua*" (Ib). The Court's Written Proceedings (R4) make multiple references to the research conducted by Thorne (R4-6), its outcomes and his interpretations of the significance of the research findings to the merits of the cases judged by the Court (R8). Additionally, Thorne gave oral evidence, delivered under cross-examination by counsel for Nicaragua, re-examination by counsel for Costa Rica, and questioning by the judges during the Merits Case, to qualify his written evidence and comment on claims made by Costa Rica and Nicaragua, and the other experts (R7). The Coordinator of the Office of International Litigations of the Ministry of Foreign Affairs writes in his testimonial, "*I commend Professor Thorne for his deep knowledge, his skill in steering the work of the team and, above all his independence, which together resulted in the truth about the illegality of Nicaragua's actions and their environmental impacts being clearly laid out before the Court*" (Ic).

In its judgment of December 2015 (R8), based on cartographic and fluvial evidence submitted by Thorne from the research he carried out (R4-6), the Court made clear that the alignment of the

Río San Juan and, hence, the border between Costa Rica and Nicaragua remains as depicted in the 1858 Treaty of Limits, the Cleveland Award of 1888 and the first and second Alexander Awards of 1897 (R4, p. 362, I.4.3; R8, para. 76). It follows from this ruling that, by occupying land on the Costa Rican side of the river in October 2010, Nicaragua did violate Costa Rica's territorial sovereignty. Experts appointed by Nicaragua relied on a map published by Google. The Court accepted Thorne's conclusion that Google Maps misrepresented the border (R4, R7, Id).

The Court also accepted Thorne's evidence (in: R4, p. 448, 11.6.2; R8, para. 119) that, far from being natural, the first canal dredged by Nicaragua was intended to artificially and illegally divert the Río San Juan from its natural course, but ultimately concluded (also consistently with that evidence) that dredging performed up to 2015 within the river itself had not damaged Costa Rican territory or the Colorado River, a distributary of the Río San Juan (R8). On the basis of Thorne's evidence (in R4, R7/3 paras. 33-34 and R8, para. 127), the Court judged that, by excavating two further canals in the disputed area in September 2013, Nicaragua illegally aggravated and extended the dispute. In addition, as is clear in the Written Documents for *Nicaragua v. Costa Rica* (R5), based primarily on Thorne's research (in R5, R6 & R7) the Court rejected Nicaragua's claim that Costa Rica had violated Nicaragua's territorial integrity (R8, para. 196). It found no basis for Nicaragua's claim of environmental damage to its territory and reiterated Costa Rica's right to navigate the Río San Juan (R8, paras. 193-194, 201-202, 223).

This impact was strengthened by the fact that Costa Rica accepted all of Thorne's research (R4-R7), even when it did not support their arguments; for example in relation to Costa Rica's claim that dredging by Nicaragua had damaged Costa Rican territory (R8, paras. 105, 119). This establishes Thorne's independence as an expert witness. As the Coordinator of the Office of International Litigations of the Ministry of Foreign Affairs writes in his testimonial, "*Professor Thorne demonstrated a deep understanding of mapping, rivers and environmental science in the way he worked with me in setting up and steering the scientific and engineering studies performed by my technical team. He then demonstrated his independence as an expert witness by not only showing how the resulting science supported most of Costa Rica's legal positions, but also showing how it refuted some of its other positions in very specific matters*" (Ic).

Nicaragua also accepted most of Thorne's evidence, challenging it only in relation to a few issues that were of marginal relevance to the judgments. The Senior Counsel for Costa Rica, who is currently serving as a judge at the ICJ, writes in his testimonial, "*Throughout this complex process, Professor Thorne was the principal expert (scientific) witness for Costa Rica and the principal scientist involved on either side. His skills and the clarity and fairness of his approach to scientific issues were undoubtedly impressive, and evidently underpinned the court's findings...*" (Ie).

The law and environmental damage: The second impact stems from the Court's ruling that, by carrying out dredging, excavation and tree felling activities in the disputed area, Nicaragua inflicted significant environmental harm on Costa Rican territory. Such was the severity of the harm, which involved clearing of rainforest and excavating wetlands protected under the Ramsar Convention, that the Court decided, for the first time in its history, to award damages to a nation state (in this instance Costa Rica) in restitution for the environmental harm done by another state (here Nicaragua) in its territory (R8). The ICJ Judge writes that Thorne's work "*contributed to the assessment of damages by the Court in the first case in which it has awarded damages for environmental harm and only the second case in its 75 year history in which it has awarded damages at all*" (Ib). Damages of USD378,890.59 (If, section VI), which were paid in full by Nicaragua on 23 March 2018, included compensation not only for restoration costs in respect of the wetland, and expenses incurred in gathering evidence, but also for impairment and loss of environmental goods and services (If, section III). In establishing that the environment has a financially accessible value and awarding damages in respect of its degradation, the ICJ set an important precedent in International Law for the effective adjudication of environmental claims within the international legal order. Through its clarification of the relevant principles of state responsibility, this ruling will influence all future cases where one nation state unlawfully harms the environment of another. This point has been recognised by international environmental groups and authorities including the International Union for Conservation Nature who stated that this case,

“marks a clear affirmation that environmental damage includes ecosystem services. The Court has recognized the important value of biological diversity and its services” (lg).

Who has benefited and how they have benefited

The most immediate beneficiary of these impacts is the country of Costa Rica, whose complaints were upheld, whose interpretation of the Treaty of Limits and Awards of Cleveland and Alexander was vindicated, and who received compensation from Nicaragua. As noted by Costa Rica’s Foreign Minister in a letter of thanks to Thorne, the ICJ judgment means that, *“boundaries between Costa Rica and Nicaragua stand completely defined, providing security and stability to both countries” (la)*. In 2019, Costa Rica was ranked the 33rd most peaceful nation in the World, a ranking which it is only able to maintain through support from international law.

Other beneficiaries of the impact of Thorne’s research are peaceful nations threatened by militarily aggressive neighbours, globally. This is because *Costa Rica v. Nicaragua* confirmed that it is possible for a nation to protect its sovereign territory through recourse to the rule of law, rather than by force of arms. Thorne’s evidence (based on research in R4) has therefore contributed to strengthening forms of dispute resolution and access to justice. Beyond this, all nations stand to benefit from the court deciding, for the first time in history, to award damages for environmental harm. This will deter states from undertaking activities liable to cause environmental harm to another state, especially in the case of Ramsar-listed wetlands, wet woodlands, and other landscapes of international importance (lh). Specifically, an ICJ Judge states Thorne’s evidence *“has made an important contribution to the development of international environmental law in relation to the activities of States along a river border. It is early to assess how the law will develop in this area but, in my opinion, the 2015 and 2018 Judgments, along with an earlier judgment (Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010, p. 14), have made a major contribution to the development of international environmental law and are the most significant judgments of their kind” (lb)*.

Of six previous environmental cases brought before the ICJ, none had been resolved successfully in favour of the environment. This case breaks that mould. The legal professionals involved in the proceedings also benefitted from the use of an independent expert witness in providing technical and scientific validity to the geographical issues presented by both sides.

Thorne’s research and its impacts were subsequently disseminated regionally and globally through the news media (TV and print) and this coverage has influenced public discourse on border disputes (e.g. li), river management, and environmental law (lh, lj). Thorne’s research has also been (and continues to be) referenced, taken up and critiqued by academic end-users in geographical, legal, environmental and political disciplines (e.g. lk).

5. Sources to corroborate the impact (l)

- a. Letter from the Minister for Foreign Affairs, Costa Rica.
- b. Testimonial from a British judge at the International Court of Justice (2009-2018), who was on the bench for the cases in point: *Costa Rica v Nicaragua* and *Nicaragua v Costa Rica*.
- c. Testimonial from the Coordinator of the Office of International Litigations of the Ministry of Foreign Affairs and Worship of Costa Rica.
- d. The Telegraph (2015) [‘Google maps error sparks invasion of Costa Rica by Nicaragua’](#).
- e. Testimonial from the Senior Counsel for Costa Rica.
- f. ICJ Press Release 2018/8 ‘Court fixes the amount of compensation due from Nicaragua to Costa Rica’.
- g. International Union for Conservation of Nature (IUCN) (2018) [‘ICJ Renders First Environmental Compensation Decision: A Summary of the Judgment’](#) 9 April 2018.
- h. Rudall, J. (2018) [‘Certain Activities Carried Out by Nicaragua in the Border Area’](#) (Costa Rica v. Nicaragua), *American Journal of International Law*, 12(2), 288-294.
- i. The Guardian (2018) [‘How international law could help victims of environmental degradation.’](#)
- j. Harrison, J. (2018) [‘Significant International Environmental Law Cases: 2017–18’](#), *Journal of Environmental Law*, 30(3), 527–541.
- k. Desierto, D. (2016) [European Journal of International Law](#).